

## 2.1 *ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires approval of the Commonwealth Minister for the Environment for actions that may have a significant impact on Matters of NES. The EPBC Act also requires Commonwealth approval for certain actions on Commonwealth land. Matters of NES under the Act include the following:

- World Heritage properties;
- National Heritage places;
- Ramsar wetlands of international importance;
- Threatened species or ecological communities listed in the EPBC Act;
- Migratory species listed in the EPBC Act;
- Commonwealth marine environment; and
- Nuclear actions.

Any proposed action that is expected to have an impact on matters of NES must be referred to the Commonwealth Minister for Sustainability, Environment, Water Population and the Communities for assessment under the EPBC Act, or assessed under the bilateral agreement between the Commonwealth and the State of NSW. The latter is not applicable in this instance.

## 2.2 *EPBC ACT – MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE SIGNIFICANT IMPACT GUIDELINES 1.1 (DEWHA 2009).*

The Green and Golden Bell Frog is listed as vulnerable under the EPBC Act. The *EPBC Act – Matters of National Environmental Significance Significant Impact Guidelines 1.1* (DEWHA 2009) was the guiding document for the field surveys to determine presence of species within the Study Area.

Habitat assessments undertaken in April 2010 were in accordance with the *EPBC Act Guidelines* (DEWHA 2009). Targeted surveys for the Green and Golden Bell Frog within the Study Area were undertaken over a four month period. The September 2010, November 2010 and January 2011 surveys were undertaken in accordance with EPBC Act Guidelines which state surveys should be undertaken between September and March each year. However, the May 2010 survey was outside these prescribed dates and was therefore not in accordance with the guidelines (see *Annex A* for survey methodology).

## 3.1 LITERATURE REVIEW

Background literature reviews and database searches provided data on flora and fauna species, populations, communities and habitats known to occur within the locality (being the area within a 10 km radius of the Study Area).

Background literature and data reviewed in the assessment process included:

- topographic map, aerial photograph and geographic information system (GIS) interpretations;
- existing vegetation mapping of the area (NPWS 2004);
- the Protected Matters Search Tool database by the DSEWPAC with a 10 km radius;
- the NSW DECCW Atlas of NSW Wildlife database;
- Birds Australia, Botanic Gardens Trust and Australian Museum databases;
- ERM, NRE No.1 Colliery Preliminary Works Environmental Assessment, 2010;
- Biosis Research, Additional Green and Golden Bell Frog (*Litoria aurea*) Surveys at NRE No. 1 Colliery, 2010;
- Biosis Research, November targeted surveys of Dam 6 for Green and Golden Bell Frog (*Litoria aurea*) at NRE No. 1 Colliery, Russell Vale, 2010; and
- Biosis Research, January targeted surveys of Dam 6 for Green and Golden Bell Frog (*Litoria aurea*) at NRE No. 1 Colliery, Russell Vale, 2011.

*ERM (2010) Initial Surveys*

A one day site inspection of the Russell Vale site was undertaken by an ERM ecologist on 27 April 2010 to assess for the presence of threatened flora and fauna and their potential habitat. Areas investigated included Bellambi Gully Creek, dams, and native vegetation along Bellambi Gully Creek (Moist Box Foothills Red Gum Forest) that could be affected by the proposed works.

*Green and Golden Bell Frog Surveys*

ERM undertook targeted surveys for amphibians during a one day survey. The grassy areas at Dam 6 and the Stormwater Control Dam Wetland at the eastern end of the Russell Vale site were searched for adult frogs and the water was observed for any sign of tadpoles or adult frogs basking on reeds. Quiet listening was undertaken for approximately 20 minutes at Dam 6. Dam 5 was also observed for tadpoles and any frog calls. A complete version of the Initial report *NRE No.1 Colliery Preliminary Works Environmental Assessment* (ERM 2010) is available on the Department of Planning website (<http://www.planning.nsw.gov.au/>).

Temperature, relative humidity and rainfall immediately before and during the survey are presented in *Table 3.1*. Approximately 12.6 millimetres (mm) of rainfall was recorded in April 2010. The timing of surveys and weather conditions were not optimal for detection of the Green and Golden Bell Frog, as the species is most active between September and March (DEWHA 2009).

ERM identified potential habitat for the Green and Golden Bell Frog during preparation of the EA for the proposed development. Recommendations were made for further surveys.

**Table 3.1** *Weather conditions during survey in April 2010*

Date	Temperature (°C)		Relative humidity at 3pm	Rainfall (mm)
	Min	Max		
26/4/2010	13.4	19.3	53	2.0
27/4/2010	12.3	19.0	55	0
28/4/2010	14.0	24.3	47	0

**Source:** Bureau of Meteorology (2010)  
<http://www.bom.gov.au/climate/dwo/201004/html/IDCJDW2014.201004.shtml>

Biosis Research undertook targeted surveys for the Green and Golden Bell Frog within the Study Area in May 2010, September 2010, November 2010 and January 2011 (Biosis) by zoologists familiar with the advertisement call, ecology and identification of the Green and Golden Bell Frog. These surveys were used to inform significance assessments following the *EPBC Act – Matters of National Environmental Significance Significant Impact Guidelines 1.1* (DEWHA 2009) and the *Threatened Species Survey and Assessment Guidelines: Field survey methods for fauna (Amphibians)* (DECC 2009).

#### *May and September 2010*

Targeted Green and Golden Bell Frog surveys were undertaken by Biosis Research at Dam 6 and immediate surrounds including Don's Dam, Roadside Dam, Stormwater Control Dam Wetland and Dam 5, to identify other areas of potential habitat within the Study Area, between 4 and 6 of May and between 7 and 9 September 2010. A reference site (Pit Top Dam) was surveyed to confirm presence of the species within the Study Area (see *Figure 3.1*).

The level of survey effort during investigations were based on that described for the Green and Golden Bell Frog *Threatened Species Survey and Assessment Guidelines: Field survey methods for fauna (Amphibians)* (DECC 2009) and *EPBC Act – Matters of National Environmental Significance Significant Impact Guidelines 1.1* (DEWHA 2009). At Dam 6 a combination of diurnal and nocturnal surveys was undertaken.

Preliminary surveys were undertaken using call play back and spotlighting methods at the Pit Top Dam (Biosis Research 2010a). A complete version of the May Report *Targeted Green and Golden Bell Frog (Litoria aurea) Surveys: NRE No. 1 Colliery* is provided in Annex B. A complete version of the September report *Additional Green and Golden Bell Surveys No. 1 Colliery* (Biosis Research 2010a) is provided as Annex C). The location of survey areas are shown in *Table 3.2*.

Temperature, relative humidity and rainfall immediately before and during the survey are presented in the *Table 3.2*. Approximately 0.8 mm of rainfall was recorded in early September. This was not considered to be ideal conditions for the detection of the species (DECC 2009, DEWHA 2009) (Biosis Research 2010a).

**Table 3.2** *Weather conditions during survey in September 2010*

Date	Temperature (°C)		Relative humidity at 3pm	Rainfall (mm)
	Min	Max		
4/9/2010	12.2	19.7	91.0	0
5/9/2010	16.3	21.3	35.0	0
6/9/2010	11.4	20.6	33.0	0
7/9/2010	10.6	14.8	62.0	0
8/9/2010	7.3	15.6	67.0	0
9/9/2010	10.0	20.6	65.0	0.8
10/9/2010	12.7	22.6	53.0	0

**Source:** Biosis Research, 2010a

*November 2010*

Targeted Green and Golden Bell Frog surveys were undertaken at Dam 6 and immediate surrounds including Don’s Dam, Roadside Dam, Stormwater Control Dam Wetland and Dam 5 by Biosis Research between 16 and 18 November 2010. The level of survey effort during investigations were based on that described for Green and Golden Bell Frog in *Threatened Species Survey and Assessment Guidelines* (DECC 2009) and *EPBC Act – Matters of National Environmental Significance Significant Impact Guidelines 1.1* (DEWHA 2009). At Dam 6 a combination of diurnal and nocturnal surveys were undertaken in November 2010 (Biosis Research 2010b). A complete version of the report *November Targeted Surveys of Dam 6 for Green and Golden Bell Frog at No. 1 Colliery* (Biosis Research 2010b) is provided as *Annex D*.

Temperature, relative humidity and rainfall immediately before and during the survey are presented in the *Table 3.3*. Approximately 90 mm of rainfall was recorded in early November (Biosis Research 2010b). Conditions were considered ideal for the detection of the species following the DECCW and EPBC Act guidelines (DECC 2009, DEWHA 2009).



- Legend**
- Study Area
  - Habitat Assessment
  - Targeted Surveys

**Figure 3.1**  
**Green and Golden Bell Frog targeted survey areas within the Study Area (Biosis 2010a)**

Client:	Gujarat NRE Coking Coal Limited	
Project:	Russell Vale Surface Works Matters of NES Assessment	
Drawing No:	0079383s_NES_G003_R0.mxd	
Date:	7/03/2011	Drawing Size: A3
Drawn By:	NS	Reviewed By: RD
Projection:	GDA 1994 MGA Zone 56	
Scale:	Refer to scale bar	



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**Table 3.3** *Weather conditions during survey in November 2010*

Date	Temperature (°C)		Relative humidity at 3pm	Rainfall (mm)
	Min	Max		
13/11/2010	18.3	23.6	84	0
14/11/2010	18.3	23.6	83	0
15/11/2010	18.1	22.7	91	0
16/11/2010	18.7	19.8	80	16.8
17/11/2010	15.2	20.1	79	0.4
18/11/2010	15.4	21.5	77	3.0
19/11/2010	11.6	20.6	68	1.0
20/11/2010	16.3	21.8	66	0

**Source:** Biosis Research, 2010b

### *January 2011*

Targeted Green and Golden Bell Frog surveys were undertaken at Dam 6 and immediate surrounds including Don’s Dam, Roadside Dam, Stormwater Control Dam Wetland and Dam 5 by Biosis Research between 17 and 20 January 2011. The January surveys met DECCW and DSEWPC guidelines of undertaking survey between September and March and to target peak breeding season in January and February. The methodology used during the survey was in accordance with *Threatened Species Survey and Assessment Guidelines* (DECC 2009), *Matters of National Environmental Significance: Significant Impact Guidelines 1.1*. (DEWHA 2009a), *Survey Guidelines for Australia’s threatened frog: Guidelines for detecting frogs listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999* (DEWHA 2009 b) and *Significant impact guidelines for the vulnerable Green and Golden Bell Frog EPBC Act policy statement 3.19 Nationally threatened species and ecological communities guidelines* (DEWHA 2010) (Biosis Research 2011).

Three reference sites, Port Kembla Heritage Park, the Port Kembla Brick & Block site and the Edgewood property, were selected prior to undertaking targeted surveys at Dam 6. At the commencement of each nightly survey, the Port Kembla Heritage Park and Edgewood reference sites were surveyed to determine whether the species was actively calling or not. During this check, an initial five minute passive listening period was undertaken followed by a period of call playback. This was followed by a limited period of active searching, as the purpose of checking reference sites was to determine whether the species was calling (Biosis Research 2011).

Upon confirmation of the Green and Golden Bell Frog calling at the reference site/s, Dam 6 was surveyed for a minimum of one hour, which is sufficient as the waterbody is less than 50 metres wide and less than 0.3 ha in surface area.

An initial five minute period of listening was followed by a period of call playback to elicit a response from any frogs that might be present. Following call playback, Dam 6 was then searched for frogs using hand-held spotlights and binoculars for a minimum period of one hour (Biosis Research 2010c). A complete version of the report *January Targeted Surveys of Dam 6 for Green and Golden Bell Frog at No. 1 Colliery* (Biosis Research 2011) is provided as *Annex E*.

Temperature, relative humidity and rainfall immediately before and during the survey are presented in the *Table 3.4*. Approximately 57 mm of rainfall was recorded in early January prior to the surveys, with 44.8 mm of rain recorded between the 9 and 16 January (Biosis Research 2011). This was considered to be ideal conditions for the detection of the species following the DECCW and EPBC Act guidelines (DECC 2009, DEWHA 2009).

**Table 3.4** *Weather conditions during survey in January 2011*

Date	Temperature (°C)		Relative humidity at 3pm	Rainfall (mm)
	Min	Max		
9/1/2011	21.1	26.1	84	21.8
10/1/2010	21.1	25.4	81	14.2
11/1/2011	20.5	24.7	84	7.0
12/1/2011	21.1	25.4	84	1.0
13/1/2011	21.2	23.2	92	.04
14/1/2011	20.4	23.9	79	0.2
15/1/2011	19.4	26.0	82	0
16/1/2011	20.1	25.2	82	0.2
17/1/2011	20.4	23.1	82	0 (light drizzle)
18/1/2011	18.0	22.9	73	0 (light drizzle)
19/1/2011	17.7	23.4	83	0 (light drizzle)
20/1/2011	19.7	26.1	84	0 (light drizzle)

**Source:** Biosis Research, 2011

#### 4.1 LITERATURE REVIEW

The EPBC Act Protected Matters Search Tool identified nine threatened flora, 45 threatened fauna species and 12 migratory species with the potential to occur within a 10km radius of the Study Area (see *Annex F*).

The NSW DECCW Atlas of NSW Wildlife database identified previous records of the Green and Golden Bell Frog within the Study Area (See *Figure 4.2*). The nearest record is located approximately 650m to the west of Dam 6 at the Pit Top Dam. This record together with the presence of some key habitat features suggests that suitable dams in the Study Area may provide potential habitat for the species.

The Draft Recovery Plan for the Green and Golden Bell Frog (DEC 2005) refers to four 'Key Populations' in the Illawarra region, including one within this Study Area.

#### 4.2 FIELD SURVEYS

The Study Area is a developed site with native vegetation and habitats restricted to the perimeters of the site, along the creek line, and within the dams on site.

##### 4.2.1 Vegetation

###### *Vegetation*

Vegetation mapping (NPWS 2004) identifies two native vegetation communities within the Russell Vale site:

- Escarpment Blackbutt Forest; and
- *Acacia* Scrub.

These communities were confirmed on site on the western boundaries of the developed areas and in addition Moist Box Red Gum Foothills Forest was mapped in areas along Bellambi Gully Creek. Vegetation mapping is presented in *Figure 4.1*. The native vegetation communities along the creek have also been impacted by weed invasion. Weeds recorded along the upper reaches of the creek lines included Lantana (*Lantana camara*), Cobbler's Peg (*Bidens pilosa*) and Privet (*Ligustrum sinense*). *Acacia* scrub occurs within developed areas of the site, and was found to be a highly disturbed vegetation type with many weed species present.

Bellambi Gully Creek provides limited habitat for aquatic species due to piping at several locations forming barriers to aquatic fauna movements along the creek line corridor. One small pool within the creek line was recorded however no tadpoles, frogs, or other aquatic fauna were recorded (ERM 2010).

#### 4.2.2 *Threatened Species*

ERM identified potential habitat for the Green and Golden Bell Frog at Dam 6 within the Study Area during preparation of the Environmental Assessment for the NRE No. 1 Colliery Preliminary Works (ERM 2010). Given the proximity to previous recorded sites and the presence of suitable habitat features, ERM considered there was a high likelihood of occurrence of Green and Golden Bell Frog within the Study Area. The Green and Golden Bell Frog is listed as endangered under the EPBC Act. The proposed removal of Dam 6 would remove up to 0.19ha of potential breeding foraging and sheltering habitat and may disrupt the movement of this species between suitable areas of habitat. Other potential Green and Golden Bell Frog habitat within the Study Area includes the Pit Top Dam, Don's Dam, Roadside Dam, Stormwater Control Dam Wetland and Dam 5 (see *Figure 3.1*). These areas will not be impacted by the proposed works and therefore survey work was limited to areas proposed for disturbance.

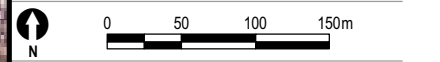
No other threatened species listed under the EPBC Act are likely to use the site or rely on the site for resources, although it is likely some migratory species (protected under the EPBC Act) may forage within the dams (ERM 2010).



- Legend**
- Study Area
- Vegetation Communities**
- Acacia Scrub
  - Artificial Wetlands
  - Cleared
  - Coachwood Warm Temperate Rainforest
  - Escarpment Blackbutt Forest
  - Modified Lands
  - Moist Box Red Gum Foothills Forest
  - Weeds and Exotics

**Figure 4.1**  
Vegetation Mapping of the Study Area

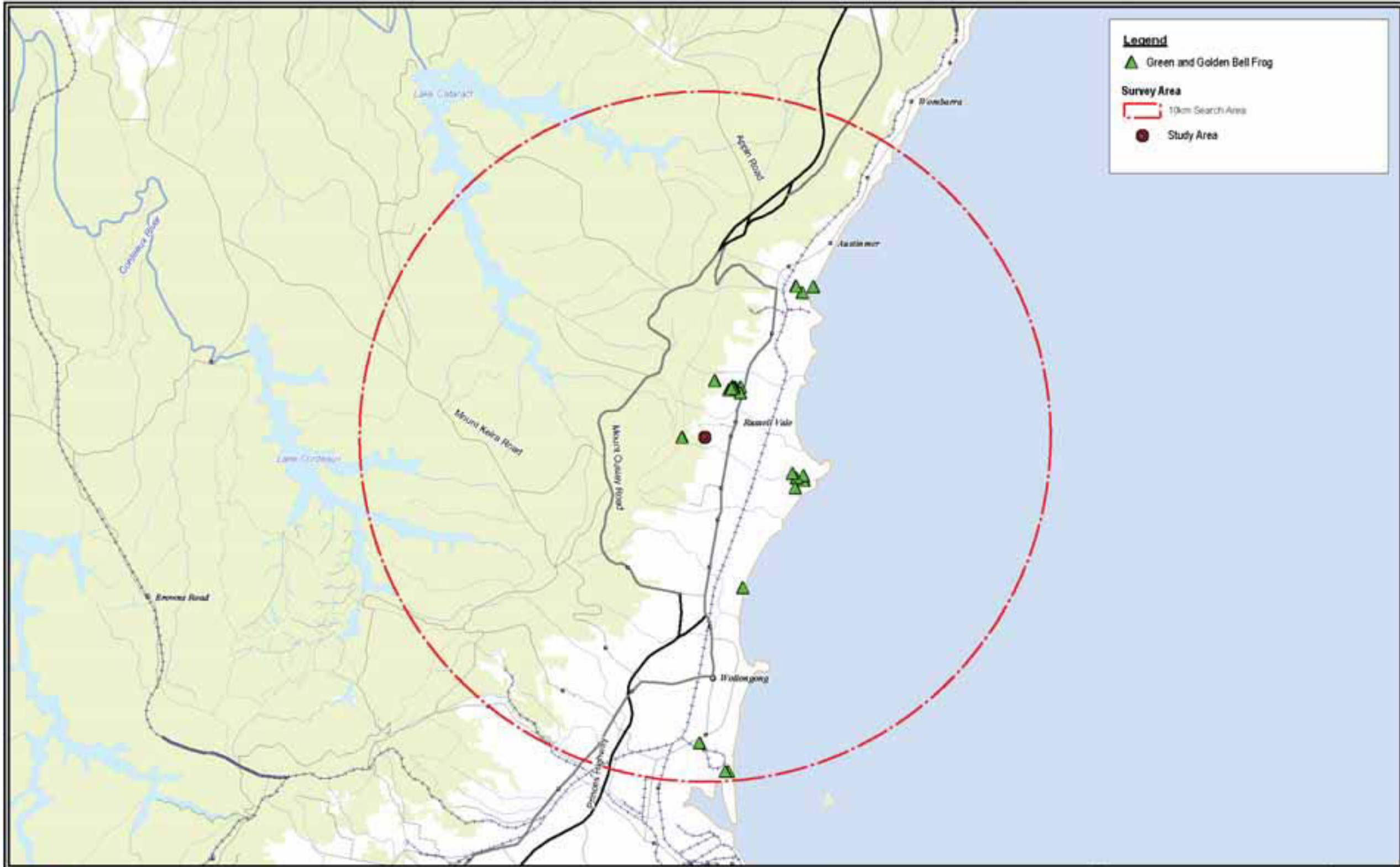
Client:	Gujarat NRE Coking Coal Limited	
Project:	Russell Vale Surface Works Matters of NES Assessment	
Drawing No:	0079383s_NES_G005_R0.mxd	
Date:	09/03/2011	Drawing size: A3
Drawn by:	NS	Reviewed by: RP
Scale:	Refer to Scale Bar	



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Source:  
- BIOSIS Research Pty Ltd

**Figure 4.2**  
**Previous records of the Green and Golden Bell Frog within a 10km Radius of the Study Area**

Client: Gujarat NRE Coking Coal Limited  
Project: Russell Vale Surface Works Matters of NES Assessment

Drawing No: 0079373s\_NES\_C001\_R0.cdr  
Date: 01/03/2011 Drawing size: A3  
Drawn by: ML Reviewed by: MK  
Scale: Refer to Scale Bar



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*Biosis Research - May and September 2010.*

Biosis Research undertook surveys for the Green and Golden Bell Frog at Dam 6 in May and September 2010. The May survey was not undertaken during the recommended time for detection of the Green and Golden Bell Frog, which is between September and March when the species is known to be most active (DEWHA 2009) and no individuals were recorded. The September surveys were undertaken within the DECCW and EPBC Act guidelines (DECC 2009, DEWHA 2009) and no individuals were recorded.

The aquatic habitat at Dam 6 consisted of approximately 60% vegetation cover, including Cumbungi (*Typha domingensis*) and River Club Rush (*Schoenoplectus validus*) and was disturbed due to surround land uses and run-off. The surrounding vegetation consisted of grasses including Kikiyu (*Pennisetum clandestinum*), Water Couch (*Paspalum distichum*) and Red Leg Grass (*Bothriochloa macra*). Water depth varied from approximately 10 centimetres (cm) along the edge to over one metre in the centre. On the basis of these habitat features, Dam 6 provides potential habitat for the Green and Golden Bell Frog. Four amphibian species were recorded calling during field investigations, however, no Green and Golden Bell Frogs were recorded (Biosis Research 2010a).

The Pit Top Dam consisted of approximately five percent vegetation cover, including Cumbungi and River Club Rush and the surrounding vegetation were disturbed due to adjacent bike tracks. The surrounding vegetation consisted of predominately weed species including Kikiyu, Dandelion (*Taraxacum officinale*), and Spear Thistle (*Cirsium vulgare*). Four frog species were recorded calling, including a potential Green and Golden Bell Frog call in response to call playback. The individual did not call with the complete Green and Golden Bell Frog repertoire, therefore it was an unconfirmed record (Biosis Research 2010a). The Pit Top Dam will not be impacted by the proposed works.

Additional areas of potential Green and Golden Bell Frog habitat were identified within the Study Area, including Don's Dam, Roadside Dam, Stormwater Control Dam Wetland and Dam 5 (see *Figure 3.1*), based upon the presence of Cumbungi, ground and shrub layers adjacent to the water bodies for foraging and presence of areas that can be utilised by the species for over-wintering sites such as drainage lines and culverts (Biosis Research 2010a). These areas will not be impacted by the proposed works.

The surveys found that, Dam 6 provides potential habitat for the Green and Golden Bell Frog and the Study Area contains potential and limited movement corridors. No Green and Golden Bell Frogs were recorded within Dam 6 however, conditions during the survey period were less than ideal despite the September survey occurring in the recommended time frame (DECC 2009, DEWHA 2009). Further surveys were recommended to determine if the species was present within Dam 6 (Biosis Research 2010a).

#### *Biosis Research - November 2010*

During the November 2010 surveys, the aquatic habitat and surrounding vegetation at Dam 6 was mostly consistent with the previous surveys carried out by Biosis Research in May and September, 2010. The only exception was an increase in aquatic vegetation density from 60% to 75% total cover and the height of the emergent vegetation, including Cumbungi and River Club Rush, had also increased since the previous surveys. These differences are due to the re-growth of aquatic vegetation following winter. Five amphibian species were recorded calling during field investigations, however, no Green and Golden Bell Frogs were recorded (Biosis Research 2010b).

The assessment identified that Dam 6 provides potential habitat for the Green and Golden Bell Frog. No Green and Golden Bell Frogs were recorded despite ideal conditions (rainfall and warm temperatures) immediately before and during the surveys. However, using the precautionary approach and the knowledge that the breeding cycles for the Green and Golden Bell Frog often occur later in the season, further surveys prior to end of the activity period of the species were recommended using the same techniques as the November surveys.

#### *Biosis Research - January 2011*

As part of the survey work, searches of known reference sites were undertaken on each survey day (see *Section 3.2.3*). The Green and Golden Bell Frog was detected both visually and through unsolicited calls in response to call playback at the Port Kembla Heritage Park reference site during each survey night. The aquatic habitat and surrounding vegetation consisted of small stands of an aquatic reed on the southern and western sides of the dam and aquatic algae covering the water surface. The dam is surrounded by a rocky bank and planted Spiny-headed Mat-rush (*Lomandra longifolia*). Many of the Green and Golden Bell Frogs were observed sitting on beds of algae or within emergent vegetation. No Green and Golden Bell Frogs were recorded during the field surveys at the Edgewood Estate reference site (Biosis Research 2011). However Green and Golden Bell Frogs were recorded at the Edgewood Estate reference site during September 2010 and November 2010 (per. Comms with Arthur White).

The aquatic habitat and surrounding vegetation at Dam 6 was mostly consistent with the previous surveys carried out by Biosis Research in May, September and November 2010. The only exception was an increase in aquatic vegetation density to approximately 80% total cover. The height of emergent vegetation, including Cumbungi and River Club Rush, had also increased since the previous surveys. These differences are due to the re-growth of aquatic vegetation following high summer rainfall. Five amphibian species were recorded calling during field investigations, however, no Green and Golden Bell Frogs were recorded (Biosis Research 2011).

This section discusses Matters of National Environmental Significance known or likely to occur within the Study Area. *Table 5.1* provides a consideration of the likelihood of threatened flora and fauna species occurring within the Study Area.

### **5.1 PROPOSED IMPACTS**

The existing drainage of the Russell Vale site includes a stormwater pipeline which directs clean water flowing in Bellambi Gully Creek underneath and past the current stockpiling and coal loading arrangements. It is proposed to remove this pipeline and replace it with a realigned, suitably designed and engineered open channel constructed on the southern side of the coal stockpile area. Proposed works will result in improved stability of the watercourse and there will be no impacts to native flora or fauna or vegetation of significance as a result of works in these areas.

Construction of the channel and works within the upper reaches of the existing channel will require the removal of less than one hectare of highly modified Moist Box Foothills Red Gum Forest and will also require the removal of Dam 6, currently located south of and elevated from the existing stockpile. No further vegetation, watercourses or dams within the Study Area will be impacted by the proposed works.

### **5.2 COMMONWEALTH THREATENED AND MIGRATORY SPECIES**

The Commonwealth EPBC Act requires approval for actions that may have a significant impact on matters of national environmental significance or Commonwealth land. There are no World Heritage properties, National Heritage Places, Ramsar wetlands, Commonwealth marine areas or nuclear actions in or near the Study Area. Commonwealth listed threatened species recorded or likely to occur within a 10 km radius of the Study Area have been identified in *Table 5.1*. A large number of species listed in *Table 5.1* are known exclusively from the escarpment and are not expected to occur within the Study Area, as it occurs on the coastal plain and has different habitat types to those found on the escarpment, despite their proximity.

Table 5.1 Consideration of Matters of Environmental Significance

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<b>Flora</b>					
<i>Caladenia tessellate</i>	Thick-lipped Spider-orchid	Species found in sheltered moist places in forests and scrubs especially in stony laterites on coastal tops. It is often seen after fire. Occurring in Sydney, southern coast and ranges and Victoria.	V	Species or species habitat likely to occur within area	Low, species known exclusively from the escarpment. Stony laterites on coastal tops do not occur within the Study Area.
<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid	Species does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. Appears to prefer open areas in the understorey of this community typically occurring in woodland dominated by Scribbly Gum, Red Bloodwood and Black She-oak.	V	Species or species habitat may occur within area	Low, habitats such as swamp-heath and Scribbly Gum, Red Bloodwood or Black She-oak woodland do not occur within the Study Area.
<i>Cynanchum elegans</i>	White-flowered Wax Plant	The species occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest; Coastal Tea-tree, Coastal Banksia scrub and Forest Red Gum/ Spotted Gum open forest and woodland.	E	Species or species habitat likely to occur within area	Low, dry rainforest habitats do not occur within the Study Area.
<i>Daphnandra johnsonii</i>		Usually occurring at less than 150 metres above sea level, on volcanic soils in sub tropical rainforest. Occasionally up to 350 metres above sea level. Often by creeks, or dry rocky scree slopes. Also in disturbed forest and rainforest margins.	E	Species or species habitat likely to occur within area	Low, sub tropical rainforest habitats do not occur within the Study Area.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	The species may occur in dense stands forming narrow strips adjacent to watercourses, in association with other <i>Melaleuca</i> sp. or as an understorey species in wet forest (DEC 2004).	V	Species or species habitat may occur within area	Low, <i>Melaleuca</i> species were not recorded adjacent to any of the watercourses within the Study Area.
<i>Melaleuca deanei</i>	Deane's Melaleuca	Species occurs on wet heath on sandstone. Mostly occupies broad flat ridgetops, dry ridges and slopes, strongly associated with sandy loam soils that are low in nutrients, sometimes with ironstone present.	V	Species or species habitat may occur within area	Low, wet heath on sandstone does not occur within the Study Area. In addition, the Study Area does not contain broad flat ridgetops, dry ridges and slopes.
<i>Pterostylis gibbosa</i>	Illawarra Orchid Greenhood	Species occurs in open forest or woodland on flat or gently sloping poorly drained soils.	E	Species or species habitat likely to occur within area	Low, a small stand of Moist Box Foothills Red Gum Forest occurs within the Study Area. However, it is highly degraded with weeds limiting habitat value.
<i>Pterostylis saxicola</i>	Sydney Plains Greenhood	Species prefers flat areas on top of stony ridges or on mossy rocks in gullies away from the coast.	E	Species or species habitat may occur within area	Low, species known exclusively from the escarpment, stony ridges and gullies do not occur within the Study Area.
<i>Pultenaea aristata</i>	Prickly Bush Pea	Species occurs in either dry sclerophyll woodland or wet heath on sandstone.	V	Species or species habitat likely to occur within area	Low dry sclerophyll woodland and wet heath on sandstone do not occur within the Study Area.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<i>Thelymitra</i> sp. <i>Kangaloon</i> (D.L.Jones 18108)	Kangaloon Sun-orchid	Species grows in seasonally swampy sedgeland on grey silty clay loam at 600-700 m above sea level.	CE	Species or species habitat likely to occur within area	Low, seasonally swampy sedgeland on grey silty clay loam does not occur within the Study Area.
<b>Birds</b>					
<i>Anthochaera phrygia</i>	Regent Honeyeater	Species found in eucalypt forests and woodlands, particularly in blossoming trees and mistletoe; also seen in orchards and urban gardens.	E, M	Species or species habitat likely to occur within area	Low, limited feed trees such as flowering eucalypts occur within the Study Area.
<i>Diomedea exulans amsterdamensis</i>	Amsterdam Albatross	The species is a marine, pelagic seabird. It nests in open patchy vegetation (among tussocks, ferns or shrubs) near exposed ridges or hillocks. It sleeps and rests on ocean waters when not breeding.	E, M	Species or species habitat may occur within area	Species will not occur, habitat ocean waters and exposed ridges which do not occur within the Study Area.
<i>Diomedea exulans antipodensis</i>	Antipodean Albatross	The species is marine, pelagic and aerial. It rarely enters the belt of icebergs region of Antarctica, but in late summer, it may approach the edge of pack-ice. It sleeps and rests on ocean waters when not breeding.	V, M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is marine aerial.
<i>Diomedea exulans exulans</i>	Tristan Albatross	The species is a marine, pelagic seabird. It forages in open water in the Atlantic Ocean near the Cape of Good Hope, South Africa. It sleeps and rests on ocean waters when not breeding.	E, M	Foraging, feeding or related behaviour may occur within area	Species will not occur within the Study Area. Species is marine aerial.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<i>Diomedea exulans gibsoni</i>	Gibson's Albatross	The species is marine, pelagic and aerial. In the Antarctic, it occurs in open water, and rarely enters the belt of icebergs region. In late summer, it may approach the edge of the pack-ice.	V, M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is aerial and occurs in open waters.
<i>Diomedea exulans (sensu lato)</i>	Wandering Albatross	The Wandering Albatross is marine, pelagic and aerial. It occurs where water surface temperatures range from -2° to 24°C. In the Antarctic, the species occurs in open water, rarely entering the belt of icebergs. In late summer, it may approach the edge of the pack-ice.	V, M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is aerial and occurs in open waters.
<i>Lathamus discolor</i>	Swift Parrot	Species found in dry sclerophyll forests and woodlands, suburban parks and gardens and flowering fruit trees; migrate to mainland during winter; return to Tasmania in early August for breeding (Sep-Mar).	E	Species or species habitat may occur within area	Low, limited feed trees such as flowering eucalypts occur within the Study Area.
<i>Macronectes giganteus</i>	Southern Giant-Petrel	The species is marine, pelagic and aerial. The species occurs over seas and inshore waters, favours edge of continental shelf and edge of pack-ice.	E, M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is aerial and occurs onshore from edges of continental shelves.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<i>Macronectes halli</i>	Northern Giant-Petrel	The species is marine, pelagic and aerial. The species occurs in temperate and sub-Antarctic seas, frequenting onshore and pelagic seas out from edges of continental shelves.	V, M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is aerial and occurs onshore from edges of continental shelves.
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	Species found in salt marshes, coastal dunes, pastures, shrub lands, estuaries, islands, beaches and moorlands within 10 km of the coast (OBPRT 2006a). Holes in eucalypts are used for nesting (Brown & Wilson 1982).	CE, M	Species or species habitat may occur within area	Low, preferred habitat of salt marshes, coastal dunes, pastures, shrub lands, estuaries, islands, beaches and moorlands do not occur within the Study Area
<i>Pterodroma leucoptera</i>	Gould's Petrel	The species a pelagic and marine, spending much of its time foraging at sea and coming ashore only to breed. The Australian subspecies breeds and roosts on two islands off NSW, Cabbage Tree and Boondelbah Islands, and the at-sea distribution is poorly known.	E, M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is marine coming to shore only on two islands that do not occur within the Study Area.
<i>Pterodroma neglecta neglecta</i>	Kermadec Petrel (western)	The species is marine, breeding on islands across the South Pacific. In Australia it breeds on Ball's Pyramid and Phillip Island (near Norfolk Island). Species nests in a crevice amongst rocks.	V	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is marine coming to shore only on islands across the South Pacific that do not occur within the Study Area.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<i>Rostratula australis</i>	Australian Painted Snipe	The species inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains.	V	Species or species habitat may occur within area	Low, claypans, waterlogged grasslands and saltmarshes do not occur within the Study Area.
<i>Thalassarche bulleri</i>	Buller's Albatross	The species is marine and pelagic, inhabiting subtropical and sub-antarctic waters of the southern Pacific Ocean. In Australia, the species is seen over inshore, offshore and pelagic waters. They appear to congregate over currents where water temperature exceeds 16 °C.	V, M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is marine occurring over inshore and offshore waters which do not occur within the Study Area.
<i>Thalassarche cauta cauta</i>	Shy Albatross	The species is marine and pelagic occurring in sub-antarctic and subtropical waters. The species has been noted in shelf-waters around breeding islands and over adjacent rises. During the non-breeding season, the Shy Albatross occurs over continental shelves around continents. The species occurs both inshore and offshore and enters harbours and bay.	V, M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is marine occurring in shelf waters and enters harbours and bays which do not occur within the Study Area.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<i>Thalassarche cauta salvini</i>	Salvin's Albatross	The species is marine and pelagic occurring in sub-antarctic and subtropical waters. The species has been noted in shelf-waters around breeding islands and over adjacent rises. During the non-breeding season, the Shy Albatross occurs over continental shelves around continents. The species occurs both inshore and offshore and enters harbours and bay.	V, M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is marine occurring in shelf waters and enters harbours and bays which do not occur within the Study Area.
<i>Thalassarche cauta steadi</i>	White-capped Albatross	The species is marine and pelagic marine occurring in sub-antarctic and subtropical waters. The species has been noted in shelf-waters around breeding islands and over adjacent rises. During the non-breeding season, the Shy Albatross occurs over continental shelves around continents. The species occurs both inshore and offshore and enters harbours and bay.	V, M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is marine occurring in shelf waters and enters harbours and bays which do not occur within the Study Area.
<i>Thalassarche melanophris</i>	Black-browed Albatross	The species is marine and pelagic inhabiting Antarctic, subantarctic and temperate waters and occasionally enters the tropics. It forages around the breaks of continental and island shelves and across nearby underwater banks but also frequents other marine habitats, such as oceanic waters and the iceberg belt.	V, M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is marine occurring in around breaks and continental shelves and enters oceanic waters and the iceberg belt which do not occur within the Study Area.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<i>Thalassarche melanophris impavida</i>	Campbell Albatross	The species is marine and pelagic inhabiting Antarctic, subantarctic and temperate waters and occasionally enters the tropics. It forages around the breaks of continental and island shelves and across nearby underwater banks but also frequents other marine habitats, such as oceanic waters and the iceberg belt.	V, M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is marine occurring in around breaks and continental shelves and enters oceanic waters and the iceberg belt which do not occur within the Study Area
<b>Fish</b>					
<i>Maccullochella macquariensis</i>	Trout Cod	A riverine species, inhabiting a variety of flowing waters in the mid to upper reaches of rivers and streams with cover in the form of woody debris or boulders.	E	Species or species habitat likely to occur within area	Species will not occur within the Study Area. No mid or upper reaches of any rivers or streams occur within the Study Area.
<i>Macquaria australasica</i>	Macquarie Perch	A riverine, schooling species. It prefers deep, rocky holes with considerable cover. Spawning occurs just above riffles (shallow running water). Populations may survive in impoundments if able to access suitable spawning sites.	E	Species or species habitat may occur within area	Species will not occur within the Study Area. Creeklines within the Study Area do not contain sufficient deep rocky holes to sustain the species.
<i>Prototroctes maraena</i>	Australian Grayling	Species inhabits a clear, gravel-bottomed stream with alternating pools and riffles, and granite outcrops.	V	Species or species habitat likely occur within area	Species will not occur within the Study Area. Creek lines within the Study Area do not contain gravel bottoms, alternating pools or granite outcrops to sustain the species.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<b>Frogs</b>					
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	Species prefers sandstone ridgetop habitat associated with small headwater creek lines. Vegetation typically woodland, open woodland and heath.	V	Species or species habitat likely to occur within area	Low, Sandstone ridgetop habitat does not occur within the Study Area.
<i>Litoria aurea</i>	Green and Golden Bell Frog	Water bodies that are unshaded, free of predatory fish such as <i>Gambusia</i> , have a grassy area nearby and diurnal sheltering sites available.	V	Species or species habitat may to occur within area	Moderate, potential habitat identified however, species not recorded.
<i>Litoria littlejohni</i>	Little John's Tree Frog	Species occurs along permanent and semi-permanent rocky streams with thick fringing vegetation associated with eucalypt woodlands and heaths among sandstone crops. Breeding occurs in slow flowing pools that receive extended exposure to sunlight, but will also use temporary isolated pools.	V	Species or species habitat may occur within area	Low, creeklines within the Study Area do not contain rocky bottoms or thick fringing vegetation to sustain the species
<i>Mixophyes balbus</i>	Stuttering Barred Frog	Species occurs in rainforest, Antarctic beech and wet sclerophyll forests (Cogger 2000). The species depends on freshwater streams and riparian vegetation for breeding and habitation.	V	Species or species habitat likely to occur within area	Low, rainforest, Antarctic beech and wet sclerophyll forests do not occur within the Study Area.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<b>Mammals</b>					
<i>Balaenoptera musculus</i>	Blue Whale	The species is a marine mammal occurring in Australian oceans.	E	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is a marine mammal.
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Species roosts in small groups in caves and mines. Most commonly recorded from dry sclerophyll forest and woodlands. Also occur in sub-alpine woodland, the edge of rainforest and wet sclerophyll forest. Insectivorous (Churchill 1998)	V	Species or species habitat may to occur within area	Low, suitable caves and mines for the species do not occur within the Study Area.
<i>Dasyurus maculatus maculatus</i> (SE mainland population)	Spotted-tail Quoll	Species inhabits a wide range of habitats including rainforest, open forest, woodland, coastal heath and inland riparian forest often on flat rocks among boulder fields and rocky cliff-faces. Nests in caves, hollow logs or tree hollows.	E	Species or species habitat may to occur within area	Low, the Study Area does not contain large rocky outcrops or cliff faces.
<i>Eubalaena australis</i>	Southern Right Whale	The species is a marine mammal occurring in Australian ocean.	E	Species or species habitat known to occur within area	Species will not occur within the Study Area. Species is a marine mammal.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<i>Isoodon obesulus obesulus</i>	Southern Brown Bandicoot	Species occurs in heathy forest, shrubland and woodland which are usually supported by well-drained soils. A mosaic of post-fire vegetation is an important component of the species' habitat.	E	Species or species habitat likely to occur within area	Low, heathy forest and shrubland does not occur within the Study Area. In addition, the Study Area is a moist environment with limited drained soils.
<i>Megaptera novaeangliae</i>	Humpback Whale	The species is a marine mammal occurring in Australian oceans.	V	Species or species habitat known to occur within area	Species will not occur within the Study Area. Species is a marine mammal
<i>Potorous tridactylus</i>	Long-nosed Potoroo	Species occurs in dense grassland or low thick scrub, its main food source is fungi, it may also take insects, grasses, roots and other types of vegetation to supplement its diet.	V	Species or species habitat may to occur within area	Low, dense grassland and low thick scrub does not occur within the Study Area.
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	Species known to inhabit open heathlands, open woodlands with a heathland understorey and vegetated sand dunes.	V	Species or species habitat likely to occur within area	Low, open heathland, woodlands with a heathland understorey and vegetated sand dunes do not occur within the Study Area.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Species found in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops; feed on the nectar and pollen of native trees; generally roost near water and in dense vegetation.	V	Foraging, feeding or related behaviour known to occur within area	Low, temperate rainforests, tall sclerophyll forests and woodlands, heaths, swamps do not occur within the Study Area. In addition, no feed trees for the species were recorded within the Study Area.
<b>Reptiles</b>					
<i>Caretta caretta</i>	Loggerhead Turtle	The species is a marine mammal occurring in Australian ocean.	E	Species or species habitat likely to occur within area	Species will not occur within the Study Area. Species is a marine mammal.
<i>Chelonia mydas</i>	Green Turtle	The species is a marine mammal occurring in Australian ocean.	V	Species or species habitat known to occur within area	Species will not occur within the Study Area. Species is a marine reptile.
<i>Dermochelys coriacea</i>	Leatherback Turtle	The species is a marine mammal occurring in Australian ocean.	E	Species or species habitat likely to occur within area	Species will not occur within the Study Area. Species is a marine reptile.
<i>Eretmochelys imbricata</i>	Hawksbill Turtle	The species is a marine mammal occurring in Australian ocean.	V	Species or species habitat known to occur within area	Species will not occur within the Study Area. Species is a marine reptile.
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	Species preferred habitat centred on the Triassic sandstone of the Sydney Basin typified by exposed sandstone outcrops and benching. Vegetation mainly woodland, open woodland and/or heath.	V	Species or species habitat likely to occur within area	Low, species known exclusively from the escarpment, exposed sandstone outcrops and benching do not occur within the Study Area

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<i>Natator depressus</i>	Flatback Turtle	The species is a marine mammal occurring in Australian ocean.	V	Species or species habitat likely to occur within area	Species will not occur within the Study Area. Species is a marine reptile.
<b>Sharks</b>					
<i>Carcharias taurus</i> (east coast population)	Grey Nurse Shark	The species is a marine mammal occurring in Australian ocean.	CE	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is a marine fish.
<i>Carcharodon carcharias</i>	Great White Shark	The species is a marine mammal occurring in Australian ocean.	V	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is a marine fish.
<i>Pristis zijsron</i>	Green Sawfish	The species is a marine mammal occurring in Australian ocean.	V	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is a marine fish.
<i>Rhincodon typus</i>	Whale Shark	The species is a marine mammal occurring in Australian ocean.	V	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is a marine fish.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<b>Migratory Species</b>					
<i>Apus pacificus</i>	Fork-tailed Swift	Species is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. Mostly occur over inland plains but sometimes above foothills or in coastal areas.	M	Species or species habitat may occur within area	Low, species is aerial and may fly over the Study Area.
<i>Ardea alba</i>	Great Egret	The species usually frequents shallow waters and has been reported in a wide range of wetland habitats, these include swamps and marshes, margins of rivers and lakes, damp or flooded grasslands, pastures or agricultural lands, reservoirs, mangrove swamps and coastal lagoons.	M	Species or species habitat may occur within area	Low, swamps and marshes, margins of rivers and lakes, damp or flooded grasslands, pastures or agricultural lands, reservoirs, mangrove swamps and coastal lagoons do not occur within the Study Area.
<i>Ardea ibis</i>	Cattle Egret	Species occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It has occasionally been seen in arid and semi-arid regions however this is extremely rare. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures.	M	Species or species habitat may occur within area	Low, temperate grasslands and wetlands do not occur within the Study Area. In addition, the Study Area contains large areas of low grass and hard stand areas which is avoided by the species.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<i>Arenaria interpres</i>	Ruddy Turnstone	Species mainly found on coastal regions with exposed rock coast lines or coral reefs. It also lives near platforms and shelves, often with shallow tidal pools and rocky, shingle or gravel beaches.	M, Ma	Species or species habitat may occur within area	Species will not occur within Study Area. Species only occurs on rocky coastlines or coral reefs.
<i>Calidris alba</i>	Sanderling	Species found in coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and bare open coastal lagoons; individuals are rarely recorded in near-coastal wetlands.	M, Ma	Species or species habitat known within the area	Species will not occur within the Study Area. Species found on coastal beach and reefs which do not occur within the Study Area.
<i>Calidris canutus</i>	Red Knot, Knot	Species inhabits intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours	M, Ma	Species or species habitat known within the area	Species will not occur within the Study Area. Species inhabits sandflats and beaches which do not occur within the Study Area.
<i>Calonectris leucomelas</i>	Streaked Shearwater	The species is pelagic, but also occurs in inshore waters. Occurs in the Pacific Ocean, nesting in Japan and many of its offshore islands. After breeding, the Streaked Shearwater will migrate toward southern Australia. Feeds mainly on fish and squid. Uses burrows to nest in.	M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species occurs on the ocean and mainly on offshore islands.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<i>Charadrius bicinctus</i>	Double-banded Plover	Species found on littoral, estuarine and fresh or saline terrestrial wetlands, muddy, sandy, shingled or sometimes rocky beaches, bays and inlets and harbours.	M, Ma	Species or species habitat known within the area	Low, muddy and sandy beaches do not occur within the Study Area and dams within Study Area provide limited habitat.
<i>Gallinago hardwickii</i>	Latham's Snipe	Species occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. Species usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands).	M, Ma	Species or species habitat may occur within area	Low, species known exclusively from the escarpment. Freshwater wetlands such as flooded grasslands and heathland do not occur within the Study Area.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Species found in coastal habitats and around terrestrial wetlands. The habitats occupied by the species are characterised by the presence of large areas of open water.	M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species prefers large areas of open water which do not occur within the Study Area.
<i>Hirundapus caudacutus</i>	White-throated Needletail	The species is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest.	M	Species or species habitat may occur within area	Low, species is exclusively aerial and may fly over Study Area.
<i>Limosa lapponica</i>	Bar-tailed Godwit	Species found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays.	M, Ma	Species or species habitat known to occur in the area.	Species will not occur within the Study Area. Coastal habitat including sandflats and harbours do not occur within the Study Area.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<i>Merops ornatus</i>	Rainbow Bee-eater	The species occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located close to permanent water.	M	Species or species habitat may occur within area	Low, open forests and woodlands, shrublands do not occur within the Study Area. The vegetated areas of the Study Area is densely vegetated which is not favored by the species.
<i>Monarcha melanopsis</i>	Black-faced Monarch	The species is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating.	M	Breeding may occur within area	Low, rainforests, eucalypt woodlands, coastal scrub and damp gullies do not occur within the Study Area.
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	The species is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	M	Breeding likely to occur within area	Low, the Study Area does not contain heavily forested gullies.
<i>Puffinus leucomelas</i>	Streaked Shearwater	Breeding and non-breeding visitor to the coastal and pelagic waters of southern Australia. Nests are built in colonies and are built in a variety of vegetation types, as long burrowing is not restricted and the area is elevated so that the birds can take off.	M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is pelagic and requires elevated habitat when nesting which is not available within the Study Area.
<i>Sterna albifrons</i>	Little Tern	The species is almost exclusively coastal, preferring sheltered environments. Nests in small scattered colonies on sandy beaches. Have also been recorded in harbours, inlets and rivers.	M	Species or species habitat may occur within area	Species will not occur within the Study Area. Species is exclusively coastal occurring in harbours and inlets which do not occur within the Study Area.

Scientific Name	Common Name	Preferred Habitat Description	Status (EPBC Act) <sup>1</sup>	Prediction of occurrence in study area from search tools (EPBC Act)	Likelihood of Occurrence within Study Area from Records and Field Observations
<i>Rhipidura rufifrons</i>	Rufous Fantail	The species is found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground. During migration, it may be found in more open habitats or urban areas.	M	Breeding may occur within area	Low, rainforest, swamp woodlands and mangroves do not occur within the Study Area.

### 5.3 SUMMARY OF FINDINGS

#### 5.3.1 Threatened Species

The DEWHA online database search identified 53 threatened species with potential to occur within a 10km radius of the Study Area (see *Annex F*). Of these, one Commonwealth listed threatened species, Green and Golden Bell Frog (*Litoria aurea*), is considered to have a moderate likelihood of occurring within the Study Area.

##### *Green and Golden Bell Frog*

The proposed removal of Dam 6 at the Russell Vale site has the potential to impact the Green and Golden Bell Frog and potential habitat within Dam 6. No additional watercourses or dams within the Study Area will be impacted by the proposed works. No other threatened flora or fauna are considered to have the potential to occur within the Study Area and to be impacted by the proposed action.

Over 2010 - 2011 a total of 13 survey nights were undertaken at Dam 6, with seven survey nights in ideal conditions for the detection of the Green and Golden Bell Frog (DECCW 2009, DSWEPC 2009) within the Study Area. Despite ideal conditions occurring immediately before, during the surveys and confirmation of the species calling at the Port Kembla Heritage Park reference site each night prior to the January surveys and anecdotal evidence of Green and Golden Bell Frogs calling at the Edgewood Estate property during September 2010 and November 2010 (pers. comms with Arthur White) no Green and Golden Bell Frogs were detected at Dam 6.

Although Dam 6 provides potential suitable habitat for the Green and Golden Bell Frog (DEWHA 2010) including an unshaded, still waterbody containing emergent vegetation and grassy banks, no floating aquatic vegetation exists which is crucial for breeding males when calling. In addition, the aquatic vegetation cover of emergent reeds including Cumbungi is very high (80% during January surveys), which also limits its value as breeding habitat.

In contrast, the Port Kembla reference site, has floating aquatic vegetation and dense reeds, and is known to support large populations of the species. The closest record of the species in the locality was recorded in 1997 and 1998 at the NRE No.1 Colliery Pit Top Dam (Goldingay & Lewis 1999). However, no records of the species at Dam 6 have been recorded or documented since (Biosis Research 2011).

Given that the Green and Golden Bell Frog has not been detected at Dam 6 and there are limitations on the quality of the breeding habitat, the proposed action including the decommissioning of Dam 6, is not likely to have a significant impact on the Green and Golden Bell Frog and no further assessments are required under the EPBC Act.

### 5.3.2 *Migratory Species*

Migratory species listed under the EPBC Act would also have the potential to occur within these areas, and have been assessed based on habitat identified during field investigations (see *Table 6.1*). The DEWHA online database search identified 12 migratory birds with potential to occur within a 10km radius of the Study Area (see *Annex F*). No migratory species were considered to have the potential to occur within the Study Area.

## CONCLUSION

This report provides the results of the Environmental Assessment undertaken by ERM (2010) and subsequent targeted Green and Golden Bell Frog surveys by Biosis Research (2010a, 2010b and 2011).

The proposed action involves upgrades to surface infrastructure including the removal of Dam 6 for the construction and longer term up-slope integrity of the new Bellambi Gully Creek channel at the Russell Vale site, which has been identified as potential habitat for the Green and Golden Bell Frog.

Investigations were undertaken by Biosis (2010a, 2010b and 2011) to identify whether Dam 6 supports the Green and Golden Bell Frog. Over 2010 – 2011, a total of 13 survey nights were undertaken at Dam 6 with seven survey nights in ideal conditions for the detection of the Green and Golden Bell Frog (DECCW 2009, DSWEPC 2009). Despite ideal conditions occurring immediately before and during the surveys, and confirmation of the species calling at the Port Kembla Heritage Park reference site each night prior to the January surveys, no records of the Green and Golden Bell Frog at Dam 6 have been recorded or documented.

Although Dam 6 provides potential suitable habitat for the Green and Golden Bell Frog (DEWHA 2010) including an unshaded, still waterbody containing emergent vegetation and grassy banks, the dam does not provide floating aquatic vegetation, which is crucial for breeding males when calling. In addition, the aquatic vegetation cover of emergent reeds including Cumbungi is very high (80% during January surveys). The high coverage of emergent reeds limits the breeding habitat value. In contrast, the Port Kembla reference site contains which contains floating vegetation is known to support large populations of the species.

The assessments concluded that, given the Green and Golden Bell Frog has not been detected at Dam 6 during any of the surveys undertaken and there are limitations to the quality of the habitat, the proposed action is not likely to have a significant impact on the Green and Golden Bell Frog and no further assessments are required under the EPBC Act.

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