EXECUTIVE SUMMARY

NEWCASTLE COAL INFRASTRUCTURE GROUP
COAL EXPORT TERMINAL

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ES1 INTRODUCTION

This document is an Environmental Assessment (EA) for the proposed development of a Coal Export Terminal (CET) (the Project) by Newcastle Coal Infrastructure Group Pty Limited (NCIG). The Project is located on Kooragang Island (Figures ES-1 and ES-2), which lies near the mouth of the Hunter River, within the Newcastle local government area.

The Project includes the construction and operation of a 66 million tonnes per annum (Mtpa) CET, including associated rail and coal handling infrastructure and wharf/shiploading facilities on the south arm of the Hunter River. The Project would initially be developed to a capacity of 33 Mtpa and would then be progressively developed to an export capacity of up to 66 Mtpa of coal to meet increases in coal export demand as they occur.

The Project site comprises vacant industrial land, the Kooragang Island Waste Emplacement Facility (KIWEF) and the north bank of the south arm of the Hunter River (Figures ES-2 and ES-3).

ES1.1 PROPONENT

NCIG is the proponent for the Project. NCIG is a consortium of the following six companies:

- Hunter Valley Energy Coal Limited;
- Centennial Coal Company Limited;
- Donaldson Coal Pty Limited;
- Excel Coal Limited;
- Felix Resources Limited; and
- Whitehaven Coal Mining Pty Ltd.

ES1.2 PROJECT DESCRIPTION

General Arrangement

The Project general arrangement is shown on Figure ES-3. The general arrangement is based on the planned maximum coal throughput of 66 Mtpa. The main activities associated with the development of the Project would include:

- foundation preparation/capping of a rail corridor traversing the existing KIWEF for the development of the rail spurs, rail sidings and rail loops;
- construction of rail spurs, rail sidings and rail loops, rail overpass, train unloading stations and connecting conveyors;
- re-use of dredged materials from the south arm of the Hunter River as preload and engineering fill for construction of the coal storage area, rail corridor and wharf facilities;
- construction of a coal storage area including coal stockpiles, conveyors, transfer points and combined stacker/reclaimers;
- construction of wharf facilities, shiploaders, conveyors and buffer bins;
- development of water management infrastructure including site drainage works, stormwater settlement ponds, primary and secondary settling ponds, site water pond, water tanks and stockpile spray system;
- installation of electricity reticulation and control systems;
- development of access roads and internal roads;
- construction of administration and workshop buildings;
- other associated minor infrastructure, plant, equipment and activities; and
- operation of the CET up to a capacity of 66 Mtpa, including the unloading of coal trains, the stockpiling of coal, and the loading of coal to ships via the wharf facilities and shiploaders.

The Project description and general arrangement are based on information from the *Newcastle Coal Infrastructure Group Coal Export Terminal – Kooragang Island Prefeasibility Study* (NCIG, 2005) and the ongoing feasibility study for the Project.

Upgrading of electricity transmission infrastructure to supply the existing and future industrial requirements of Kooragang Island industrial facilities (including the Project) is being undertaken by Energy Australia and is not included as part of the Project or assessed in this EA.

Dredged material from the approved Extension of Shipping Channels within the Port of Newcastle (DA-134-3-2003-i) (the Port Consent) would be used as construction material for the Project.

Project Snapshot

Key Project information is summarised in Table ES-1.

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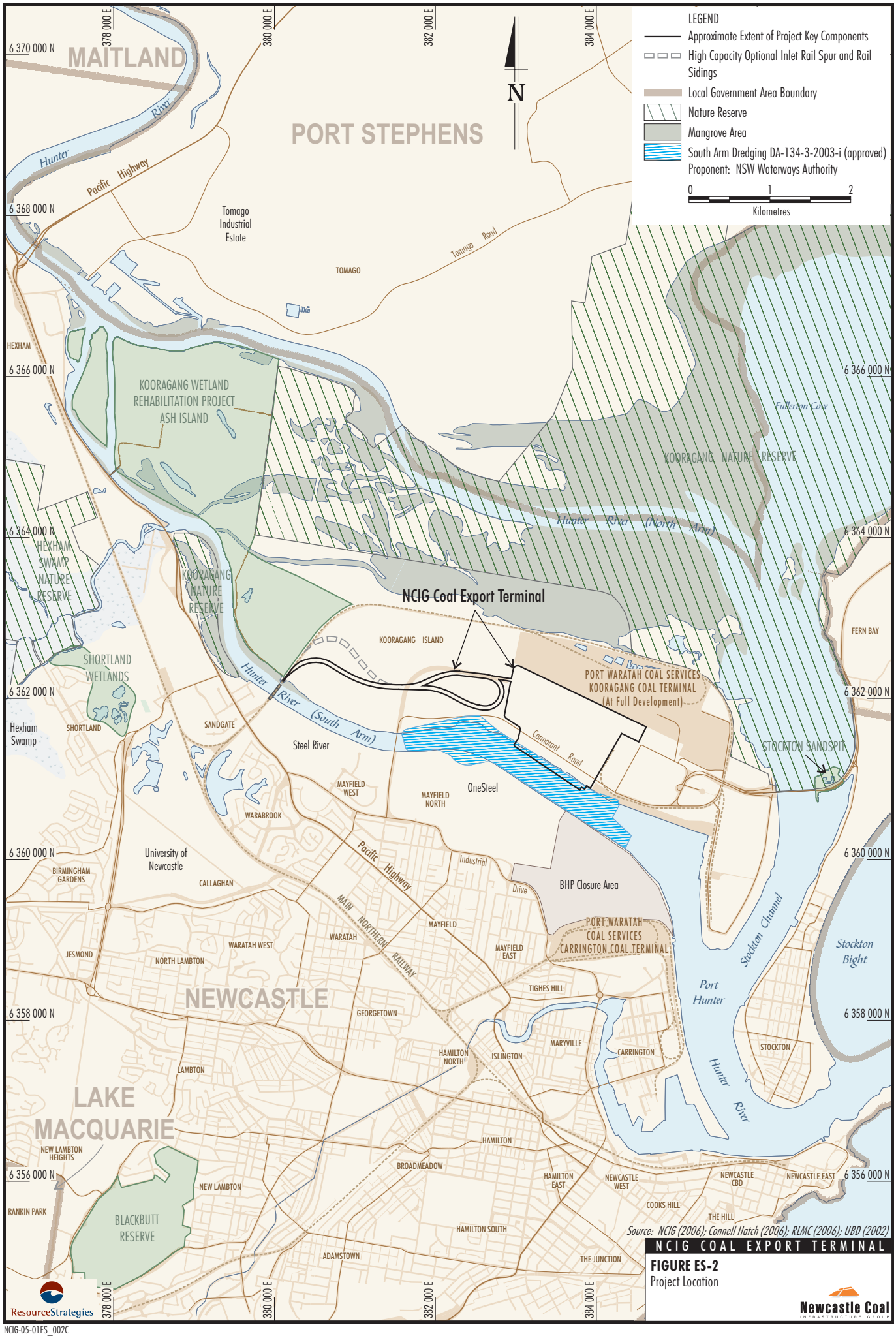

Source: NCIG (2006); Connell Hatch (2006); RLMC (2006); UBD (2002)

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FIGURE ES-2
Project Location

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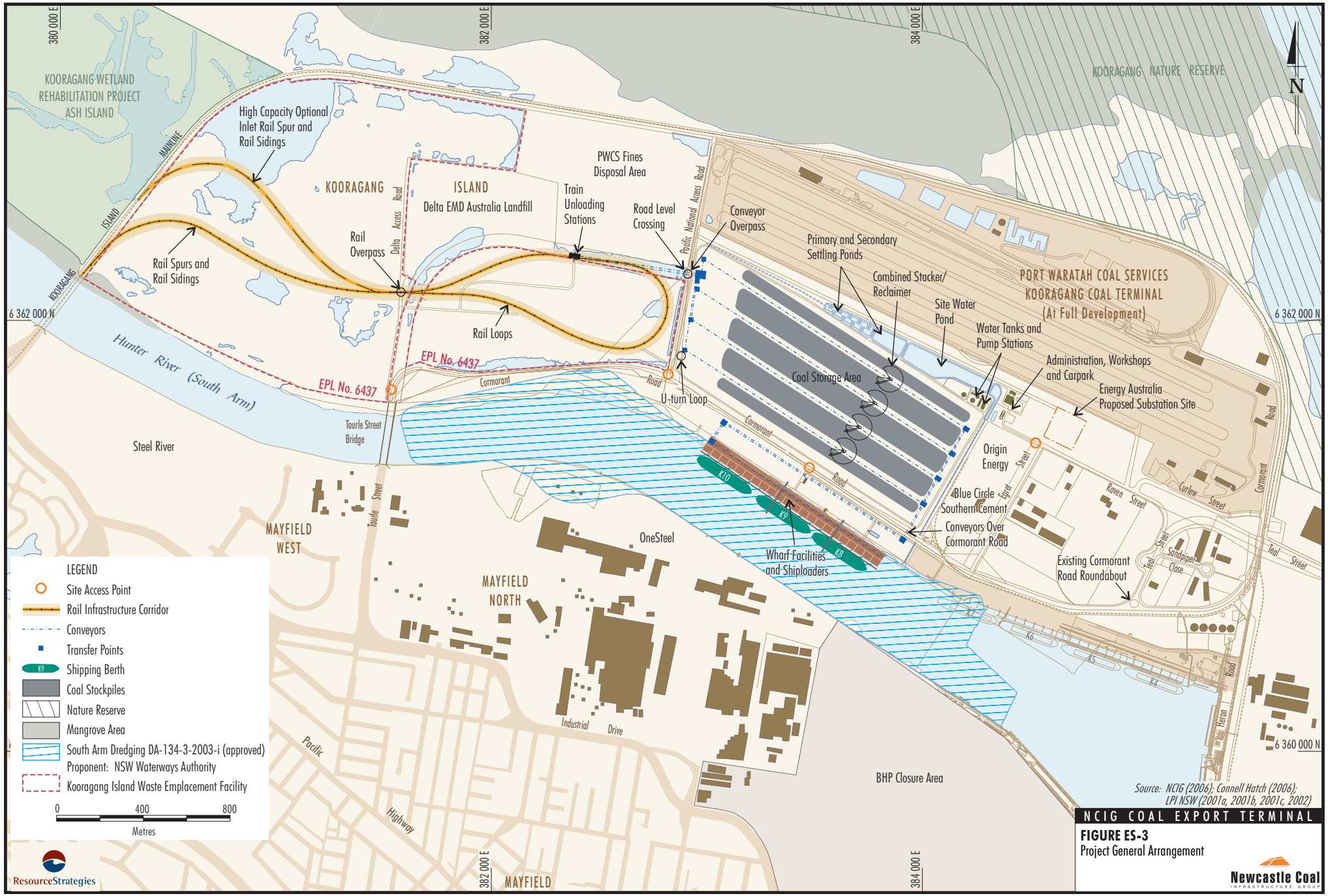

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Table ES-1
Project Snapshot

Summary	
Project	Construction and operation of a 66 Mtpa capacity CET including rail spurs from the Kooragang Island mainline, rail sidings, rail loops, train unloading, coal handling/stockpiling and shiploading systems.
Proponent	NCIG is the proponent for the Project. NCIG is a consortium of six coal companies including: Hunter Valley Energy Coal Limited; Centennial Coal Company Limited; Donaldson Coal Pty Ltd; Excel Coal Limited; Felix Resources Limited; and Whitehaven Coal Mining Pty Ltd.
Land Tenure	NCIG signed an Agreement for Lease of the Project site on 26 August 2005. The Agreement for Lease outlines the conditions that NCIG must satisfy (including obtaining Project Approval) prior to entering into a 35 year lease.
Coal Transport	Coal trains would enter the Project site from the Kooragang Island mainline via the rail spurs, follow the rail loops and empty their wagons into a hopper at train unloading stations. An average of approximately 26 trains would be unloaded each day. Up to a maximum of 40 trains would be unloaded on any one day.
Train Unloading	Two train unloading stations would be designed to operate at up to approximately 8,500 tonnes per hour (tph).
Coal Stockpiles	Coal would be stacked to a maximum height of approximately 25 metres (m) and would allow a maximum design capacity of up to approximately 6.6 million tonnes (Mt) of coal to be stockpiled at the CET. The coal stockpiles would be served by rail-mounted combined stacker/reclaimers and associated conveyor systems.
Wharf Facilities and Shiploaders	Three berths would be constructed for the CET. The berths would be served by two rail-mounted shiploaders. Each shiploader would operate at approximately 10,500 tph nominal capacity, peaking at up to 12,500 tph. Coal would be transferred from the coal stockpiles to the shiploaders via conveyors over Cormorant Road.
Shipping	The wharf would be capable of receiving Cape size vessels which carry up to 230,000 tonnes (t) of coal. Up to approximately 12 ships would be loaded per week.
Water Supply	Water supply requirements would be met from stormwater contained on-site and water purchased from the Hunter Water Corporation. Water would be recycled on-site to reduce the quantity of water purchased.
Project Life	Expected to exceed 30 years - dependent on the future development of coal reserves in the Hunter Valley and Gunnedah Basin.
Employment	Construction workforce of up to 500 employees and an operational workforce of 100 employees (at 66 Mtpa capacity).
Construction	Installation, construction and commissioning of rail infrastructure, coal storage area, wharf facilities and shiploaders. An initial 33 month construction phase is expected for the CET capacity to reach 33 Mtpa. The timing of further progressive development of the CET to 66 Mtpa would depend on market demand. Construction materials would be provided from dredging activities associated with the approved Extension of Shipping Channels within the Port of Newcastle (DA-134-3-2003-i).
Hours of Operation	Construction activities with the potential to be audible at surrounding residential areas would generally be undertaken between 7.00 am and 6.00 pm, up to seven days per week. Oversize loads may be transported outside of these times to minimise traffic impacts. Dredged material from the south arm of the Hunter River would be deposited at the Project site 24 hours per day and seven days per week. CET operations would take place 24 hours per day, seven days per week. Trains and shipping would operate 24 hours per day, seven days per week.
Access Roads	During the operation of the CET, the main access point for the Project would be via the entrance to the administration and workshop buildings located off the western end of Raven Street near the intersection of Egret Street and Raven Street. Secondary access points would be available to the wharf and rail infrastructure areas. Construction access would be via Roads and Traffic Authority approved access points.
Electricity Supply and Distribution	An internal power reticulation network would be developed for the Project. Electricity supply infrastructure to the Project would be provided by Energy Australia.

Project Operations

A schematic flow diagram of the Project is shown on Figure ES-4. Project operations include the following three main activities: train unloading; coal handling/stockpiling; and shiploading. These activities are described below.

Train Unloading

Coal trains would enter the Project site from the Kooragang Island mainline, travel along the Project rail spurs and empty their coal wagons into one of the two train unloading stations (Figures ES-3 and ES-4). Empty trains would then travel around the Project rail loops in a clockwise direction and rejoin the Kooragang Island mainline.

The Project would receive coal by rail transportation only. Based on a nominal 7,000 tonne (t) capacity train, an average of approximately 26 trains would be unloaded each day when operating at 66 Mtpa capacity.

Coal Handling/Stockpiling

Coal would be transferred from the train unloading stations to the coal storage area for stockpiling via stacking conveyors or conveyed directly to the wharf facilities and shiploaders. Up to four combined stacker/reclaimers would be used to stack coal onto the coal stockpiles and reclaim coal via bucket-wheel. The combined stacker/reclaimers would each have a stacking capacity of up to 8,500 tph and a reclaiming capacity of up to 10,500 tph. Coal would be reclaimed from the coal storage area and conveyed to the wharf facilities and shiploaders, as required.

Shiploading

At a maximum capacity of 66 Mtpa, the Project infrastructure would include two shiploaders to service the three berths. Shiploaders would operate at approximately 10,500 tph nominal capacity, peaking at up to 12,500 tph when drawing coal from the buffer bins. Based on a 180,000 t capacity ship, and allowing for the time taken to manoeuvre ships and equipment, up to approximately 12 ships would be loaded per week.

Project Construction Schedule

The Project construction phase would involve the construction and commissioning of rail infrastructure, the coal storage area, wharf facilities and shiploaders. An initial 33 month construction phase is expected for a Project capacity of 33 Mtpa.

Construction activities with the potential to be audible at surrounding residential areas would generally be undertaken between 7.00 am to 6.00 pm, up to seven days per week. Dredging operations and the associated deposition of dredged material on the Project site would be undertaken up to 24 hours per day. The movement of oversize vehicles to and from the Project site may be undertaken outside of daytime hours to minimise potential impacts on existing traffic flows.

Figure ES-5 shows the proposed construction schedule for the initial 33 Mtpa Project capacity. The timing of further development of the Project capacity up to 66 Mtpa would depend on coal market demand.

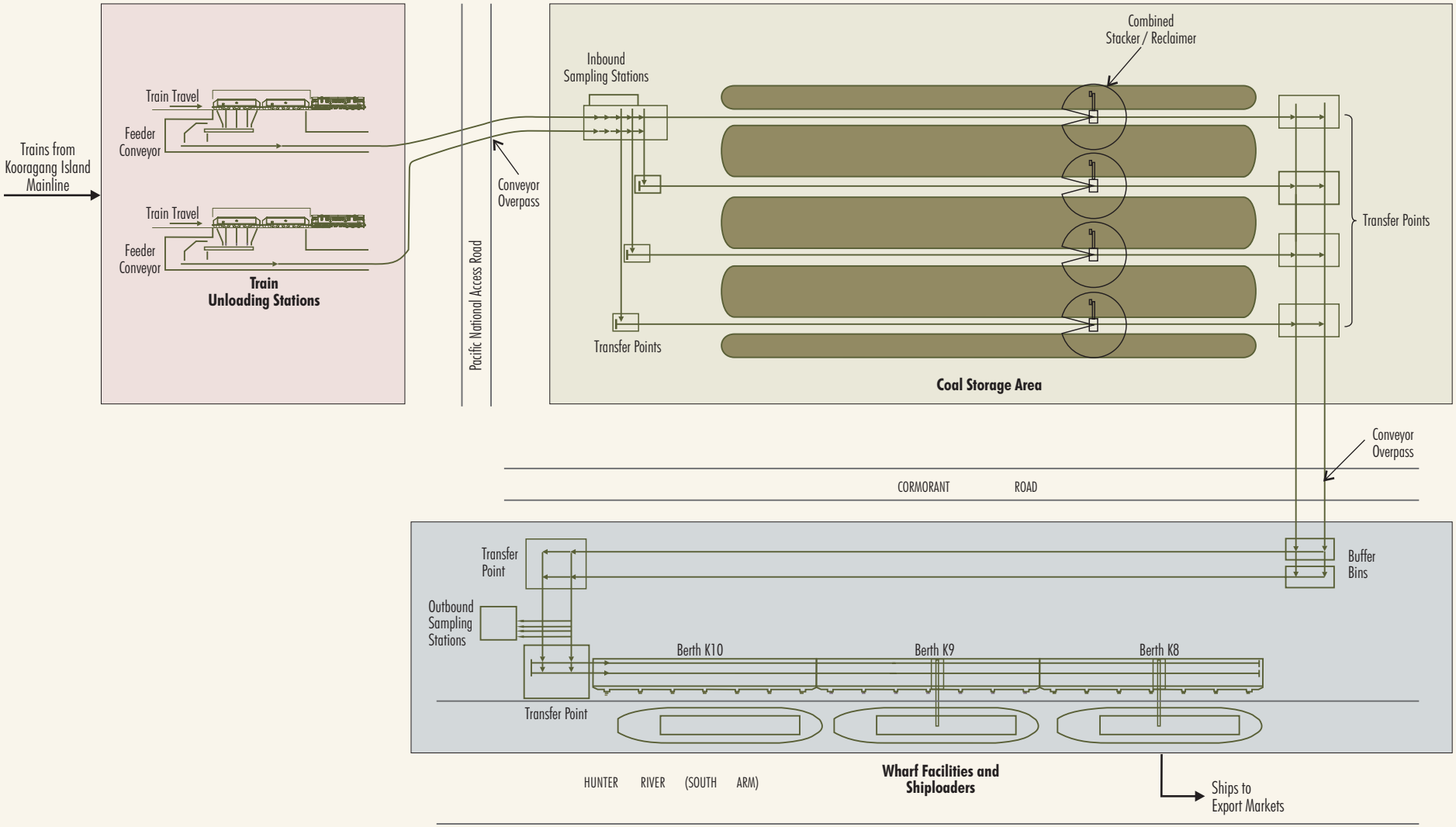
ES1.3 PROJECT APPROVAL PROCESS

This EA has been prepared to accompany the Project Application in accordance with Part 3A of the *Environmental Planning and Assessment Act, 1979* (EP&A Act).

A Planning Focus Meeting (PFM) for the Project was held on 8 March 2006. The objective of the PFM was to familiarise government stakeholders with the development proposal and to facilitate identification and consideration of environmental and other issues relevant to the Project. The meeting was attended by representatives of the following government stakeholders:

- the Premiers Department;
- the Department of Planning (DoP);
- the Department of Environment and Conservation (DEC);
- the NSW Maritime Authority;
- the Department of Primary Industries (DPI);
- the Australian Rail Track Corporation (ARTC); and
- the Newcastle Port Corporation (NPC).

From this consultation, the Director-General of the DoP developed the Environmental Assessment Requirements (EARs) for the EA which were issued on 26 April 2006 in accordance with the requirements of Part 3A of the EP&A Act and Part 1A of the *Environmental Planning and Assessment Regulation, 2000* (EP&A Regulation). This EA assesses the environmental impacts of the Project in accordance with the EARs (Table ES-2).



Source: After Connell Hatch (2005) and NCIG (2006)

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FIGURE ES-4
Schematic Flow Diagram

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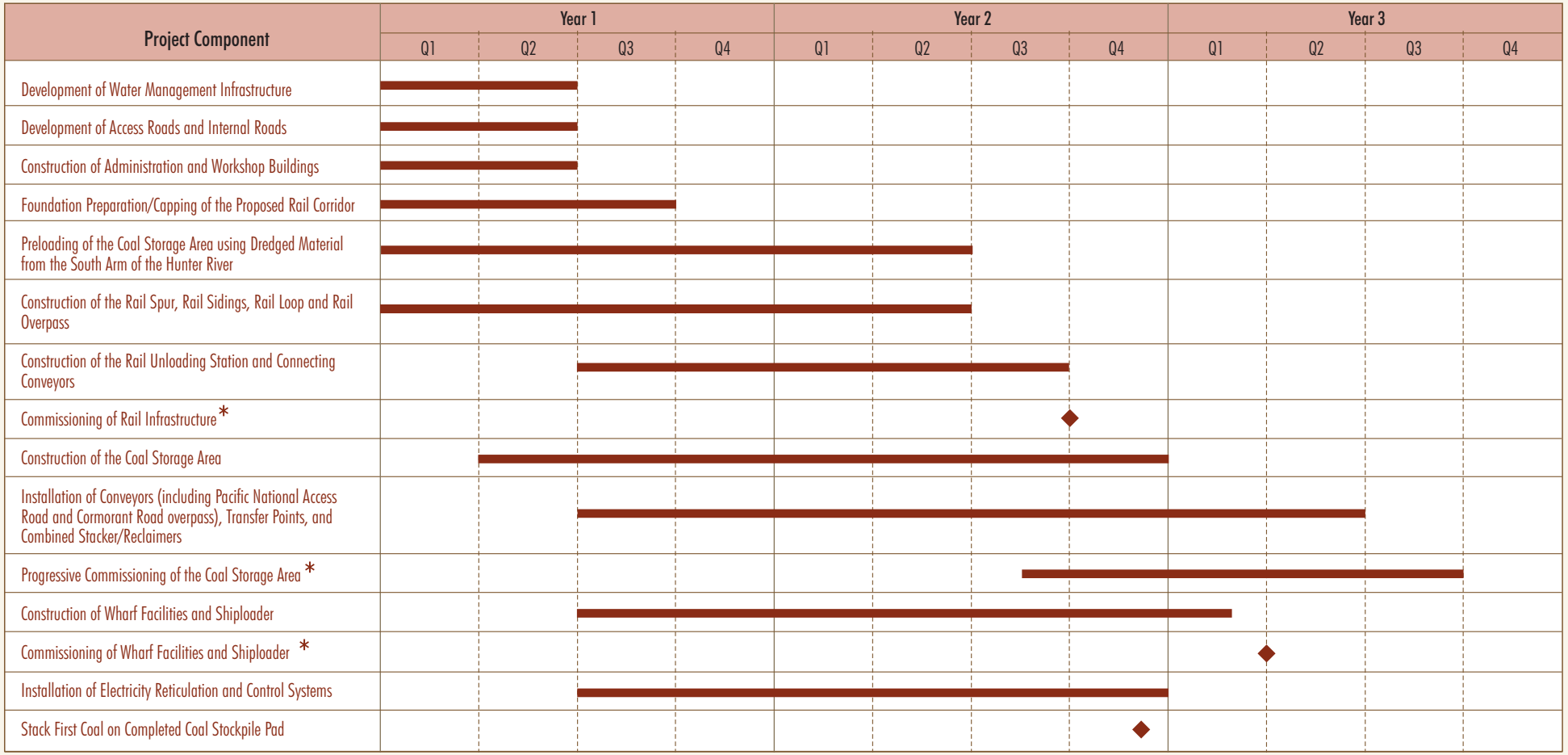
NCIG-05-01 ES_004C

Proposed Construction Schedule



* *For up to a 33 Mtpa Capacity CET. The timing of further development of the CET for a capacity up to 66 Mtpa would depend on coal market demand.*

Source: After Connell Hatch (2005) and NCIG (2006)

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FIGURE ES-5
Proposed Construction Schedule

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Table ES-2
Director-General's Environmental Assessment Requirements – Reference Summary

General/Key/Consultation Requirements	Main Text Reference
General Requirements	
The Environmental Assessment (EA) must include:	
Executive Summary.	Executive Summary – front of EA document
Description of the proposal including construction, operation and staging.	Sections 1 and 2
An assessment of the environmental impacts of the Project.	Section 4
Project justification with consideration of benefits and impacts of the proposal.	Section 3.9
Draft Statement of Commitments	Section 5
Certification by the author of the Environmental Assessment.	Front of EA Document
Key Assessment Requirements	
The EA must include assessment of the following key issues:	
Strategic Planning and Justification – The strategic basis for the Project with specific reference to the need for, the scale of, and any staging works associated with, the Project.	Sections 2 and 3.9
Air Quality Impacts – Air quality (including odour) impact assessment prepared in accordance with the *Approved Methods for Modelling and Assessment of Air Pollutants in NSW* (DEC, 2005a). The assessment must consider impacts of the Project in isolation and in a cumulative context during construction and operations and provide mitigation, monitoring and management measures.	Section 4.4
Noise Impacts – Noise impact assessment conducted in accordance with the *NSW Industrial Noise Policy* (EPA, 2000), *Environmental Noise Control Manual* (EPA, 2004a) and the *NSW Environmental Noise Criteria for Road Traffic Noise* (EPA, 1999). The assessment must consider the impact of the Project on the residential areas of Warabrook, Mayfield, Carrington and Stockton in isolation and in a cumulative context and provide mitigation, monitoring and management measures.	Section 4.3
Water Quality and Hydrological Impacts – Assessment of water quality (surface and groundwater) impacts during both the construction and operation of the Project. Consideration of how the Project will alter the surface profile of landfill areas, and how a capping strategy can be implemented for the altered areas that meets performance requirements. The assessment must also consider the hydrodynamics of the Hunter River, Hunter River estuary and associated aquifer systems. Water quality and hydrodynamic mitigation, monitoring and management measures must also be outlined.	Sections 2.4.1, 2.5.1, 2.8, 4.6 and 4.7
Ecological Impacts – Flora and Fauna impact assessments prepared in accordance with the *Guidelines for Threatened Species Assessment* (DEC and DPI, 2005). The assessments must specifically consider threatened and migratory species and communities listed under both NSW and Commonwealth legislation that have been recorded in the Kooragang and surrounding wetland areas.	Sections 4.8 and 4.9
Heritage Impacts – Aboriginal heritage assessment prepared in accordance with the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005b) and an assessment of Non-Aboriginal heritage.	Section 4.10
General Environmental Risk Analysis – Environmental risk analysis (ERA) to identify potential environmental impacts associated with the Project (construction and operation). The ERA must identify mitigation measures and potentially significant residual environmental impacts after the application of the proposed mitigation measures.	Section 3.8
Consultation Requirements	
Consultation must be undertaken with the following parties during the preparation of the EA: • Commonwealth Department of Environment and Heritage; • NSW Department of Environment and Conservation; • NSW Department of Natural Resources and Hunter Catchment Management Trust; • NSW Department of Primary Industries; • Australian Rail Track Corporation and NSW Rail Infrastructure Corporation; • Newcastle City Council and Port Stephens Council; • Mayfield Residents Group, Stockton Community Forum, Citizens and Kooragang Alliance (CAKA) and the Hunter Bird Observers Club; and • the local community.	Section 3.7

ES1.4 INTERACTION WITH OTHER ACTIVITIES

Dredging of the South Arm of the Hunter River

The NSW Maritime Authority holds a development consent (DA-134-3-2003-i) for the Extension of Shipping Channels within the Port of Newcastle (including dredging, excavation, treatment and disposal of sediments from the south arm of the Hunter River) (the Port Consent).

NCIG would implement the Port Consent where it is relevant to the Project. The Project is consistent with the Port Consent which has been assessed in an Environmental Impact Statement (EIS) (*Proposed Extension of Shipping Channels, Port of Newcastle Environmental Impact Statement* [Waterways Authority, 2003]) (Port Consent EIS), which provides as follows:

> *The South Arm has been identified as the most suitable location for port expansion in Newcastle, mainly because of the South Arm's proximity to transport infrastructure, its lower potential for significant environmental impacts (particularly in the Kooragang Nature Reserve) and its more passive hydraulic characteristics (compared to the North Arm of the Hunter River).*

The dredging of the south arm of the Hunter River for the purposes of providing deep water access to future berth sites at the Project wharf is assessed in the Port Consent EIS and is not assessed further in this EA.

Remediation of Contaminated Sediments in the South Arm of the Hunter River

The Port Consent EIS includes the remediation of known contaminated sediments adjacent to the former Broken Hill Proprietary Company Limited (BHP) steelworks site in the south arm of the Hunter River. In the order of 2% of the estimated 13.6 million cubic metres of material to be dredged under the Port Consent carries elevated concentrations of contaminants that will require treatment before appropriate disposal.

NCIG has consulted with BHP Billiton (BHPB) (the party responsible for the remediation of the contaminated sediments) with respect to the potential interaction of dredging activities.

Sufficient clean (uncontaminated) dredge material is available from the approved dredging of the south arm of the Hunter River to meet the fill requirements for development of the Project. Once removed from the south arm of the Hunter River, remediation of the contaminated sediments would be undertaken as a separate activity by BHPB and would not provide an impediment to the development of the Project.

Closure and Capping of Landfill Areas on Kooragang Island

The KIWEF was established in 1972 and is a licensed waste disposal facility that is under the control of the Regional Land Management Corporation (RLMC). The facility has not been utilised significantly for waste disposal since 1999, however, it remains a licensed facility and is managed by the RLMC in accordance with Environmental Protection Licence (EPL) 6437 under the *Protection of the Environment Operations Act, 1997* (POEO Act).

The closure/capping of the KIWEF to the satisfaction of the DEC would be undertaken by the RLMC and the timing of this activity is outside of the control of NCIG. The localised capping of any landfill areas traversed by the Project rail infrastructure would be undertaken by NCIG during construction in such a manner that can be readily integrated with the final capping of the KIWEF and meets the relevant goals of benchmark techniques 28 and 29 in *Environmental Guidelines: Solid Waste Landfills* (Section ES3.3.2).

ARTC Rail Upgrades to Improve Efficiency and Capacity

The ARTC is owned by the Commonwealth of Australia and is overseen by the Federal Minister for Transport and Regional Services and Minister for Finance and Administration. On 5 September 2004, the ARTC commenced a 60-year lease of the Hunter Valley rail lines. The ARTC goals include: improving reliability; reducing transit times on key corridors; and to increase the yield in train operations from track infrastructure. ARTC plans for improvements to the Hunter Valley rail lines are described in the ARTC Hunter Valley Corridor Capacity Improvement Strategy.

ARTC rail improvements would be undertaken progressively to maintain rail capacity ahead of coal export demand and the ARTC would be the proponent for these activities. Environmental approvals that are required for the various improvements to the rail system would also be progressively obtained by the ARTC in accordance with the assessment requirements of the NSW Government under the EP&A Act.

ARTC Rail Noise Performance

Rail noise along the Main Northern Railway that runs through the Hunter Valley is regulated via the ARTC EPL 3142 under the POEO Act. Within this EPL, Pollution Reduction Programs are to be implemented for railways within the ARTC network. The Pollution Reduction Programs are to provide strategies for controlling environmental impacts, including noise.

Upgrades referred to in the ARTC Hunter Valley Corridor Capacity Improvement Strategy would be subject to assessment under the EP&A Act (including public consultation requirements) and would be regulated by the DEC under EPL 3142. The environmental assessment for each component of physical upgrade in the rail network would provide the ARTC with the opportunity to develop and consider appropriate mitigation works in accordance with EPL 3142.

Train movements on the ARTC rail network are not part of the Project and are not assessed in this EA. Noise associated with the operation of trains on the Project rail infrastructure corridor is assessed in this EA.

ES2 CONSULTATION

NCIG is committed to an open and constructive consultation programme. Comprehensive consultation has been undertaken as part of the preparation of the EA. The consultation programme has provided an effective avenue to identify issues of concern or interest to stakeholders and to address these issues in this EA document where applicable. The consultation conducted has also provided an opportunity for stakeholders to provide material input to the design of the Project (e.g. rail design input by the ARTC).

Government Agencies

Consultation with relevant NSW Government agencies commenced in 2005. As described in Section ES1.3, a PFM was held in March 2006. A range of State and Local Government agencies were consulted during the preparation of the EA, including:

- Department of Planning (DoP);
- Department of Environment and Conservation (DEC);
- Department of Natural Resources (DNR);
- Hunter Catchment Management Authority (HCMA) and the Kooragang Wetland Rehabilitation Project (KWRP);
- Department of Primary Industries (DPI);
- Rail Infrastructure Corporation (RIC);
- Newcastle City Council (NCC);
- Port Stephens Council (PSC);
- Roads and Traffic Authority (RTA);
- Newcastle Port Corporation (NPC);
- NSW Maritime Authority;
- Regional Land Management Corporation (RLMC); and
- Hunter Water Corporation (HWC).

Consultation was also undertaken with State Members of Parliament and relevant federal government agencies including the ARTC and the Department of Environment and Heritage (DEH).

Public Consultation

Public consultation included formation of a Stakeholder Focus Group (SFG) in April 2006 which included members of the Mayfield Residents Group, Stockton Community Forum, Carrington Residents Group, Fern Bay Residents Group, Citizens and Kooragang Alliance and the KWRP Project Manager.

The members of the SFG were selected based on nominations from community members and other stakeholders. The SFG aims to assist with the transfer of information between the local community and NCIG and to provide a forum for constructive consultation regarding the key environmental issues for the Project. A number of meetings with the SFG were held during the preparation of the EA.

In addition to SFG meetings, consultation was undertaken with the following non-government agencies/groups:

- Hunter Bird Observers Club (HBOC);
- University of Newcastle; and
- Aboriginal groups.

NCIG has a website that provides Project information and contact details. The website can be found at www.ncig.com.au. The website will be maintained by NCIG throughout the Project approval process.

ES3 ENVIRONMENTAL ASSESSMENT

The following subsections outline the primary findings of the EA with respect to the key issues described in the EARs (Section ES1.3).

ES3.1 AIR QUALITY IMPACTS

An Air Quality Impact Assessment for construction and operation of the Project has been undertaken by Holmes Air Sciences. The assessment was conducted in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*.

Air Quality Criteria

Dust Deposition

The DEC amenity criteria for dust deposition seek to limit the maximum increase in the mean annual rate of dust deposition from a new development to 2 grams per square metre per month (g/m^2/month) and total dust deposition (i.e. including background air quality) to 4 g/m^2/month.

Concentrations of Suspended Particulate Matter

Exposure to suspended particulate matter can be associated with health and amenity impacts. The likely risk of these impacts depends on a range of factors including the size, chemical make-up and level of the particulate matter and the general health of the person.

Such particles (total suspended particulates [TSP]) are typically less than 50 micrometers (µm) in size and can be as small as 0.1 µm. Fine particles less than 10 µm are referred to as PM_{10}.

Suspended particulate matter criteria, standards and goals used in the assessment comprise:

- The National Environment Protection Measure (NEPM) 24-hour reporting standard for PM_{10} of 50 $\mu g/m^3$ (with five exceedances allowed per year) and the DEC 24-hour PM_{10} assessment criterion of 50 $\mu g/m^3$ (for concentrations due to the Project alone).
- The DEC annual assessment criterion for PM_{10} of 30 $\mu g/m^3$ has been interpreted as a concentration that should be met within the region (concentrations due to the Project and background).
- The National Health and Medical Research Council's (NHMRC) annual goal for TSP of 90 $\mu g/m^3$ (which has been interpreted as the assessment criterion for TSP concentrations due to the Project and background air quality).

Background Air Quality

As a component of the Air Quality Impact Assessment, background air quality data was collected and reviewed from the DEC monitoring stations at Beresfield, Newcastle and Wallsend and from the Steel River Industrial Estate. This data is described in the EA.

Potential Impacts of the Project

The Air Quality Impact Assessment considered the air quality emissions likely to be generated by the Project construction and operations and the predicted impact of these emissions in combination with existing background air quality in the vicinity of the Project.

Construction

Project construction would involve the construction and commissioning of rail infrastructure, the coal storage area, wharf facilities and shiploaders. Air quality impacts during construction would largely result from dust generated during earthworks and other engineering activities, which would be undertaken in a progressive manner. Construction activities would generally be limited to the daytime, which limits emissions from vehicle movements and material handling as compared to 24-hour activities during Project operations.

The air quality impacts during construction would be less than that during operations. Dust emissions during construction are expected to be readily controlled using water sprays (i.e. water trucks) and other standard dust control measures typically used at construction sites.

Management measures designed to minimise the potential for construction activities to result in contaminated particulates becoming airborne are described below.

Operations

Emissions associated with operation of the Project would be primarily derived from coal dust emissions from transfer points, stacking/reclaiming, loading/unloading and wind blown emissions (particularly from the surfaces of coal stockpiles).

Dust Deposition

Incremental increases in annual average dust deposition due to the Project only are not predicted to be above the applicable 2 g/m^2/month DEC amenity criterion at any receiver. Figure ES-6 shows the predicted increase in annual average dust deposition due to the Project.

Annual average dust deposition due to the Project plus background was not predicted to be above the applicable 4 g/m^2/month DEC amenity criterion at any receiver in the vicinity of the Project.

Suspended Particulate Matter

Concentrations of suspended particulate matter were calculated as 24-hour average and annual average PM_{10} concentrations and annual average TSP concentrations.

Maximum 24-hour average PM_{10} concentrations were not predicted to exceed the DEC Project only assessment criterion of 50 $\mu g/m^3$ at any receiver (including industrial receivers on Kooragang Island). Figure ES-7 shows the predicted maximum 24-hour average PM_{10} concentrations resulting from the Project.

Because the background air quality data indicated that there are occasional exceedances of 24-hour average PM_{10} criteria, an assessment was conducted by predicting 24-hour average PM_{10} concentrations associated with the Project and matching these predictions with contemporaneous PM_{10} monitoring data. This assessment concluded that there would be no additional exceedances of the of 24-hour average PM_{10} criteria due to the incremental effect from the Project.

Predicted annual average PM_{10} (Project plus background) concentrations were not predicted to be above the DEC assessment criterion at any receiver.

Annual average TSP (Project plus background) concentrations were not predicted to be above the NHMRC goal at any receiver.

Odour

Project construction would include the use of dredged materials from the south arm of the Hunter River as preload and engineering fill for construction. The Environmental Odour Laboratory at the University of New South Wales prepared an odour impact assessment for the Port Consent EIS. This study assessed potential odour emissions from the dredging operations. It was concluded that odour impacts at the nearest sensitive receivers would be within acceptable levels.

Self-heating of coal can give rise to smouldering fires in stockpiles, which can lead to significant emissions of smoke and odour. The potential for self-heating of stockpiled coal would be reduced at the Project through the use of water sprays and prudent stockpile management.

Greenhouse Gas

Greenhouse gases generated at the Project are estimated at approximately 40,000 tonnes of carbon dioxide equivalent per annum (t $CO_{2\text{-}e}$/year) for operations at 33 Mtpa and approximately 70,000 t $CO_{2\text{-}e}$/year for operations at 66 Mtpa.

The EA does not contain an assessment of the greenhouse gas emissions which may be emitted from mining operations, rail transport or the burning of coal that is exported through the Project.

The greenhouse gas emissions from mining and associated domestic rail transport are matters that have been or will be specifically considered in the assessment process for individual mining operations and rail expansion plans. The Project does not seek approval for any mining operations or rail expansions. Therefore, it would be inappropriate to include greenhouse gas emissions associated with mining operations or rail expansions when assessing the greenhouse gas emissions from the operation of the Project.

Similarly, it would be inappropriate to incorporate an assessment of the greenhouse gas emissions of the burning of coal that is exported through the Project, when assessing the impacts of the Project. The former are impacts created by third party consumers of coal and these impacts are regulated by regimes in the consumers' countries.

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

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FIGURE ES-6
Predicted Annual Average Dust Deposition Concentrations (g/m²/month) from the Project

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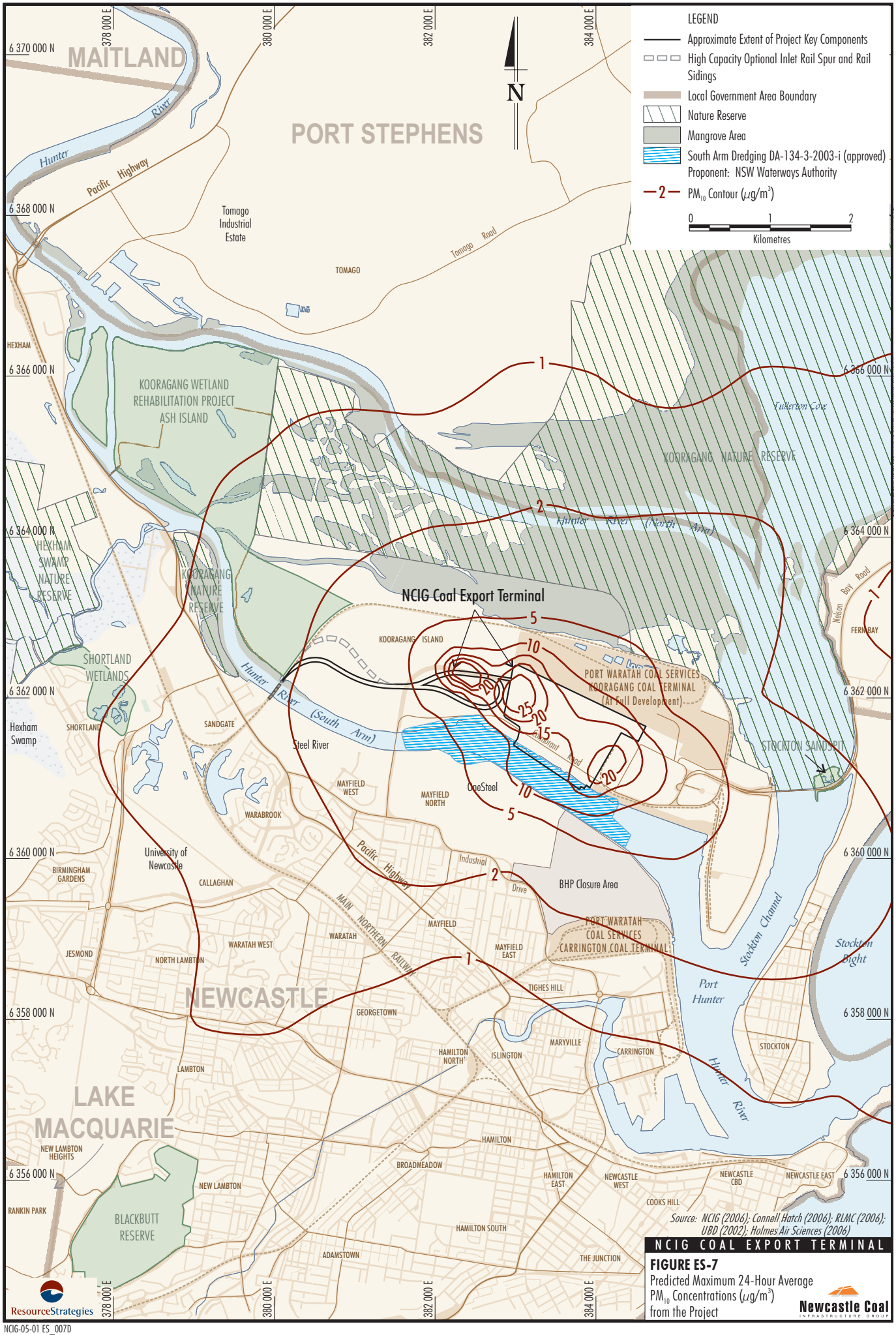
NCIG-05-01 ES_006C



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

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FIGURE ES-7
Predicted Maximum 24-Hour Average PM_{10} Concentrations ($\mu g/m^3$) from the Project

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NCIG-05-01 ES_007D

At a global level, if the Hunter Valley coal supply chain is unable to meet export demand, this would not stop the burning of coal by other countries as coal could be sourced from elsewhere.

The major destinations of Hunter Valley coal exports are Japan, South Korea and Taiwan, with strong demand also forecast for Malaysia. South Korea, Malaysia and Japan have all signed and ratified the Kyoto Protocol, while Taiwan has not. Each country that purchases Hunter Valley coal has the sovereignty to address their greenhouse gas emissions as they see fit within the conventions and protocols to which they are signatories.

Potential Cumulative Impacts

Potential cumulative impacts due to the Project coupled with background air quality and potential impacts from approved developments (including those not yet fully developed) in the vicinity of the Project were assessed. The approved developments detailed in Table ES-3 were considered in the cumulative assessment.

Of these, the Cargill Oilseed Processing Facility, Proposed Extension of Shipping Channels and Multi-Purpose Terminal are not expected to generate significant air quality emissions.

The quantitative cumulative assessment incorporating the approved expansion of the PWCS Kooragang Coal Terminal indicated the criteria for annual average PM_{10}, TSP and dust deposition would not be exceeded at the nearest residential receivers. With respect to the 24-hour PM_{10} concentrations, the cumulative assessment indicated total impacts would not present additional instances where PM_{10} concentrations would be above the 50 $\mu g/m^3$ goal at the nearest residential receivers.

Mitigation Measures, Management and Monitoring

Construction

Air quality controls during construction of the Project would include the following:

- areas to be disturbed would be minimised as far as practicable;
- exposed surface areas would be stabilised as quickly as practicable;
- soils would be removed from trucks entering and leaving the Project site; and
- exposed surface areas and traffic areas would be watered using water trucks (or similar) to minimise the generation of dust.

With respect to the potential for liberation of potentially contaminated dust, a Soils and Excavation Management Plan (SEMP) would be prepared for the Project. The SEMP would describe the measures to control contaminated soils and dust generation/volatilisation potential. These measures would include:

- using water sprays to control dust;
- minimising the surface area disturbed by excavation at any one time;
- confining vehicle movements to designated access routes;
- limiting the speed of vehicles on unpaved roads; and
- immediate encapsulation of materials considered unsuitable for use as construction fill.

Table ES-3
Description of Approved Developments Included in the Cumulative Air Quality and Noise Assessments

Name of Development	Proponent	Description	Current Status
Kooragang Coal Terminal	Port Waratah Coal Services (PWCS)	Coal export terminal.	Currently operating at 64 Mtpa (Stages 1, 2 and 3A). Stage 3 remainder – not yet fully developed.
Cargill Oilseed Processing Facility	Cargill Australia Ltd	Oilseed processing facility.	Stage 1 – operating. Stage 2 – not yet fully developed.
Proposed Extension of Shipping Channels in the Port of Newcastle	NSW Waterways Authority	Dredging project (south arm of the Hunter River).	Not yet fully developed (temporary).
Multi-Purpose Terminal	BHP Company Limited	Bulk export terminal.	Not yet developed.

Operations

During the development of the dispersion modelling undertaken by Holmes Air Sciences, a number of steps were taken to develop air quality mitigation measures for the Project. Specific air quality control measures that are proposed for the Project include:

- moisture levels of the coal stockpiles would be monitored and maintained to minimise dust emissions;
- a dust extraction system would be provided at the train unloading stations, with the hopper designed for dust containment;
- coal transfer conveyors would be covered or enclosed on three sides, except for yard and wharf conveyors;
- conveyors over roads would be fully enclosed;
- conveyor transfer points would be fully enclosed;
- buffer bins would be fully enclosed; and
- water sprays would be used on stockpiles and immediately after conveyor transfer points.

The water sprays on the coal stockpiles would include rain gun type sprays mounted on the berms approximately 60 m apart on each side of the coal stockpiles. The system would be controlled by software integrated with the on-site meteorological station. The moisture status of coal stockpiles and relevant meteorological conditions would be monitored and dust suppression sprays on the coal stockpiles would be automatically activated to minimise dust emissions as required.

Odour Management

An Odour Management Plan for the dredging activities would be implemented under the Port Consent. A Spontaneous Combustion Management Plan would also be developed for the Project and would include coal stockpile management measures; monitoring of potential causes of spontaneous combustion events; and corrective action in the event of spontaneous combustion.

Air Quality Monitoring

An Air Quality Monitoring Programme (AQMP) would be prepared for the construction and operation of the Project. Notwithstanding the predicted compliance with applicable air quality criteria, the AQMP would detail specific actions for responding to exceedances of criteria and complaints should they occur.

A network of up to six dust depositional gauges would be installed for the Project prior to the commencement of construction (Figure ES-8). A high volume air sampler (HVAS) would be installed at Stockton to facilitate monitoring of PM_{10} concentrations (Figure ES-8).

ES3.2 NOISE IMPACTS

A Construction, Operation and Road Transport Noise Impact Assessment has been undertaken by Heggies Australia in accordance with the requirements of the *NSW Industrial Noise Policy* (NSW INP), *Environmental Noise Control Manual* (ENCM) and *Environmental Criteria for Road Traffic Noise* (ECRTN).

Applicable Criteria/Goals

Construction Noise

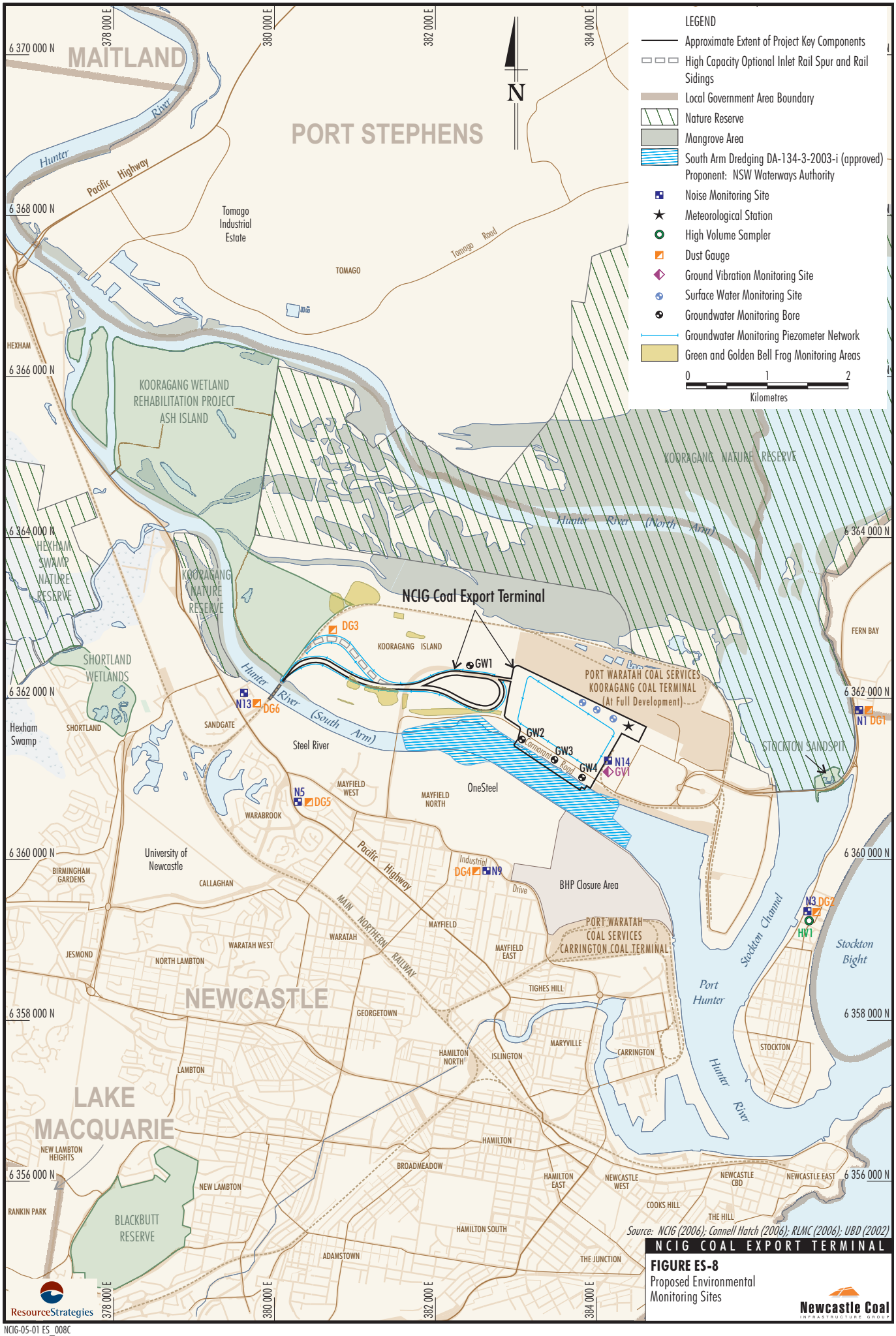
Construction noise is assessed with regard to the ENCM. The ENCM provides noise limits for construction periods of up to 26 weeks. As the duration of the Project construction phase is greater than 26 weeks, Project construction noise criteria are the same as the intrusive criteria which apply for Project operations (as described below).

Construction Vibration

Up to four piling rigs are anticipated to be required during construction of the rail, coal storage and wharf facilities. Relevant damage and annoyance criteria based on German Standard DIN 4150-3 1999 "*Structural Vibration Part 3: Effects of Vibration on Structures*" and the DEC interim guideline "*Assessing Vibration: A Technical Guideline"*.

Operations Noise

In accordance with NSW INP objectives, background noise levels for the Project site and surrounds have been characterised. Intrusive criteria for noise sensitive receivers are calculated by adding 5 dBA to the Rating Background Level that has been determined from measured background levels. Applicable amenity criteria have been determined by calculation using algorithms in the NSW INP. Project-specific noise assessment criteria derived from this approach for each receiver area are outlined in Table ES-4.



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

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FIGURE ES-8
Proposed Environmental Monitoring Sites

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NCIG-05-01 ES_008C

Table ES-4
Project-Specific Noise Assessment Criteria (dBA re 20 µPa)

Receiver Area	Noise Sensitive Receiver Type	Project-Specific Noise Assessment Criteria (dBA)					
		Intrusive $L_{Aeq(15\ minute)}$			Amenity $L_{Aeq(period)}$		
		Day[1]	Evening[1]	Night-time[1]	Day[1]	Evening[1]	Night-time[1]
Fern Bay (West)	Residential	55	47	49	60	48	38
Fern Bay (East)	Residential	45	49	47	60	50	41
Stockton (West)	Residential	47	49	49	60	47	38
Stockton (East)	Residential	46	48	48	60	50	39
Warabrook/Mayfield West	Residential	50	51	46	60	48	41
Mayfield	Residential	51	52	48	60	48	39
Carrington	Residential	47	46	42	60	48	43
Sandgate	Commercial[2]	Intrusive noise not applicable[3]			65	65	65
Mayfield West	Steel River	Intrusive noise not applicable[3]			65	65	65
Kooragang Island	Industrial	Intrusive noise not applicable[3]			70	70	70
Mayfield North	Industrial	Intrusive noise not applicable[3]			70	70	70
Any	School	Intrusive noise not applicable[3]			External 45 when in use		
Any	Hospital	Intrusive noise not applicable[3]			External 50 when in use		

Source: Appendix A

[1] Daytime 7.00 am to 6.00 pm, Evening 6.00 pm to 10.00 pm, Night-time 10.00 pm to 7.00 am.

[2] Receiver type is commercial due to zoning as Urban Services 4(A) in the *Newcastle Local Environmental Plan, 2003*.

[3] Intrusive criteria apply to residential receivers only.

Cumulative Operational Noise

The NSW INP provides cumulative noise assessment guidelines that address existing and successive industrial development by setting acceptable (45 dBA) and maximum (50 dBA) cumulative $L_{Aeq(period)}$ amenity levels for industrial (i.e. non-transport related) noise in an area.

Road Traffic Noise

Based on the ECRTN, Nelson Bay Road, Cormorant Road and Industrial Drive are classified as “arterial roads” and the applicable traffic noise goals for these roads are presented in Table ES-5. Further, where the ECRTN establishes that the nominated traffic noise goals are already exceeded, traffic associated with a new development should not lead to an increase in the existing traffic noise of more than 2 dBA.

Potential Impacts

Construction Noise

Construction activities with the potential to be audible at surrounding residential areas would generally be undertaken between 7.00 am and 6.00 pm, up to seven days per week. Dredging operations in accordance with the Port Consent and the associated deposition of dredged material on the Project site would be undertaken up to 24 hours per day. The movement of oversize vehicles to and from the Project site may be undertaken outside of daytime hours to minimise potential impacts on existing traffic flows.

The construction noise impact assessment predicts Project construction noise emissions would be below the relevant assessment criteria at noise sensitive receivers.

Construction Vibration

The construction vibration assessment concluded that the damage and annoyance risk to all residential receivers is negligible. The damage risk to the nearest commercial and industrial receivers is also considered negligible.

Table ES-5
NSW Environmental Criteria for Road Traffic Noise

Receiver Area (Road)[1]	Policy	Descriptor	Traffic Noise Goal
• Fern Bay (Nelson Bay Road) • Kooragang Island (Cormorant Road) • Warabrook/Mayfield (Industrial Drive)	Land use developments with the potential to create additional traffic on existing freeways/arterials	Daytime[2] $L_{Aeq(15hour)}$	60 dBA
		Night-time[3] $L_{Aeq(9hour)}$	55 dBA

Source: Appendix A
[1] Refer to Figure ES-9.
[2] 7:00 am to 10:00 pm.
[3] 10:00 pm to 7:00 am.

The risk of annoyance to the occupants of commercial and industrial receivers is also minimal at all but the very nearest adjacent industrial neighbours to the east of the Project site. The annoyance risk to the closest offices and workshops would only be temporary.

Operations Noise

Project operations at a capacity of 66 Mtpa are considered to be worst-case with respect to noise emissions. Two operational scenarios were developed to be representative of worst-case noise emissions for noise sensitive receivers to the east and west, respectively.

The predicted Project operations intrusive and amenity noise emissions are below the relevant assessment criteria for all noise sensitive receivers under all scenarios assessed.

The predicted outer envelope (i.e. east and west combined) night-time intrusive and amenity noise contours under potential adverse conditions are presented on Figure ES-9 and ES-10, respectively. These contours were developed by merging the contours generated from the east and west operational scenarios, to graphically represent the overall worst-case noise emission scenario.

Road Transport Noise

The maximum Project-related incremental increase in traffic flows would occur during the construction period along Cormorant Road. The road traffic noise assessment indicates that the anticipated increases in vehicle movements associated with construction corresponds to a negligible (0.1 to 0.5 dBA) increase in the existing daytime $L_{Aeq(15hour)}$ and night-time $L_{Aeq(9hour)}$ noise levels respectively and hence would comply with the requirements of the ECRTN.

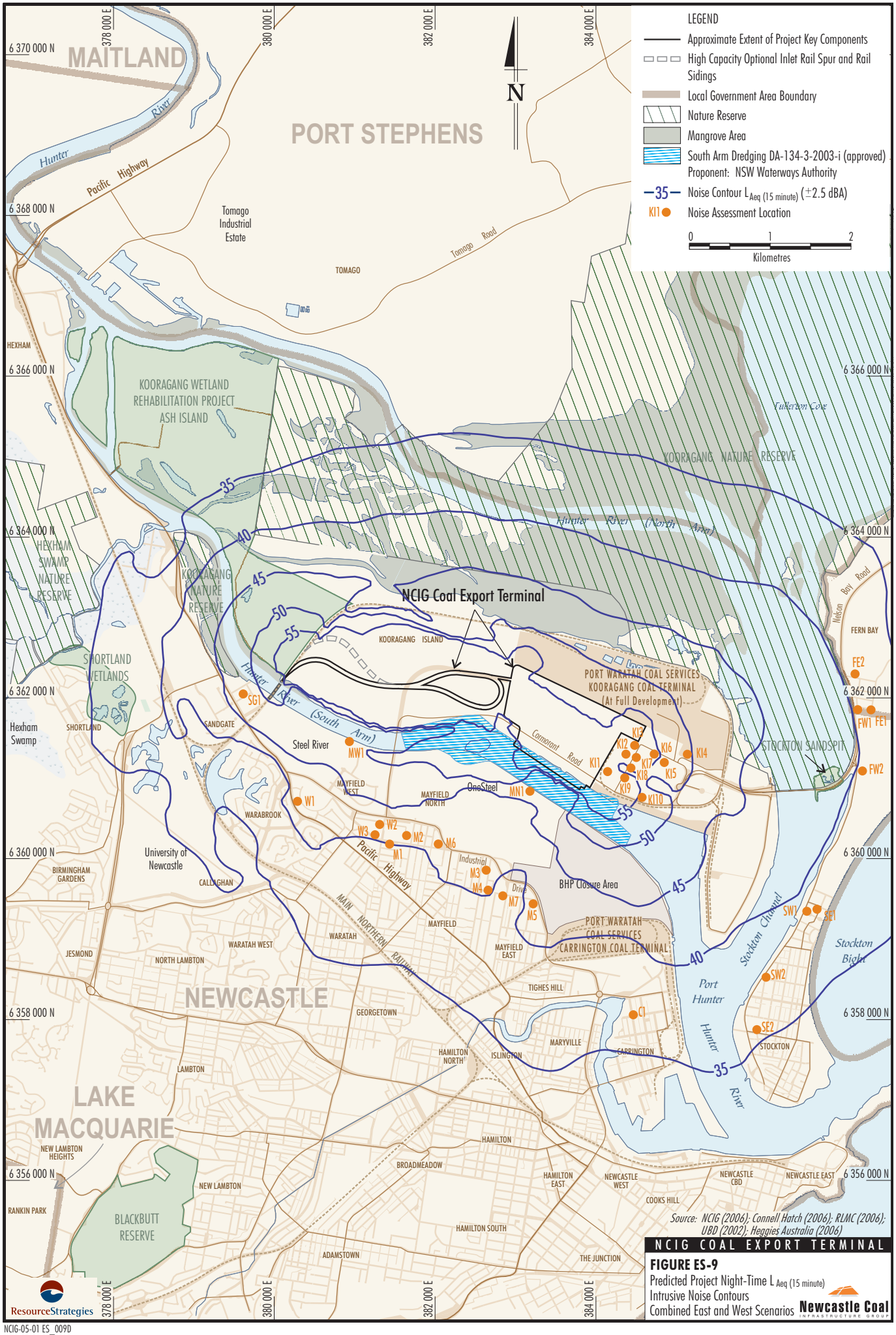
Operations Project traffic flows would be significantly lower than during the construction period. Therefore, the increase in road noise during operation of the Project would be lower than for construction.

Cumulative Operational Noise

In accordance with the NSW INP and the Project EARs (Section ES1.3), an assessment was undertaken by Heggies Australia to cumulatively assess the Project and approved developments (including those not yet fully developed) in the vicinity of the Project with respect to the amenity criteria. Table ES-3 describes the industrial developments that were considered in the cumulative noise assessment.

The night-time cumulative amenity noise levels are calculated by summing the existing industrial noise sources; noise from approved developments; and the predicted Project operational noise amenity levels.

Cumulative noise amenity levels are predicted to remain below the maximum noise amenity level of 50 dBA at all residential receiver locations. The likelihood of all existing, approved and proposed developments listed in Tables ES-3 being developed and subsequently emitting maximum noise emission at the same time is considered to be remote and therefore this assessment is considered to be conservative.



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

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FIGURE ES-9

Predicted Project Night-Time $L_{Aeq\ (15\ minute)}$ Intrusive Noise Contours Combined East and West Scenarios

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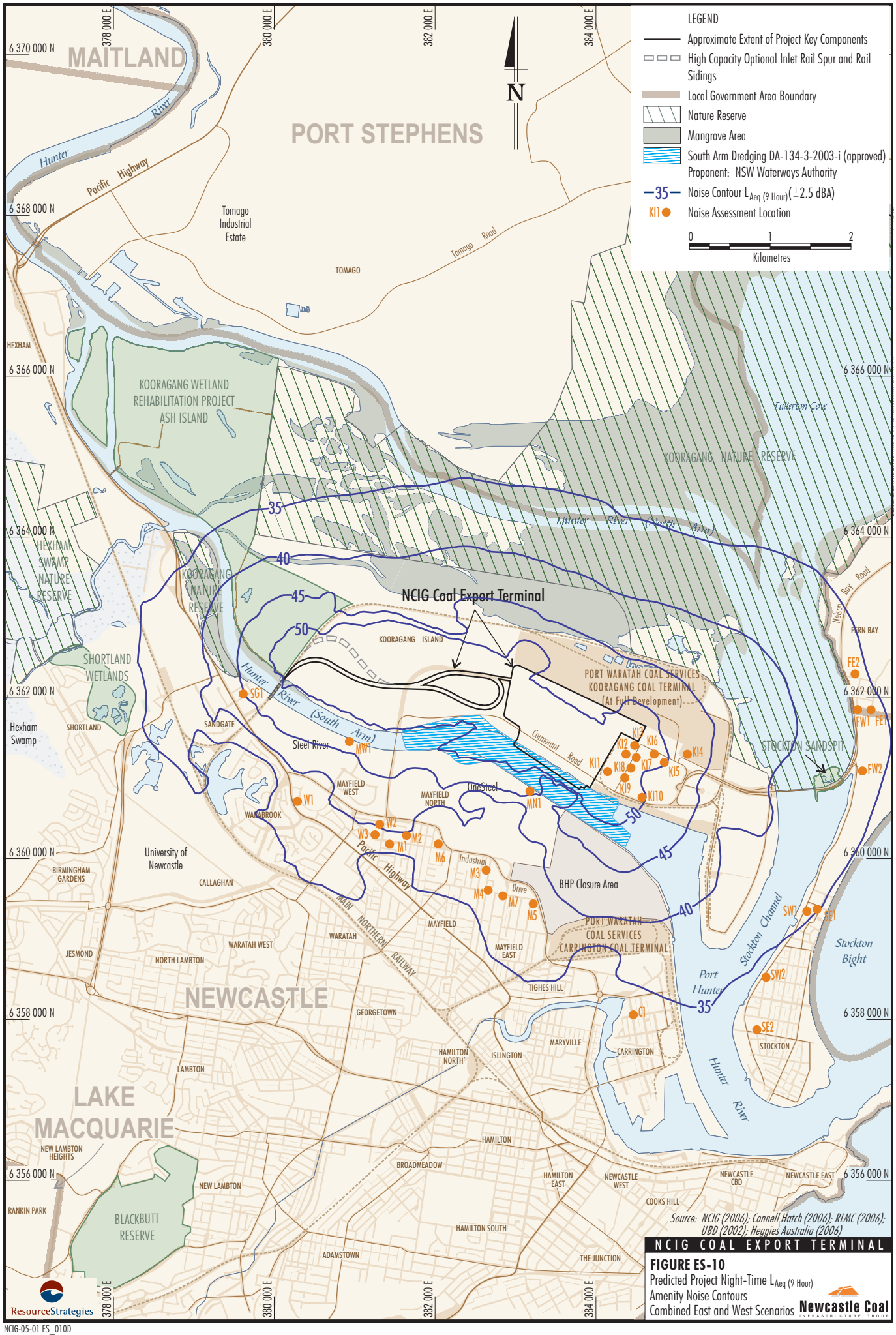

Source: NCIG (2006); Connell Hatch (2006); RLMC (2006); UBD (2002); Heggies Australia (2006)

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FIGURE ES-10

Predicted Project Night-Time $L_{Aeq\ (9\ Hour)}$ Amenity Noise Contours Combined East and West Scenarios

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Newcastle Coal Infrastructure Group

NCIG-05-01 ES_010D

Mitigation Measures, Management and Monitoring

During the noise impact assessment, a number of iterative steps were taken to develop noise mitigation measures for the Project, including:

- preliminary noise modelling to identify potential areas of affectation;
- further modelling incorporating various noise mitigation measures to assess their relative effectiveness;
- consideration of various combinations of noise mitigation measures to minimise the potential noise affectation zone; and
- adoption by NCIG of a range of noise mitigation measures that significantly reduce Project noise emissions.

The noise mitigation and management measures included in the predictive modelling and which would be adopted for the Project include:

- Fixed plant and mobile equipment would be commissioned and maintained to remain below specified maximum operating L_{Aeq} sound power levels.
- An earth bund approximately 1,500 m in length would be constructed on the northern side of Cormorant Road. The bund would be located east of the Pacific National access road between the coal storage area and Cormorant Road. The bund would essentially be an extension of, and of a similar height to, the existing southern embankment of the KIWEF.

In addition, following initial noise modelling and conduct of the Project Environmental Risk Analysis (ERA), further noise propagation control was identified comprising a purpose-built acoustic barrier for a section of the rail infrastructure corridor. The implementation of the acoustic barrier would be dependant on the actual progressive development of the Project capacity.

Noise Monitoring Programme

A Noise Monitoring Programme (NMP) would be developed for construction and operation of the Project. Project noise monitoring would comprise quarterly attended and unattended monitoring. Quarterly monitoring would be conducted at up to six locations (Figure ES-8).

Construction Vibration Monitoring

Monitoring of construction vibration would be undertaken at adjacent industrial receivers within 180 m of piling activities to assess compliance with relevant criteria. Vibration monitoring would be documented in the Construction Environmental Management Plan (CEMP). The CEMP would incorporate mechanisms for responding to any vibration-related complaints that may be received.

ES3.3 WATER QUALITY AND HYDROLOGICAL IMPACTS

ES3.3.1 Surface Water

The Land Contamination and Groundwater Assessment undertaken by RCA Australia for the Project included the characterisation of existing surface water resources on the Project site. Surface water management studies have also been undertaken by NCIG and its Project designers (Connell-Hatch) as part of the Project feasibility studies.

Existing Environment

Kooragang Island is defined by the north and south arms of the Hunter River which drain to the Pacific Ocean (Figure ES-2). Kooragang Island was originally a series of deltaic islands near the mouth of the Hunter River until the land was reclaimed and converted into a single island by in-filling of tidal mudflats and creeks. The Project site has been heavily disturbed by land reclamation activities and the long term disposal of dredge spoil and industrial waste.

The Project rail infrastructure corridor traverses the KIWEF (Figure ES-3). Surface water features in this area comprise water bodies created by the existing Kooragang Island mainline rail embankment, emplacement cells associated with the KIWEF and a number of depressions in the KIWEF landform that intermittently fill with water in response to rainfall runoff.

A discussion of relevant surface water quality monitoring data is provided in the EA. The water quality monitoring indicates that surface water quality reflects the historical land use of the Project site (ie. the KIWEF and general placement of dredge spoil and industrial waste).

The Lower Hunter River Flood Study conducted by the NCC and Port Stephens Council in 1994 indicates that with the exception of south arm of the Hunter River, all land subject to development for the Project is above the 1% annual exceedance probability (AEP) flood level.

Potential Impacts

Water Quality

Surface water runoff from disturbance areas during construction and operation of the Project has the potential to contain sediments, soluble salts, fuels, oils, grease and other contaminants.

Mitigation Measures, Management and Monitoring

The Project water management system was developed by NCIG and Connell-Hatch to minimise potential surface water quality impacts. Key components of the water management system include:

- the separation of surface water runoff generated from within the active Project operations areas from that generated from surrounding areas;
- containment and re-use of water on-site; and
- the implementation of adequate water management controls to minimise the potential for impacts to off-site water resources.

A Site Water Management Plan (SWMP) would be developed for the construction and operation phases of the Project in consultation with relevant authorities. The SWMP would describe the Project water management system and surface water monitoring programme.

The SWMP would be reviewed and revised as required in consultation with relevant authorities and would be periodically updated over the life of the Project. Proposed surface water monitoring sites are shown on Figure ES-8.

Erosion and sediment control measures would be designed in accordance with the above water management principles and would involve the preparation and implementation of an Erosion and Sediment Control Plan (ESCP). The ESCP would describe the sequencing of construction/ development works to minimise the area of disturbance at any given time in conjunction with the progressive stabilisation of disturbed areas.

ES3.3.2 Groundwater and Land Contamination

The Land Contamination and Groundwater Assessment conducted by RCA Australia incorporated a *Stage 1 – Preliminary Investigation* of the Project site in accordance with State Environmental Planning Policy (SEPP) 55 and the Department of Urban Affairs and Planning (DUAP) and Environmental Protection Authority (EPA) (1998) *Managing Land Contamination – Planning Guidelines SEPP 55 – Remediation of Land* (Land Contamination Guidelines).

For the purpose of the Land Contamination and Groundwater Assessment, the site has been divided into four land investigation areas (Figure ES-11):

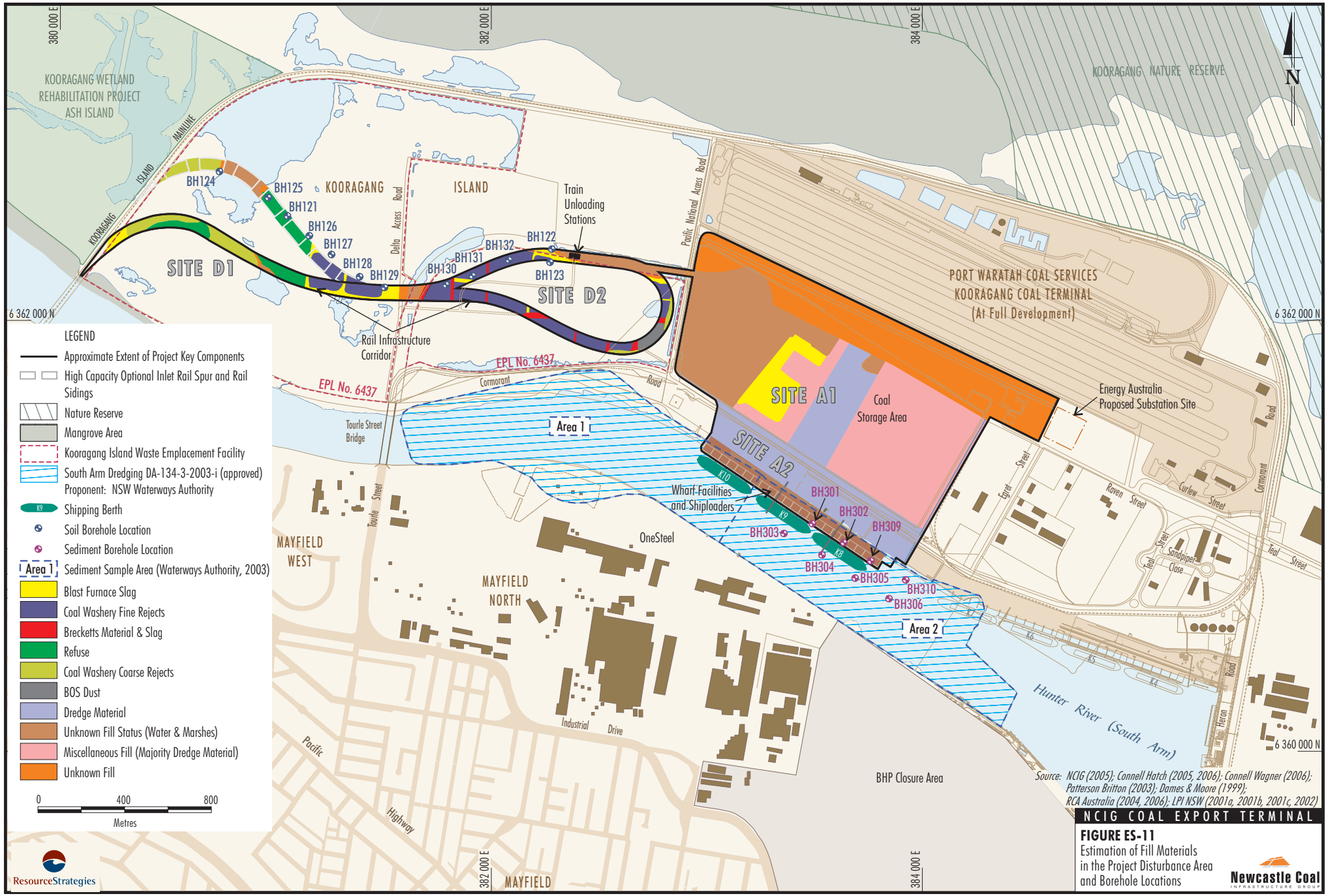
- Site A1 – including the Project coal storage area;
- Site A2 – south of Cormorant Road including the Project wharf facilities and shiploaders;
- Site D1 – the KIWEF west of the Delta access road traversed by the Project rail infrastructure corridor; and
- Site D2 – the KIWEF between the Delta access road and the Pacific National access road traversed by the Project rail infrastructure corridor and train unloading stations.

Existing Environment

Land Contamination Site History

As a component of Land Contamination and Groundwater Assessment, previous land contamination studies at the Project site and the results of additional sampling conducted in 2006 were reviewed, including:

- soil sampling and analysis;
- site inspections;
- interviews; and
- review of aerial photographs.



Source: NCIG (2005); Connell Hatch (2005, 2006); Connell Wagner (2006); Patterson Britton (2003); Dames & Moore (1999); RCA Australia (2004, 2006); LPI NSW (2001a, 2001b, 2001c, 2002)

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FIGURE ES-11
Estimation of Fill Materials in the Project Disturbance Area and Borehole Locations

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NCIG-05-01 ES_011C

Kooragang Island was used for agriculture (predominately grazing and dairy farming) during the 1800s up to the early to mid 1900s. In the late 1880s, dredging of the Newcastle Harbour commenced. Dredged materials (i.e. sand, silt and clay) from these dredging activities were used intermittently to reclaim the tidal estuary up until the 1950s. The enactment of the *Newcastle Harbour Foreshore Improvement Act 1953* (NHFI Act) in 1953, permitted the NSW Public Works Department to reclaim land and convert the islands into an area suitable for industrial use (Kooragang Island was named in 1968).

In 1972, BHP (and its subsidiaries) commenced utilising the KIWEF (Sites D1 and D2) as a solid waste facility. Solid waste disposal at the site ceased in late 1999 following the closure of the former BHP steelworks site. Sites A1 and A2 comprise vacant industrial lots and have only been previously used for filling activities and agricultural use (including aerial spraying).

The presence of land contamination at the Project site is described in the EA and reflects the past land use history. Figure ES-12 provides a series of aerial photographs illustrating development of the Project site since 1954.

Hydrogeology

Kooragang Island is located to the south and west of the Tomago and Stockton groundwater sources, respectively (Figure ES-13). Fullerton Cove is located to the north-east of Kooragang Island between the Tomago and Stockton groundwater sources (Figure ES-13). The Kooragang Wetland system surrounds the Project site.

The Project site hydrogeology comprises two aquifers (fill and estuarine). The two aquifers are separated by a clay aquitard, however, drill data indicates that the clay aquitard is not present in all areas. The unconfined fill aquifer is primarily recharged by rainfall and the groundwater flow is primarily horizontal, generally flowing towards the nearest surface waterbody (Figure ES-14). The water table has been identified at depths between 0.4 and 1.2 m from the surface. The estuarine aquifer consists of sand of a moderate to high permeability.

Groundwater quality monitoring data collected from the Project site and surrounds is described in the EA and reflects the past land use history as well as natural factors.

Potential Impacts, Mitigation Measures, Management and Monitoring

The potential land contamination and groundwater impact mechanisms associated with the Project include the following:

- Contact with contaminated soils and/or acid sulphate soils in Project excavations during construction.
- Contact with, or uncontrolled release of, contaminated water that accumulates in Project excavations during construction.
- Project excavations resulting in the connection of groundwater aquifer systems leading to the mobilisation of contaminated groundwater.
- Preloading of soils during construction of Project elements (i.e. rail embankment and coal storage area) resulting in the mobilisation of contaminated groundwater.
- Infiltration of water through the Project rail infrastructure corridor compromising the long-term performance of the KIWEF capping strategy.

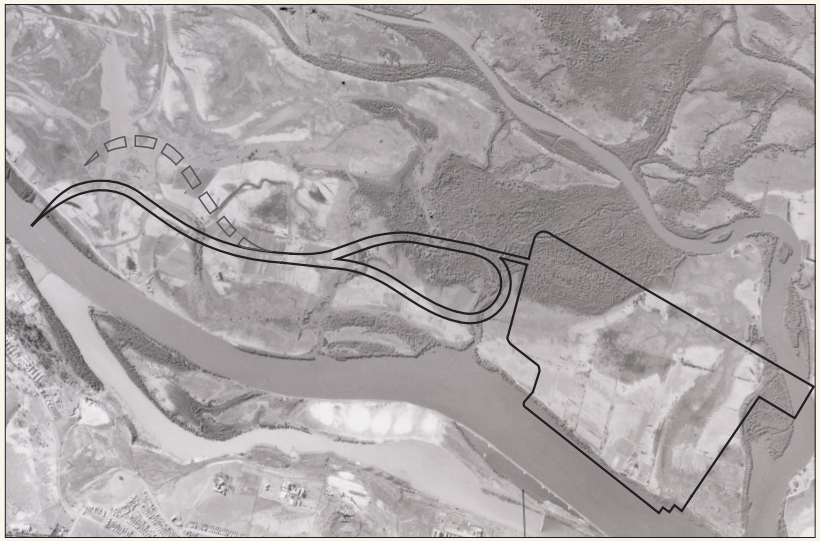
Each of the above potential impact mechanisms has the potential to result in impacts on existing surface and groundwater resources if not appropriately mitigated/managed. Management measures are outlined below.

Soil Management During Excavation

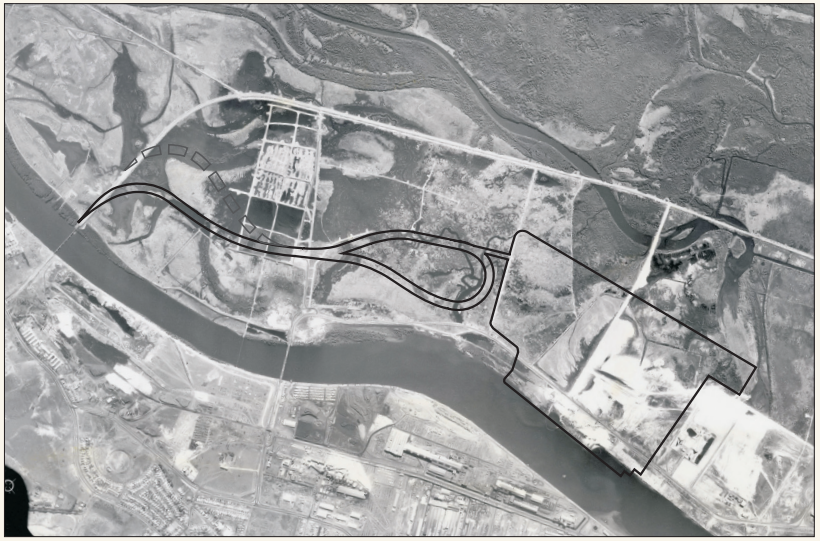
Prior to any excavation on site, a representative surface and sub-surface soil sampling and analysis programme would be undertaken in order to characterise the material to be excavated in accordance with the EPA *Guidelines for the Assessment, Classification and Management of Liquid and Non-Liquid Waste*.

Materials that are identified as not being suitable for use as fill material on site would be excavated and removed from the site to adjacent RLMC owned land. The material would be placed in encapsulated cells and capped with an appropriate cover layer in accordance with Benchmark techniques 1 and 2 in the EPA *Environmental Guidelines: Solid Waste Landfills*.

The presence or otherwise of acid sulphate soils would be identified during the surface and sub-surface soil sampling and analysis and management such as lime dosing of soils would also be undertaken if necessary.



Project Site 1954



Project Site 1975

Project Site 1993

Project Site 2001

LEGEND

Approximate Extent of Project Key Components

High Capacity Optional Inlet Rail Spur and Rail Sidings

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Source: Department of Lands (2006); NCIG (2006)

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FIGURE ES-12
Historical Aerial Photographs
of Kooragang Island

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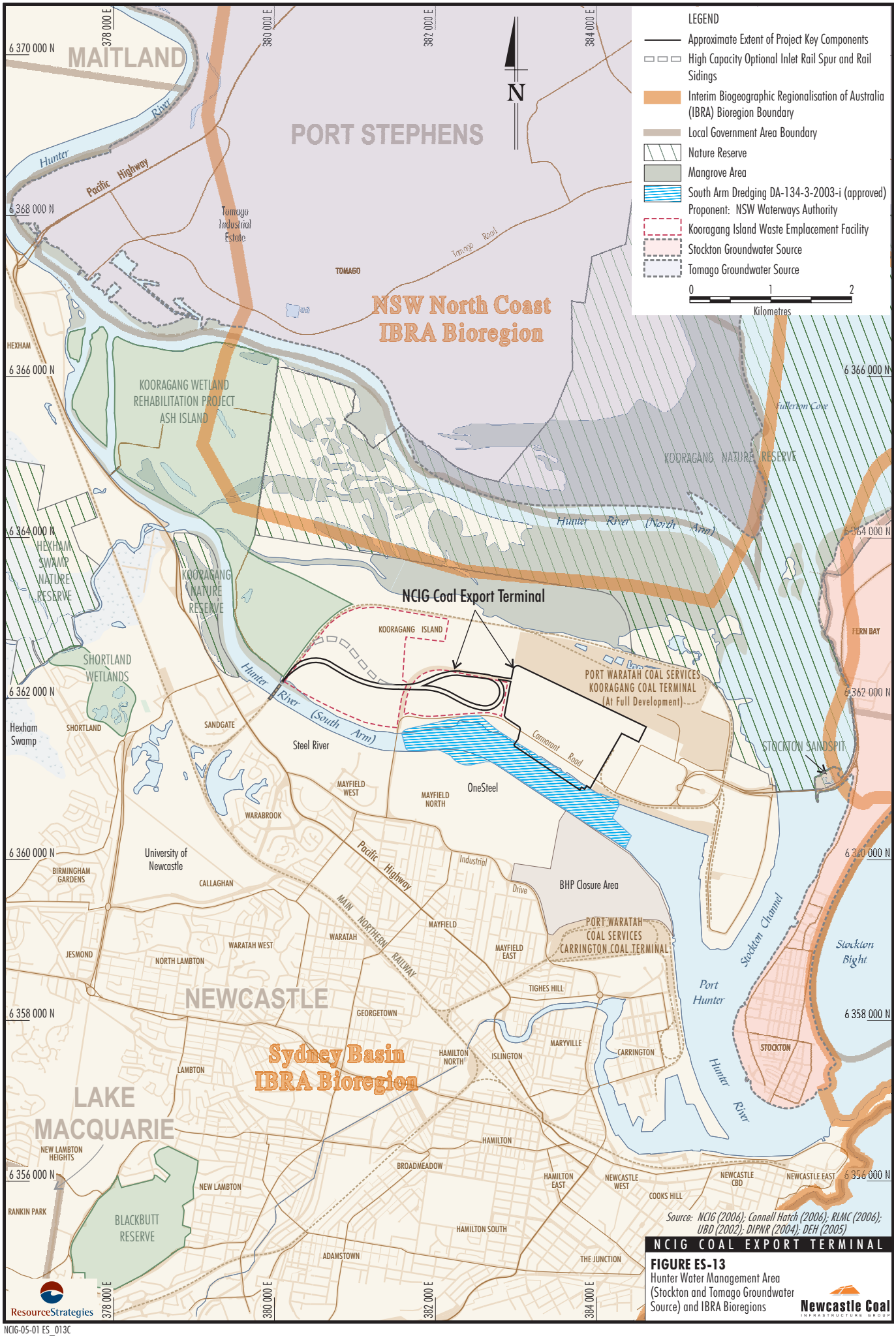

Source: NCIG (2006); Connell Hatch (2006); RLMC (2006); UBD (2002); DIPNR (2004); DEH (2005)

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FIGURE ES-13
Hunter Water Management Area (Stockton and Tomago Groundwater Source) and IBRA Bioregions

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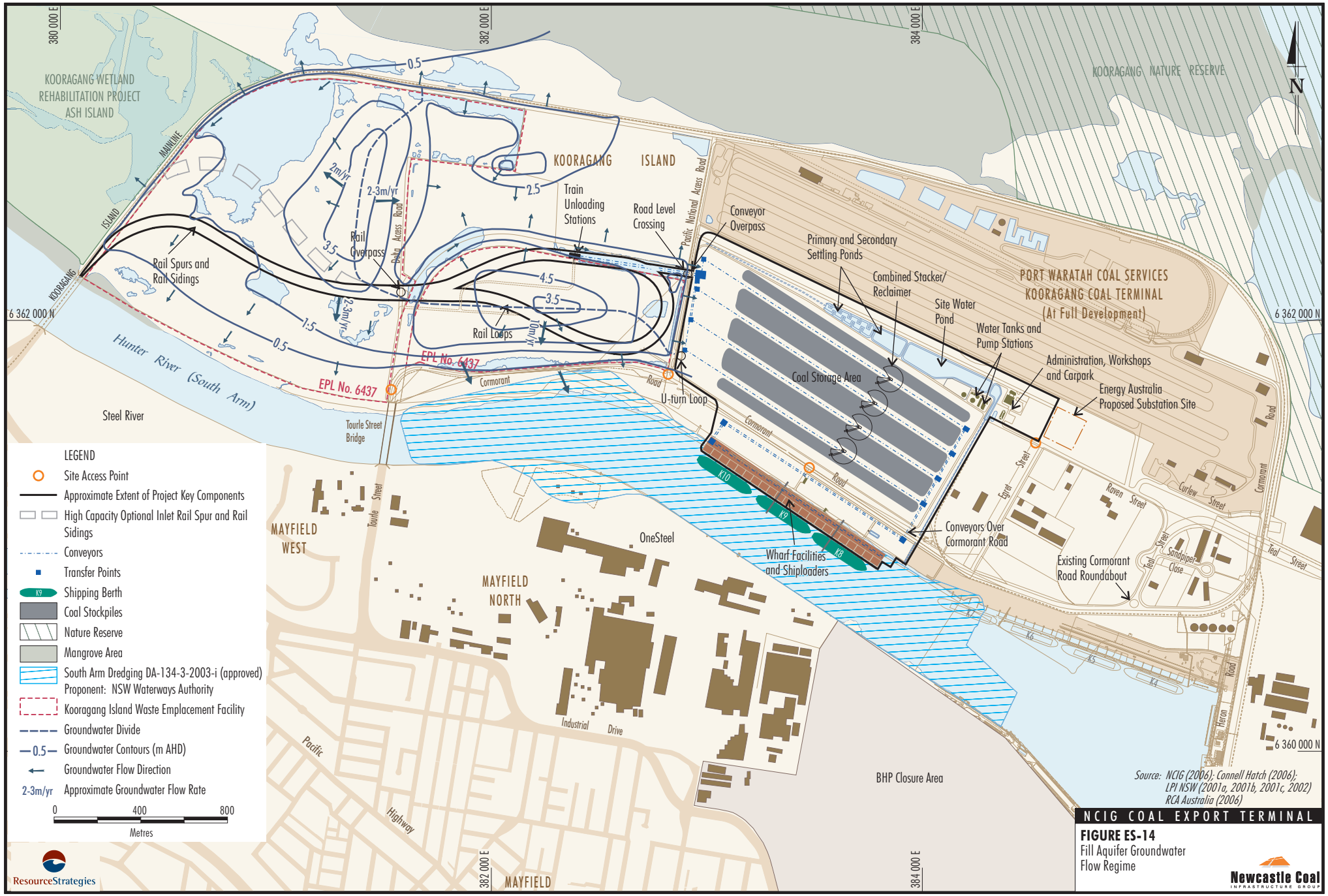

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To manage the risk of human exposure to contaminated materials (including airborne particles) during excavation activities a range of controls would be implemented in accordance with the SEMP as described in Section ES3.1.

Water Management During Excavations

Any water that accumulates in excavations during Project construction would be tested to determine its quality. Depending on the quality of this water it would be pumped to dedicated detention ponds or (if the water quality is suitable) pumped to the primary and secondary settling ponds for storage on-site and re-use.

Water that is considered to be of unsuitable quality for re-use would be temporarily stored within dedicated detention ponds with low permeability liners (e.g. compacted clay or geo-membrane) before being treated for re-use and/or removed from site and disposed of by a licensed contractor.

Preloading of the Coal Storage Area – Groundwater Management

Preloading would be undertaken as part of the construction of the coal storage area to provide for consolidation of the existing soils. Wick drains would be used to accelerate consolidation. Wick drains assist in expediting the consolidation process by providing a conduit for groundwater movement.

Bores would be located around the perimeter of Site A1 to monitor the fill and estuarine aquifers as part of the surface water and groundwater monitoring programme. If groundwater monitoring indicates the need, an investigation would be undertaken and additional/contingency control measures would be developed in consultation with the relevant authorities, including measures such as:

- pumping from bores to intercept migrating groundwater;
- localised subsurface low permeability barriers around affected areas (i.e. a physical barrier to groundwater migration in potentially affected areas); and
- subsurface low permeability barrier around the perimeter of Site A1 (i.e. a physical barrier to groundwater migration from the coal storage area).

Preloading of the Rail Infrastructure Corridor – Groundwater Management

The rail infrastructure predominately requires the placement of fill material over the top of the existing surface to create an embankment. The depth of fill material required varies across Sites D1 and D2, depending on the existing surface level. The placement of the embankment material would cause consolidation of the underlying soils.

As described above, wick drains would be used to accelerate consolidation in the clay aquitard in areas of significant fill.

Bores would be located along the perimeter of the rail infrastructure corridor to monitor the fill and estuarine aquifers as part of the surface water and groundwater monitoring programme.

In addition to the mitigation and management measures described in the previous sections, the Project rail infrastructure corridor has been designed with a capping system to minimise long-term infiltration (Figure ES-15).

Soils and Excavation Management Plan

A SEMP would be developed for the Project detailing methods for the management of contaminated soils and water. The SEMP would be prepared prior to the development of the Project and would incorporate the outcomes of a detailed geotechnical and geochemical investigation undertaken as part of the detailed design of the Project.

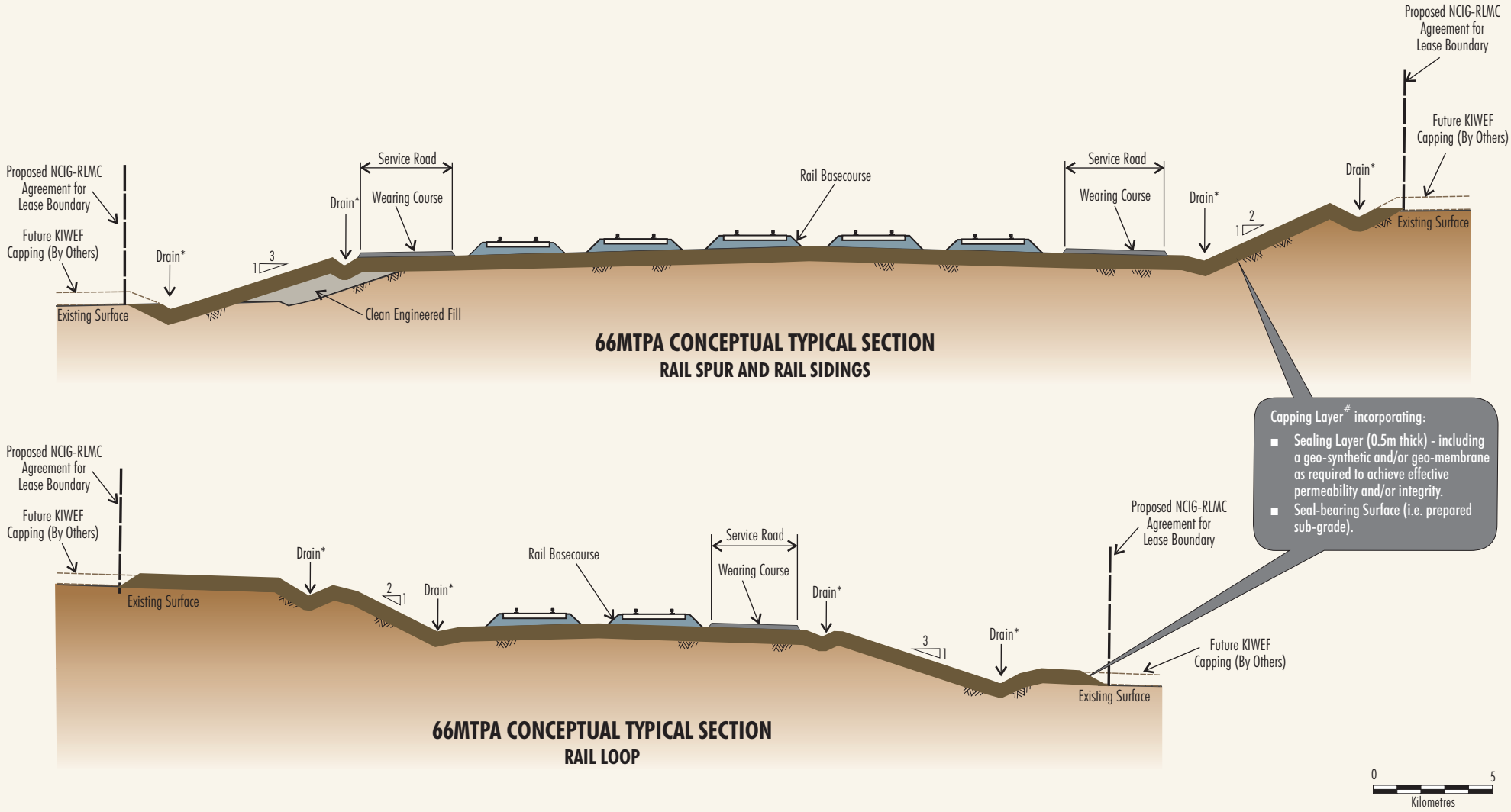
Surface Water and Groundwater Monitoring Programme

The performance of the mitigation and management measures would be monitored by the surface water and groundwater monitoring programme as detailed in the SWMP.

The detailed design of the surface water and groundwater monitoring programme would consider the proposed groundwater controls and the results of the detailed geotechnical and geochemical investigation undertaken as part of the detailed design of the Project.

Suitability of Site for Use

RCA Australia concluded that with the implementation of the mitigation, management and monitoring measures proposed (including the surface and groundwater monitoring programme and the SEMP) the Project site is suitable for the purpose of development of the Project.



Source: NCIG (2006); Connell Hatch (2006); RCA Australia (2006)

Notes:

* *Lining/armouring of drain alignments as required.*

\# *An Infiltration Drainage Layer and Revegetation Layer would be placed across the Capping Layer as part of Project closure and rehabilitation works.*

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FIGURE ES-15
Conceptual Typical Cross Section of the Rail Infrastructure Corridor

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NCIG-05-01 ES_015B

ES3.4 ECOLOGICAL IMPACTS

Flora and Fauna Assessments were prepared for the Project in accordance with the DEC/DPI Draft *Guidelines for Threatened Species Assessment*. Numerous previous vegetation studies, flora assessments and fauna studies have been undertaken in the Project site and surrounds. Literature reviews were undertaken as part of the Project Flora Assessment and Fauna Assessment which included review of relevant reports (e.g. EISs, reports prepared for government departments and scientific literature).

Flora field surveys for the Project were conducted by Connell-Hatch to augment earlier studies undertaken by Protech Steel (2001) and Umwelt (2003b) and Department of Commerce (2005) and included a vegetation survey and targeted searches. Flora database searches for the Project site and surrounds were also undertaken.

Targeted fauna surveys for the Green and Golden Bell Frog (*Litoria aurea*) and the Australasian Bittern (*Botaurus poiciloptilus*) were undertaken for the Project by Connell-Hatch in summer 2005-2006. A Shorebird Study and Habitat Assessment for the Project was conducted in summer 2005-2006 by Avifauna Research and Services.

Fauna database searches for the Project site and surrounds were also undertaken.

Existing Environment

Flora

The Project site lies in the North Coast Botanical Division and is situated in the far north-eastern corner of the Sydney Basin Interim Biogeographic Regionalisation of Australia (IBRA) Bioregion (Figure ES-13).

The nearby Hunter Estuary Wetlands comprise the Kooragang and Hexham Swamp Nature Reserves, Shortland Wetlands and the SEPP 14 listed wetlands associated with the lower Hunter River Estuary. The Hunter Estuary Wetlands are also listed as a Wetland of International Importance under the Ramsar Convention.

The Project site includes artificial ephemeral and semi-permanent wetlands which are subject to seasonal changes in vegetation and water levels. Terrestrial habitat is also present in the Project site and is characterised by dense grassland (dominated by landscape and pasture species) and landscape plantings.

The majority of the KIWEF site (i.e. including the Project rail corridor) is dominated by introduced grasses and herbaceous weeds.

Very few native flora species were recorded in the Project site as part of the flora surveys for the Project apart from native aquatic vegetation and landscape plantings. A total of 96 plant taxa were recorded by the vegetation survey and of these, 42 were native and 54 were exotic species. An additional 102 flora species have been recorded in the Project site and surrounds by previous studies, of which over half were exotic. Seven noxious weeds listed by NCC were recorded in the Project site and surrounds by the vegetation survey. Six additional noxious weeds listed by NCC were recorded in the Project site and surrounds by previous studies.

The only threatened flora species listed under the *Threatened Species Conservation Act, 1995* (TSC Act) and/or *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) recorded in the Project site was *Zannichellia palustris* (a submerged aquatic plant) which was identified in a number of ponds, one of which is within the Project disturbance area and would be partially disturbed by the Project.

No other threatened flora species listed under the TSC Act or EPBC Act were recorded by previous studies in the Project site or surrounds.

Within the Project site, two Endangered Ecological Communities (EECs) have been identified:

- Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions EEC (Freshwater Wetlands on Coastal Floodplains EEC).
- Coastal Saltmarsh in NSW North Coast, Sydney Basin and South East Corner Bioregions EEC (Coastal Saltmarsh EEC).

Fauna

The landuse history of the site has meant that much of the original vegetation has been covered with fill and, subsequently, the habitat resources of the Project site are limited. However, habitat for the Green and Golden Bell Frog, the Australasian Bittern and shorebirds was identified during the Project surveys.

The grassland within the Project site and surrounds offers foraging opportunities for raptor species. However, the Project site does not contain suitable habitat for arboreal fauna as there are no hollow-bearing trees and connectivity with forested habitat in the surrounding area is lacking.

Previous fauna studies conducted in the industrial area of Kooragang Island have found few native mammals.

Threatened fauna species recorded within the Project site, include the Green and Golden Bell Frog, Black-tailed Godwit, Blue-billed Duck, Freckled Duck and Australasian Bittern.

No threatened fauna listed under the TSC or EPBC Acts were observed during the previous field surveys. Similarly, no threatened species under the TSC Act, EPBC Act or *Fisheries Management Act, 1994* were recorded by the Aquatic Ecology Impact Assessment Report for the Port Consent EIS.

The Eastern Bent-wing Bat (*Miniopterus schreibersii*), a threatened species listed under the TSC Act, was recorded near ponds in the adjoining PWCS Kooragang Coal Terminal. In addition, the HBOC recorded the Red-backed Button-quail west of the Delta access road near the Project rail infrastructure corridor.

Some 165 marine protected species and 81 migratory fauna species have been recorded within the Project site and surrounds.

Potential Impacts

Detailed evaluations were conducted to determine the likelihood of the Project having a significant effect on *Zannichellia palustris,* Freshwater Wetlands on Coastal Floodplains EEC and Coastal Saltmarsh EEC.

Evaluations were conducted to determine the likelihood of the Project having a significant effect on threatened and migratory fauna species. Individual evaluations were conducted for each of the threatened fauna species previously recorded within the Project site as well as for other threatened species specified by the Project EARs (Section ES1.3). In addition, an individual evaluation was conducted for the Grass Owl (*Tyto capensis*) as the DEC informed NCIG that this species was recorded in the vicinity of the Project site (i.e. Kooragang Nature Reserve approximately 1 km to the north) earlier this year.

Based on the evaluations, it is considered that the Project is unlikely to have a significant effect on any threatened flora species, EECs or fauna species listed under the TSC Act and EPBC Act or species which are listed as migratory under the EPBC Act. The potential impacts of the Project on threatened flora, EECs and fauna are not considered to be significant from a local or regional perspective.

Mitigation Measures, Management and Monitoring

Although the Project will avoid or minimise direct impacts on threatened species, EECs and associated habitats wherever possible, several measures have been developed to mitigate unavoidable impacts of the Project on flora and fauna including a Flora and Fauna Management Plan (FFMP). Compensatory measures and other ecological initiatives are also proposed by NCIG. These are outlined below.

Flora and Fauna Management Plan

The FFMP would be prepared prior to Project construction and would include management measures to be undertaken during construction and operation, including a Vegetation Clearance Protocol (VCP), weed control, landscape plantings, Threatened Species Management Protocol (TSMP), pest management measures, on-site amphibian chytrid fungus management measures, rail culvert modification and fauna monitoring programmes.

Existing Compensatory Habitat

Offsets have already been proposed by the NSW Government for the development of Big Pond by the Department of Commerce as part of the Big Pond Habitat Offset Scheme (BPHOS) Report. The BPHOS Report proposes to enhance and create compensatory habitats in the Kooragang Nature Reserve to offset the proposed development of Big Pond.

The proposed compensatory areas are at Ash Island (located on Kooragang Island) and at the Tomago Wetlands (located north of the Hunter River north arm) (Figure ES-13). The aim of BPHOS Report is to modify land of low habitat value to create land with high values particularly for resident and migratory shorebirds.

Other offsets funded by the NSW Government for potential impacts on Big Pond included the modifications of the Stockton Sand Spit, diurnal roost improvement at Smith Island and Sandy Island, the artificial roost at Fullerton Cove East, pond construction at Ash Island and reintroduction of tidal flows at Tomago.

The offsets funded by the NSW Government address the potential impacts of the development of Big Pond.

Kooragang Wetland Rehabilitation Project Environmental Management Plan

A financial contribution would be made to the KWRP towards updating its Environmental Management Plan to incorporate the details of the proposed habitat creation initiatives outlined below, where relevant to lands managed by the KWRP. This would include a consultation programme and input from relevant independent experts.

Habitat Creation

Habitat creation for the Green and Golden Bell Frog and shorebirds/saltmarsh would be funded as part of the Project.

A financial contribution would be made towards current or future projects which involve habitat creation for the Green and Golden Bell Frog on RLMC-owned lands within the KWRP or alternate suitable lands in the Kooragang Nature Reserve. Habitat creation would be located on the perimeter of existing habitat areas to provide suitable habitat into which the existing Green and Golden Bell Frog population can expand. This habitat creation would also create an opportunity to research the performance of alternative types of habitat enhancement.

Habitat creation initiatives for the Green and Golden Bell Frog would include construction of two habitat ponds of similar scale and detail to existing ponds where the Green and Golden Bell Frogs have been recorded on the KIWEF site. This is consistent with the recovery strategies (i.e. *habitat rehabilitation/restoration and/or regeneration* and *monitoring*) identified by the DEC to help recover the Green and Golden Bell Frog.

Mangroves in the Hunter Estuary have been expanding at the expense of the Coastal Saltmarsh EEC and, in some areas (e.g. Ash Island), mangroves have been removed to enhance habitat for Coastal Saltmarsh EEC and shorebirds.

A financial contribution would be made to an organisation such as the KWRP for the removal of up to 6 ha of mangroves from coastal saltmarsh habitat.

A financial contribution would also be made towards the construction of a flow control structure to minimise the potential for mangrove propagules to enter areas reserved for saltmarsh. Alternatively, these initiatives may also be applied to lands within the Kooragang Nature Reserve. These works are expected to enhance habitat for shorebirds as well as provide habitat for the Coastal Saltmarsh EEC.

In addition, habitat in the form of shallow areas for foraging shorebirds would be created during the construction of the northern rail spur embankment, if required to be installed when the Project is fully developed to 66 Mtpa, by modifying the design of the embankment batter slopes to have a gentle toe gradient (i.e. in the submerged zone of the batter slope). This would result in the creation of shallow areas suitable for shorebirds in Deep Pond. The specifications of this initiative would be detailed in the FFMP.

Contribution to Research

A financial contribution would be given to the University of Newcastle, or other appropriately recognised research body, to fund research into the Green and Golden Bell Frog. The focus of research would be to expand existing knowledge of factors affecting the species which may be used to actively improve the strength of the population of Green and Golden Bell Frogs on Kooragang Island.

This is consistent with one of the recovery strategies (i.e. *research: general biological and ecological studies*) identified by the DEC to help recover the Green and Golden Bell Frog.

Contribution to Hunter Wetlands Centre

A financial contribution would be given to the Hunter Wetlands Centre towards an annual exhibition regarding the Green and Golden Bell Frog and migratory shorebirds. The exhibition would include an update on the progress and the effectiveness of the habitat enhancement initiatives conducted as part of the compensatory measures of the Project. This would also provide an opportunity for a representative undertaking the university-based research described above to explain the progress/findings of the research to the interested public.

This is consistent with one of the recovery strategies (i.e. *community and land-holder liaison/awareness and/or education*) identified by the DEC to help recover the Green and Golden Bell Frog.

ES3.5 HERITAGE IMPACTS

ES3.5.1 Aboriginal Heritage

A search of the NSW National Parks and Wildlife Service's (NPWS) Aboriginal Heritage Information Management System (AHIMS) for recorded aboriginal sites in the vicinity of the Project was conducted in January 2006. The AHIMS search did not identify any registered sites at the Project site.

A Preliminary Aboriginal Heritage Assessment (PAHA) has been undertaken in accordance with the DEC *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005b).

The PAHA conducted for the Project concluded:

- The Project site is located in the Kooragang Port and Industrial Area. The Port and Industrial Area has been subject to agricultural development since European settlement, and over a period of more than 50 years, dredge spoil disposal, land reclamation and waste disposal activities.
- Previous surveys within the Project site and Kooragang Port and Industrial Area for recent development proposals have not identified any remaining archaeological evidence of Aboriginal occupation.
- Consultation with the Aboriginal community for this proposal and previous development proposals has not identified any significant cultural heritage values in the Kooragang Port and Industrial Area.
- In accordance with the *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005b), it can be concluded that an Aboriginal Cultural Heritage Assessment of the Project site is not required as:
  - NCIG propose redevelopment of a site where Aboriginal objects have not previously been found; and
  - long term disturbance, extensive land reclamation and waste disposal to landfill has taken place at the site, which indicates there is little likelihood of Aboriginal objects remaining.

ES3.5.2 Non-Aboriginal Heritage

No known non-Aboriginal heritage items of significance have been identified on the Project site. Non-Aboriginal heritage sites that are registered on Kooragang Island would not be impacted by the development. In addition, the Port and Industrial area of Kooragang Island is not listed as a heritage conservation area and the extensive land reclamation and waste disposal to landfill that has taken place at the site indicates there is little likelihood of significant non-Aboriginal heritage objects remaining.

ES3.5.3 Heritage Management Measures

Notwithstanding the lack of identified heritage sites at the Project site, there is the possibility that Aboriginal or non-Aboriginal heritage items could be uncovered during site excavation works. Aboriginal and non-Aboriginal heritage management frameworks have been developed for the Project to manage this eventuality, should it occur.

ES3.6 GENERAL ENVIRONMENTAL RISK ANALYSIS

An Environmental Risk Analysis (ERA) was undertaken to identify the key environmental risk groups for the construction and operation of the Project. The risk analysis team consisted of representatives from:

- NCIG;
- Connell-Hatch;
- Heggies Australia;
- Holmes Air Sciences;
- Western Research Institute, Charles Sturt University;
- RCA Australia;
- Enesar Consultants;
- Resource Strategies; and
- Safe Production Solutions.

The key potential environmental issues that were identified by the risk analysis team are presented in Table ES-6.

Table ES-6
Key Potential Environmental Issues Identified in the Environmental Risk Analysis

Key Risk Group	Risk
Soil	Loss of habitat in the area to be cleared for construction, most significantly in the area of Big Pond (including an Endangered Ecological Community).
Noise	Noise generated (particularly at night) potentially leading to off-site annoyance (non-compliance with anticipated Project noise criteria), sleep disturbance and fauna specific impact (although fauna are habituated and unlikely to be affected by normal noises).
Air	Coal dust generated from operations potentially leading to off-site health and amenity impacts and species-specific effects.
Water	Flow of sediment laden or contaminated water entering Deep Pond affecting the ecology of Deep Pond (which includes an endangered species).
	Impact on the Hunter River resulting from contaminated sediments and low pH water flowing from the site.

Source: Appendix J

The ERA is documented in full as Appendix J and the risks identified in Table ES-6 have been addressed in this EA.

Additional specialist studies were conducted to examine potential environmental impacts that were not specifically required by the EARs. These additional studies included:

- Road Transport Assessment;
- Socio-Economic Assessment;
- Visual Assessment; and
- Preliminary Hazard Analysis.

Other general aspects of the existing environment were also considered in developing the EA including meteorology and land resources.

ES3.7 DRAFT STATEMENT OF COMMITMENTS

NCIG has prepared a Draft Statement of Commitments for the Project which provides a summary of the environmental mitigation and management measures and environmental monitoring that the company proposes to incorporate into the Project during construction and operation. These commitments are further described in the EA document.

ES4 STRATEGIC PLANNING AND JUSTIFICATION FOR THE PROJECT

Export Demand and Supply of Hunter Valley Coal to the Port of Newcastle

The ability for NSW coal producers to export coal through Newcastle is constrained by the capacity of the Hunter Valley coal supply chain.

As part of an Australian Government initiative, the Federal Department of Industry, Tourism and Resources commissioned the Australian Bureau of Agricultural and Resource Economics (ABARE) to assess:

- the current and future demand for coal from the Hunter Valley;
- the capacity of coal producers to meet current and expected future demand for coal from the Hunter Valley;
- whether current rail and port infrastructure is sufficient to support estimated coal exports from the Hunter Valley over the medium term; and
- the potential economic costs of infrastructure constraints in the Hunter Valley coal supply chain.

The ABARE study found that demand for Hunter Valley coal is strong and predicted that, as a medium case, potential demand for coal exports from the Hunter Valley will increase at an annual rate of 2.8% per annum from the 2004 level of 78 Mtpa to 122 Mtpa in 2015. Further, ABARE estimates that at a coal price of US$35/t, producers could supply between 130 Mtpa and 140 Mtpa of coal by 2015 if unconstrained by the coal supply chain. If coal prices were US$50/t then the ABARE report indicates coal producers could supply over 200 Mtpa of coal by 2015 if unconstrained by the coal supply chain.

The 2006 ARTC Hunter Valley Corridor Capacity Improvement Strategy indicates that the ARTC planning for export demand rises from approximately 104 Mtpa in 2006 to 145 Mtpa in 2011, and possibly as high as 157 Mtpa by 2015. These demand predictions are based on consultation with the coal mining industry.

The ability of individual Hunter Valley coal producers to meet potential market demand for their coal depends on there being sufficient capacity in the coal supply chain (i.e. railway and port infrastructure) to facilitate export.

The estimated coal supply chain capacity in 2005 was 85 Mtpa. This included the capacity of PWCS (Kooragang Island and Carrington) at 89 Mtpa and the rail system capacity of approximately 85 Mtpa. Export of coal through the Port of Newcastle totalled approximately 81 Mtpa in 2005.

PWCS has an existing approval to expand the combined capacity of its Kooragang Island and Carrington coal terminals to 102 Mtpa. Similarly, the ARTC has a planned programme of rail infrastructure improvements to maintain rail capacity ahead of anticipated coal export demand.

Consideration of the ABARE and the ARTC coal demand and supply scenarios indicates that even with the planned increase in PWCS port capacity to 102 Mtpa, the ability for coal producers to meet potential export demand through the Port of Newcastle is expected to be constrained if the Project were not to be developed.

Role of the Project

While there is uncertainty around future coal prices and export demand, it is evident that there are potentially very significant economic benefits to the Australian economy that would be foregone if port capacity limits the ability of Hunter Valley coal producers to meet export demand.

The Project, when constructed to an initial capacity of 33 Mtpa would provide significant additional port capacity to meet the expected increases in coal export demand in the short to medium term. The Project would also provide the ability to expand export capacity up to 66 Mtpa to meet further growth in demand and therefore realise the potential economic benefits.

In addition, the Project would also provide competition at the Port of Newcastle for coal export shiploading services and potentially reduce demurrage costs borne by coal producers associated with delays to shipping.

Socio-Economic Benefits of the Project

The Project would provide an average of 400 and up to 500 direct full time construction jobs for a period of some 33 months during initial construction and would provide 100 direct jobs when operating at full capacity (66 Mtpa). The life of the Project is likely to extend for a significant term (i.e. until global demand for Hunter Valley coal is reduced, or the ability of mining companies to produce coal is significantly constrained).

Employment and expenditure associated with the Project is also predicted to have significant flow-on effects in the regional economy. The Socio-Economic Assessment (Appendix G) has indicated the development of the Project, together with other capacity improvements in the Hunter Valley coal supply chain to meet export demand, would provide net production benefits between approximately $700 million (M) and $6,000 M over an assessment period of 30 years.

These very significant economic benefits to Australia (and the State of NSW) would be forgone if Hunter Valley coal supply chain capacity constraints are not addressed to allow coal producers to meet export demand.