

The groundwater flow regime in the estuarine aquifer comprises a low hydraulic gradient, with flow ultimately discharging to the adjacent wetlands and south arm of the Hunter River.

The placement of embankment material for the Rail Flyover Modification components may cause some consolidation of the underlying soils. The consolidation could lead to a minor increase in pore pressure, which would induce flows from the clay aquitard into the fill and estuarine aquifers. This increase in flow would be expected to be short-term and localised similar to those predicted and experienced during the construction of the existing NCIG CET rail spur. The presence of fill materials would assist in dissipating the groundwater pressure from the placement of fill for the rail embankment and therefore any increases in flow rate is expected to be only minor.

Consistent with the conclusions in the NCIG CET EA, it is expected that some short-term localised and minor increases in the groundwater table would occur in areas of consolidation within the KIWEF, but such increases are expected to have negligible impact on surrounding groundwater systems due to the elevated water table present in the area.

Ground improvement techniques would continue to be used to accelerate consolidation in the clay aquitard in areas of significant fill. Potential impacts associated with the use of wick drains (i.e. increased groundwater flows) would be localised, of generally short duration, and would eventually collapse or block with sediment resulting in a reduction in flow.

Notwithstanding the above, monitoring and contingency measures developed for the NCIG CET would continue to be implemented including:

- installation of bores along the perimeter of the rail infrastructure corridors (including the Rail Flyover Modification components); and
- monitoring of any groundwater changes/effects and, if significant, undertake an investigation and consider contingencies (i.e. pumping of bores or installation of localised subsurface low permeability barriers).

4.8 FLORA

A Threatened Species Assessment for the Rail Flyover Modification is presented in Appendix D. A summary of the findings is provided below.

A Flora Assessment was undertaken by NCIG (2006c) as part of the NCIG CET EA in association with (i.e. co-authored by) Professor David Goldney.

The potential impacts on flora from the CET (relevant to the rail infrastructure) were identified as clearing of native vegetation, alteration of surface water flow to wetland flora and incursion of weeds.

The CET is a semi-natural to highly disturbed industrial site, although the Flora Assessment (NCIG, 2006c) for the CET recognised that it also provided habitat for some threatened flora species and communities listed under the NSW *Threatened Species Conservation Act, 1995* (TSC Act). The CET is approved to disturb some potential habitat for *Zannichellia palustris*, an aquatic plant listed as endangered under the TSC Act. It is also approved to remove:

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

A number of flora surveys have been conducted in the general area of the NCIG CET (Protech Steel, 2001; Umwelt [Australia] Pty Limited, 2003; Department of Commerce, 2005; Connell-Hatch, 2006a, 2006b). The most recent surveys 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. Flora and vegetation 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.

The proposed Rail Flyover Modification would involve similar potential impacts on flora as those identified for the CET (clearing of native vegetation and potential for incursion of weeds). The proposed Rail Flyover Modification would have negligible additional impact on the surface water flows or quality (Section 4.6) as to affect surrounding wetland areas.

No threatened flora species listed under the TSC Act or EPBC Act have been recorded within the additional lands associated with the Rail Flyover Modification.

Native vegetation communities recorded within the Rail Flyover Modification area are listed in Table 4 and shown on Figure 11.

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. The additional native vegetation proposed to be cleared for the Rail Flyover Modification, comprises of approximately 0.13 ha of Freshwater Wetlands on Coastal Floodplains EEC and approximately 1.3 ha of Coastal Saltmarsh EEC (Table 4).

**Table 4
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 (<i>Avicennia marina</i> subsp. <i>australasica</i>)	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.

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, 2006c]).

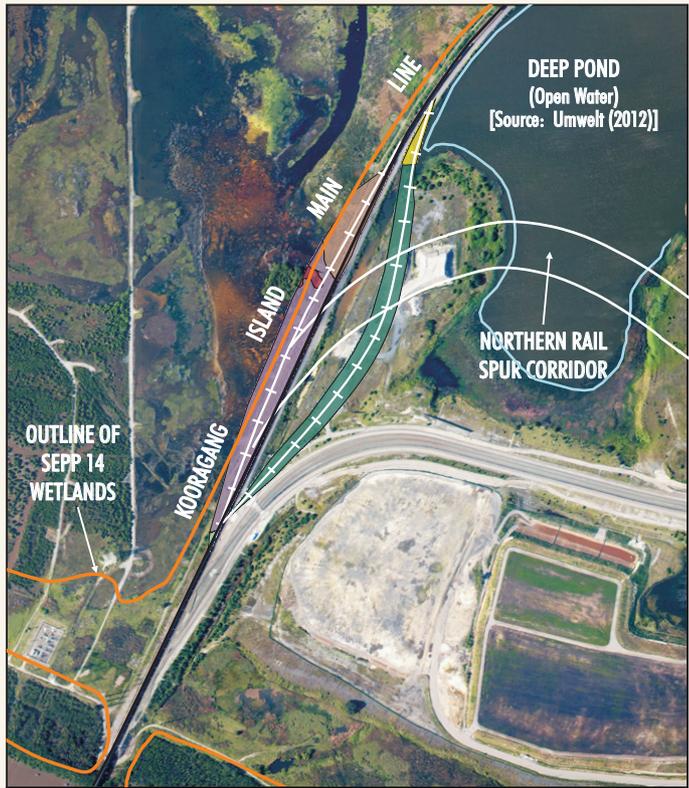
The additional EECs proposed to be removed for the Rail Flyover Modification is only a small incremental disturbance (<3 percent [%]) additional to the area of EECs already approved for clearance. The EECs proposed to be removed is also located adjacent to the existing rail infrastructure.

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*]). The weed management program 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.

NCIG would continue to implement the CHEMEP. This would include continuation of the vegetation clearance protocol to delineate disturbance areas to approved Project boundaries.

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



- LEGEND**
- Rail Flyover Modification
 - Vegetation Communities**
 - Disturbed Land (wasteland, roads, exotic grasslands etc)
 - Freshwater Wetland
 - Freshwater Wetland Variant - Occurring in Fill
 - Mangrove Forest
 - Saltmarsh
 - Saltmarsh Variant: with Freshwater Influence



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

RAIL FLYOVER MODIFICATION

FIGURE 11

Vegetation Mapping



- 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's peer-review letter is provided in Appendix D.

4.9 FAUNA

A Threatened Species Assessment for the Rail Flyover Modification is presented in Appendix D. A summary of the findings is provided below.

A Fauna Assessment was undertaken by NCIG (2006d) as part of the NCIG CET EA. The potential impacts on fauna from the CET (relevant to the rail infrastructure) were identified as clearing of native vegetation, alteration of surface water flow to wetland habitat, potential for attracting introduced fauna, fauna mortality due to traffic movements, disruption of fauna routine activities due to noise emissions and fauna movement due to fencing.

A number of fauna surveys have been conducted in the general area of the NCIG CET (NSW Department of Commerce, 2005; Protech Steel, 2001; Umwelt, 2003; Regional Land Management Corporation, 2003; Hamer, 1997, 1998, 2002; Premier's Department, 2003; Winning, 1998; PWCS, 1996; ARTC, 2005; Straw, 1999, 2000).

The most recent surveys of the lands adjacent to the NCIG CET (including the Rail Flyover Modification area) have been undertaken by Umwelt (Australia) Pty Limited (2012). Their fauna surveys involved a detailed review of relevant literature, reports and vegetation mapping as well as database searches. 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.

The broad fauna habitat types associated with the Rail Flyover Modification are listed in Table 5, based on the vegetation communities listed in Table 4.

**Table 5
Broad Fauna Habitat Types**

Vegetation Communities	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 11). As described in Section 3.3, the realignment of the outbound track has been specifically 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 11). This habitat is likely to be opportunistically used by fauna with general habitat requirements.

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*) is listed as endangered under the TSC Act and vulnerable under the EPBC Act. It is known to occupy Kooragang Island environs.

The Rail Flyover Modification would involve the removal of approximately 1.45 ha of potential habitat for the Green and Golden Bell Frog, comprising Freshwater Wetland habitat and Saltmarsh habitat. 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 11) 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 GGBFMP, including measures such as pre-clearance surveys for the frog.

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

- Feral animal and noxious weed 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).
- 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* (NSW National Parks and Wildlife Service, 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).
- Lighting management in accordance with the requirements of EPBC Act Particular Manner Decision 2006/2987 (Attachment 3).
- Noise management measures, including the implementation of noise and vibration controls in accordance with NCIG's CNMP and ONMP (NCIG, 2010a, 2010b).
- Groundwater management to prevent off-site impacts to ensure that proximate vegetation communities and aquatic systems are not adversely impacted in accordance with the CSWMP and OWMP (NCIG, 2010a, 2010b).
- Surface water management 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, 2010a, 2010b)
- Dust management to control the potential impacts on air quality in accordance with NCIG's ODMP (NCIG, 2010b).

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.

Dr Arthur White (a suitably qualified ecologist approved by the Director-General) has reviewed the threatened species assessment (Appendix D) and considers it adequate for the reasons described in Section 4.8 and Appendix D. Dr Arthur White's peer-review letter is provided in Appendix D.

4.10 HERITAGE

As part of the NCIG CET EA, a Preliminary Aboriginal Heritage Assessment (PAHA) and desktop non-Aboriginal heritage assessment were undertaken for the Project site and surrounds.

Aboriginal Heritage

The PAHA identified two Aboriginal sites (shell middens) on Kooragang Island as being registered on the Aboriginal Heritage Information Management System (AHIMS) database. Neither of these registered sites is located within the NCIG CET site including the Rail Flyover Modification.

Of relevance, the PAHA also concluded:

- The area has been subject to agricultural development since European settlement, and over a period of more than 50 years, dredge spoil, land reclamation and waste disposal activities.
- Previous surveys have not identified any remaining archaeological evidence of Aboriginal occupation.
- Consultation with the Aboriginal community had not identified any significant cultural heritage values in the Kooragang Port and Industrial Area including the NCIG CET site.

Notwithstanding the fact that no Aboriginal sites have been identified within the NCIG CET site including the Rail Flyover Modification, NCIG would continue to implement the management measures described in the CEMP, as follows:

- During induction training, NCIG personnel would be advised of their responsibility to advise management if they uncover any item that could be of Aboriginal heritage significance.
- If potential archaeological material is identified, construction activities proximal to the potential archaeological material would cease and the OEH's, North East Branch - Environment Protection and Regulation Group, Regional Archaeologist would be contacted to determine appropriate management requirements.
- If items of Aboriginal cultural heritage significance are salvaged on-site, they would be stored in a keeping place on-site for the duration of the Project.
- At the cessation of the Project, if any salvaged Aboriginal objects are stored on-site their ongoing management will be determined in consultation with the Aboriginal community and the OEH.

Non-Aboriginal Heritage

No known non-Aboriginal heritage items of significance have been identified within the NCIG CET site including the Rail Flyover Modification.

Notwithstanding the fact that no non-Aboriginal heritage items of significance have been identified, NCIG would continue to implement the management measures described in the NCIG CET EA, as follows:

- During induction training, NCIG personnel would be advised of their responsibility to advise management if they uncover any item that could be of non-Aboriginal heritage significance.
- If an item of possible heritage significance is identified on-site during excavation or construction activities, analysis would be undertaken by a suitably qualified heritage consultant to determine the significance of the identified objects.
- If the item is of a local or higher significance, subsequent consultation would be undertaken with the NSW Heritage Office in regard to the fate of the item.

4.11 TRANSPORT

Construction (Fill) Transport

During construction of Stage 2AA of the NCIG CET, NCIG sought and obtained the agreement of the Director-General of the DP&I (in accordance with Condition 2.47 of Project Approval [06_0009]) to import construction fill at the NCIG CET site from local quarries with heavy vehicle movements of up to 120 truck deliveries per day over a 10 month period between 7:00 am to 6:00 pm, six days per week (Monday to Saturday).

As described in Section 3.4, the road transport impacts associated with the Rail Flyover Modification are related to the transport of construction fill material to the CET.

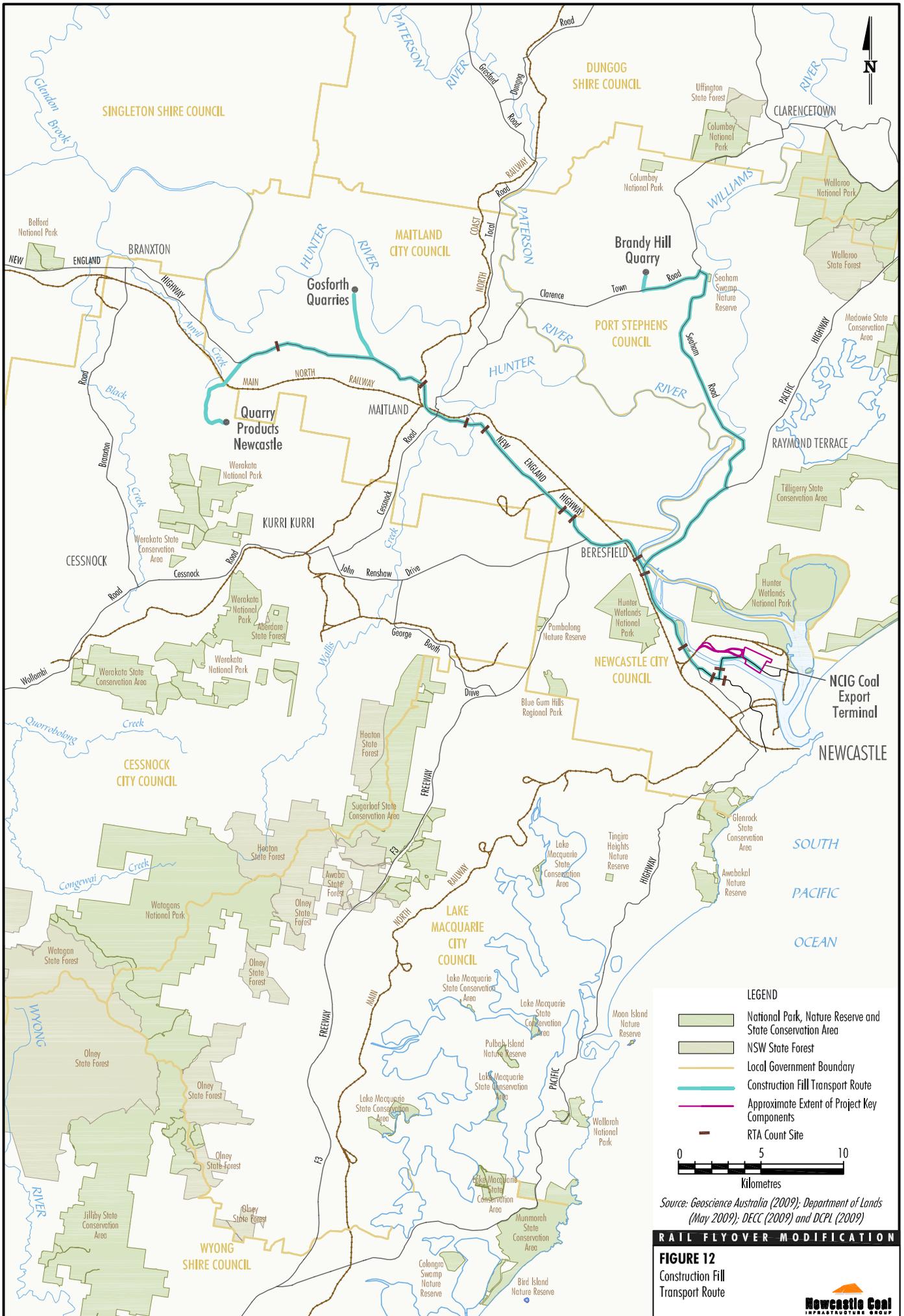
Consistent with the approach undertaken for Stage 2AA construction, NCIG commissioned GTA Consultants to conduct an assessment of the potential impacts associated with the transport of construction fill material for the Rail Flyover Modification (Appendix E).

It is anticipated that up to 48 deliveries per day would be required to transport the required amount of material for a period of approximately 18 months. The material would be sourced from three quarries located within the Lochinvar Area (Figure 12).

Consistent with the existing management of fill transport to the CET, fill would be transported between 7.00 am and 6.00 pm Monday to Friday, and between 7.00 am and 1.00 pm on Saturdays. The proposed transport route for fill would be via the same routes for Stage 2AA (i.e. New England Highway, Pacific Highway, Industrial Drive, Tourle Street Bridge and Cormorant Road) (Figure 12).

Access to the CET site would continue to be via the prescribed access points as presented in Road Transport Assessment report of the EA (Masson Wilson Twiney, 2006).

Consistent with the approved access routes, vehicles would access the rail flyover construction site using the existing access point immediately to the north of the Tourle Street bridge (Delta Access Road). This would be via left turn northbound movements only. Trucks would leave the CET site by left turn onto Cormorant Road from Delta Access Road and performing a U-turn at the roundabout to return to the New England Highway.



The primary entry to the rail flyover construction site would be via Delta Access Road, however during exceptional circumstances, when access via Delta Access Road is restricted, trucks may enter and leave the site (left turn in, left turn out) via Pacific National Road. This potential route would be expected to only carry a small percentage of the overall traffic volume for the Rail Flyover Modification.

A cumulative assessment of potential traffic impacts concluded that the road transport implications of the flyover construction works will be limited to the local access arrangements on Kooragang Island (Appendix E).

It is considered that the traffic movements associated with the construction of the Rail Flyover Modification can be adequately and appropriately mitigated and managed in accordance with the CTMP (Appendix E).

Rail Transport

As described in Section 1.1.1, the Kooragang Island Main Line (Figure 3) services the Kooragang Coal Terminal and a number of other industrial facilities' on Kooragang Island, including Boral Cement and facilities on Walsh Point.

Construction of the rail flyover would be undertaken in a manner to avoid where possible or otherwise minimise interruptions to services on Kooragang Island in consultation with the ARTC.

Once complete, the rail flyover would be beneficial to rail transport services on Kooragang Island, reducing potential future scheduling issues for train movements.

4.12 HAZARD AND RISK

As part of the NCIG CET EA, a PHA was conducted in accordance with SEPP 33 (Section 1.2.2).

The NCIG CET operates in accordance with the environmental management plans and management procedures required by the existing Project Approval (06_0009) (Section 2.7). These plans and procedures have been developed to minimise the environmental risks associated with construction and operation of the CET.

The Rail Flyover Modification would not introduce any new hazardous materials to the NCIG CET during construction, nor would it increase the risks beyond those already ranked and assessed in the PHA to:

- the off-site environment;
- members of the public; and
- private property.

Therefore, the Rail Flyover Modification would not significantly alter the consequences or likelihood of a hazardous event occurring at the NCIG CET, as the construction and operational activities on-site would be generally unchanged.

Notwithstanding, environmental management plans and procedures would be updated to include the Rail Flyover Modification, where relevant (Section 5.2).

5 ENVIRONMENTAL MONITORING AND MANAGEMENT

5.1 ENVIRONMENTAL MONITORING

The existing environmental monitoring network for the NCIG CET includes monitoring sites and monitoring frequencies for a range of environmental parameters (Section 2.7). The Rail Flyover Modification is located within and adjacent to existing/approved construction and operational areas and therefore the existing NCIG CET environmental monitoring network already covers the majority of issues or requirements relevant to the Rail Flyover Modification. Additional surface water monitoring sites would however be established to the west of the Kooragang Island Main Line embankment.

5.2 ENVIRONMENTAL MANAGEMENT

Existing environmental management plans (Section 2.7) that would be updated to reflect the Rail Flyover Modification would include:

- the CEMP and, if required, relevant components (e.g. ASSMP, CSWMP, CNMP and CTMP);
- the OEMP and, if required, relevant components (e.g. ONMP and OWMP); and
- CHEMP.

Compliance with the requirements of the Project Approval (06_0009), including compliance status reviews and independent environmental audits, would continue to be reported to the Director-General of the DP&I. An AEMR would continue to be prepared and distributed to government agencies, stakeholders and interested parties, to review NCIG's performance against the requirements of the environmental management plans, protocols and programs.

If required, any variations to existing EPL 12693 for the Rail Flyover Modification would be undertaken in consultation with the OEH.

NCIG's Community Support Program (Section 1.3.1) would continue to be implemented to provide community groups/organisations within the Newcastle area with sponsorship support to help meet their objectives.

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