VISUAL ASSESSMENT

APPENDIX H

NEWCASTLE COAL INFRASTRUCTURE GROUP
COAL EXPORT TERMINAL

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NCIG COAL EXPORT TERMINAL

VISUAL ASSESSMENT

A report to

NEWCASTLE COAL INFRASTRUCTURE GROUP

By

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May 2006

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H1 Introduction

EDAW Australia (EDAW) was commissioned by Newcastle Coal Infrastructure Group (NCIG), to prepare a Visual Assessment Report as part of an Environmental Assessment (EA) for the development of a Coal Export Terminal (CET) on industrial zoned land on Kooragang Island in Newcastle, New South Wales (**Figure H1.1**).

The following components were included as part of the study:

- Review of existing visual assessments undertaken on Kooragang Island *viz. Port Waratah Coal Services Kooragang Coal Terminal Stage 3 Expansion Environmental Impact Statement* (ERM, 1996) and *Protech Proposed Cold Mill Facility Kooragang Island Environmental Impact Statement* (GHD, 2001) and relevant environmental planning instruments (Newcastle Local Environmental Plan, 2003 and Newcastle Development Control Plan, 2005).
- A site inspection to identify the Project viewshed and potentially sensitive viewing locations within the Project vicinity (e.g. residential areas, public roads and natural/recreation areas).
- Characterisation of the existing visual landscape in terms of topography, existing land use and vegetation, including site photography.
- Characterisation of the Project components with respect to potential visual impacts.
- Preparation of a visual impact assessment to include characterisation of the existing visual landscape, potential visual impacts and provide recommendations for the management of potential visual impacts.

The study assesses the potential visual impact of the Project in accordance with the relevant environmental assessment requirements of the Director-General of the Department of Planning.

H1.1 Methodology

The methodology employed by EDAW has been based on an analysis of the setting and assessment of the anticipated impacts of the development of the NCIG CET. The key factors considered include:

- Sensitive land uses (e.g. residential areas, public roads and natural/recreation areas).
- The visual form, scale and colour of the development.

The structure of this report is comprised of a number of components including:

- Review of previous visual assessment reports undertaken on Kooragang Island and relevant environmental planning instruments.
- An assessment of the existing landscape and visual setting.
- A description of the Project components.
- A qualitative visual assessment including:
  - Assessment of visual modification at key viewpoints – *How does the proposed development contrast with the landscape character of the surrounding setting?*
  - Assessment of visual sensitivity at key viewpoints – *How sensitive will viewers be to the proposed development?*
- Assessment of potential visual impacts based on the Visual Management System developed by the United States of America Forestry Service.
- Visual landscape and management strategies.

NCIG-05-01 Visual_001D

The methodology employed by EDAW is based on the Visual Management System developed by the United States Department of Agriculture (USDA) Forestry Service (USDA, 1974) whereby the visual impact of a proposed development is determined by evaluating the degree of visual modification/fit of the development in the context of the visual sensitivity of surrounding land use areas from which a proposed development may be visible. The visual impact resulting from the combination of visual modification and visual sensitivity is illustrated in **Table H1.1.**

Visual Modification \ Viewer Sensitivity	H	M	L
H	H	H	M
M	H	M	L
L	M	L	L
VL	L	VL	VL

VL = Very Low

L = Low

M = Moderate

H = High

Table H1.1 - Visual Impact Matrix

H1.1.1 Visual Modification

The visual modification level of a proposed development can be best measured as an expression of the visual interaction, or the level of visual contrast between the development and the existing visual environment. Throughout the visual catchment (or zone of visual influence) the degree of visual modification generally decreases as the distance from the development to various viewpoint locations increases.

The degree of visual modification is considered negligible where the development is distant and/or relates to a small proportion of the overall viewscape.

A low degree of visual modification occurs where there is minimal visual contrast and a high level of integration of form, line, shape, pattern, colour or texture values between the development and the landscape. In this situation the development may be noticeable, but does not markedly contrast with the existing modified landscape.

A moderate degree of visual modification occurs where a component of the development is visible and contrasts with the landscape, while at the same time achieving a degree of integration. This occurs where surrounding topography, vegetation or existing modified landscape provide some measure of visual integration or screening.

A high degree of visual modification occurs where the major components of the development contrast strongly with the existing landscape.

H1.1.2 Visual (Viewer) Sensitivity

Visual (viewer) sensitivity is a measure of how critically a change to the existing landscape will be viewed from various use areas, and is a function of both land use and duration of exposure.

Different activities undertaken within the landscape setting have different sensitivity levels. Individuals on holiday who are using the surrounding landscape as a part of the holiday experience will generally view changes to the landscape more critically than agricultural or industrial workers in the same setting. Similarly, individuals will view changes to the visual setting of their residence more critically than changes to the visual setting of the broader setting in which they travel or work.

The visual sensitivity of the development depends on a range of viewer characteristics. The primary characteristics used in this study are land use, the distance of the development from viewers and its visibility from critical viewing areas and view angle. The visual sensitivity of land uses was assessed to assist in determining the visual impact of the development. As distance from the viewer to the proposed development increases, the level of sensitivity reduces.

Public acceptance of a change to a setting (i.e. support for a particular development), can subconsciously alter the level of sensitivity. Another factor to consider is the extent to which the viewer has become accustomed to significant modifications to the existing landscape, for example existing industrialisation in the region.

Typical Visual Sensitivity levels are defined in **Table H1.2.**

Use Area	Foreground (Local Setting) 0 - 0.5 km 0.5 – 1 km		Middleground (Sub-Regional Setting) 1 - 2 .5 km 2.5 - 5 km		Background Regional Setting > 5 km
NATURAL AREA – RECREATION	H	H	H	M	L
RESIDENTIAL	H	H	H	M	L
TOURIST ROADS	H	M	M	L	L
OTHER MAIN ROADS	M	L	L	L	L
LOCAL ROADS	L	L	L	L	L
INDUSTRIAL AREAS	L	L	L	L	L

Table H1.2 – Typical Visual (Viewer) Sensitivity.

For the purposes of this visual assessment, land uses in the vicinity of the Project were characterised in terms of low, moderate or high visual sensitivity, as follows:

- Low visual sensitivity – industrial areas and local roads.
- Moderate visual sensitivity – tourist roads and major roads (e.g. Cormorant Road).
- High visual sensitivity – residential areas and natural/recreation areas (e.g. Kooragang Nature Reserve).

H2 Review of Previous Visual Assessments

A review of two previous visual assessments for industrial developments on Kooragang Island was undertaken by EDAW and is summarised below:

- *Port Waratah Coal Services Kooragang Coal Terminal Stage 3 Expansion Environmental Impact Statement (ERM, 1996)*

  The visual assessment used a methodology consistent with the methodology used by EDAW for this study. Eight specific sites were selected to assess visual impact and all of the selected sites were within the sub-regional setting (i.e. between 1- 5 km radius of site). The following conclusions were drawn from the visual impact assessment:

  - The new shipping berths would be generally obscured from residential locations in Mayfield and South Stockton by other existing infrastructure;
  - There would be some views of coal stockpiling and the conveyor line from the Stockton viewshed, however the visual aesthetic of coal stockpiling is consistent with the broader industrial landscape; and
  - The stockyard lighting would be visible from Fern Bay and suggests lighting design to minimise this impact.

- *Protech Proposed Cold Mill Facility Kooragang Island Environmental Impact Statement (GHD, 2001)*

  The visual assessment used a method similar to that undertaken by EDAW for this study, however the visual assessment was for a different industrial application (i.e. steel processing plant composed predominantly of buildings). The size and bulk of the buildings however, is similar to that proposed for the NCIG CET. The visual assessment selected specific sites up to a 2 km radius from the site, therefore addressing viewpoints located within the local and sub-regional settings. The report concluded that there would be loss to scenic quality of open grassland, however, that the scale of the development was consistent with other developments within the Kooragang Island Industrial Area.

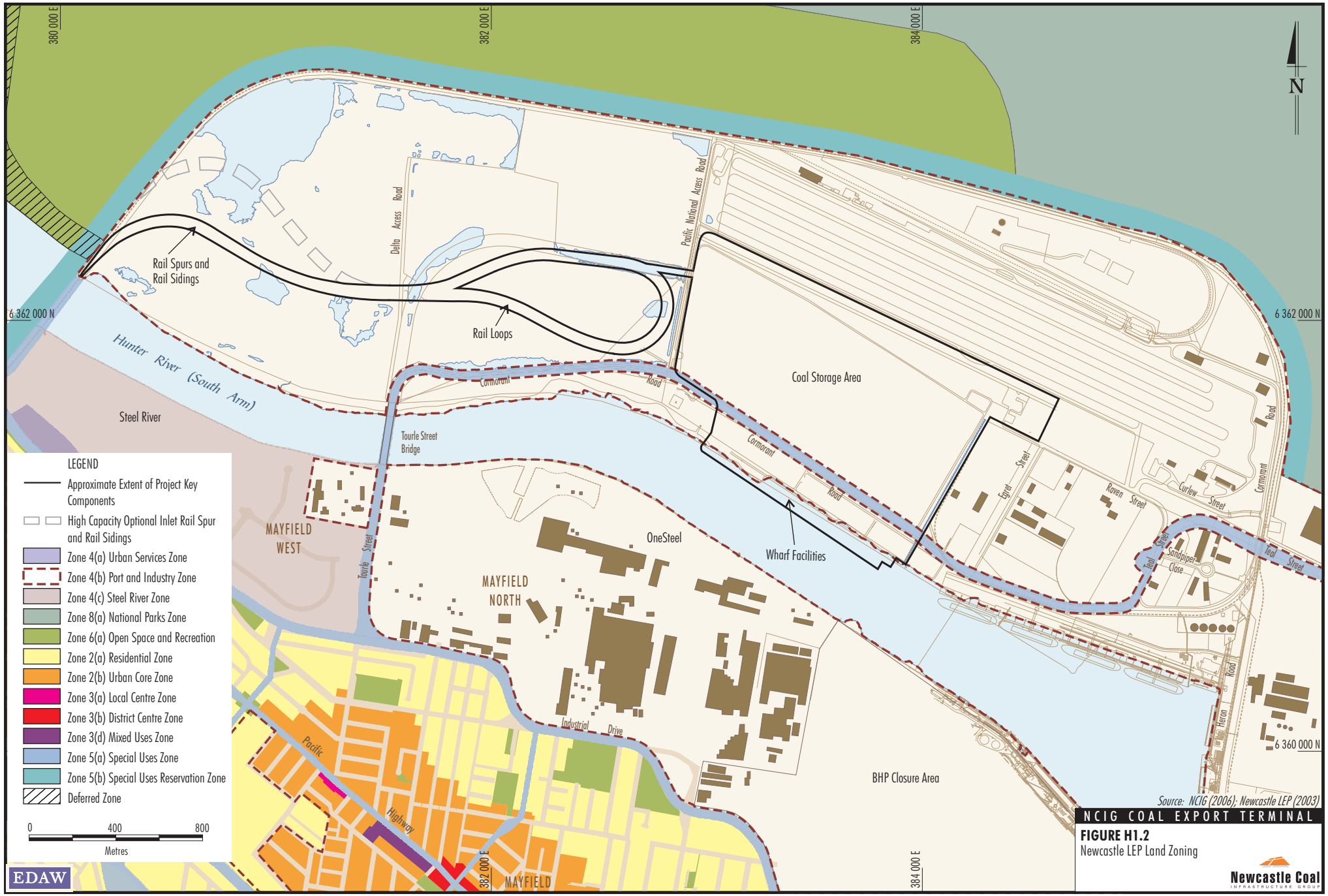
H3 Environmental Planning Instruments

The proposed site is wholly located within land zoned 4(b) Port and Industry Zone under the *Newcastle Local Environmental Plan, 2003* (**Figure H1.2**).

The proposed site is also wholly within the *Newcastle Development Control Plan, 2005* (Newcastle DCP) area. The following visual-related elements from the Newcastle DCP are relevant to the Project:

Element 4.4 – Landscaping

Element 4.4 outlines requirements and procedures for landscaping planning and design for development sites. Element 4.4 identifies three categories of development requiring varying levels of landscape planning. The Project falls into Category 3 development, as it industrial development with a capital cost greater than $2 million.



Source: NCIG (2006); Newcastle LEP (2003)

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FIGURE H1.2
Newcastle LEP Land Zoning

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Category 3 developments are required to have a landscape architect or similar qualified professional complete a site survey and analysis; landscape concept plan; preliminary landscape design report; and a comprehensive landscape plan.

Element 7.4 – Kooragang Port and Industrial Area

The Project lies within the Kooragang Port and Industrial Area identified in Element 7.4. Element 7.4 aims to promote and maximise the agglomeration advantages for long-term port-related industrial development within the core economic areas around the Port of Newcastle and the Kooragang Port and Industrial Area, balanced with the need to protect, enhance and reinforce the important cultural, heritage and biodiversity values of Kooragang.

- *Landscape, Habitat Conservation and Open Space*

Clause 7.4.8 presents provisions relating to the incorporation of landscaped areas to provide habitat areas, visual relief and recreational uses.

- *Lighting*

Clause 7.4.15 provides provisions to provide a functional and coordinated site lighting system which contributes to a safe and aesthetically pleasing environment.

H4 Existing Landscape and Visual Setting

H4.1 Scenic Quality and Landscape Character

It has been established through previous studies, that scenic quality increases as the presence of water forms, water edge and water area increase (Leonard and Hammond, 1984; Zube *et al*, 1974; Zube *et al*, 1976; Brush and Shafer, 1975; Anderson *et al*, 1976). Scenic quality also increases as topographic ruggedness and relative relief increase (Leonard and Hammond, 1984; Burns and Rundell, 1969; Anderson *et al*, 1976). Scenic quality can also increase as the patterning of vegetation increases.

Kooragang Island and its surrounds are comprised of a number of distinct land use types and landscape units of varying levels of landscape quality. These have been defined as follows:

- Kooragang Nature Reserve - generally flat estuarine system associated with the Hunter River which dominates the regional landscape in the north;
- Hunter River - dominant feature in the landscape with landscape settings varying from natural to highly disturbed / modified;
- Heavy Industry - large scale buildings and plant; and
- Residential Areas - detached dwellings of one or two stories to the south and east of the site.

The visual settings (e.g. local, sub-regional and regional) are based on distance from the development as follows:

- Regional setting – greater than 5 km from the Project;
- Sub-regional setting – 1 to 5 km from the Project; and
- Local setting – up to 1 km from the Project.

Regional Setting (>5 km)

The visual character of the regional setting has attributes of a high scenic quality due to the presence of water, the coastline and vegetation patterns associated with the estuarine environment (i.e. Kooragang Nature Reserve), as well as attributes of a low scenic quality due to the modification that has occurred due to heavy industry in the Newcastle region.

Sub-Regional Setting (1 to 5 km)

The sub-regional setting is comprised of large scale heavy industrial and port facilities including the Port Waratah Coal Services (PWCS) Kooragang Island coal loading facilities, OneSteel and Steel River developments. The Hunter River and estuarine environment within the sub-regional setting taken in isolation has attributes of high scenic quality. However the proximity to the heavy industrial uses that dominate the sub-regional setting result in a low scenic quality.

Residential areas within the sub-regional setting include Mayfield West, Mayfield, Fern Bay and Stockton.

Local Setting (<1 km)

The Project local setting has been disturbed by previous landfill activities (**Plate H4.1**) and also has a number of modifying elements of infrastructure including the PWCS coal stockpiles (**Plate H4.2**), infrastructure and wharf facilities (**Plate H4.3**) and OneSteel on the southern bank of the Hunter River (south arm) (**Plate H4.4**). Other features of the local setting include the road networks on Kooragang Island and connecting bridges, electricity transmission lines and Energy Australia's wind turbine. The visual character of the local setting is therefore considered to be of low scenic quality. Notwithstanding, the Hunter River and estuarine environment within the local setting taken in isolation has attributes of high scenic quality.

A small residential area within an Urban Services Zone under the Newcastle LEP in Sandgate (south-west of the Project) lies within the local setting, however no views of the Project site are available.

H4.2 Overall Character of the Broader Landscape Setting

The previously described land use types and landscape units combine with similar landscapes to create the broader landscape setting as a whole (**Plate H4.5**).

H4.3 Site Topography and Vegetation

The Project site and surrounds is generally flat to slightly undulating, comprised of estuarine flats and dune forms modified by land filling activities. The western half of the site is higher and more undulating than the eastern half as a result of the landfill activities in the Kooragang Island Waste Emplacement Facility.

The Project site has been heavily modified over time with the majority of vegetation disturbed. The site is primary covered with grassy species with occasional scattered woody species (**Plate H4.6**). Bands of vegetation are located along the southern boundary of the western half of the site, adjacent to Cormorant Road and to the western side of the Pacific National access road.

Plate H4.1 Heavily Disturbed Site - Kooragang Island Waste Emplacement Facility

Plate H4.2 Heavily Industrialised Site - Existing PWCS Kooragang Coal Terminal - Coal Stockpiles

Plate H4.3 Heavily Industrialised Site - Existing PWCS Kooragang Coal Terminal - Shiploading

Plate H4.4 Heavily Industrialised Site - Existing OneSteel Plant

Plate H4.5 Kooragang Island - Broader Landscape Setting*

Plate H4.6 Site Vegetation

*Image from: *www.wetlands-e.schools.nsw.edu.au/photos.htm*

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PLATES H4.1 TO H4.6

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H4.4 Landscape Character Significance

A review was undertaken of designations or classifications of the broader landscape setting from a cultural perspective. Inquiries were made of the databases of the following organisations:

- National Trust of Australia (NSW).
- NSW Heritage Council.
- Commonwealth National Heritage Database.

The Register of National Estate in the Commonwealth National Heritage Database lists the Hunter Estuary Wetlands. As stated in the Register of National Estate listing:

> *"Kooragang Nature Reserve is ecologically diverse and represents a regionally significant genetic pool for wetland plant species. One hundred and twelve species of vascular plants have been identified at Kooragang Island forming many distinct habitat types of which the Mangrove and Saltmarsh areas are good examples.*
>
> *Hexham Swamp has been recognised as the largest freshwater swamp on the NSW north coast and comprises about 45% of the entire remaining freshwater wetland habitat in the Hunter Valley. The swamp is of vital importance as a storage area for flood waters, of regional and national importance for wildlife, valuable as a nutrient sink and nursery ground for fish and other estuarine life and a major open space landscape of regional significance."*

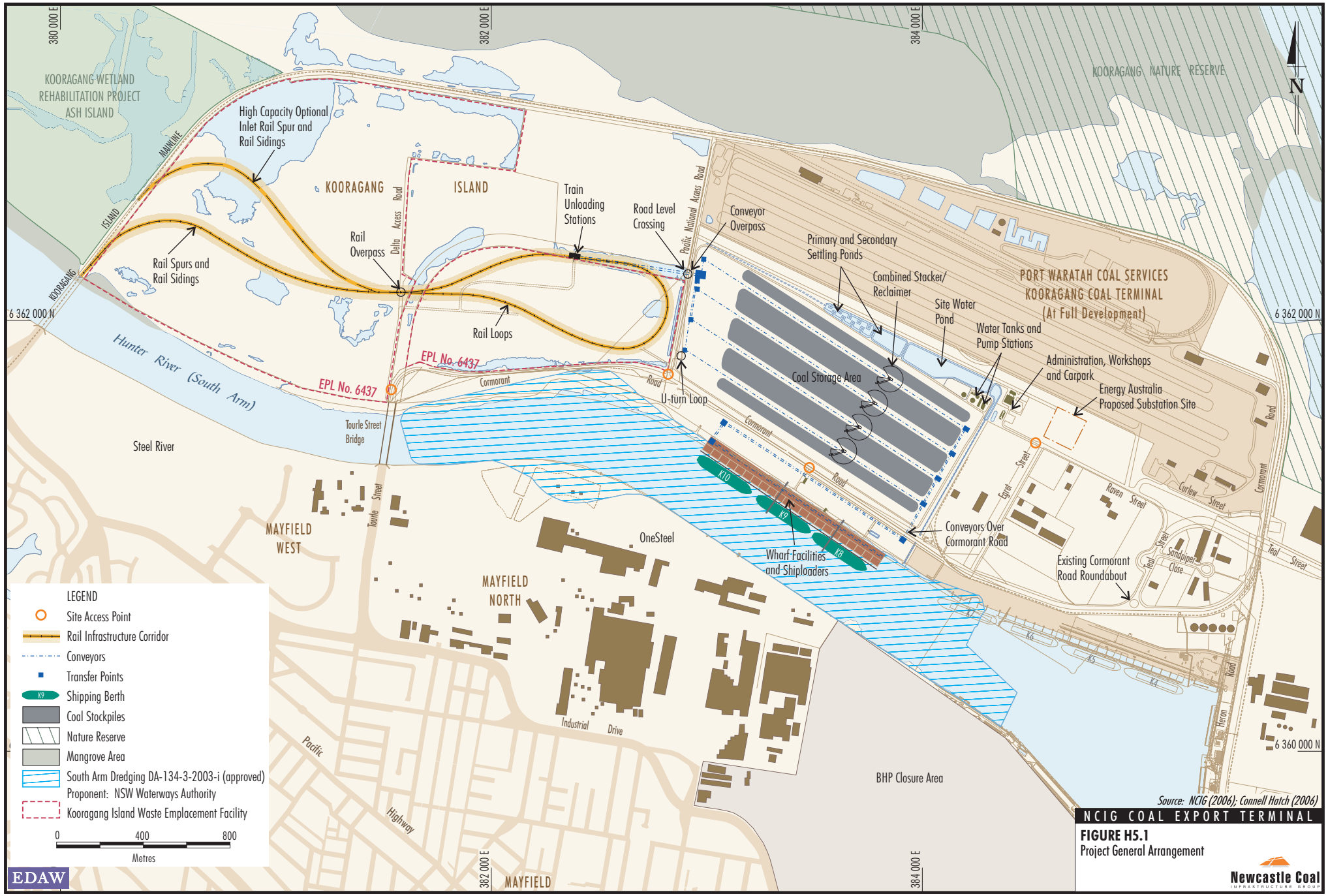
No other citation was found for classification of significance of the landscape in the vicinity.

H5 Description of the Project

H5.1 Overview

The Project general arrangement is shown on **Figure H5.1**. Elements of the Project considered to have the potential to impact on the visual landscape include:

- construction and operation of rail spurs, rail sidings and rail loops, rail overpass, train unloading stations and connecting conveyors;
- construction and operation of a coal storage area including coal stockpiles, conveyors, transfer points, and combined stacker/reclaimers;
- construction and operation of wharf facilities and shiploaders, conveyors and buffer bins;
- construction of administration and workshop buildings;
- other associated minor infrastructure, plant, equipment and activities; and
- lighting associated with night time operations.



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

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FIGURE H5.1
Project General Arrangement

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H5.2 Timing of Construction and Project Duration

The construction period for the main operational components of the NCIG CET is expected to take approximately 33 months, with noise generating construction activities generally undertaken during daytime hours up to seven days per week. Dredging operations and associated deposition of dredged material on the Project site would be undertaken up to 24 hours per day in accordance with the existing development consent (DA-134-3-2003-i) held by the NSW Maritime Authority.

The proposed construction schedule for the Project is shown on **Figure H5.2**. The timing of further development of the Project capacity up to 66 Mtpa would depend on coal market demand.

H5.3 General Site Layout

The main development components have been arranged on the site as follows (**Figure H5.1**):

- Rail Spurs, Rail Sidings, Rail Loops and Train Unloading Stations – Located on the western part of the site, north of Cormorant Road.
- Coal Storage Area – Located on the eastern part of the site, north of Cormorant Road and adjacent to the existing PWCS Kooragang Coal Terminal.
- Wharf Facilities and Shiploaders – Located south of Cormorant Road at the eastern part of the site, adjacent to the PWCS wharf facilities.

H5.4 Project Components

A description of the physical and visual form/character of the major components of the Project is provided below.

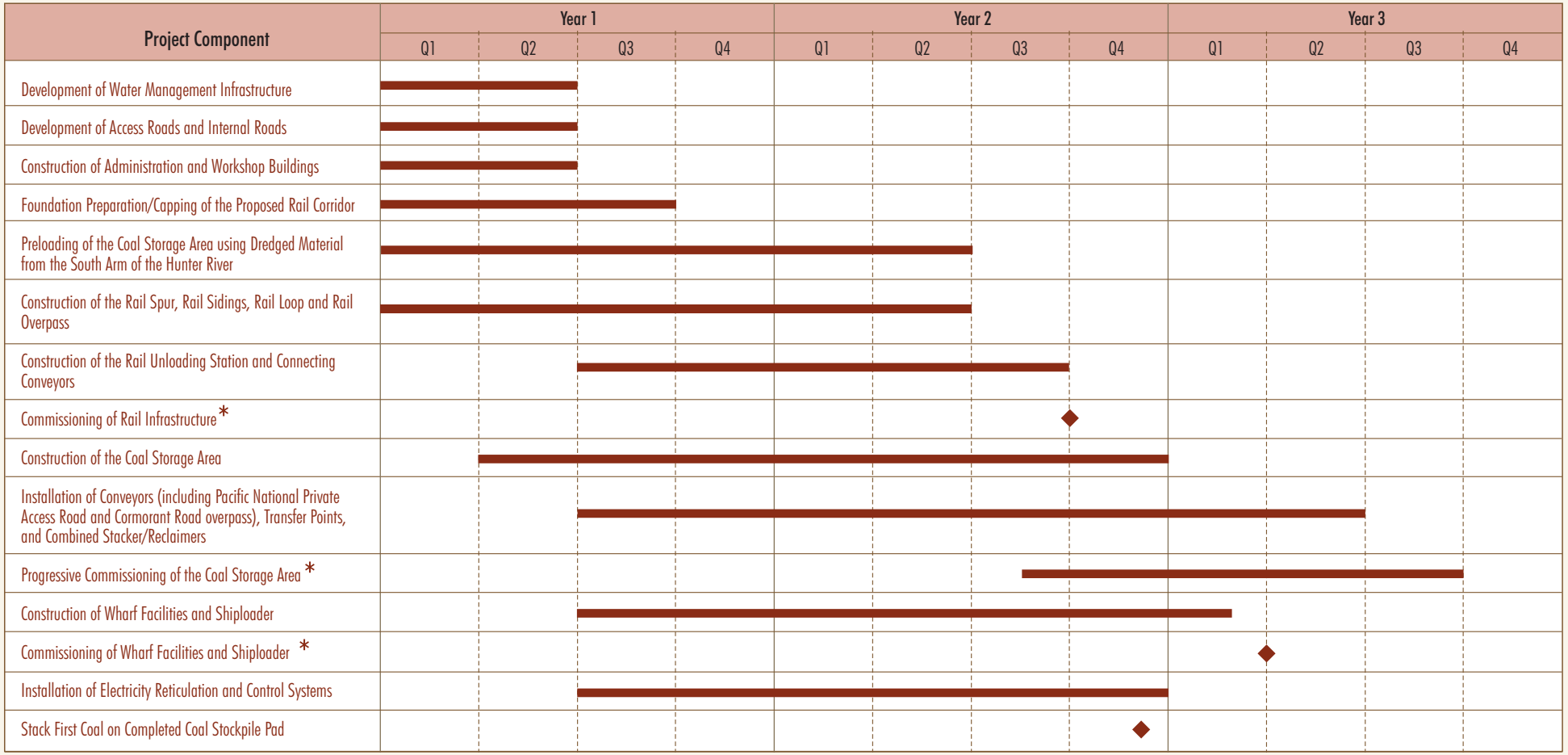
H5.4.1 Rail Infrastructure

The Project would include the construction of rail spurs from the Kooragang Island mainline, five rail sidings and two rail loops. The general layout of the rail spurs, rail sidings and rail loops are shown on **Figure H5.1**. A high capacity optional inlet rail spur with an at-grade connection from the Kooragang Island mainline is also shown.

Construction of the southern rail spur and associated three rail sidings and rail loop would be required for the Project to be developed to its initial capacity of 33 Mtpa and would take approximately 18 months. The second rail spur, additional rail sidings and duplicated rail loop would be constructed as the throughput capacity of the Project is progressively increased up to 66 Mtpa.

Consultation with the Australian Rail Track Corporation (ARTC) indicates that a future flyover may be required for the high capacity optional inlet rail spur to manage the interaction of Project rail traffic and rail traffic on the Kooragang Island mainline. If a flyover is required it would be subject to further detailed design, assessment and separate approvals in consultation with the ARTC. The high capacity optional inlet rail spur assessment as part of this environmental assessment is based on an at-grade connection to the Kooragang Island mainline (**Figure H5.1**).

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 H5.2
Proposed Construction Schedule

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NCIG-05-01 Visual_004G

H5.4.2 Train Unloading Stations

The Project train unloading stations would be located on the northern side of the rail loop (**Figure H5.1**). The two train unloading stations would be housed within a single multi-level structure (approximately 13 m high) and would be constructed on the outside edge of the northern embankment of the Kooragang Island Waste Emplacement Facility. The layout of the train unloading stations is shown on **Figure H5.3**.

H5.4.3 Coal Stockpiles

The construction of a coal storage area would include coal stockpiles, transfer points, conveyors, and combined stacker/reclaimers.

The coal stockpiles would comprise a series of parallel coal stockpile pads and intermediate berms (**Figure H5.4**). The coal stockpiles would be progressively established from south to north (coal stockpiles 1 to 11) as the throughput capacity of the Project is increased up to 66 Mtpa. Coal would be stacked to a maximum height of approximately 25 m above the pads.

The coal stockpiles would be similar in principle to the existing coal stockpiles at the PWCS Kooragang Coal Terminal (**Plate H5.1**).

H5.4.4 Earth Bund

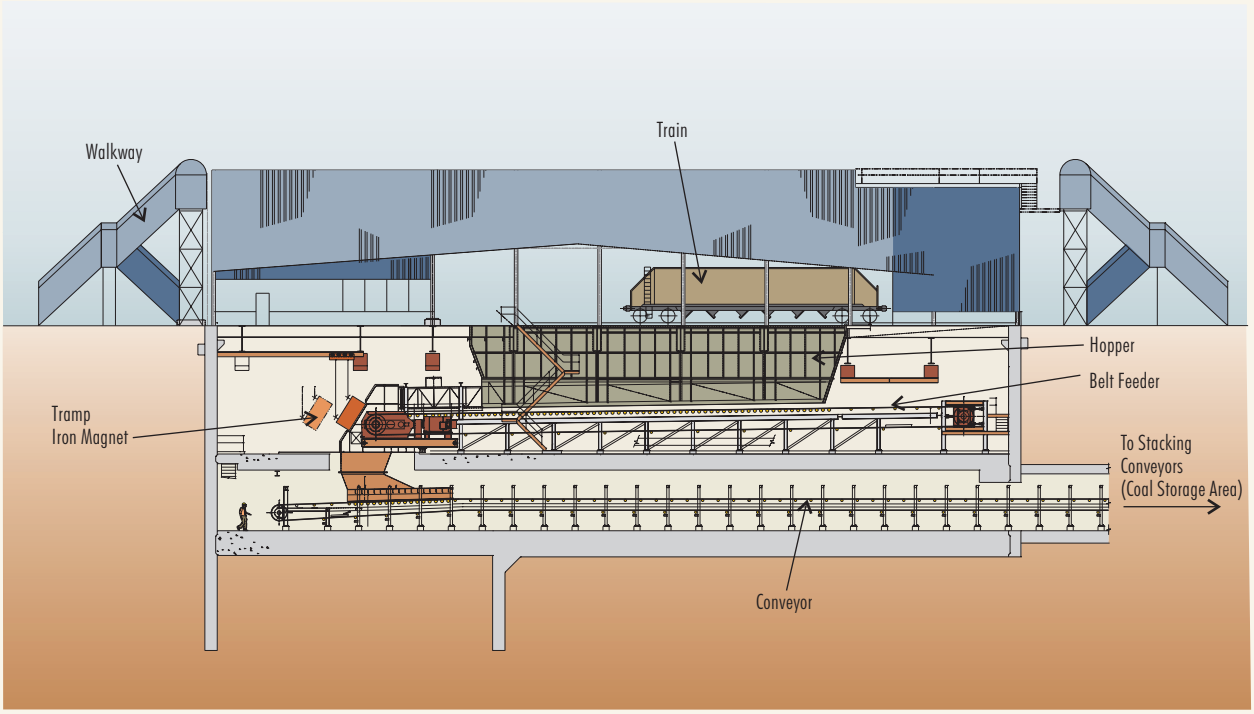
An earth bund approximately 1,500 m in length would be constructed on the northern side of Cormorant Road. The bund would be located east of the Pacific National access road, between the coal storage area and Cormorant Road. The bund would essentially be an extension of, and of a similar height to, the existing southern embankment of the Kooragang Island Waste Emplacement Facility.

H5.4.5 Coal Conveyors and Transfer Points

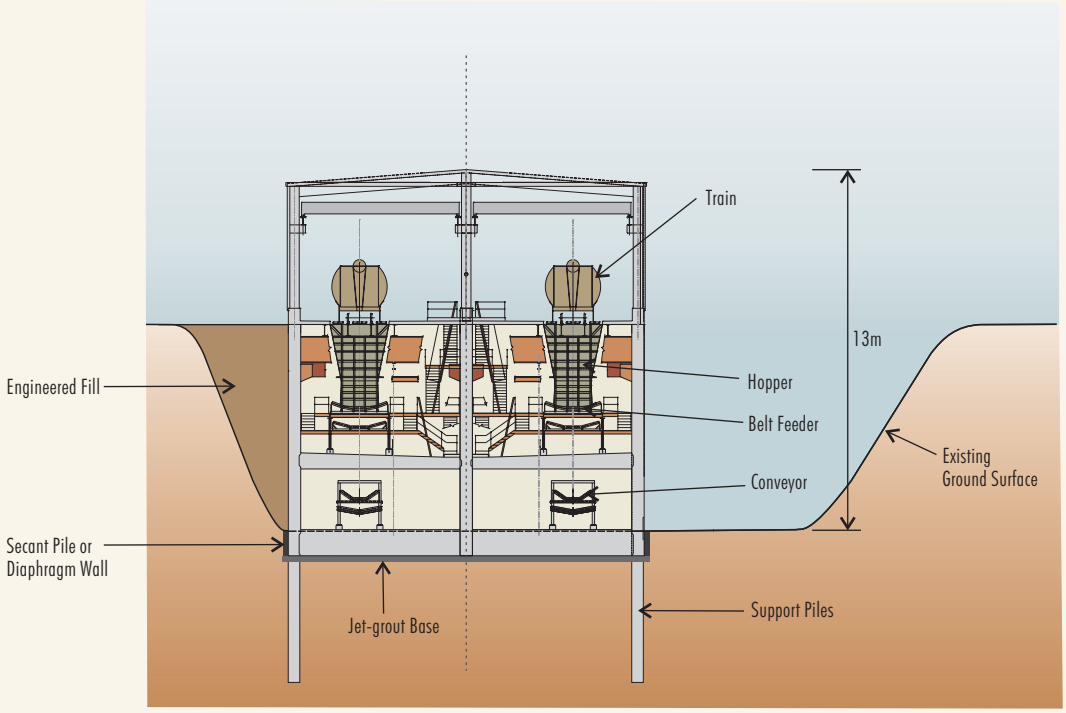
A network of belt conveyors and transfer points would facilitate the transport coal from the train unloading stations to the coal storage area and to the wharf facilities and shiploaders. The layout of the conveyors and transfer points are shown on **Figure H5.1**. Conveyor overpasses would be constructed across the Pacific National access road and Cormorant Road.

The overall length of the conveyor overpass structure across Cormorant Road would be approximately 120 m and it would be up to 16 m wide.

Conveyor belts would be up to 3.5 m wide. Conveyors would be roofed or partially enclosed except for the stacking/reclaiming conveyors in the coal storage area and the shiploading conveyor at the wharf facilities. Enclosed transfer points would allow transfer of coal from one conveyor to another.



Conceptual Long Section



Conceptual Cross Section

Source: Connell Hatch (2005)

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FIGURE H5.3
Train Unloading Stations

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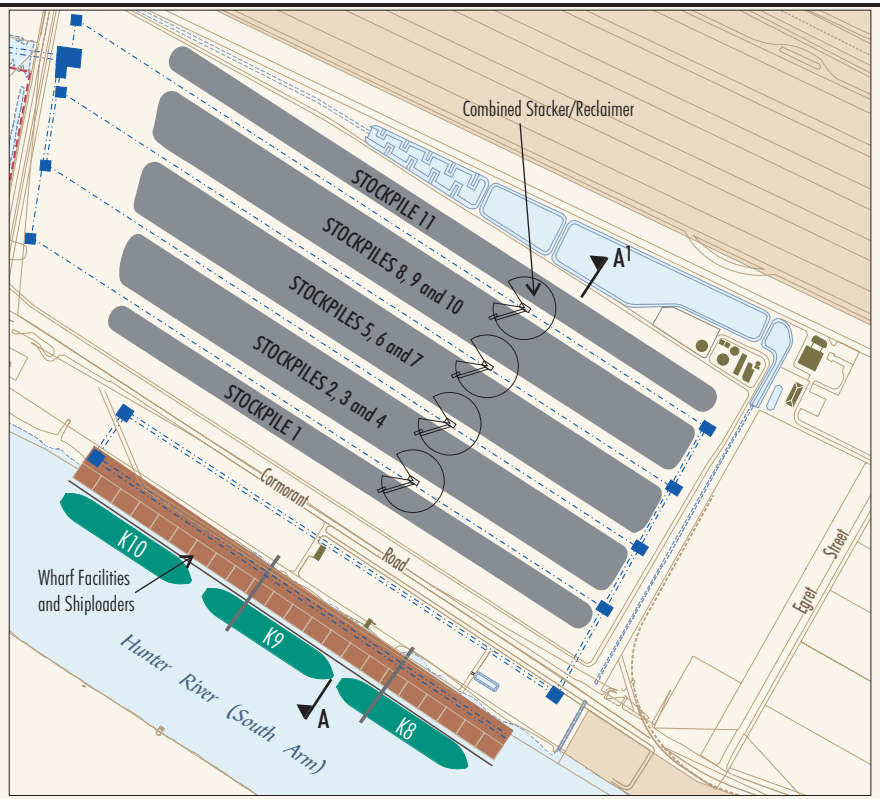

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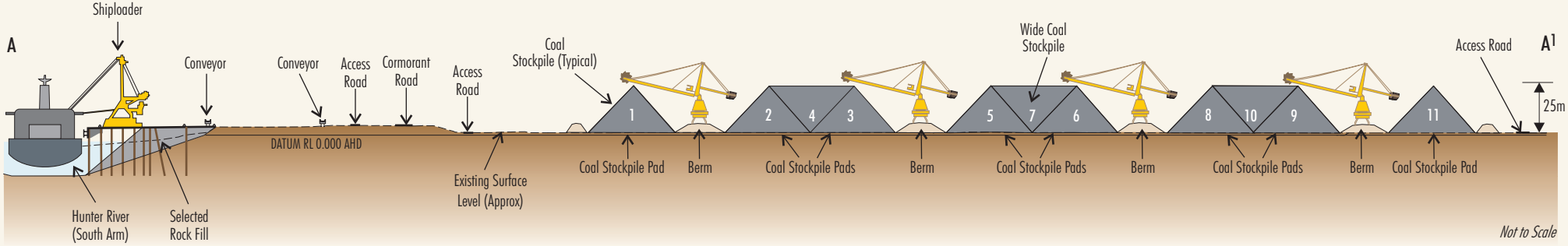

CONCEPTUAL SECTION A - A1

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

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FIGURE H5.4
Coal Storage Area

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Plate H5.1 Existing PWCS Kooragang Coal Terminal - Coal Stockpiles

Plate H5.2 Existing PWCS Kooragang Coal Terminal - Stacker Arrangement

H5.4.6 Combined Stackers and Reclaimers

The coal stockpiles would be served by up to four rail-mounted combined stacker/reclaimers and associated stacking/reclaiming conveyors. The arrangement of combined stacker/reclaimers would enable coal to be stacked onto the coal stockpiles and reclaimed via bucket-wheel.

The existing PWCS stacking arrangement is shown on **Plate H5.2**.

H5.4.7 Buffer Bins

Two buffer bins would be installed adjacent the wharf facilities to allow coal conveyed from the coal storage area to be temporarily stored during hatch changes when loading ships. Each buffer bin would be capable of storing up to 2,000 t of coal and would have a height up to approximately 28 m.

H5.4.8 Sampling Stations

Four sampling stations (two inbound and two outbound) would be required to provide samples for measurement and recording of coal grade and quality (moisture, chemical assay and ash content).

H5.4.9 Wharf Facilities and Shiploaders

The Project would include the construction of three shipping berths. The first two berths (K8 and K9) would be constructed initially for a Project capacity of 33 Mtpa. The third berth (K10) would be installed as the throughput capacity of the Project is increased up to 66 Mtpa. Construction of K8 and K9 would take approximately 15 months.

The wharf structure would be approximately 75 m wide and up to 1 km long and comprise a precast concrete deck supported on steel piles driven into the underlying substrate. The wharf would be capable of receiving Cape sized ships, accommodating up to 230,000 t of coal.

The three shipping berths would be served by two rail-mounted shiploaders. However, only one shiploader would be required during the initial Project capacity of 33 Mtpa. The second shiploader would be installed as the throughput capacity of the Project is progressively increased. Each shiploader would consist of a large travelling structural steel portal, shuttle and boom and would be fed by a dedicated shiploading conveyor from the wharf.

H5.4.10 Other Infrastructure

Administration and Workshop Buildings

The administration building would be a single storey structure containing a reception area, offices, meeting rooms, general workstation areas, lunchroom, kitchen, first aid room, restrooms and lockers for up to 120 people (i.e. allowance made for visitors, short term contractors and latent capacity).

The workshop building would contain a stores section, chemical storage, fuel storage, general maintenance bay, unloading area and outdoor secure storage area. A vehicle washdown facility would also be located in this area. The building would be fitted with an electric crane to facilitate work on equipment and the unloading of trucks. The store area would be suitable for forklift access and adjacent unloading of semi-trailer type transport.

The administration and workshop areas would be appropriately landscaped with selective tree planting, formal gardens and grassed areas in keeping with the "shop front" location on the public road.

Site Security Fencing

Existing site security fencing on Kooragang Island would be maintained and security patrols undertaken for the life of the Project. Additional site security fencing for the Project would be erected as required, including fencing the rail infrastructure, wharf facilities and shiploaders. Site security would meet the requirements of the *Maritime Transport and Offshore Facilities Security Act, 2003*.

Power Supply

Energy Australia would supply electricity to the Project from a new 132kV/33kV zone substation. The new substation is being developed by Energy Australia and is subject to separate approvals. An area has been set aside for the new 132kV/33kV zone substation by Energy Australia (**Figure H5.1**). The substation is planned for existing and future industrial development on Kooragang Island (i.e. the substation is not exclusively for power supply to the Project).

Up to three 33 kV powerlines would feed from the new Energy Australia substation to the NCIG main 33 kV/11 kV substation. An internal power reticulation network would be developed for the Project from the main substation and distribute 11 kV, 3.3 kV, 415 V and 240 V electricity supply.

Access Roads and Internal Roads

During construction of the Project, access to the main construction facilities would be via an entry and exit point at the intersection of Egret Street and Raven Street (**Figure H5.1**). Construction traffic would be required to turn left when departing Egret Street to Cormorant Road (i.e. no right turn would be permitted). For Newcastle bound traffic, a U-turn would be required at the existing Cormorant Road roundabout. Alternatively, construction traffic could exit the site via Raven Street (**Figure H5.1**).

Construction access to the rail infrastructure area would be via the Delta access road from Cormorant Road adjacent to the Tourle Street Bridge (heavy vehicle traffic only) and the Pacific National access road (**Figure H5.1**). The Pacific National access road would also provide supplementary access to the coal storage area. Consistent with that described above for Egret Street, no right turn movements from the Pacific National access road or the Delta access road adjacent to the Tourle Street Bridge would be permitted.

Construction access to the wharf facilities and shiploaders would be via a construction road off Cormorant Road (**Figure H5.1**). No right turn movements from the wharf facilities onto Cormorant Road would be permitted.

A U-turn loop would be constructed along the Pacific National access road for use by vehicles exiting the wharf area to travel toward Stockton (i.e. vehicles leaving the wharf area would be required to travel west before turning right into the Pacific National access road off Cormorant Road and performing a U-turn) (**Figure H5.1**).

During the operation of the Project, 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. This area would contain a car park facility (up to 80 car capacity) for employees and visitors and dedicated storage areas for large equipment for the workshops.

A series of dedicated internal roads would connect the administration and workshop area to the train unloading stations and coal storage area. Access to the wharf facilities and shiploaders from the coal storage area would be via Cormorant Road. No right turn movements (i.e. across oncoming traffic) from any Project access points on to Cormorant Road would be permitted.

Signage

Identification, directional, advisory and warning signage would be installed, particularly adjacent to the main site access road.

Night Lighting

Construction activities would generally be undertaken during daytime hours up to seven days per week. As discussed above, dredging operations and associated deposition of dredged material on the Project site would be undertaken up to 24 hours per day in accordance with the existing development consent (DA-134-3-2003-i) held by the NSW Maritime Authority.

The CET would operate 24 hours a day seven days per week therefore night lighting would be required. Night lighting would be emitted from two main sources during operation of the CET *viz*.:

- Overhead lighting of the coal storage area combined stacker/reclaimers, train unloading station and wharf facilities and shiploaders; and
- mobile vehicle-mounted lights (e.g. trains and work vehicles on site).

The scale and nature of night lighting for the Project would be similar in intensity to the existing night lighting at the PWCS Kooragang Coal Terminal.

H6 Assessment of Potential Visual Impacts

This assessment has been prepared to identify areas where visual impacts are most likely to occur as a result of the Project and to assist in the mitigation of those impacts from sensitive viewpoints. The assessment process has focussed on the visual impact that may result on views for the most sensitive visual settings/land uses where routinely accessed or readily accessible viewpoints exist.

H6.1 Sensitive Visual Settings

The critical issues to consider in the assessment of visual impacts are:

- the number of sensitive viewing locations; and
- the degree to which the proposed works are visible. If they are not seen, then there is no impact.

The most sensitive visual settings in the vicinity of the Project are elevated residential areas of Mayfield, Mayfield West and Fern Bay, commuters travelling along Cormorant Road and the Kooragang Nature Reserve. Residences with views of the Project at distances of less than 2.5 km have a high level of viewer sensitivity, however would vary according to the location and the degree to which the Project is visible. The visual sensitivity of viewpoints along Cormorant Road within 1 km of the Project is also considered to be high.

Several viewpoints located within a range of visual settings, have been identified and are assessed in the following section. The locations of the viewpoints are shown on **Figure H6.1**.

H6.2 Qualitative Assessment – Sensitive Sites

The potential visual impact of the Project is determined by considering the visual sensitivity of different viewing areas with the level of visual modification apparent from each particular viewpoint. The potential visual impact level of the Project is assessed for the development prior to any amelioration being undertaken (i.e. vegetation screening). The final category considers some maturation of vegetation/planting works (i.e. 5-7 years).

The following assessment represents the views of EDAW based on the methodology described in Section H1.1. A summary of the assessment of the chosen sensitive sites analysed in the following subsections is provided in **Table H6.1**.

Viewing Location (Figure H6.1)		Sensitivity	Visual Modification Level	Impact	Impact After Final Amelioration
Regional Setting (Greater than 5 km)		**L**	**VL**	**VL-N**	**VL-N**
Sub-Regional Setting (1 – 5 km)		**M-H**	**L-VL**	**L-M**	**L-M**
Viewpoint 1	Mayfield	**H**	**L-VL**	**L-M**	**L-M**
Viewpoint 2	Mayfield West (Gregson/Stevenson Avenue)	**H**	**L-VL**	**L-M**	**L-M**
Viewpoint 3	Fern Bay (Nelson Bay Road)	**H**	**VL**	**L**	**L**
Viewpoint 4	Kooragang Nature Reserve	**M-H**	**L**	**L-M**	**L-M**
Viewpoint 5	Stockton Bridge	**M**	**L**	**L**	**L**
Local Setting (Up to 1 km)		**Varies**	**Varies**	**Varies**	**L-M**
Viewpoint 6	Cormorant Road	**M-H**	**M-H**	**M-H**	**L-M**
Viewpoint 7	Hunter River	**L**	**L**	**L**	**L**
Viewpoint 8	Sandgate Residential - Urban Services Zone (River Road)	**H**	**Nil**	**Nil**	**Nil**

H – High, M – Moderate, L – Low, VL – Very Low, N – Negligible

Table H6.1 – Summary of Visual Impact Assessment

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

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FIGURE H6.1
Visual Settings and Viewpoints

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NCIG-05-01 Visual_0071

H6.2.1 Regional Settings – Beyond 5 km

The potential visual impact of the Project on the regional setting is considered to be very low to negligible. There may be dispersed and distant elevated viewing locations within this setting that have views to the site but at this distance the sensitivity level reduces to low. The level of apparent visual modification from this distance would be very low because: the proposed development would be indistinguishable from the existing heavy industry landscape setting; the reduction in clarity of viewing which occurs over distance; and the lack of direct views.

H6.2.2 Sub-Regional Settings – 1 to 5 km

The potential visual impacts on viewing locations within the sub-regional setting would vary according to the visual sensitivity and visual screening provided by intervening vegetation and the built form of large scale industrial elements. The potential impacts of the Project from selected viewpoints within the sub-regional setting are described below.

Views from Mayfield (Viewpoint 1)

Mayfield is a slightly elevated residential area close to the edge of the local setting catchment. The residential area is located to the south of Industrial Drive, along a slight rise in topography that runs east to west. From the edge of the rise, there are occasional, distant views to the site through gaps in buildings and along streets.

Level of Visual Modification

The industrial development along the southern bank of the Hunter River South Channel is a dominant element in the foreground and middleground. Less elevated viewpoints are screened by vegetation and large buildings along Industrial Drive. The visual context is of a highly modified, industrial landscape setting.

Therefore, the Project would result in a low to very low level of visual modification.

Viewer Sensitivity

Within the near sub-regional visual setting (<2.5 km), the level of visual sensitivity would be high.

Visual Impact

A low to very low visual modification level coupled with a high visual sensitivity would result in a low to moderate visual impact.

Views from Mayfield West – Gregson/Stevenson Avenue (Viewpoint 2)

An elevated vantage point exists within the Mayfield West residential setting along Gregson/Stevenson Avenue with distant views to site (**Plate H6.1**). Viewers from this location would generally be residents and other users of the local road network. The viewpoint is just outside the local visual setting, within the near sub-regional setting (**Figure H6.1**).

Level of Visual Modification

There are distant views of the industrial area from this viewpoint. As can be seen in **Plate H6.1**, the southern bank industrial area, including OneSteel, is visible in the middleground. Part of the Project site is located beyond a band of vegetation which would provide partial screening to the proposed development.

Plate H6.1 Existing View from Mayfield West (Viewpoint 2)

Plate H6.2 Existing View from Fern Bay (Viewpoint 3)

Plate H6.3 Existing View from Kooragang Nature Reserve (Viewpoint 4)

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PLATES H6.1 TO H6.3

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The Project components would add to the industrial buildings and features but would be partially screened by the intervening vegetation from the viewpoint. It would therefore result in a very low to low level of visual modification.

Viewer Sensitivity

Within the near sub-regional setting (<2.5 km), the visual sensitivity for residential users is considered to be high.

Visual Impact

A low to very low visual modification level combined with a high visual sensitivity will result in a low to moderate visual impact.

Views from Fern Bay - Nelson Bay Road (Viewpoint 3)

Nelson Bay Road runs parallel to the Stockton/North Channel in Fern Bay with residential development occurring to the east. Viewers from this location would generally be residents and other users of the local road network (**Plate H6.2**). The viewpoint is located approximately 2 km from the site (**Figure H6.1**).

Level of Visual Modification

Views to the site are partially screened by existing road and riverside vegetation (**Plate H6.2**). Views across the channel are dominated by the existing PWCS Kooragang Coal Terminal. The proposed development is to occur behind this site and is designed with similar massing and form, therefore the visibility of the proposed development would be predominantly screened by the existing industrial buildings. This would result in a very low level of visual modification.

Viewer Sensitivity

Within the near sub-regional setting, the visual sensitivity of a residential area within 1 to 2.5 km of the site would be high.

Visual Impact

Given the site would be obscured by the existing PWCS Kooragang Coal Terminal, a very low visual modification level coupled with a high visual sensitivity would result in a low visual impact.

Views from Kooragang Nature Reserve (Viewpoint 4)

The Kooragang Nature Reserve is predominantly located within the sub-regional setting, with a small percentage of land in the southern area of the site located with local setting. Most areas of Kooragang Nature Reserve are not readily accessible by the public. Likely users would be fisher people and those engaged in nature based activities.

Level of Visual Modification

The estuarine environment is predominantly flat with low lying vegetation allowing for distant views across towards the existing PWCS Kooragang Coal Terminal (**Plate H6.3**). The existing industry prevails in the background with elements in light, reflective, taller or contrasting form dominating over grey or muted elements.

The Projects components would add to the industrial buildings and features in the background but would not create a significant modification to the backdrop of the nature reserve. Therefore, at this distance, the Project would result in a low visual modification.

Viewer Sensitivity

Within the near sub-regional setting, the visual sensitivity of a nature reserve within 1 to 2.5 km of the site would be high, although user numbers would be very low. Within the far sub-regional setting, the visual sensitivity of a nature reserve within 2.5 to 5 km of the site would be moderate.

Visual Impact

A low visual modification combined with a high visual sensitivity within the 1 to 2.5 km radius of the site would result in a moderate visual impact, whilst a low visual modification combined with a moderate visual sensitivity within the 2.5 to 5 km radius of the site would result in a low visual impact.

Views from Stockton Bridge (Viewpoint 5)

Stockton Bridge is a highly elevated structure. Westbound lanes of traffic have expansive views over the Hunter River / Stockton Channel, as well as the heavy industrial area concentrated along the water's edge.

Level of Visual Modification

The industrial development along the Hunter River is the dominant element in views from the bridge. The visual context is of a highly modified, industrial landscape setting. The establishment of another development of similar form and character would result in a low level of visual modification.

Viewer Sensitivity

Within the near sub-regional setting, the visual sensitivity of users of the bridge and road, which carries large volumes of industrial as well as tourism traffic from Stockton Beach, would be moderate.

Visual Impact

A low level of visual modification, combined with a moderate level of visual sensitivity, would result in a low visual impact.

H6.2.3 Local Settings – Within 1 km

The potential visual impacts of the proposed development on viewing points within the local setting are described below. The assessment has focussed on the visual impact that may result on views for the most sensitive visual settings/land uses where routinely accessed or readily accessible viewpoints exist.

Views from Cormorant Road (Viewpoint 6)

Cormorant Road, which runs adjacent to the southern boundary of the site, is a major road catering for industrial transport as well as commuters and tourists to the area. The road is at grade, located within a very flat landscape. At present, the proposed development site on both sides of Cormorant Road provides a break in the industrial landscape. The eastern half of the site boundary adjacent to the road is devoid of tall vegetation (**Plate H6.4**), whereas the western half of the site boundary adjacent to the road has a mature stand of vegetation on the Kooragang Island Waste Emplacement Facility bund wall that effectively screen views into the site (**Plate H6.5**).

Plate H6.4 Existing View from Cormorant Road (Viewpoint 6 - North-East)

Plate H6.5 Existing View from Cormorant Road (Viewpoint 6 - West)

Plate H6.6 Existing View from Cormorant Road (Viewpoint 6 - South)

Plate H6.7 Existing View from Cormorant Road (Viewpoint 6 - East)

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PLATES H6.4 TO H6.7

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Level of Visual Modification

There are currently exposed views into the site to the north east through a chain mesh fence (**Plate H6.4**). The development would be visually similar to the PWCS Kooragang Coal Terminal in the background. However, it would be much closer to Cormorant Road and more visually dominant.

The railway loop would be located to the north-west and would be generally concealed behind the existing Kooragang Island Waste Emplacement Facility bund wall and vegetation.

The ship loading facility and wharf would be located to the south of Cormorant Road (**Plate H6.6**), and the connecting conveyor from the coal storage area would cross over the road. It would be similar in form to that further along Cormorant Road (**Plate H6.7**). The new ship loading facility and wharf would be a dominant element in close proximity to the road, but consistent with the existing facilities immediately to the east. The level of visual modification would therefore be moderate to high.

Viewer Sensitivity

Within the local setting, the visual sensitivity of road users, on what is a major road and tourism route, would be moderate to high.

Visual Impact

Given the moderate to high level of visual modification coupled with a moderate to high level of sensitivity, a moderate to high visual impact would result on views from Cormorant Road, immediately adjacent to the proposed site.

Amelioration and Duration of Impact

It is recommended that foreground vegetation screening be established along Cormorant Road along the eastern half of the site boundary to obscure potential views of the coal storage area. The vegetation screen should remain as a permanent landscape feature and be planted with grasses, shrubs and trees. Implementation of this amelioration measure would reduce the level of visual impact for commuters and tourists travelling along Cormorant Road to moderate to low. The greatest potential for visual impact would be during the early years of the Project as the vegetation screen establishes and progressively reduces the visual impact.

Views from Hunter River (Viewpoint 7)

The north and south arms of the Hunter River encompass Kooragang Island and the Project site (**Figure H6.1**).

Level of Visual Modification

The heavy industrial elements dominate the viewshed of the Hunter River. The proposed coal storage area would not be highly visible from the river and would be located in close proximity to the PWCS Kooragang Coal Terminal. The proposed ship loading facility and wharf could be effectively seen as an extension of the existing wharfs on the Hunter River (south arm).

The visual modification level is therefore considered to be low.

Viewer Sensitivity

The Hunter River is used for a variety of purposes, ranging from a transport corridor for freighters and bulk carriers, to a recreational resource for water skiers and fisher people. The sensitivity of these user groups ranges from high to low, although given the long standing industrial uses and their dominance of the rivers edge, some desensitisation of users may have occurred.

The visual sensitivity of users of the river is therefore considered to be low.

Visual Impact

A low level of visual modification, combined with a low level of sensitivity, would result in a low visual impact on users of the Hunter River.

Views from Sandgate – Residential Area (Urban Services Zone) (Viewpoint 8)

This small, isolated residential area within an Urban Services Zone is located immediately adjacent to the Hunter River (south arm) to the west of the proposed site (**Figure H6.1**).

Level of Visual Modification

This viewpoint is low lying, with river side vegetation on both banks screening any potential views to the site. The visual modification is therefore considered to be nil.

Viewer Sensitivity

Within the local setting, the visual sensitivity of residents would be high.

Visual Impact

Given the Project site would not be visible, there would be no resulting visual impact in views from this location or general vicinity.

H6.3 Impacts of Night Lighting

The visual setting is generally well lit as a consequence of the existing industrial facilities which operate 24 hours a day.

Potential night lighting impacts on the local and sub-regional settings would generally be restricted to the production of a glow above operational areas that contrast with the night sky. This effect would decrease with distance however the glow would be visible at nearby residential areas and along the local road network (i.e. Cormorant Road).

The potential impact of night lighting on sensitive visual settings would be negligible given the presence of numerous light emitting sources in the local, sub-regional and regional settings.

H6.4 Potential Cumulative Impacts

The existing heavy industrial activities in the vicinity, of a similar scale and form of the proposed Project, ensure that the resulting visual modification would be low. The heavily modified industrial setting is the overriding factor in the cumulative visual impact assessment of the Project.

PWCS have development consent to expand to existing Kooragang Island coal terminal from its current 64 Mtpa capacity up to 77 Mtpa. This would involve the expansion of the existing coal stockpiles and wharf facilities on Kooragang Island.

The Cargill Oilseed Processing Facility was also granted Project Approval in April 2006 for expansion of the existing facility on Kooragang Island. The expansion would include a 44.5 m high stack similar in height to the existing stack and a number of additional buildings.

An additional consideration is the desensitisation of viewer perception that can occur when a setting is continually modified to a significant level over a long period of time. Sensitive viewpoints are few within the local setting, resulting in a generally low level of visual impact.

Although the setting is heavily modified, there would be a localised impact along Cormorant Road, where the existing views to the undeveloped site to the north and the river to the south would be significantly altered. Vegetation screening undertaken in this location would have a significant ameliorative effect in reducing visual impacts.

In conclusion, the development of the Project from a cumulative perspective would generally result in a low visual impact on surrounding areas.

H7 Visual/Landscape Management Strategies and Recommendations

The following visual/landscape management strategies have been recommended for incorporation of Project and landscape design to assist in reducing the level of visual impact of the Project.

H7.1 Landscape Design

Consistent with the requirements of relevant environmental planning instruments (Section H3) the Proponent should:

- fulfil the requirements outlined in Element 4.4 – Landscaping of the Newcastle DCP;
- ensure the administration and workshop areas are appropriately landscaped with selective tree planting, formal gardens and grassed areas in keeping with the “shop front” location on the public road consistent with the requirements of Element 7.4.8 of the Newcastle DCP;
- integrate and rationalise signage to minimise visual clutter at formal entry points into the site; and
- in accordance with Element 7.4.15 of the Newcastle DCP, lighting should be positioned and directed so as to cause no glare or excessive light spillage to neighbouring land and should comply with Australian Standard (AS) 4282-1995 *Control of Obtrusive Effects of Outdoor Lighting*.

H7.2 Foreground Visual Screening – Cormorant Road

It is recommended that foreground vegetation screening, in conjunction with the earth bund, be established along Cormorant Road along the eastern half of the site boundary to obscure potential views of the Project coal storage area. The vegetation screen should remain as a permanent landscape feature and be planted with grasses, shrubs and trees.

H7.3 Construction Material Selection

Taller Project elements should, where possible, be clad with non reflective materials of a light to mid blue / grey colour that blends with the back drop of the sky. It is also recommended that ground plane elements be painted in a mid dusky green colour to better blend with surrounding vegetation.

H8 References

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ATTACHMENT H1 – Glossary of Terms

Amelioration – The ability to reduce the visual impact of a development through siting, design, colour or screening.

Sensitivity – The degree to which various user groups will respond to change based on their expectation of a particular experience in a given setting (i.e. the expectation of a high level of visual amenity in a national park).

Modification Level – The degree to which a development contrasts or blends with its setting.

Visual Impact – The result of assessing the sensitivity level of a viewer and the modification level of a development.

Viewshed – The area visible from a particular viewing location.

Zone of Visual Influence (ZVI) – The area over which an object can be seen within the landscape.

Visual Amenity – The qualities of a landscape setting that are appreciated and valued by a viewer.

Viewer Perception – The way in which people respond to what they are seeing as influenced by things other than purely visual (i.e. noise and economic benefits).