APPENDIX D

THREATENED SPECIES ASSESSMENT [RESOURCE STRATEGIES, 2012]

NEWCASTLE COAL INFRASTRUCTURE GROUP
COAL EXPORT TERMINAL RAIL FLYOVER MODIFICATION

APPENDIX D

THREATENED SPECIES ASSESSMENT

PREPARED BY
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EXECUTIVE SUMMARY

The Newcastle Coal Infrastructure Group (NCIG) Coal Export Terminal (CET) is located on Kooragang Island in Newcastle, New South Wales (NSW). NCIG propose a modification to the CET under Section 75W of Part 3A of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act), which is herein referred to as the Rail Flyover Modification.

This Threatened Species Assessment provides an assessment of the potential impacts from the Rail Flyover Modification on threatened flora and fauna listed under the NSW *Threatened Species Conservation Act, 1995* (TSC Act). It has been prepared in accordance with the *Draft Guidelines for Threatened Species Assessment* because the modification is sought under Section 75W of Part 3A of the EP&A Act.

The CET is located on a semi-natural to highly disturbed industrial site which has been surveyed on multiple occasions in recent history. Searches of relevant databases, literature reviews and field surveys have been undertaken to determine threatened species and communities that are relevant to the Rail Flyover Modification. No listed flora or fauna populations under the TSC Act are known to occur on Kooragang Island.

No threatened flora species have been recorded in the Rail Flyover Modification. The CET is approved to disturb some habitat (fresh to brackish wetlands), with the potential to contain Pondweed (*Zannichellia palustris*), an aquatic plant listed as endangered under the TSC Act. Similar habitat would also be disturbed for the Rail Flyover Modification, although this species has not been recorded in the Rail Flyover Modification area.

Various threatened birds and bats under the TSC Act are known to occur on Kooragang Island (e.g. water birds associated with permanent waterbodies and foraging areas for bats), however, only one threatened fauna species has the potential to be directly adversely impacted by the Rail Flyover Modification, namely the Green and Golden Bell Frog (*Litoria aurea*). The Rail Flyover Modification would involve the removal of approximately 0.13 hectares (ha) of Freshwater Wetland, potential habitat for the Green and Golden Bell Frog and 1.3 ha of less ideal Bell Frog habitat represented by Saltmarsh. The habitat is represented by ephemeral wetland areas and no permanent waterbodies (such as Deep Pond) would be disturbed as part of the Rail Flyover Modification.

Two threatened ecological communities would be impacted by the Rail Flyover Modification: approximately 0.13 ha of Freshwater Wetlands on Coastal Floodplains Endangered Ecological Community (EEC) and approximately 1.3 ha of Coastal Saltmarsh EEC. These EECs occur more extensively across Kooragang Island in semi-natural to highly disturbed wetland areas, and larger areas of these two EECs surrounding the site would remain. The Freshwater Wetlands occurs in a narrow man-made drainage channel that is intermittently inundated with water from Deep Pond.

The biodiversity values in the region are likely to be maintained considering:

- the small scale of land disturbance required the Rail Flyover Modification (2.6 ha);
- the proportion of proposed land disturbance which is already disturbed (42 percent [%] or 1.1 ha);
- the additional EECs proposed to be removed for the Rail Flyover Modification are only small incremental disturbances (<3%) additional to the area of EECs already approved for clearance;
- the Rail Flyover Modification area is a linear disturbance located adjacent to the existing rail (infrastructure would therefore be streamlined);
- the works would not significantly impact any threatened species, populations, or ecological communities, or their habitats, listed under the TSC Act;

- the works would be undertaken in accordance with a number of approved environmental management plans, including controls for weeds, animal pests, lighting, etc.
- NCIG would establish additional compensatory habitat for the Green and Golden Bell Frog in accordance with the existing NCIG *Compensatory Habitat and Ecological Monitoring Program*; and
- NCIG would undertake the works in accordance with the modified conditions of approval.

Dr Arthur White (a suitably qualified ecologist approved by the Director-General) has reviewed this threatened species assessment and considers it adequate.

1 INTRODUCTION

The Newcastle Coal Infrastructure Group (NCIG) Coal Export Terminal (CET) is located on Kooragang Island in Newcastle, New South Wales (NSW) (Figure 1). An Environmental Assessment (EA) has been prepared by NCIG to support an application under Section 75W of Part 3A of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) to modify Project Approval (06_0009) (herein referred to as the Rail Flyover Modification). This Threatened Species Assessment assesses the potential impacts on threatened flora and fauna as a result of the Rail Flyover Modification.

1.1 PROJECT DESCRIPTION

The Rail Flyover Modification includes the following key components:

- grade separation of the inbound track for the NCIG Northern Rail Spur (also referred as the 'high capacity optional inlet rail spur and rail sidings');
- minor realignment of the inbound (western) track of the Kooragang Island Main Line; and
- minor realignment of the outbound (eastern) track of the Kooragang Island Main Line.

The proposed changes to the existing/approved NCIG CET are shown on Figures 2 and 3.

1.2 ASSESSMENT OBJECTIVES

This Flora and Fauna Assessment has been prepared in accordance with the *Draft Guidelines for Threatened Species Assessment* (Department of Environment and Conservation [DEC] and Department of Primary Industries [DPI], 2005). These guidelines identify important factors that must be considered when assessing potential impacts on threatened species, populations, or ecological communities, or their habitats listed under the NSW *Threatened Species Conservation Act, 1995* (TSC Act) for development applications assessed under Part 3A of the EP&A Act (DEC and DPI, 2005).

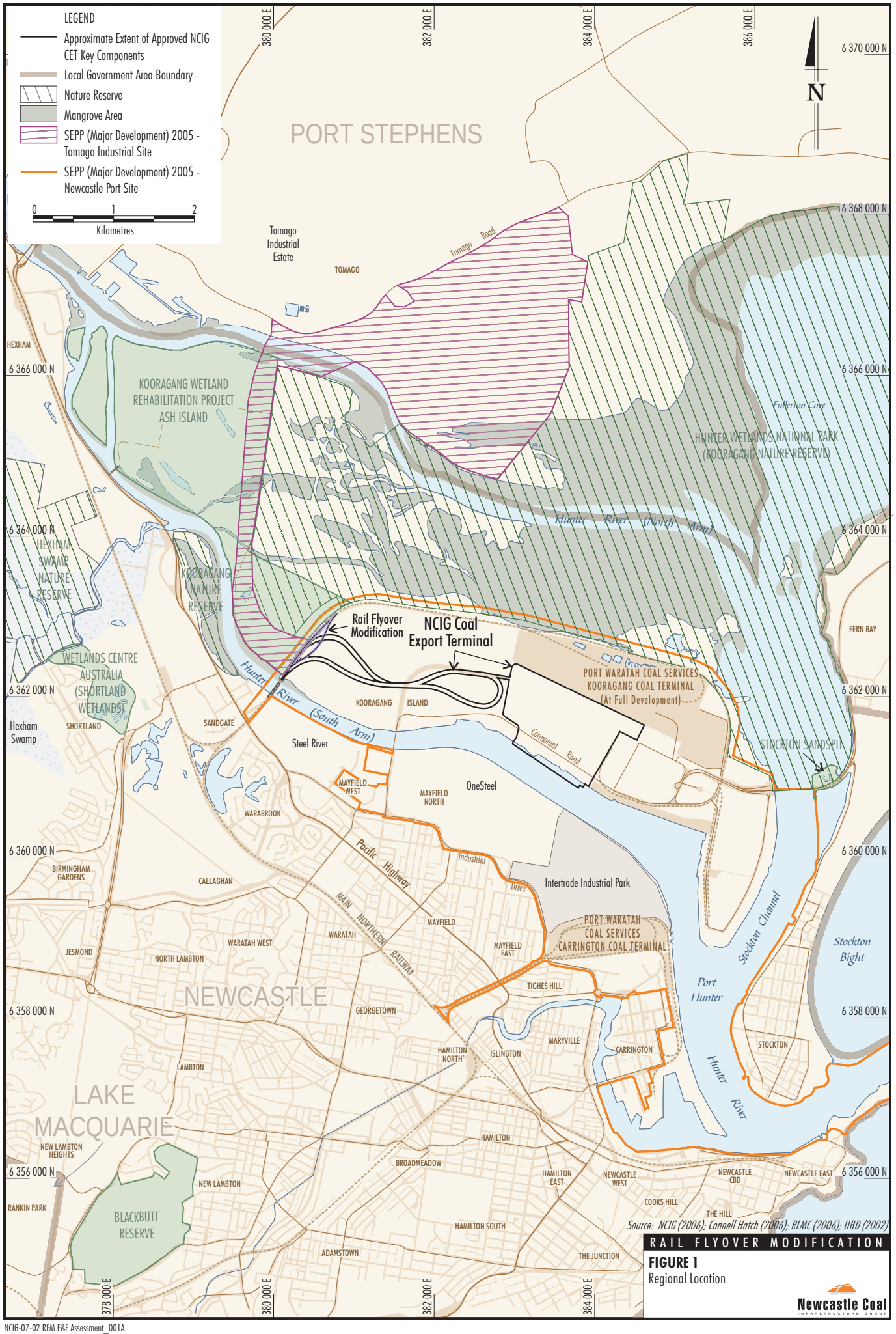
There are no species or communities listed as threatened under the NSW *Fisheries Management Act, 1994* that are relevant to the modification.

An assessment on Matters of National Environmental Significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) is outside the scope of this assessment in accordance with DEC and DPI (2005) guidelines. The relevant of the EPBC Act to the Rail Flyover Modification is discussed in the EA.

1.3 APPROVED IMPACTS ON THREATENED FLORA AND FAUNA FROM THE NCIG CET

Detailed flora and fauna assessments were prepared for the NCIG CET (NCIG, 2006a and 2006b). The approved impacts on threatened flora and fauna from the NCIG CET that are relevant to the proposed Rail Flyover Modification are discussed in this section.

Although the CET is a semi-natural to highly disturbed industrial site, the Flora Assessment (NCIG, 2006a) for the CET recognised that it also provided habitat for some threatened flora species and communities listed under the TSC Act. The CET is approved to disturb some potential habitat for Pondweed (*Zannichellia palustris*), an aquatic plant listed as Endangered under the TSC Act.



Source: NCIG (2006); Connell Hatch (2006); RLMC (2006); UBD (2002)

RAIL FLYOVER MODIFICATION

FIGURE 1
Regional Location

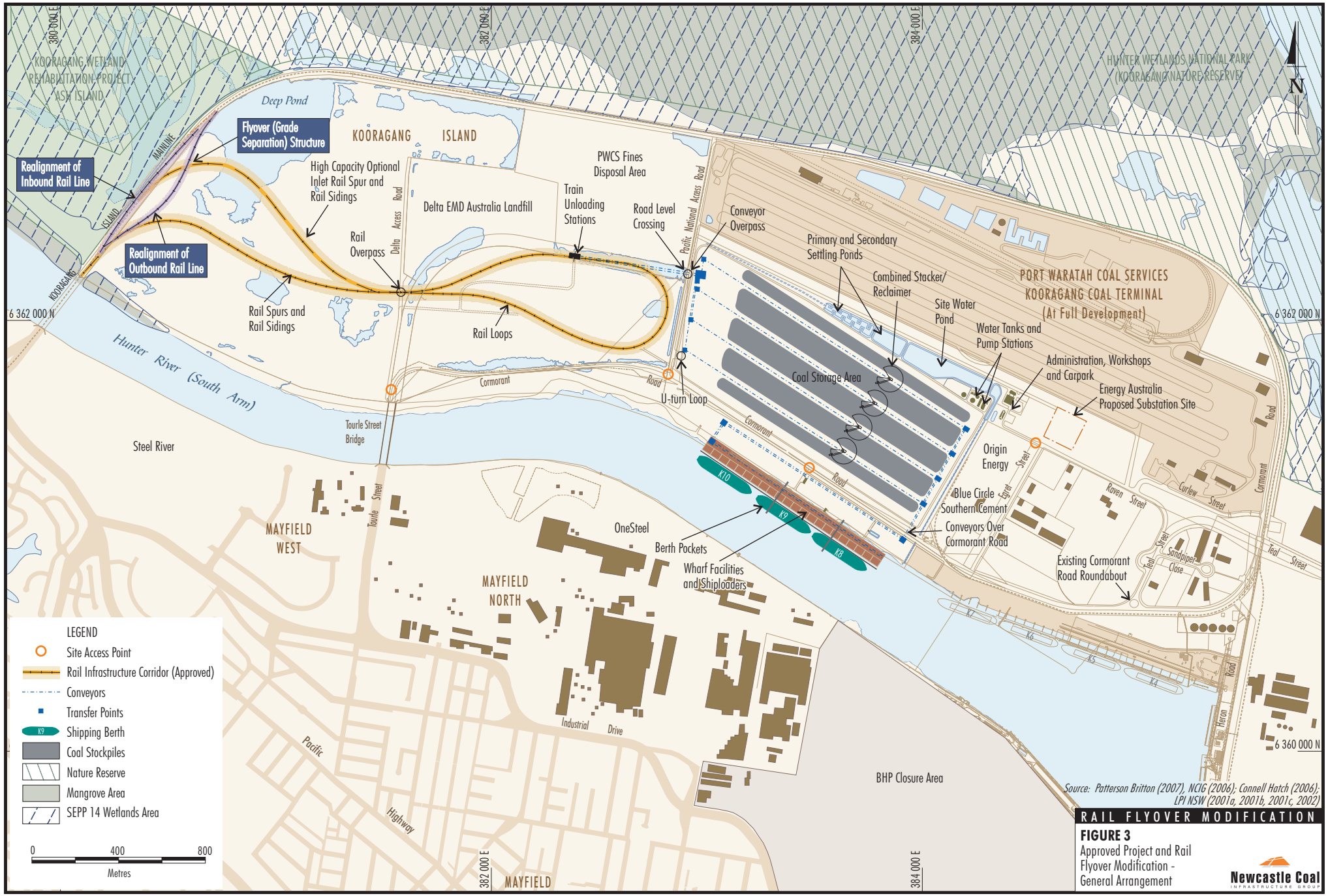
Newcastle Coal INFRASTRUCTURE GROUP

Source: Aerial Photo NCIG (February 2012)

RAIL FLYOVER MODIFICATION

FIGURE 2
Aerial Photo of NCIG CET Site
(February 2012)

Newcastle Coal
INFRASTRUCTURE GROUP



Source: Patterson Britton (2007), NCIG (2006); Connell Hatch (2006); LPI NSW (2001a, 2001b, 2001c, 2002)

RAIL FLYOVER MODIFICATION

FIGURE 3
Approved Project and Rail Flyover Modification - General Arrangement

Newcastle Coal INFRASTRUCTURE GROUP

NCIG-07-02 RFM F&F Assessment_003A

The CET is also approved to remove:

- approximately 50 hectares (ha) of *Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions Endangered Ecological Community EEC* (Freshwater Wetlands on Coastal Floodplains EEC); and
- approximately 3 ha of *Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions Endangered Ecological Community* (Coastal Saltmarsh EEC).

The CET is approved to disturb Green and Golden Bell Frog habitat (NCIG, 2006c). In accordance with Condition 2.20(b)(i), Schedule 2 of the Project Approval (06_0009), NCIG will establish no less than twice the area of Green and Golden Bell Frog habitat identified during the ecological surveys, in a location agreed by the Director-General of the NSW Department of Planning and Infrastructure in consultation with the NSW Office of Environment and Heritage (OEH).

The CET is required to be managed in accordance with the existing Project Approval conditions and approved management plans.

2 PRELIMINARY ASSESSMENT

A preliminary assessment of potentially occurring threatened species was undertaken considering relevant databases and literature. The following databases have been reviewed for threatened species listed under the TSC Act that are relevant to the Rail Flyover Modification:

- OEH (2012) Threatened Species - Atlas Database Records for a 10 kilometre (km) x 10 km search area centred on the Rail Flyover Modification area;
- Birds Australia (2012) Database Records for a 10 km x 10 km search area centred on the Rail Flyover Modification area; and
- Australian Museum (2012) Database Records for a 10 km x 10 km search area centred on the Rail Flyover Modification area.

The results of the database search were refined to threatened species records from Kooragang Island (Attachment A).

The land surrounding the CET on Kooragang Island has been well surveyed. A number of past flora surveys have been conducted in the general area of the NCIG CET (Protech Steel, 2001; Umwelt [Australia] Pty Limited, 2003; NSW Department of Commerce, 2005; Connell Hatch, 2006a, 2006b). In addition, a number of past fauna surveys have been conducted in the general area of the NCIG CET (NSW Department of Commerce, 2005; Protech Steel, 2001; Umwelt (Australia) Pty Ltd, 2003; Regional Land Management Corporation, 2003; Hamer, 1997, 1998, 2002; Premier's Department, 2003; Winning, 1998; Port Waratah Coal Services Limited, 1996; Australia Rail Track Corporation, 2005; Straw, 1999, 2000). Additional studies undertaken by Umwelt (Australia) Pty Limited (2012) are discussed in Section 3.

Other studies to the west of the Rail Flyover Modification include the general fauna survey of the Hunter Wetlands National Park (EcoBiological, 2011) and the Bat Survey of the Hunter Estuary and Hexham Swamp (McConville, 2011).

3 FIELD SURVEY AND ASSESSMENT

3.1 FLORA SURVEY

The most recent flora surveys covering the proposed Rail Flyover Modification area have been undertaken by Umwelt (Australia) Pty Limited (2012). Their flora surveys involved a detailed review of relevant literature, reports and vegetation mapping, as well as database searches.

The flora surveys were undertaken in November and December 2010, May and November 2011 and January 2012, and comprised field surveys and vegetation mapping. Field surveys included quadrat vegetation sampling, sampling along meandering transects, and field reconnaissance to identify the spatial arrangement of vegetation across the study area which included the proposed Rail Flyover Modification area.

Searches of threatened flora species listed under the TSC Act and EPBC Act were undertaken. Additional surveys for the *Zannichellia palustris* were undertaken in December 2010, December 2011 and January 2012.

3.2 THREATENED ECOLOGICAL COMMUNITIES

In June 2011, FloraSearch undertook vegetation mapping of an area to the north-west of the NCIG CET. The mapping was produced by a combination of air photo interpretation and ground-truthing. The mapping identified the wider occurrence of Freshwater Wetlands on Coastal Floodplains EEC and the Coastal Saltmarsh EEC. This mapping is reported later in this document.

3.3 FAUNA SURVEY

The most recent fauna surveys of the lands adjacent to the NCIG CET (including the Rail Flyover Modification area) have been undertaken by Umwelt (Australia) Pty Limited (2012). The fauna surveys were undertaken in February, March, August, November and December 2010; January, February and March 2011; and January 2012. Surveys comprised hair funnel sampling, bird surveys, diurnal herpetological surveys, spotlighting surveys, nocturnal call-playback, micro-bat echolocation recording surveys and habitat assessments.

Searches of threatened fauna species listed under the TSC Act and EPBC Act were undertaken. Additional targeted surveys for the Green and Golden Bell Frog (*Litoria aurea*), Australasian Bittern (*Botaurus poiciloptilus*), Eastern Grass Owl (*Tyto longimembris*) and threatened micro-bats were also undertaken. In addition, sites located outside of the survey area were also surveyed for the Green and Golden Bell Frog.

3.3.1 Green and Golden Bell Frog Monitoring

The Green and Golden Bell Frog at Kooragang Island has been surveyed and monitored on multiple occasions over the past 10 years by multiple different ecological consultants and researchers. This includes the studies listed in Table 1.

Table 1
Green and Golden Bell Frog Studies at Kooragang Island 1999 to 2011

Document	Period/Year	Reference
Various consultant records and database records that provide individual sightings	July to October 2001, December 2002 and January 2003.	Environmental Resources Management (2003a)
	December 2002 to January 2003	Environmental Resources Management (2003b)
	2003	Environmental Resources Management (2004)
	2006	Connell Hatch (2006c)
	2010 and 2011	Umwelt (Australia) Pty Limited (2012)
Research (mainly undertaken through the University of Newcastle)	September 1999 to April 2000	Lane *et al.* (2007)
	September 2000 to April 2001	Hamer and Mahony (2010)
	September 2001 to April 2002	Hamer and Mahony (2007)
	September 2001 to April 2002	Hamer *et al.* (2008)
Monitoring that provide individual sightings over the monitoring period	2006-present	Biosphere Environmental Consultants (Arthur White)

Prior to the construction of the NCIG CET, an analysis of the population of Green and Golden Bell Frog on Kooragang Island was undertaken by Hamer and Mahony (2007); Hamer *et al.* (2008) and Hamer and Mahony (2010). 'Mark-capture' techniques were used at 32 waterbodies on Kooragang Island to investigate the population age structure, as well as growth and survival rates of individuals (Hamer and Mahony, 2007). This has also been used to investigate the movement and habitat use of the Green and Golden Bell Frog (Hamer *et al.,* 2008), and to model site-occupancy and turnover using the statistical programme called PRESENCE (Hamer and Mahony, 2010).

3.3.2 Birds

Birds have been surveyed across many surveys on Kooragang Island (Section 2 and Section 3.3).

Shorebird monitoring at the NCIG CET and surrounds has been undertaken by the Hunter Bird Observers Club (Michael Roderick). The monitoring has been undertaken monthly since 2008.

3.3.3 Bats

Bats have been surveyed across many surveys on Kooragang Island (Section 2 and Section 3.3).

4 FLORA AND FAUNA CHARACTERISTICS OF THE MODIFICATION AREA

4.1 FLORA

Native Vegetation

Native vegetation communities recorded within the Rail Flyover Modification area are shown on Figure 4.

Threatened Ecological Communities

Two threatened ecological communities would be impacted by the Rail Flyover Modification, namely Freshwater Wetlands on Coastal Floodplains EEC and the Coastal Saltmarsh EEC. The wider extent of these EEC's is shown on Figure 5.

Threatened Flora

No threatened flora species listed under the TSC Act have been recorded within the Rail Flyover Modification area.

Critical Habitat

The Rail Flyover Modification would not affect any critical habitat. No critical fauna habitat occurs within the vicinity of the Rail Flyover Modification area as designated by the Register of Critical Habitat held by the Commonwealth Minister, Register of Critical Habitat held by the Director-General of the OEH, the Register of Critical Habitat held by the Director-General of the DPI-Fisheries or identified within the *Newcastle Local Environmental Plan, 2003*.

4.2 FAUNA

Habitat

The native vegetation communities recorded within the Rail Flyover Modification area (Figure 4) relate to the following broad fauna habitat types:

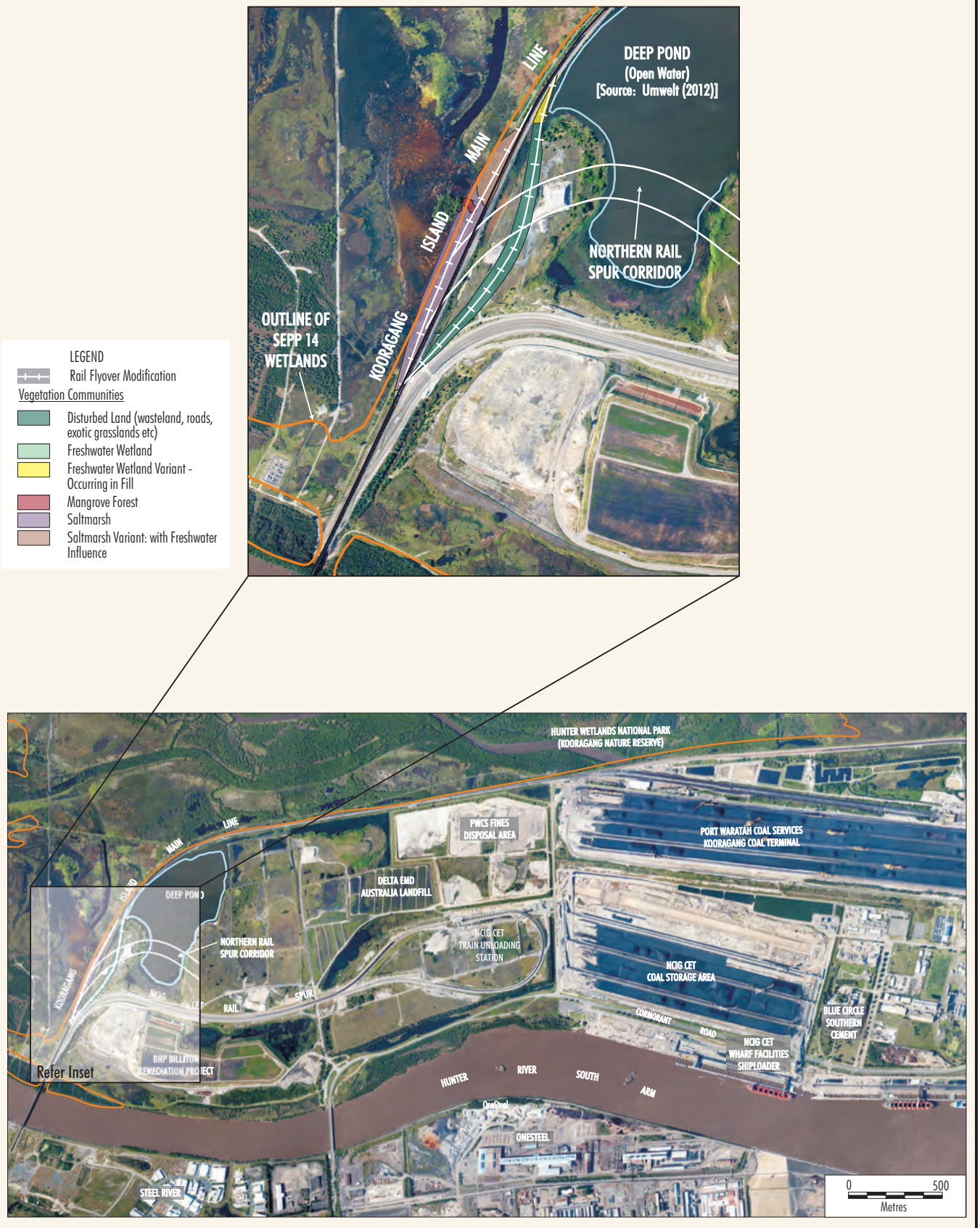
- Freshwater Wetland;
- Mangrove Forest; and
- Saltmarsh;

These habitats occur adjacent to the existing rail alignment. In addition, the Rail Flyover Modification area will impact a portion of land considered to be Disturbed Land, which provides little useable habitat.

Threatened Fauna

The results of the database search were refined to threatened species records from Kooragang Island (Attachment A).

Various threatened birds and bats under the TSC Act are known to occur on Kooragang Island (e.g. water birds associated with permanent waterbodies and foraging areas for bats).



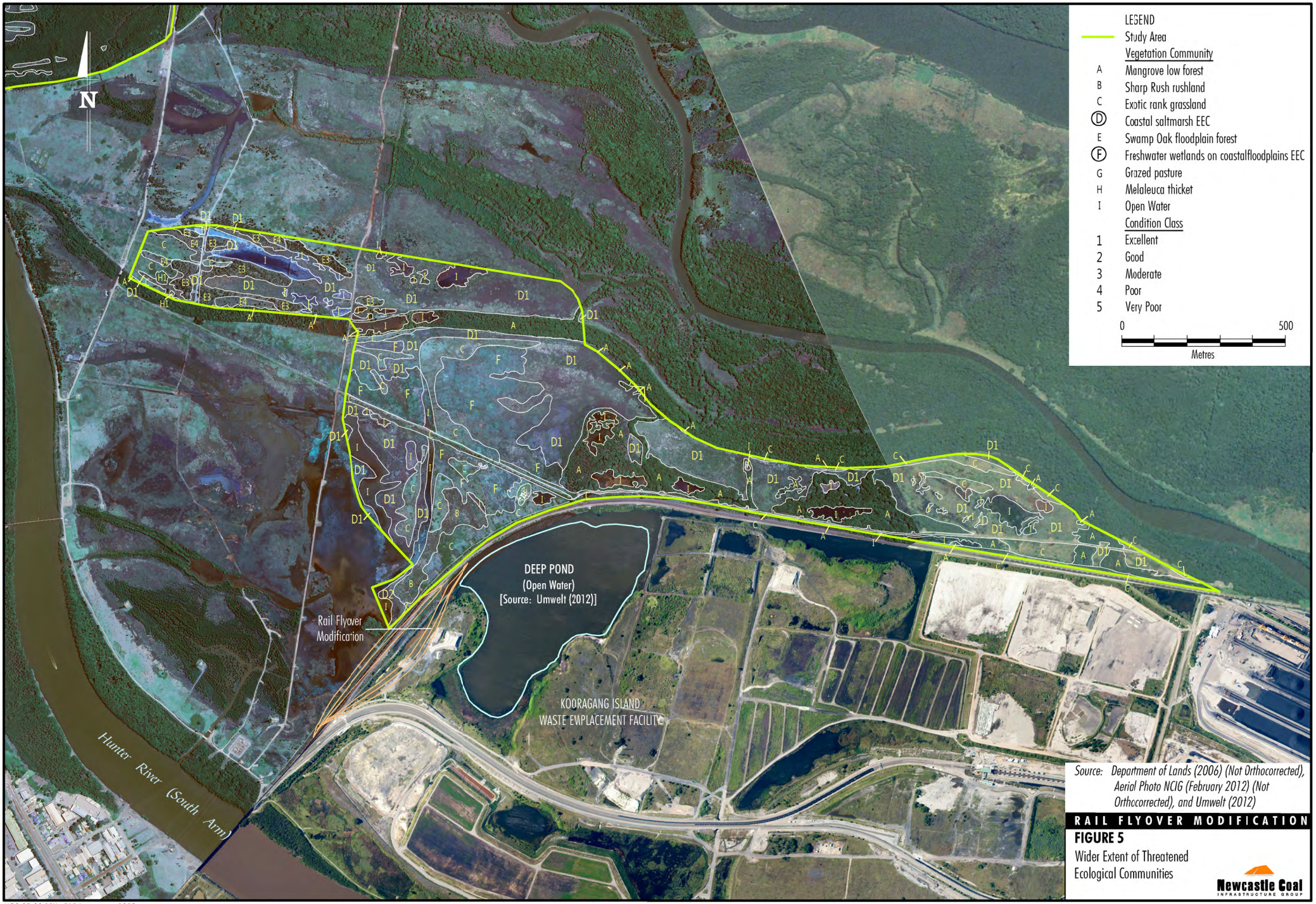
Source: Aerial Photo NCIG (February 2012) (Not Orthocorrected) and Umwelt (2012)

RAIL FLYOVER MODIFICATION

FIGURE 4

Vegetation Mapping

Newcastle Coal INFRASTRUCTURE GROUP



Source: Department of Lands (2006) (Not Orthocorrected), Aerial Photo NCIG (February 2012) (Not Orthocorrected), and Umwelt (2012)

RAIL FLYOVER MODIFICATION

FIGURE 5

Wider Extent of Threatened Ecological Communities

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NCIG-07-02 RFM_F&F Assessment_105C

5 EVALUATION OF IMPACTS

The proposed Rail Flyover Modification would involve similar potential impacts on flora as those identified for the CET (NCIG, 2006c), clearing of native vegetation and potential for incursion of weeds. These are discussed in the sections below.

The potential impacts on fauna from the CET (relevant to the rail infrastructure) were identified as alteration of surface water flows, removal of fauna habitat, potential for attracting introduced fauna and disruption of fauna routine activities due to noise emissions. These are discussed in the sections below.

5.1 CLEARING OF NATIVE VEGETATION

The additional lands associated with the Rail Flyover Modification cover less than 2.6 ha, comprising approximately 1.5 ha of native vegetation and approximately 1.1 ha of disturbed land (Table 2).

Table 2
Vegetation Communities

Vegetation Communities[1]	Description[1]	Area (ha)
Freshwater Wetland*	The lack of tidal flow and inundation by freshwater from rainfall has resulted in the colonisation of freshwater wetland species.	0.02
Freshwater Wetland Variant – Occurring in Fill*	Filled/reclaimed land that collects rainwater and forms artificial freshwater wetlands that have been colonised by a collection of aquatic flora species that are typical of disturbed wetlands.	0.11
Mangrove Forest	Forest of grey mangrove (*Avicennia marina* subsp. *australasica*)	0.05
Saltmarsh**	Saltmarsh vegetation	0.88
Saltmarsh Variant: with Freshwater Influence**	Saltmarsh vegetation with some invasion of fresh/brackish plant species.	0.44
Disturbed Land		1.1
	Total	2.6

[1] Umwelt (Australia) Pty Limited (2012).

* Freshwater Wetlands on Coastal Floodplains EEC.

** Coastal Saltmarsh EEC.

The assessment has conservatively assumed a disturbance corridor as shown on Figure 3, and such access tracks have been incorporated as part of the design.

5.1.1 Threatened Ecological Communities

Two threatened ecological communities would be impacted by the Rail Flyover Modification, namely approximately 0.13 ha of Freshwater Wetlands on Coastal Floodplains EEC and approximately 1.3 ha of Coastal Saltmarsh EEC (Table 2).

These EECs occur more extensively across Kooragang Island in semi-natural to highly disturbed wetland areas, and larger areas of these two EECs surrounding the site would remain (as identified as part of the Flora Assessment for the NCIG CET [NCIG, 2006a]). The wider extent of these EEC's are shown on Figure 5. The additional EECs proposed to be removed for the Rail Flyover Modification is only a small incremental disturbance (<3%) additional to the area of EECs already approved for clearance. The EECs proposed to be removed is also located adjacent to the existing rail infrastructure.

The evaluation of potential impacts on the two EECs is provided in Tables 3 and 4.

Table 3
Evaluation of Potential Impacts on the Coastal Saltmarsh EEC

Factor[1]	Assessment
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	Coastal Saltmarsh in NSW North Coast, Sydney Basin and South East Corner Bioregions (Coastal Saltmarsh) EEC is the name given to the ecological community occurring in the intertidal zone on the shores of estuaries and lagoons along the NSW coast (NSW Scientific Committee, 2004). A portion of Coastal Saltmarsh EEC would be disturbed for the Rail Flyover Modification as described above (1.3 ha). In relation to the regional distribution of known or potential habitat for this EEC, it is considered that the area to be disturbed for the Rail Flyover Modification does not constitute a significant area given the small scale of the habitat disturbance required for the Rail Flyover Modification and the greater quantity and quality of such habitat. Coastal Saltmarsh EEC is present on Ash Island and in the Tomago area which is located to the north of the Rail Flyover Modification area (Department of Commerce, 2005). The Coastal Saltmarsh EEC occurs in a number of conservation reserves including Hunter Estuary National Park (NSW Scientific Committee, 2004). The wider extent of Freshwater Wetlands on Coastal Floodplains EEC surrounding the modification is shown on Figure 5.
Does the proposal affect any threatened species or populations that are at the limit of its known distribution?	Considering the Rail Flyover Modification area is located in the NSW Sydney Basin Bioregion, it can be concluded that the Rail Flyover Modification area is located within the middle of the distribution of the Coastal Saltmarsh EEC and therefore does not represent a distributional limit for this community.
How is the proposal likely to affect current disturbance regimes?	As the Rail Flyover Modification would be constructed adjacent to the existing rail line there would be minimal alteration of the natural flow regime in the Coastal Saltmarsh EEC area. There is unlikely to be any change to the current fire regime due to the Rail Flyover Modification.
How is the proposal likely to affect habitat connectivity?	There is unlikely to be any significant change of connectivity of habitat for the Coastal Saltmarsh EEC as the modification is adjacent to the existing rail line.

[1] DEC and DPI (2005).

Table 4
Evaluation of Potential Impacts on the Freshwater Wetlands on Coastal Floodplains EEC

Factor[1]	Assessment
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	Freshwater Wetlands on Coastal Floodplains of the NSW North Coat, Sydney Basin and South East Corner Bioregions (Freshwater Wetlands on Coastal Floodplains) EEC is the name given to the ecological community associated with periodic or semi-permanent inundation by freshwater (minor saline influence may be present in some wetlands) (NSW Scientific Committee, 2005). Freshwater Wetlands on Coastal Floodplains EEC generally occur on silts, muds or humic loams in depressions, drainage lines, flats, backswamps, lagoons and lakes associated with coastal floodplains (NSW Scientific Committee, 2005). A portion of Freshwater Wetlands on Coastal Floodplains EEC would be disturbed for the Rail Flyover Modification (0.13 ha). In relation to the regional distribution of known or potential habitat for this EEC, it is considered that the area to be disturbed for the Rail Flyover Modification does not constitute a significant area given the small scale of the habitat disturbance required for the Rail Flyover Modification and the greater quantity and quality of such habitat (approximately 3,500 ha in the region quantified in the 1990s [NSW Scientific Committee, 2005]). The wider extent of Freshwater Wetlands on Coastal Floodplains EEC surrounding the modification is shown on Figure 5.
Does the proposal affect any threatened species or populations that are at the limit of its known distribution?	Considering the Rail Flyover Modification area is located in the NSW Sydney Basin Bioregion, it can be concluded that the Rail Flyover Modification area is located within the middle of the distribution of the Freshwater Wetlands on Coastal Floodplains EEC and therefore does not represent a distributional limit for this community.
How is the proposal likely to affect current disturbance regimes?	As the Rail Flyover Modification would be constructed adjacent to the existing rail line there would be minimal alteration of the natural flow regime in the area. A culvert would be installed under the rail embankment crossing the wetland habitat. Culverts would allow surface waters to continue to flow from Deep Pond in a similar manner to the existing conditions. There is unlikely to be any change to the current fire regime due to the Rail Flyover Modification.
How is the proposal likely to affect habitat connectivity?	There is unlikely to be any significant change of connectivity of habitat for the Coastal Saltmarsh EEC as the modification is adjacent to the existing rail line.

[1] DEC and DPI (2005).

5.2 INCURSION OF WEEDS

Construction of the Rail Flyover Modification has the potential to facilitate the incursion and spread of environmental weeds and weeds listed as noxious under the NSW *Noxious Weeds Act, 1993* (e.g. Crofton Weed [*Ageratina adenophora*], Bitou Bush [*Chrysanthemoides monilifera* ssp. *rotunda*], Boneseed [*Chrysanthemoides monilifera* ssp. *monilifera*] and Pampas Grass [*Cortaderia selloana*]). Appropriate weed management would continue to be implemented to limit the spread and colonisation of weeds in the Project site (including the Rail Flyover Modification) during construction and operations.

5.3 SURFACE WATER FLOWS

The proposed Rail Flyover Modification would have negligible additional impact on the surface water flows or quality as to affect surrounding wetland areas. Culverts would be installed as necessary.

5.4 REMOVAL OF FAUNA HABITAT

The broad fauna habitat types associated with the Rail Flyover Modification are listed in Table 5, based on the vegetation communities listed in Table 2.

Table 5
Broad Fauna Habitat Types

Broad Fauna Habitat Types	Area (ha)
Freshwater Wetland*	0.13
Mangrove Forest	0.05
Saltmarsh**	1.32
Disturbed Land	1.1
Total	2.6

* Freshwater Wetlands on Coastal Floodplains EEC.

** Coastal Saltmarsh EEC.

The additional lands associated with the Rail Flyover Modification area cover less than 2.6 ha, comprising approximately 1.5 ha of native vegetation and approximately 1.1 ha of disturbed land. The majority of habitat in the Rail Flyover Modification area occurs on the western side of the existing rail embankment. These habitats extend further to the Hunter Wetlands National Park and occur more extensively across Kooragang Island (Figure 4). The realignment of the outbound track has been designed to avoid Deep Pond beyond that for the approved NCIG CET.

A component of the Freshwater Wetland broad habitat type, the *Freshwater Wetland Variant – Occurring in Fill,* occurs on the eastern side of the existing rail embankment as a result of filled/reclaimed land (Figure 4). This habitat is likely to be opportunistically used by fauna with general habitat requirements (habitat generalists).

5.5 POTENTIAL FOR ATTRACTING INTRODUCED FAUNA

The potential for attracting introduced fauna is likely to be the same as the existing CET. Measures to manage introduced fauna are described in Section 6.4.

5.6 DISRUPTION OF FAUNA ROUTINE ACTIVITIES DUE TO NOISE EMISSIONS

The potential for noise to disrupt fauna is likely to be the same as the existing CET. Measures to manage noise impacts are described in Section 6.7.

5.7 GREEN AND GOLDEN BELL FROG

Only one threatened fauna species has the potential to be directly impacted by the Rail Flyover Modification, the Green and Golden Bell Frog (*Litoria aurea*) (Table 6).

Table 6
Evaluation of Potential Impacts on the Green and Golden Bell Frog

Factor[1]	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	A single population of the Green and Golden Bell Frog occurs at Kooragang Island (DEC, 2005). The disturbance of a portion of the Green and Golden Bell Frog habitat by the Project is unlikely to disrupt the lifecycle such that a local viable population of this species would be placed at risk. The Rail Flyover Modification would involve the removal of approximately 1.45 ha of potential habitat for the Green and Golden Bell Frog, comprising approximately 0.13 ha of Freshwater Wetland potential habitat and 1.32 ha of less ideal habitat represented by Saltmarsh (due to high salinity). The Freshwater Wetlands (0.13 ha) occurs in a narrow man-made drainage channel that is intermittently inundated with water from Deep Pond. The habitat is represented by ephemeral wetland areas and no permanent waterbodies (such as Deep Pond) would be disturbed as part of the Rail Flyover Modification. The Freshwater Wetland that would be cleared appears to be suitable habitat but there are no Green and Golden Bell Frog records from this location and no evidence that it has ever been used as a breeding site. Sections of Deep Pond and surrounding habitat are used as shelter or breeding habitat and these areas will not be affected by the rail flyover.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	Optimum habitat for the Green and Golden Bell Frog is considered to be unshaded waterbodies which are free of *Gambusia holbrooki* (an introduced predatory fish), have a grassy area nearby and diurnal sheltering sites (e.g. vegetation and/or rocks) (NPWS, 1999). Consistent with what has been observed at Kooragang Island, Green and Golden Bell Frog populations, especially in the Greater Sydney region, exist in highly disturbed areas such as disused industrial sites, landfill areas and cleared land (NPWS, 1999). The Green and Golden Bell Frog also occasionally inhabit farm dams and ornamental ponds (Robinson, 1998). The Rail Flyover Modification would involve the removal of approximately 1.45 ha of potential habitat for the Green and Golden Bell Frog, comprising approximately 0.13 ha of Freshwater Wetland potential habitat and 1.3 ha of less ideal habitat represented by Saltmarsh. Vegetation mapping covering the Rail Flyover Modification is shown on Figure 4 and wider mapping is shown on Figure 5. It is noted that the Green and Golden Bell Frog are known to use disturbed areas for movement between breeding habitats. However in this case, the majority of the disturbed land (Figure 4) would not be used by this frog, as it is largely associated with the existing rail infrastructure and is not located between known habitat areas. NCIG would continue to implement the Green and Golden Bell Frog Management Plan (GGBFMP), including measures such as pre-clearance surveys for the frog. The additional offset is discussed in Section 6.10.
Does the proposal affect any threatened species that are at the limit of its known distribution?	The Rail Flyover Modification area is located within the known distribution of the Green and Golden Bell Frog, and does not represent a distributional limit for this species.
How is the proposal likely to affect current disturbance regimes?	As the Rail Flyover Modification would be constructed adjacent to the existing rail line there would be minimal alteration of the natural flow regime in the area. A culvert would be installed under the rail embankment crossing the wetland habitat. Culverts would allow surface waters to continue to flow from Deep Pond in a similar manner to the existing conditions. There is unlikely to be any change to the current fire regime due to the Rail Flyover Modification.
How is the proposal likely to affect habitat connectivity?	It is noted that the Green and Golden Bell Frog are known to use disturbed areas for movement between breeding habitats. However in this case, the majority of the disturbed land (Figure 4) would not be used by this frog as it is largely associated with the existing rail infrastructure and is not located between known habitat areas. Notwithstanding, consistent with the existing approval, rail culverts would include relevant specifications to facilitate the migration/dispersal of the Green and Golden Bell Frog.

[1] DEC and DPI (2005).

5.8 WATERBIRDS

An evaluation of potential impacts from the Rail Flyover Modification on waterbirds is provided in Table 7. Waterbirds known from Kooragang Island are listed in Attachment A.

Table 7
Evaluation of Potential Impacts on Waterbirds

Factor[1]	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	Waterbird habitat within the Rail Flyover Modification is associated with: • 0.13 ha of Freshwater Wetland located in a narrow man-made drainage channel that is intermittently inundated with water from Deep Pond; and • a linear strip of Saltmarsh (1.32 ha) on the west of the existing rail embankment (Figure 4). A number of waterbirds are known to generally use these habitat types (Attachment A). However, the removal of the wetland habitat in the Rail Flyover Modification area (as described) is unlikely to adversely impact threatened waterbirds, and while some waterbirds could forage in the saltmarsh habitat, proposed disturbance is a linear strip on the edge of a greater area of saltmarsh habitat. Based on the small amount of habitat disturbance and the availability of proximal habitat external to the Project disturbance areas, it is considered that the Project would not have a significant impact on the locally available habitat for waterbirds. Lighting screens would be installed to minimise lighting impacts on shorebird habitat on the southern shores of Deep Pond (e.g. where beams of light from the trains would sweep across the surface of Deep Pond).
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	Waterbird habitat within the Rail Flyover Modification is described above. The Rail Flyover Modification would avoid Deep Pond, a permanent water source to the east of the modification.
Does the proposal affect any threatened species that are at the limit of its known distribution?	No waterbirds that are likely to occur are at their limit of known distribution.
How is the proposal likely to affect current disturbance regimes?	As the Rail Flyover Modification would be constructed adjacent to the existing rail line there would be minimal alteration of the natural flow regime in the area. A culvert would be installed under the rail embankment crossing the wetland habitat. Culverts would allow surface waters to continue to flow from Deep Pond in a similar manner to the existing conditions.
How is the proposal likely to affect habitat connectivity?	The Rail Flyover Modification is unlikely to affect the habitat connectivity for waterbirds given the nature of the proposed works and the mobility of the waterbirds.

[1] DEC and DPI (2005).

Table 8 provides a specific impact assessment on the Australasian Bittern.

Table 8
Evaluation of Potential Impacts on the Australasian Bittern

Factor[1]	Assessment
How is the proposal likely to affect the lifecycle of a threatened species and/or population?	The Australasian Bittern inhabits temperate freshwater wetlands and occasionally estuarine reedbeds (NSW Scientific Committee, 2009). Australasian Bittern habitat within the Rail Flyover Modification is associated with 0.13 ha of Freshwater Wetland located in a narrow man-made drainage channel that is intermittently inundated with water from Deep Pond. Targeted surveys in the vicinity of the Project area and its surrounds and observations across Kooragang Island have previously recorded the Australasian Bittern proximal to areas of permanent water (Umwelt [Australia] Pty Ltd, 2012; Connell Hatch, 2006; Hunter Bird Observers Club, 2006 and 2010; Regional Land Management Corporation, 2003). The OEH BioNet/Atlas of NSW Wildlife (2012) and Birdlife Australia (2012) database records for Kooragang Island also indicate the species at locations predominantly near permanent water. The closest record is located approximately 0.5 km north of the Project area. Suitable Australasian Bittern habitat was mapped by Connell Hatch (2006) in the vicinity of the Rail Flyover Modification area which included the south-western margin of Deep Pond and a small strip on the eastern side of the existing Kooragang Island Main Line. Notwithstanding, bird monitoring results from Deep Pond have not recently recorded the Australasian Bittern (Attachment B). Given the Project would avoid Deep Pond, involve limited wetland habitat disturbance, and the potential is available external to the Project disturbance areas, it is considered that the Project would not have a significant impact on the locally available habitat for the species. Considering the absence of recent records for the species at Deep Pond (Attachment B - Monitoring results since 2008) and the limited disturbance to potential wetland habitat for the species, the Project is considered very unlikely to disrupt the lifecycle of the species or a local viable population.
How is the proposal likely to affect the habitat of a threatened species, population or ecological community?	Australasian Bittern habitat within the Rail Flyover Modification is described above. The Rail Flyover Modification would avoid Deep Pond and would involve limited wetland habitat disturbance. Lighting screens would be installed to minimise lighting impacts on shorebird habitat on the southern shores of Deep Pond (e.g. where beams of light from the trains would sweep across the surface of Deep Pond). Other available potential habitat for the species is located outside the Rail Flyover Modification area on Kooragang Island including within the Hunter Wetlands National Park and to the west of the Project at the Hexham Swamp Nature Reserve. Based on the above (i.e. small amount of habitat disturbance and availability of proximal habitat external to the Rail Flyover Modification area), it is considered that the Project would not have a significant impact on the locally available habitat for the Australasian Bittern.
Does the proposal affect any threatened species that are at the limit of its known distribution?	The national distribution of the Australasian Bittern is from southern Queensland to Tasmania and south eastern South Australia (including most of NSW and Victoria) and the south-western corner of Western Australia (Marchant and Higgins, 1990). Therefore, the Rail Flyover Modification area is located within the known distribution of the Australasian Bittern and does not represent a distributional limit for this species.
How is the proposal likely to affect current disturbance regimes?	As the Rail Flyover Modification would be constructed adjacent to the existing rail line there would be minimal alteration of the natural flow regime in the area. A culvert would be installed under the rail embankment crossing the wetland habitat. Culverts would allow surface waters to continue to flow from Deep Pond in a similar manner to the existing conditions.
How is the proposal likely to affect habitat connectivity?	The Rail Flyover Modification is unlikely to affect the habitat connectivity for Australasian Bittern given the nature of the proposed works and the mobility of the species.

[1] DEC and DPI (2005).

Threatened waterbirds known from Deep Pond include: Magpie Goose (*Anseranas semipalmata*), Spotted Harrier (*Circus assimilis*), Black-tailed Godwit (*Limosa limosa*) and White-fronted Chat (*Epthianura albifrons*) (Attachment B). As described above, the Rail Flyover Modification would avoid Deep Pond. The potential waterbird habitat in Deep Pond is very different to the habitat in Rail Flyover Modification area (i.e. Deep Pond is a permanent water body whereas the wetland habitats in the modification area are created from tidal flow [saltmarsh] and overflow water from Deep Pond [freshwater wetland]).

5.9 BATS

Threatened bats known from Kooragang Island are listed in Attachment A. No threatened bats are likely to be adversely impacted by the Rail Flyover Modification due to the lack of potential roosting habitat in the area to be cleared.

5.10 MIGRATORY SPECIES

An assessment on migratory species listed under the EPBC Act is outside the scope of this assessment in accordance with DEC and DPI (2005). Notwithstanding, the Rail Flyover Modification would avoid Deep Pond, a permanent water source.

5.11 SEPP 14 WETLANDS

State Environmental Planning Policy No. 14 (Coastal Wetlands) (SEPP 14) aims to ensure the preservation and protection of coastal wetlands in the environmental and economic interests of the State. The mapped extent of the wetlands to which SEPP 14 applies proximal to the Rail Flyover Modification is shown on Figure 3. The inbound (western) track would encroach upon the mapped extent of the wetlands by approximately 15 metres, with a total disturbance of 0.56 ha of SEPP 14 wetland.

6 AVOID, MITIGATE AND OFFSET

Mitigation measures proposed for the Rail Flyover Modification to mitigate potential impacts on fauna species are listed below.

6.1 RAIL DESIGN

Some aspects of the rail design minimise impacts on threatened species, namely:

- a considerable portion of the Rail Flyover Modification is located on previously disturbed land (42% already disturbed);
- the Rail Flyover Modification is located adjacent to the existing rail (thereby streamlining infrastructure); and
- the Rail Flyover Modification has been specifically designed to avoid Deep Pond.

6.2 CLEARANCE PROCEDURES

NCIG would continue to implement the *Compensatory Habitat and Ecological Monitoring Program* (CHEMP) (NCIG, 2010a) and the *Construction Environmental Management Plan* (NCIG, 2012). This would include continuation of the vegetation clearance protocol to delineate disturbance areas to approved Project boundaries.

NCIG would continue to implement the GGBFMP, including measures such as pre-clearance surveys for the Green and Golden Bell Frog.

6.3 WEED MANAGEMENT PROGRAMME

Appropriate weed management would continue to be implemented to limit the spread and colonisation of weeds in the Project site (including the Rail Flyover Modification) during construction and operations.

6.4 FERAL ANIMAL

Feral animal control would be achieved by mandating a clean, rubbish-free environment to discourage scavenging and reduce the potential for further colonisation by non-endemic fauna (e.g. introduced rodents and foxes).

6.5 AMPHIBIAN CHYTRID FUNGUS

Amphibian chytrid fungus management measures (as described in the GGBFMP) would be implemented to minimise the further spread of amphibian chytrid fungus, including potentially new strains of the fungus into the rail flyover construction area. Project personnel would be trained in site hygiene management in accordance with the *Hygiene Protocol for the Control of Disease in Frogs* (NPWS, 2001), tyres and wheels of vehicles brought into the rail flyover construction areas that have been exposed to mud and are to be used in areas in close proximity to potential frog habitat would be disinfected. Mobile plant would be inspected prior to entering the site and would not be permitted to enter the site if it is not adequately clean (i.e. free of soil and/or organic matter).

6.6 LIGHTING MANAGEMENT

In accordance with Condition 7 of the Particular Manner Decision (2006/2987), lighting screens would be installed to minimise lighting impacts on shorebird habitat on the southern shores of Deep Pond (e.g. where beams of light from the trains would sweep across the surface of Deep Pond). The screens would comprise timber paling fences or similar structures. At these locations, this screen would also screen the light emitted from the ground-level lighting which would be installed along the rail infrastructure corridor.

6.7 NOISE MANAGEMENT

Noise management measures, including the implementation of noise and vibration controls would be conducted in accordance with NCIG's Construction Noise Management Plan and Operation Noise Management Plan (NCIG, 2010b, 2010c).

6.8 WATER MANAGEMENT

Groundwater management would be undertaken to prevent off-site impacts, and to ensure that proximate vegetation communities and aquatic systems are not adversely impacted, in accordance with the Construction Surface Water Management Plan (CSWMP) and Operation Water Management Plan (OWMP) (NCIG, 2010d, 2010e).

Surface water management would be undertaken to prevent off-site impacts and manage potential erosion and sedimentation issues to ensure that proximate vegetation communities and aquatic systems are not adversely impacted in accordance with the CSWMP and OWMP (NCIG, 2010d, 2010e).

6.9 DUST MANAGEMENT

Dust management to control the potential impacts on air quality in accordance with NCIG's Operation Dust Management Plan (NCIG, 2010f) would continue to be implemented.

6.10 OFFSET

NCIG began preliminary compensatory habitat works in January 2009 with additional compensatory habitat planned for 2012. Stage 1 of the CHEMP is being undertaken on Ash Island in the Hunter Estuary National Park, specifically in an area to the west of Cabbage Tree Road. The proposal to construct trial ponds (Stage 1) for research and monitoring purposes is currently with NPWS. NPWS has confirmed that approval would be forthcoming by late May, 2012.

The aim of the planned compensatory habitat works is to provide additional habitat for the Green and Golden Bell Frog (i.e. breeding, foraging, shelter, over-winter and movement habitat). The compensatory habitat would be established with regard to the *Best Practice Guidelines: Green and Golden Bell Frog Habitat* (DECC, 2008a) and *Protecting and Restoring Green and Golden Bell Frog Habitat* (DECC, 2008b).

To compensate for the additional clearance of approximately 1.45 ha of potential habitat for the Green and Golden Bell Frog, NCIG would establish additional compensatory habitat in a location agreed by the Director-General, equivalent to or no less than twice the area of habitat to be removed (i.e. 2.9 ha) in accordance with the CHEMP.

7 KEY THRESHOLDS

Key thresholds are discussed in Table 9 in relation to the Rail Flyover Modification, in accordance with the *Draft Guidelines for Threatened Species Assessment* (DEC and DPI, 2005).

Table 9
Key Thresholds

Factor	Assessment
Would the proposal, including actions to avoid or mitigate impacts or compensate to prevent unavoidable impacts, maintain or improve biodiversity values?	Yes
Is the proposal likely to reduce the long-term viability of a local population of the species, population or ecological community?	No
Is the proposal likely to accelerate the extinction of the species, population or ecological community or place it at risk of extinction?	No
Would the proposal adversely affect critical habitat?	No

8 CONCLUSION

The biodiversity values in the region would be maintained considering:

- the small scale of land disturbance required the Rail Flyover Modification (2.6 ha);
- the proportion of proposed land disturbance which is already disturbed (42% or 1.1 ha);
- the additional EECs proposed to be removed for the Rail Flyover Modification are only small incremental disturbances (<3%) additional to the area of EECs already approved for clearance.
- the Rail Flyover Modification area is a linear development located adjacent to the existing rail (infrastructure would therefore be streamlined);
- the works would not significantly impact any threatened species, populations, or ecological communities, or their habitats, listed under the TSC Act;
- the works would be undertaken in accordance with a number of approved environmental management plans, including controls for weeds, animal pests, lighting.
- NCIG would establish additional compensatory habitat for the Green and Golden Bell Frog in accordance with the existing NCIG CHEMP (NCIG, 2010a); and
- NCIG would undertake the works in accordance with the modified conditions of approval.

Dr Arthur White (a suitably qualified ecologist approved by the Director-General) has reviewed this threatened species assessment and considers it adequate (Attachment C).

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