PROJECT DESCRIPTION

SECTION 2

NEWCASTLE COAL INFRASTRUCTURE GROUP
COAL EXPORT TERMINAL

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2 PROJECT DESCRIPTION

The Project comprises the construction and operation of a 66 Mtpa capacity CET on Kooragang Island in Newcastle, NSW (Figures 1-2 and 2-1).

2.1 PROJECT GENERAL ARRANGEMENT

The Project general arrangement is shown on Figure 2-1. 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. The general arrangement shown on Figure 2-1 may vary in minor respects as a result of the detailed design of the Project elements.

In addition to the activities described above, NCIG plan to implement a number of flora and fauna compensatory measures on adjacent lands owned by the RLMC and/or the Kooragang Nature Reserve. These activities are described in Sections 4.8.4 and 4.9.4.

2.2 PROJECT OPERATION

A schematic flow diagram of the Project is shown on Figure 2-2. Project operations include the following three main activities: train unloading; coal handling/stockpiling; and shiploading. These activities are described below.

2.2.1 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 2-1 and 2-2). Empty trains would then travel around the Project rail loops in a clockwise direction and rejoin the Kooragang Island mainline. Train signalling would manage the interaction of the Project rail traffic with other traffic on the Kooragang Island mainline.

A description of train unloading stations is provided in Section 2.4.2. Each train unloading station would have a capacity of up to approximately 8,500 tonnes per hour (tph).

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. Allowing for the time taken to manoeuvre trains and equipment, the Project infrastructure would have a capacity to receive up to a maximum of 40 trains on any one day.

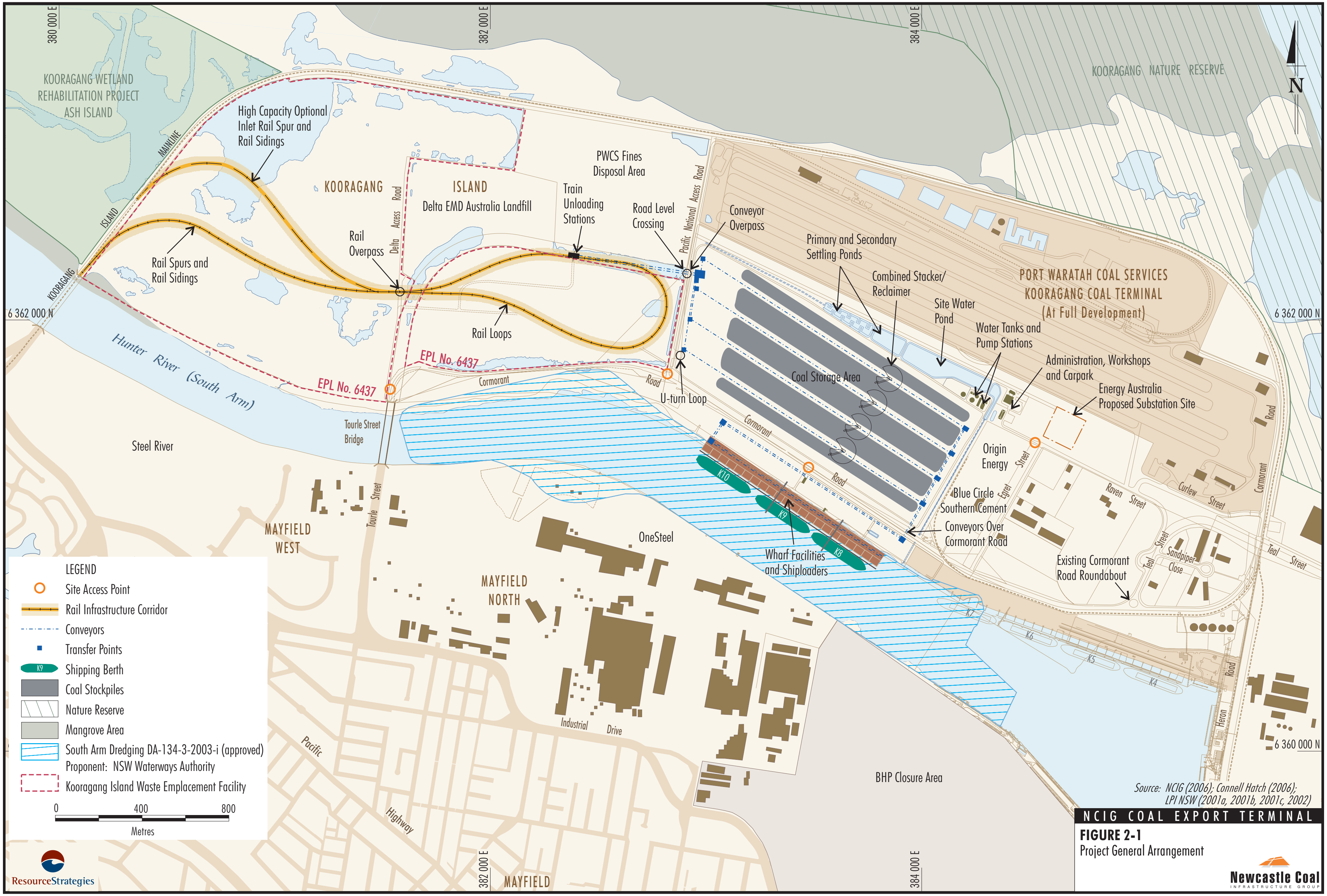

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FIGURE 2-1
Project General Arrangement

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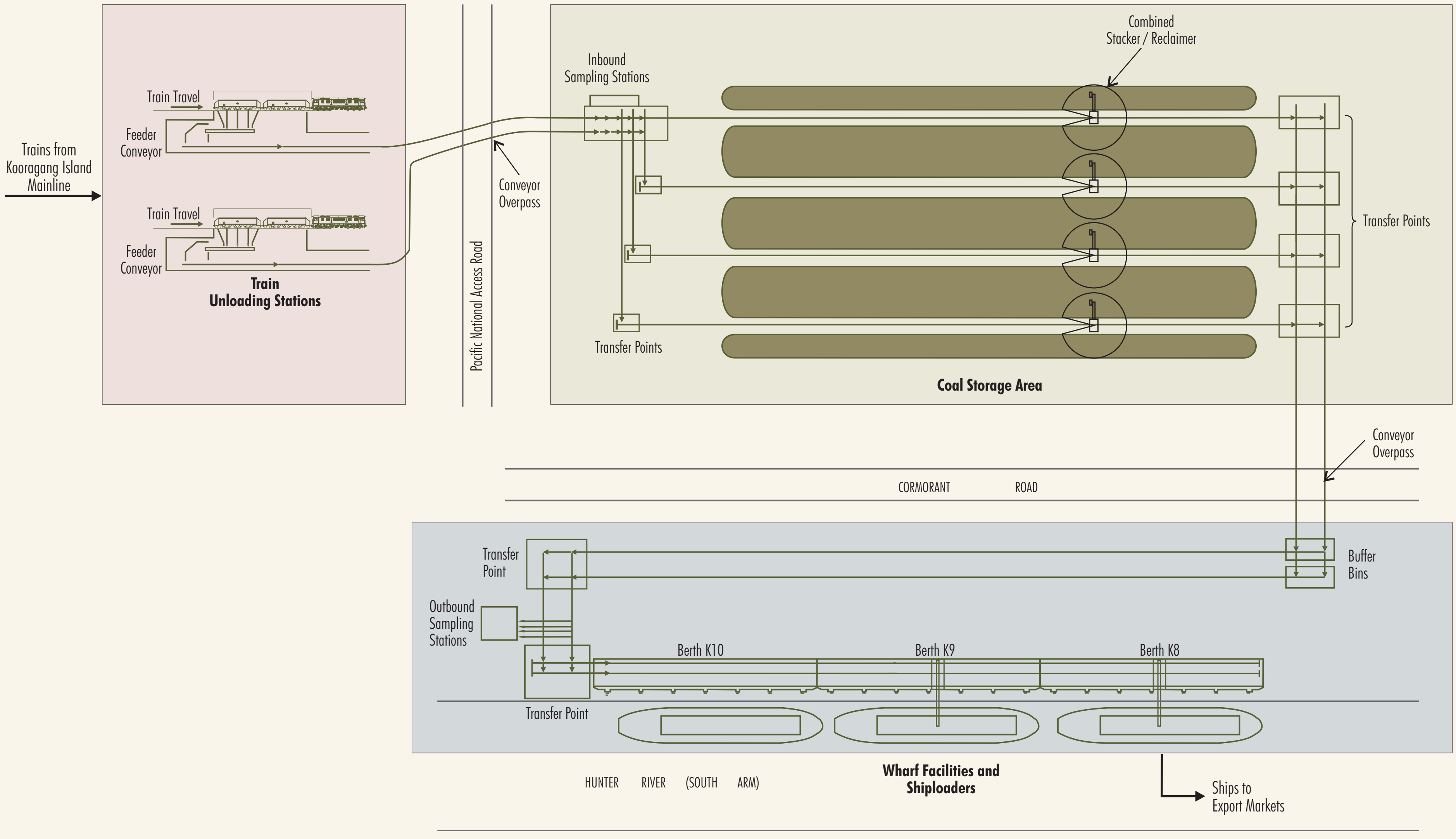

Source: After Connell Hatch (2005) and NCIG (2006)

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FIGURE 2-2
Schematic Flow Diagram

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2.2.2 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.

The coal storage area and associated coal handling infrastructure is described in Sections 2.5 and 2.6, respectively.

2.2.3 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.

The wharf facilities and shiploaders are described in Section 2.7.

2.3 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 be undertaken during daytime hours up to seven days per week. Dredging operations (as described in Section 3.6.1) 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 (Section 4.11).

Figure 2-3 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. This is further discussed in Sections 3.9.1 and 3.9.2.

The main Project construction management facilities would be established adjacent to the coal storage area (Figure 2-1). The facilities would include the contractors' site amenities and offices, temporary construction workshops and laydown and pre-fabrication areas. Other minor construction management facilities would also be erected at the train unloading stations, wharf facilities and shiploaders.

The construction phase of the Project would also include the establishment of water management structures. Water management structures would be constructed in accordance with a Site Water Management Plan (SWMP) (Section 4.6.3). Stormwater settlement ponds, primary and secondary settling ponds, site water pond and the associated drainage network would be installed to capture runoff from Project disturbance areas (Section 2.8).

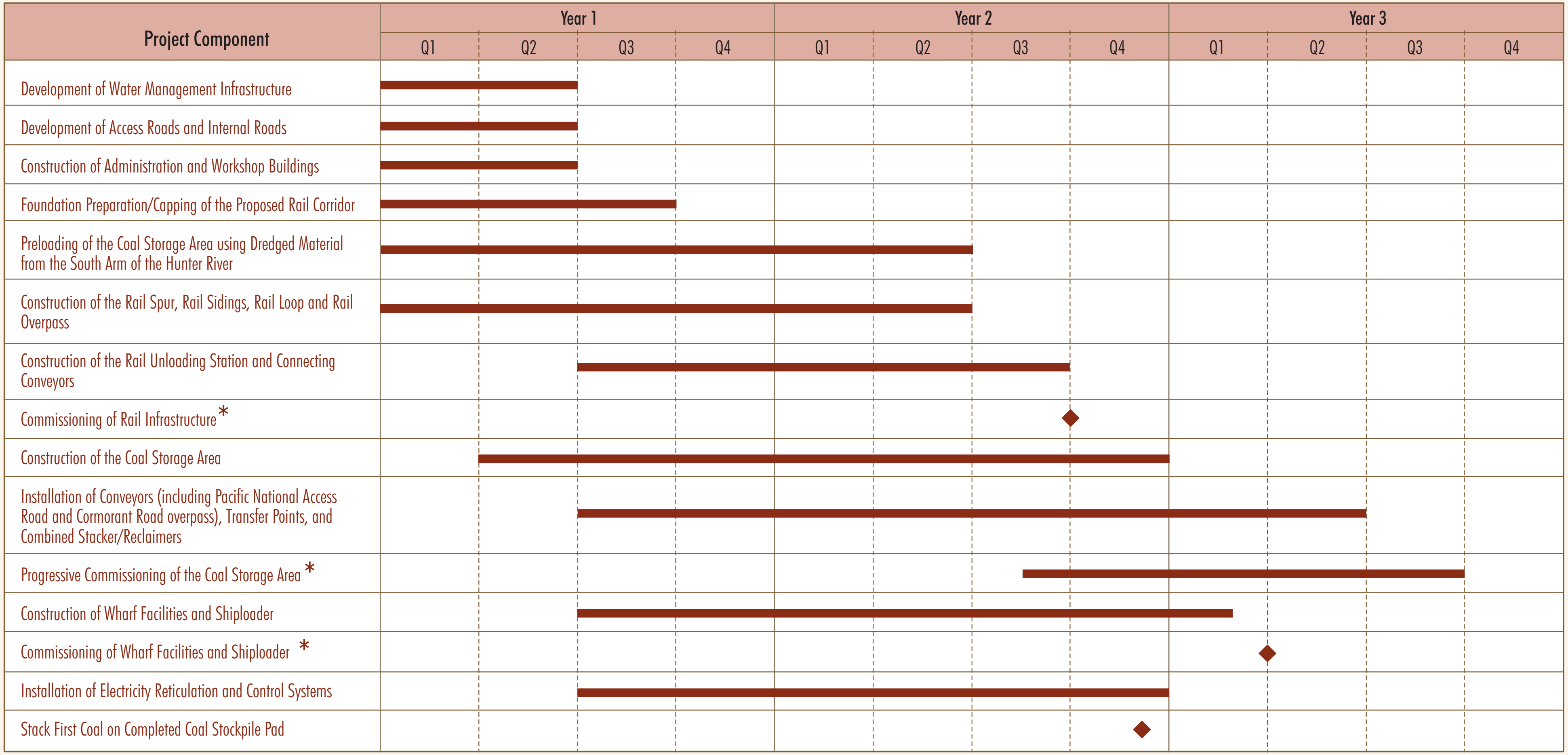
2.4 RAIL INFRASTRUCTURE

2.4.1 Rail Spurs, Rail Sidings and Rail Loops

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 Project rail infrastructure is shown on Figure 2-1. As discussed below, the Project rail infrastructure includes a high capacity optional inlet rail spur with an at-grade connection from the Kooragang Island mainline (Figure 2-1).

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 to construct. The northern rail spur (if deemed necessary), additional rail sidings and duplicated rail loop would be constructed as the throughput capacity of the Project is progressively increased up to 66 Mtpa.

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 2-3
Proposed Construction Schedule

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The Project rail infrastructure corridor (Figure 2-1) would traverse portions of the existing KIWEF. An existing environment protection licence (EPL) is held by the RLMC for the KIWEF (Section 4.1.1). Construction of the Project rail infrastructure would require some minor excavation. Any excavations within the KIWEF would be undertaken in accordance with management procedures described in Section 4.7.

The Project rail infrastructure corridor would be designed and constructed such that it meets the goals of benchmark techniques 28 and 29 in *Environmental Guidelines: Solid Waste Landfills* (EPA, 1996) where it traverses the KIWEF. This would be achieved by the inclusion of the following aspects in the rail infrastructure corridor design (Appendix D):

- A seal-bearing surface (i.e. prepared sub-grade).
- A 0.5 m thick sealing layer with an effective permeability of not greater than $1x10^{-8}$ metres per second (m/s) (unless otherwise agreed by the DEC). A geo-synthetic and/or geo-membrane would be incorporated into this layer where necessary to achieve the desired effective permeability and/or to protect the integrity of the sealing layer.
- Incorporation of a drainage system along the rail infrastructure corridor to maximise rainfall runoff and minimise infiltration. The drainage system would include table drains along the length of the corridor to collect and divert runoff to the existing site drainage system via sediment control structures. The rail embankment would include culverts where it traverses low points in the existing topography to allow drainage across its alignment.
- An infiltration drainage layer with an effective permeability not less than $1x10^{-5}$ m/s and a revegetation layer would be placed across the capping layer as part of Project closure and rehabilitation works.
- The capping layer and drainage layout would be designed such that they can be readily integrated with the RLMC's ultimate capping strategy for the whole KIWEF.

The design features discussed above are further described in Section 4.7 and Appendix D.

Dredged material that is sourced from the south arm of the Hunter River would be used for the construction of rail embankments. Approximately 575,000 cubic metres (m^3) of fill material would be required and would be hauled across the Pacific National access road via a level crossing from the coal storage area (Section 2.5) to the rail infrastructure area. Validation sampling and testing of the dredged material would be progressively undertaken during its initial deposition in the coal storage area (Section 2.5.1) and during its rehandling for construction of the rail embankments to confirm its suitability for use. Testing of this nature is also required under the existing Development Consent (DA 134-3-2003-i) (the Port Consent) (Section 3.6.1).

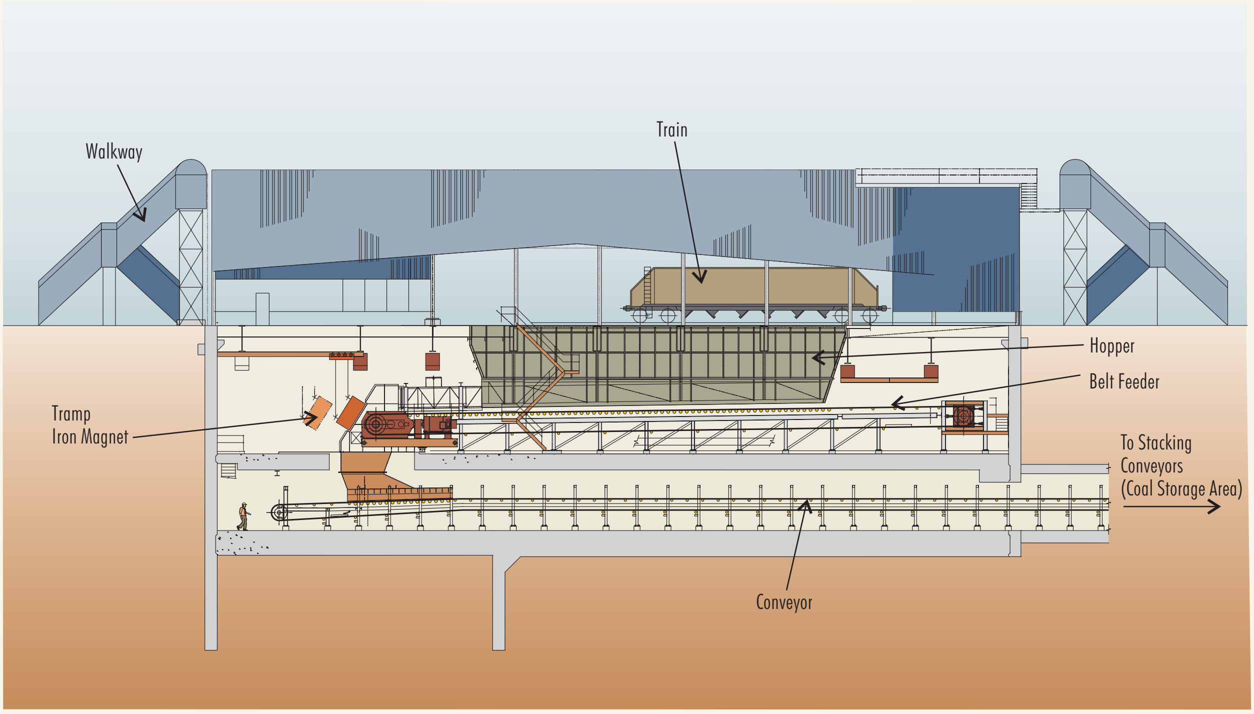
The design and construction of the Project rail infrastructure would be undertaken in accordance with the requirements of the Australian Rail Track Corporation (ARTC) who manage the Hunter Valley Coal Rail Network. The rail spurs, rail sidings and rail loops would accommodate up to five coal trains.

Consultation with 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 when the facility is operating at 66 Mtpa. 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 assessed as part of this EA is based on an at-grade connection to the Kooragang Island mainline (Figure 2-1).

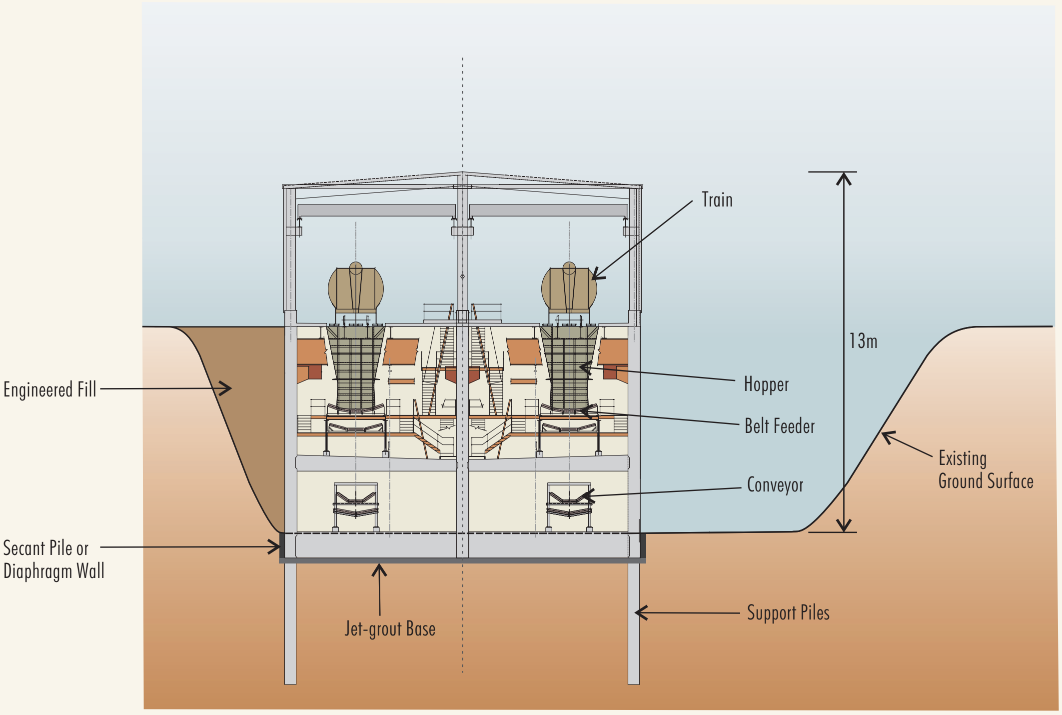
2.4.2 Train Unloading Stations

The Project train unloading stations would be located on the northern side of the rail loop (Figure 2-1). One train unloading station would be required for the Project to meet its initial operational capacity of 33 Mtpa. Construction and commissioning of the first train unloading station would take approximately 15 months. The second train unloading station would be constructed as the throughput capacity of the Project is progressively increased up to 66 Mtpa.

The two train unloading stations would be housed within a single multi-level structure (approximately 13 metres [m] high) (Figure 2-4). The structure would be constructed on the outside edge of the northern embankment of the KIWEF (Figure 2-1). As a groundwater management measure, the structure would be supported on piles with a sealed jet-grouted base and secant pile or diaphragm wall (Figure 2-4).



Conceptual Long Section



Conceptual Cross Section

Source: Connell Hatch (2005)

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FIGURE 2-4
Train Unloading Stations

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Construction of the train unloading stations would require minor excavation for the preparation of foundations. Construction activities requiring excavation would be undertaken in accordance with procedures described in Section 4.7.

2.4.3 Rail Overpass

A rail overpass would be constructed over the Delta access road (Figure 2-1). The rail overpass would be designed to meet the applicable vehicle height clearance requirements.

2.5 COAL STORAGE AREA

2.5.1 Preloading and Construction of Coal Stockpile Pads and Berms

Within the coal storage area, each coal stockpile would sit on a pad (i.e. prepared foundation) (Figure 2-5). These pads would be between approximately 1,100 m and 1,300 m long and up to 120 m wide. Berms would be constructed between the coal stockpile pads to a height of approximately 4.5 m above the finished level of the pads. Each berm would be approximately 25 m wide and would form the foundation for a combined stacker/reclaimer and coal conveyor as well as providing for separation between each coal stockpile. Additional berms would also be constructed at the external edges of coal stockpiles 1 and 11 (Figure 2-5). These Project elements would be constructed from materials dredged from the south arm of the Hunter River.

Dredged material would be pumped via a dedicated pipe from the dredging operations to the coal storage area. The pipe would cross Cormorant Road via an excavated trench or via the existing concrete-lined channel on the eastern edge of the Project site. The dredging operations would be undertaken in accordance with the Port Consent (Section 3.6.1). The dredged material would be pumped as a slurry to a series of temporary dredge ponds in the north of the first stage coal storage area. The solids (predominantly sands) portion of the deposited material would form a beach as it is placed. The sea water that is pumped with the solids would drain to the primary and secondary settling ponds and site water pond for water quality testing prior to being returned to the Hunter River via the existing concrete-lined stormwater channel (Figure 2-1 and Section 2.8). The dredged material would be progressively built up into stacks in this manner and left to drain until dry enough to rehandle with earthmoving equipment.

The existing soils on which the coal stockpile pads and berms would be constructed would be preloaded with dredged material as part of the construction process. The purpose of preloading is to consolidate (i.e. compress) the existing soils on which the coal stockpiles and associated infrastructure are to be developed. This results in the soils being able to support the Project infrastructure without excessive settlement in the future.

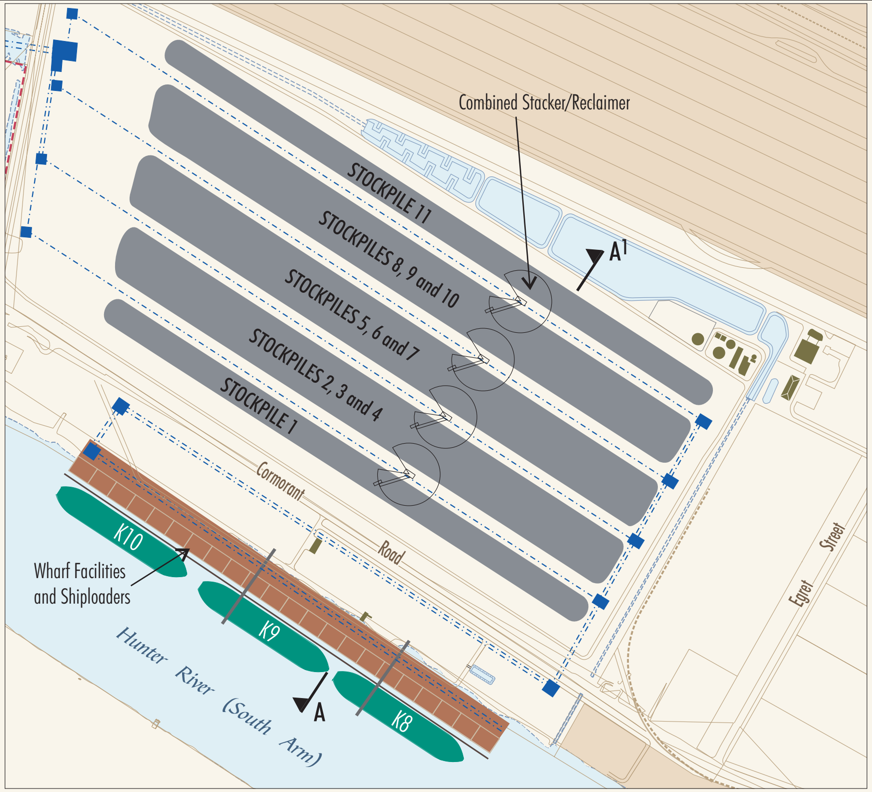
A fleet of mobile earth-moving equipment would be used to rehandle the drained dredged material to progressively place it across the footprint of the coal storage area for preloading. It would also be used for construction of the rail embankments and wharf facilities. Wick drains (or other similar methodologies) would be used during preloading to accelerate sub-surface drainage and consolidation. Lime and/or cement stabilisation techniques may be employed to increase the soil bearing capacity for the pads and berms if required.

Once preloading of each coal stockpile pad and berm footprint is complete (i.e. sufficient settlement is achieved) the preload material would be trimmed (i.e. excavated) down to the desired finished surface level. Trimmed material would be used for preloading and construction of the next coal stockpile pad and berm. In this way, the dredged material would be progressively used to preload and then form the foundations for the coal storage area infrastructure.

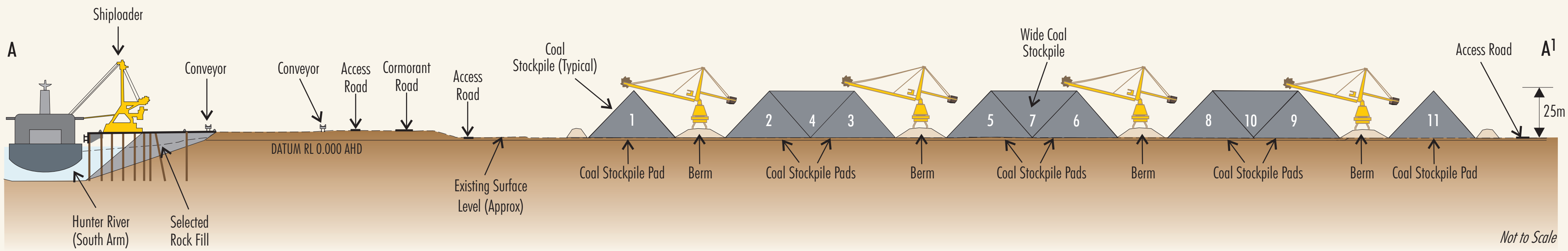
Approximately 4 million m^3 of fill material would be required for the preloading and construction of the coal storage area. Validation sampling and testing of the dredged material would be progressively undertaken during the preloading and construction of the coal storage area to confirm its suitability for use (Section 2.4.1).

A sub-grade drainage system would be integrated into the coal stockpile pads. The purpose of this drainage system would be to intercept water that infiltrates through the coal stockpiles during Project operations and return it to the Project water management system (Section 2.8.1).

The temporary dredge ponds would be decommissioned after the completion of Project construction activities.



PLAN



CONCEPTUAL SECTION A - A1

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

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FIGURE 2-5
Coal Storage Area

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2.5.2 Coal Stockpiles and Combined Stacker/Reclaimers

The coal stockpiles would comprise a series of parallel coal stockpile pads and intermediate berms (Figures 2-1 and 2-5). The coal stockpiles would be progressively established from south to north (i.e. 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. With the exception of the two outermost stockpiles (i.e. single coal stockpiles 1 and 11) the stockpiles may be combined to form wide coal stockpiles (Figure 2--5). This would facilitate a total coal storage capacity of up to approximately 6.6 Mt.

The coal stockpiles would be served by four rail-mounted combined stacker/reclaimers and associated stacking/reclaiming conveyors. A dozer would be used during daytime operations to assist with coal stockpile management. The major components of the combined stacker/reclaimers would be transported to site via ship and unloaded at the wharf facilities. These items would then be transported across Cormorant Road to the coal storage area for assembly. Traffic management plans would be developed in consultation with the Newcastle City Council (NCC) and the Roads and Traffic Authority (RTA) prior to transportation of the major Project components across Cormorant Road (Section 4.11.3) and these activities would be undertaken outside of peak traffic times.

The general arrangement of the combined stacker/reclaimers is shown on Figure 2-5.

2.5.3 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 KIWEF.

2.6 COAL HANDLING INFRASTRUCTURE

2.6.1 Coal Conveyors and Transfer Points

A series of belt conveyors and transfer points would facilitate the transport of coal from the train unloading stations to the coal storage area and to the wharf facilities and shiploaders. The general arrangement of the main conveyors and transfer points is shown on Figure 2-1. Conveyor overpasses would be constructed over 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 the structure would be up to 16 m wide. Both conveyor overpasses would be designed and constructed in accordance with the NCC and RTA requirements (Section 4.11.3 and Appendix C). Traffic management plans would be developed in consultation with the NCC and RTA prior to construction of the overpasses (Section 4.11.3).

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. Transfer points would allow transfer of coal from one conveyor to another.

2.6.2 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 of up to approximately 28 m.

2.6.3 Sampling Stations

Four sampling stations (two inbound and two outbound) would be required to provide samples for the measurement and recording of coal grade and quality (e.g. moisture, chemical assay and ash content). The general locations of the sampling stations in the Project operational process are shown on Figure 2-2.

2.7 WHARF FACILITIES AND SHIPLOADERS

2.7.1 Berths and Wharf Structure

The Project would include the construction of three shipping berths. The dredging of the berths would be undertaken in accordance with the Port Consent (Section 3.6.1). The first two berths (K8 and K9) would be constructed initially for a Project capacity of 33 Mtpa (Figure 2-1). The third berth (K10) would be installed as the throughput capacity of the Project is progressively increased up to 66 Mtpa. Construction of K8 and K9 would take approximately 20 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 up to 320 m long that can carry up to 230,000 t of coal.

Approved dredging activities in the south arm of the Hunter River would result in an approximate 1 vertical (V): 4 horizontal (H) batter slope from the bottom of the dredged channel. Approximately 400,000 m^3 of fill material (the majority of which would be rock fill) sourced from the south arm of the Hunter River would be used to form a 1V:1.5H batter slope and would be compacted as a base for construction of the wharf structure. Validation sampling and testing of the dredged material would be progressively undertaken during the construction of the berths and wharf structure to confirm its suitability for use (Section 2.4.1).

A silt curtain would be used to control turbidity during construction of the 1V:1.5H batter slope for the berths and wharf structure and during piling operations. Appropriate batter protection measures (e.g. riprap, grout treatment or geo-textile blanket) would be used to provide for long term bank stability.

2.7.2 Shiploaders

The three shipping berths would be served by two rail-mounted shiploaders. However, only one shiploader would be required for 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. Each shiploader would operate at approximately 10,500 tph nominal capacity, with a peak capacity of up to 12,500 tph when drawing coal from the buffer bins.

2.7.3 Navigational Aids

Navigational aids would be incorporated in the wharf design to promote safe navigation of the shipping channel in the south arm of the Hunter River in accordance with the requirements of the Newcastle Port Corporation. Fixed position shore navigation beacons would be installed and existing markers adjusted where necessary.

2.8 WATER MANAGEMENT

The water management strategy for the Project is based on:

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

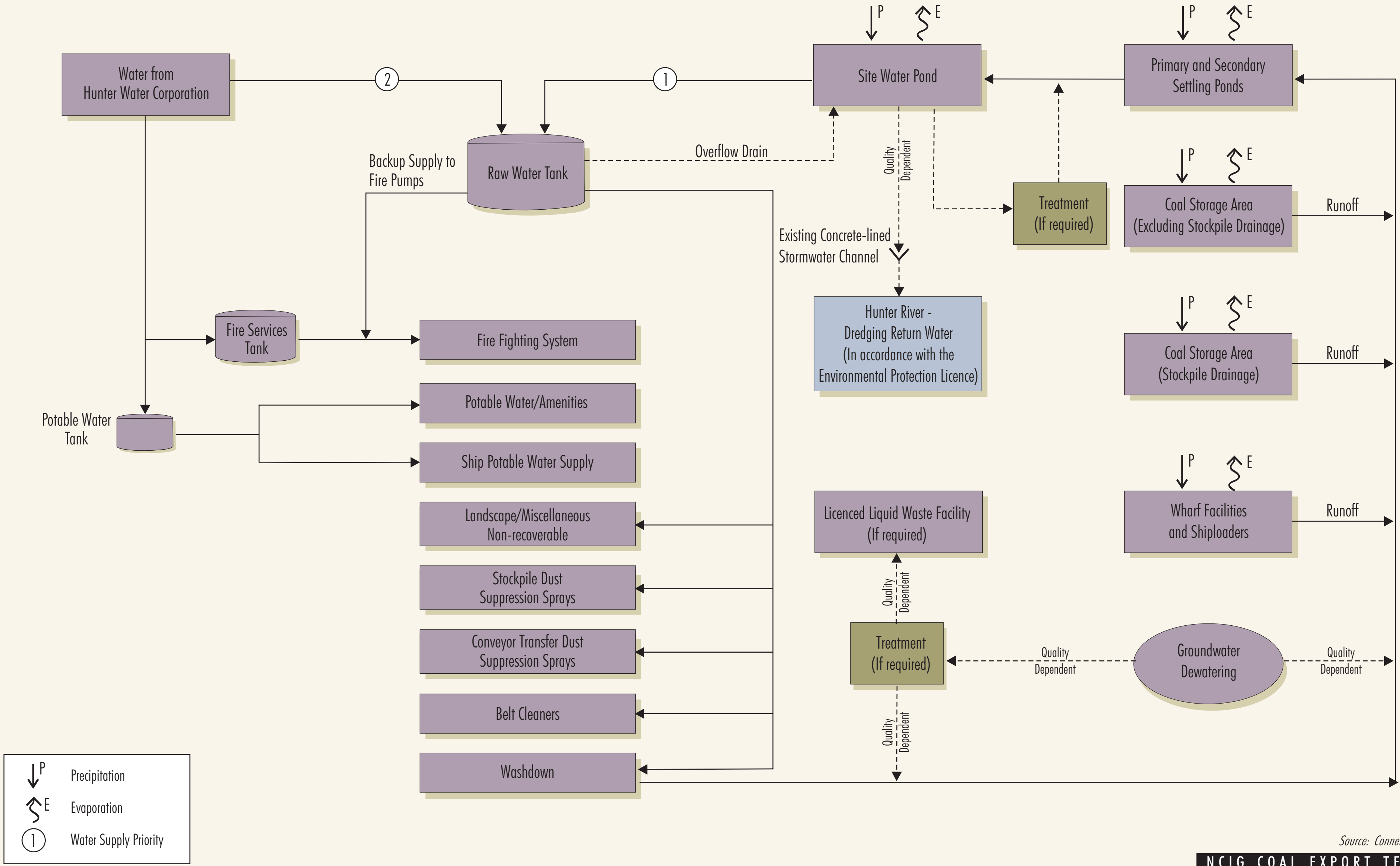
The primary design goal of the Project water management system is that of no discharge to the Hunter River during operation of the Project.

2.8.1 Water Management System

The Project water management system is shown in schematic form on Figure 2-6 and would be progressively developed as Project water management requirements change over time. A SWMP would be developed for the Project as described in Section 4.6.3.

Water Management – Construction

Temporary erosion and sediment controls (e.g. silt fences and sediment control structures) would be installed prior to the commencement of construction activities. A silt curtain would be used during construction of the shipping berth batters, wharf structure and during piling operations.



Source: Connell Hatch (2006)

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FIGURE 2-6
Project Water
Management System

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Silt curtains (typically woven or non-woven polypropylene skirts with float and ballast assemblies) are used on the east coast of Australia during the construction of wharf facilities and dredging operations to control sediments and minimise the potential for associated water quality impacts.

The site drainage network (including primary and secondary settling ponds and site water pond) would be established at the commencement of construction activities to capture site runoff and to manage sea water draining from dredged material during preloading of the coal storage area (Section 2.5.1). Runoff (including sea water) captured from the coal storage area during construction would be water quality tested and would be returned to the Hunter River from the site water pond via the existing concrete-lined stormwater channel if the relevant criteria stipulated in the Project EPL is met. Water returned to the Hunter River during dredging activities would be undertaken in accordance with the requirements of an EPL to be obtained from the Department of Environment and Conservation (DEC) (Section 3.1.2). Water that does not meet the relevant water quality criteria would be stored on-site and treated prior to release and/or re-used on-site.

Water Management – Operation

A network of stormwater drains and stormwater settlement ponds, primary and secondary settling ponds and a site water pond would be used to manage runoff on and around the site. All site water management structures would be lined with low permeability materials (e.g. compacted clay or geo-membrane) to minimise the potential for leakage. The provisional site drainage layout is shown on Figure 2-7.

Stormwater runoff from areas external to the Project site would be directed around the Project infrastructure areas by table drains and culverts to the existing stormwater drainage system on Kooragang Island. Stormwater runoff collected on the Project infrastructure areas would be diverted through sediment control structures and/or to stormwater settlement ponds. Lined sumps would be installed where necessary at the end of the open drains to act as pollutant traps.

The coal storage area would be sloped with dedicated drains located along the pads and berms. A sub-grade drainage system would be incorporated into the coal stockpile pads to capture water infiltrating through the coal stockpiles (Section 2.5.1). The sub-grade drainage system would comprise a series of underground drains, pits and transfer pumps for controlling drainage from the coal storage area.

The primary and secondary settling ponds and site water pond would be constructed to the north of the coal storage area (Figure 2-7). The settling ponds would capture sediments not trapped in the concrete sumps in open drains. Water in the site water pond would be pumped to a raw water tank with a capacity of up to 4 mega litres (ML). The raw water tank would store water for re-use on-site for purposes such as dust suppression, fire protection, plant washdown and landscape management.

A 500 kilolitre (kL) potable water tank would be installed adjacent the raw water tank for potable water supply purposes (e.g. amenities and ship potable water supply). A 2 ML fire services tank would also be installed for emergency fire fighting situations. Pumping stations would be located adjacent the water tanks (Figure 2-7) for water reticulation on-site.

Stormwater runoff from the Project rail infrastructure area would be diverted via table drains along the Project rail infrastructure corridor to localised sediment control structures/settlement ponds. Once runoff has passed through these structures it would report to the existing drainage system across the KIWEF. Sediment control structures/settlement ponds would also be installed at the administration and workshop area and the wharf facilities and shiploaders. Water collected in these ponds would be transferred via pump and pipeline to the primary and secondary settling ponds.

Consistent with the design goal of no discharge to the Hunter River during operations, the stormwater settlement ponds, primary and secondary settlement ponds and the site water pond would be designed and constructed with sufficient capacity to contain a 1 in 100 year average recurrence interval (ARI) rainfall event. All Project water management structures would be operated in accordance with the requirements of the Project EPL.

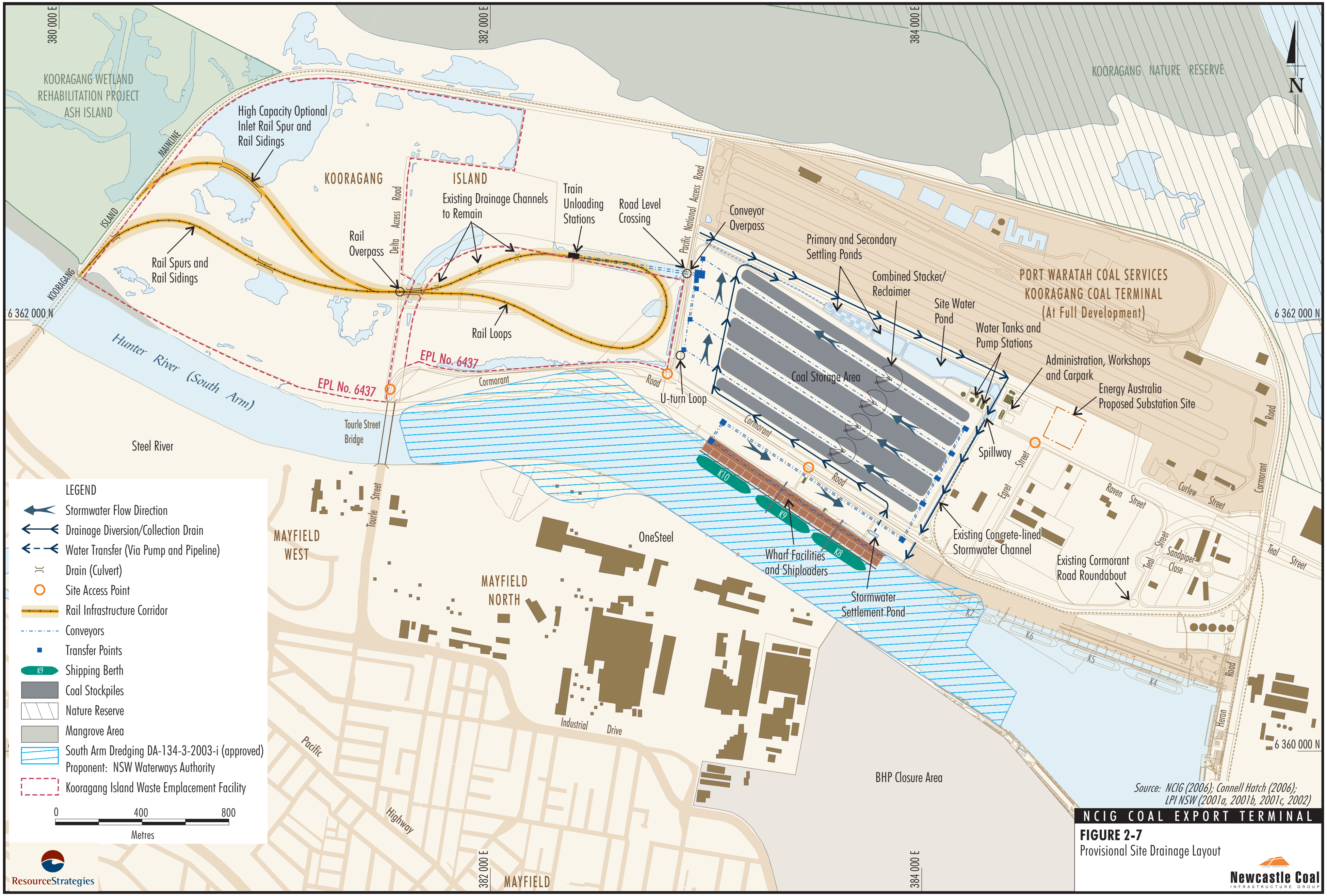

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FIGURE 2-7

Provisional Site Drainage Layout

Groundwater Management

The Project site includes a relatively shallow groundwater table in areas of fill from previous landuse activities (Section 4.7 and Appendix D). Consequently, any interception of the groundwater table during Project construction activities or effect on the groundwater system as a result of Project operations would need to be managed. NCIG has incorporated into the design of the Project a comprehensive suite of construction methods and design systems (including contingency measures) (NCIG, 2006a). Groundwater management measures for specific Project elements described in Section 4.7 and Appendix D include:

- any groundwater that is dewatered from the Project excavations and is not considered suitable for re-use would be temporarily stored in dedicated cells with low permeability liners (e.g. compacted clay or geo-membrane) before being treated for re-use and/or removed from site by an appropriately licensed contractor;
- the use of piled foundations together with a jet-grouted base and secant pile and/or diaphragm sub-surface perimeter walls for construction of the train unloading stations and adjacent conveyors (Figure 2-4) to minimise groundwater inflow or connection;
- incorporation of a low permeability capping layer into the rail embankment formation to minimise infiltration (Section 2.4.1);
- establishment of groundwater bores to monitor groundwater levels, and water quality around the perimeter of the coal storage area and along the rail infrastructure corridor;
- development of an SWMP which describes groundwater monitoring programme, management triggers, investigation procedures and details of contingency measures; and
- if the groundwater monitoring programme indicates the need, the implementation of groundwater management contingency measures such as:
  - localised temporary pumping of groundwater for subsequent detention, dilution, evaporation, treatment and/or disposal by an appropriately licensed contractor (depending on water quality and quantity); and/or
  - the construction of localised sub-surface groundwater barriers (e.g. bentonite filled trench or geo-membrane) to control groundwater migration.

Appropriate licences would be obtained from the Department of Natural Resources (DNR) for any temporary dewatering requirements.

2.8.2 Site Water Supply

Construction

Only minor quantities of water would be required during construction activities. Construction water (e.g. water used for dust suppression and moisture conditioning of earthworks) would be supplied from stormwater contained on-site, or if necessary, purchased from the Hunter Water Corporation.

Operation

Water supply requirements during operation of the Project would be met from stormwater contained on-site and water purchased from the Hunter Water Corporation. Water would be used for the following applications:

- dust suppression on road surfaces, coal stockpiles and at conveyor transfer points;
- washdown of site vehicles, conveyors, wharf areas, shiploaders and other coal handling machinery;
- belt washing;
- landscape irrigation;
- fire protection systems; and
- employee amenities and other minor potable water uses (Section 2.9.4).

Water would be recycled on-site to reduce the quantity of water purchased from the Hunter Water Corporation. If required, alternative water supply sources would be investigated during the life of the Project including the beneficial use of treated sewage effluent from the Hunter Water Corporation or local bore water. Any such alternative sources of Project water supply would be subject to separate environmental assessment and approvals.

2.8.3 Site Water Balance

A site water balance model was developed by NCIG and Connell-Hatch (2006) to determine the water demand requirements for the Project during operation at 66 Mtpa. The model quantified the water budget for three weather scenarios based on 140 years (1865 to 2005) of historical rainfall records for the Newcastle area from the Bureau of Meteorology, including:

1. Average rainfall year (i.e. 1,068 mm).
2. Low rainfall year (i.e. 792 mm).
3. High rainfall year (i.e. 1,551 mm).

Results of the water balance modelling are shown in Table 2-1.

The amount of stormwater runoff that would be captured for on-site use is expected to vary from 174 to 922 ML/annum. Based on the results of the site water balance, the average make-up water demand (i.e. water purchased from the Hunter Water Corporation) is estimated to be approximately 406 ML/annum.

2.9 INFRASTRUCTURE AND SERVICES

2.9.1 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 adjacent to the workshop. 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 heavy/oversize vehicles.

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.

2.9.2 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 2-1). 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 2-1).

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 2-1). 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 2-1). 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 2-1).

Level crossings would also be installed across the Pacific National access road and Delta access road for a short period during construction for hauling fill material between the coal storage area and the rail infrastructure area (Appendix C).

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 at the workshops.

Table 2-1
Site Water Balance

	Low Rainfall Scenario	Average Rainfall Scenario	High Rainfall Scenario
Water Supply			
Stormwater runoff and on-site recycled water	174 ML/annum	460 ML/annum	922 ML/annum*
Water from Hunter Water Corporation	728 ML/annum	406 ML/annum	126 ML/annum
TOTAL	**902 ML/annum**	**866 ML/annum**	**1,048ML/annum**
Water Demand			
Dust suppression	686 ML/annum	650 ML/annum	615 ML/annum
Washdown	19.7 ML/annum	19.7 ML/annum	19.7 ML/annum
Belt cleaning	68.3 ML/annum	68.3 ML/annum	68.3 ML/annum
Landscape irrigation	1.6 ML/annum	1.6 ML/annum	1.6 ML/annum
Potable water (employee amenities, ship supply, fire services)	126 ML/annum	126 ML/annum	126 ML/annum
TOTAL	**902 ML/annum**	**866 ML/annum**	**831 ML/annum**

Source: NCIG and Connell-Hatch (2006)

* As described in Section 2.8.1, the stormwater settlement ponds, primary and secondary settlement ponds and site water pond would be designed and constructed with sufficient capacity to contain a 1 in 100 year ARI rainfall event.

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 of the Project access points onto Cormorant Road would be permitted.

2.9.3 Electricity Supply and Distribution

Energy Australia would supply electricity to the Project from a new 132 kilovolt (kV)/33 kV 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 132 kV/33 kV zone substation by Energy Australia (Figure 2-1). 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 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 volt (V) and 240 V electricity supply.

The estimated maximum power supply requirement for the Project when fully developed is 25 megavolt amps (MVA). At a capacity of 33 Mtpa the Project would require 15 MVA.

2.9.4 Potable Water

Potable water at the Project would be supplied by the Hunter Water Corporation's local water supply system. The Hunter Water Corporation would also supply water for dust suppression, fire protection and washdown activities to supplement the Project water management system as required.

2.9.5 Site Security

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 of the rail infrastructure, wharf facilities and shiploaders. Site security would meet the requirements of the *Maritime Transport and Offshore Facilities Security Act, 2003*.

2.9.6 Communications

A wireless communication system would be installed for the Project to provide voice communication between the site manager, maintenance staff and operators. The global system for mobile communications (GSM) network would also be used.

A telemetry train signalling system would be used to control train speed during unloading. Control systems would be employed for communications between major plant items (i.e. combined stacker/reclaimers, dust suppression system, etc.).

2.10 MANAGEMENT OF CHEMICALS AND WASTES

Only small quantities of chemicals, hazardous or dangerous goods, and wastes would require transportation, handling or storage on the Project site.

2.10.1 Dangerous Goods

Transportation

Any hazardous or dangerous goods required for the Project would be transported in accordance with the appropriate regulations under the *Road and Rail Transport (Dangerous Goods) Act, 1997*. These regulations apply versions of the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (ADG Code) (DTRS, 2000).

Handling and Storage

Potentially hazardous goods used on-site for the Project would generally be limited to fuels (i.e. diesel and petrol), hydrocarbons (e.g. oil) and gas cylinders.

Hydrocarbon storage facilities would be designed, located, constructed and operated in accordance with Australian Standard (AS) 1940-2004 *The Storage and Handling of Flammable and Combustible Liquids.*

The above ground diesel storage facility would have a capacity of up to 12,000 L. Annual diesel usage would be up to 500,000 L during construction and up to 200,000 L during operations at 66 Mtpa. Petrol would be stored in a 30,000 L above ground tank. Annual petrol consumption would be up to approximately 100,000 L during construction and up to 75,000 L during operations at 66 Mtpa. Electronically controlled refuelling systems would be installed for the Project.

An oil storage facility would be installed comprising 1,000 L oil storage pods with dispensing pumps and flow meters. Annual oil usage would be up to 45,000 L.

Waste hydrocarbons would be collected and stored in a 12,000 L waste oil tank, before being removed by licensed waste transporters on a periodic basis. The workshop and truck washdown areas would have purpose built oil/water separator systems installed which would be inspected and maintained on a regular basis.

A limited number of liquid petroleum gas (LPG) cylinders would be used on site (up to 15 cylinders during construction). During operations approximately three cylinders would be stored on site. LPG cylinders would be stored and handled in accordance with Australian Standard/New Zealand Standard (AS/NZS) 1596-2002 *The Storage and Handling of LP Gas*.

Material Safety Data Sheets and Chemical Storages

No chemical or hazardous material would be permitted on-site unless a copy of the appropriate Material Safety Data Sheet (MSDS) is available on-site or in the case of a new product, it is accompanied by a MSDS.

All chemicals brought onto the Project site would be recorded in an inventory register which would identify the type of product, dangerous goods class, liquid class, hazchem class and the quantity held on-site. The inventory register would also identify the compatibility of materials and the emergency response procedures in the event of a spill.

Chemical storage facilities would be provided with in the workshop building and would be separated according to chemical type and storage requirements.

2.10.2 Liquid and Non-Liquid Wastes

Liquid and non-liquid wastes are defined in the *Environmental Guidelines, Assessment, Classification and Management of Liquid and Non-Liquid Wastes* (Waste Classification Guidelines) (EPA, 2004b).

All solid wastes (i.e. scrap metal, timber, concrete, packaging, etc.) generated by the Project would be removed from site and disposed of by a licensed contractor.

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 in accordance with the Waste Classification Guidelines. Further validation samples would be taken where necessary during excavation and handling of excavated material. Any material excavated during construction activities that is 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 Benchmarks 1 and 2 in *Environmental Guidelines: Solid Waste Landfills* (EPA, 1996) (Appendix D), or removed from the site for treatment at a licensed facility.

Liquid wastes (e.g. any groundwater that is dewatered from the Project excavations and is not considered suitable for re-use) would be temporarily stored in dedicated cells with low permeability liners (e.g. compacted clay or geo-membrane) before being treated for re-use and/or removed from site by an appropriately licensed contractor (Appendix D).

2.10.3 Downgraded Coal

Downgraded coal (i.e. coal that does not meet export quality requirements) including coal which accumulates in stormwater settlement ponds and other Project infrastructure areas would be stockpiled for export as opportunities arise.

2.10.4 Recyclable and Non-Recyclable Domestic Waste

Recyclable and non-recyclable domestic waste from office buildings and workforce areas would be collected regularly and managed by waste disposal contractors. A register of waste collected by contractors would be maintained. Where licenced contractors handle waste, those contractors would be required to comply with their own licence waste agreements with the DEC. Waste would be disposed of at a DEC approved waste facility that is licensed under the *Protection of the Environment Operations Act, 1997* (POEO Act).

2.10.5 Sewage

Sewage produced on-site during operation of the Project would be piped to the Hunter Water Corporation's existing sewer network on Kooragang Island. The connection point to the existing sewer network is in the south-eastern corner of the coal storage area. Temporary sewage containment and treatment facilities would be provided for the construction workforce in accordance with the requirements of the NCC.

2.11 WORKFORCE

2.11.1 Construction

It is anticipated that up to 500 people would be employed for construction of the Project.

2.11.2 Operation

The Project would operate 24 hours a day, seven days per week and would employ up to 100 people when operating at the maximum throughput capacity of 66 Mtpa, including a mixture of NCIG employees and contractors.