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ANNUAL ENVIRONMENTAL MONITORING REPORT 2015
NCIG COAL EXPORT TERMINAL

RAMBOLL

ANNUAL ENVIRONMENTAL MONITORING REPORT 2015 NCIG COAL EXPORT TERMINAL

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NCIG AEMR 2015 FINAL.docx

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1. INTRODUCTION

This Annual Environmental Management Report (AEMR) has been prepared for the Newcastle Coal Infrastructure Group (NCIG) Coal Export Terminal project (the Project) in accordance with the conditions of the approved Construction Environmental Management Plan (CEMP) and Operation Environmental Management Plan (OEMP) (Sections 5.2 and 7.2 respectively). The CEMP was prepared in accordance with Condition 7.2 and the OEMP was prepared in accordance with Condition 7.5, both within Schedule 2 of the Project Approval (06_0009) which was granted on 13 April 2007.

This is the seventh AEMR prepared for the NCIG Project and it covers the period April 2014 to June 2015, which includes the fifth year of terminal operation. This reporting period extends to June 2015 to align future AEMRs to the financial year.

The AEMR reviews the performance of the Project against the requirements of the Project Approval and provides an overview of environmental management actions and summarises monitoring results over the 15 month reporting period. The AEMR will be distributed to relevant government agencies and stakeholders, and copies provided to other interested parties, if requested.

1.1 Approvals, leases, licences and permits

The Project is being undertaken under the approvals, leases, licences and permits presented in **Table 1**.

Table 1 Project Approval, Leases, Licences and Permits

Instrument	Relevant Authority	Date Granted	Duration of Approval
Project Approval (06_0009)	Department of Planning and Infrastructure	13 April 2007	5 years unless substantially commenced
Modification of Minister's Approval MP06_0009	Department of Planning and Infrastructure	27 November 2007	N/A (conditions appended to the Project Approval)
Modification of Minister's Approval MP06_0009 MOD2	Department of Planning and Infrastructure	13 May 2013	N/A (conditions appended to the Project Approval)
Project Lease	State Property Authority	22 January 2008	35 years
Environmental Protection Licence (EPL) (No. 12693)	NSW Environment Protection Authority	26 October 2007	Until the Licence is surrendered or revoked. The Licence is subject to review every 5 years.
Environment Protection and Biodiversity Conservation Act 1999	Department of the Environment and Heritage	11 October 2007	Perpetuity
Maritime Services Act 1935 s13JE	NSW Roads and Maritime Services	02 October 2007	Perpetuity
Environmental Representative	Department of Planning and Infrastructure	03 October 2007	Perpetuity
Project Ecologist	Department of Planning and Infrastructure	02 May 2007 & 25 October 2007	Perpetuity

1.2 Management plans and monitoring programmes

In accordance with the Project Approval, the Project is currently being undertaken under a number of environmental management plans and monitoring programmes, including:

Construction Management Plans and Protocols

- Stage 2F (incl. Flyover) Construction Environmental Management Plan
- Stage 2F (incl. Flyover) Construction Noise Management Plan
- Stage 2F (incl. Flyover) Construction Surface Water Management Plan
- Stage 2F (incl. Flyover) Construction Traffic Management Plan
- Stage 2F (incl. Flyover) Acid Sulphate Soils Management Plan
- Stage 2F (incl. Flyover) Construction Aboriginal Heritage Management Plan
- Vegetation Clearance Protocol

Operations Management Plans

- Operation Environmental Management Plan
- Operation Dust Management Plan
- Operation Noise Management Plan
- Operation Spontaneous Combustion Management Plan
- Operation Water Management Plan

Stage 2F and Flyover Management Plans

Other Management Plans and Programs

- Site Water Management Plan
- Green and Golden Bell Frog Management Plan
- Compensatory Habitat and Ecological Monitoring Program
- Coordinated Works Program
- Compliance Tracking Program
- Coordinated Environmental Monitoring and Management Protocol (with PWCS)

Monitoring Programs

- Environmental Monitoring Program (contained within the CEMP and OEMP)
- Green and Golden Bell Frog Monitoring Program
- Avifauna Monitoring Program

1.3 Project Contacts

Contact Details for the Project are provided below:

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1.4 Project Background

The Newcastle Coal Infrastructure Group (NCIG) Coal Export Terminal (CET) (the Project) is located on Kooragang Island in Newcastle, New South Wales (NSW) (Figure 1). The Project includes the construction and operation of a CET up to 66 million tonnes per annum (Mtpa), including associated rail and coal handling infrastructure and wharf/ship loading facilities on the south arm of the Hunter River.

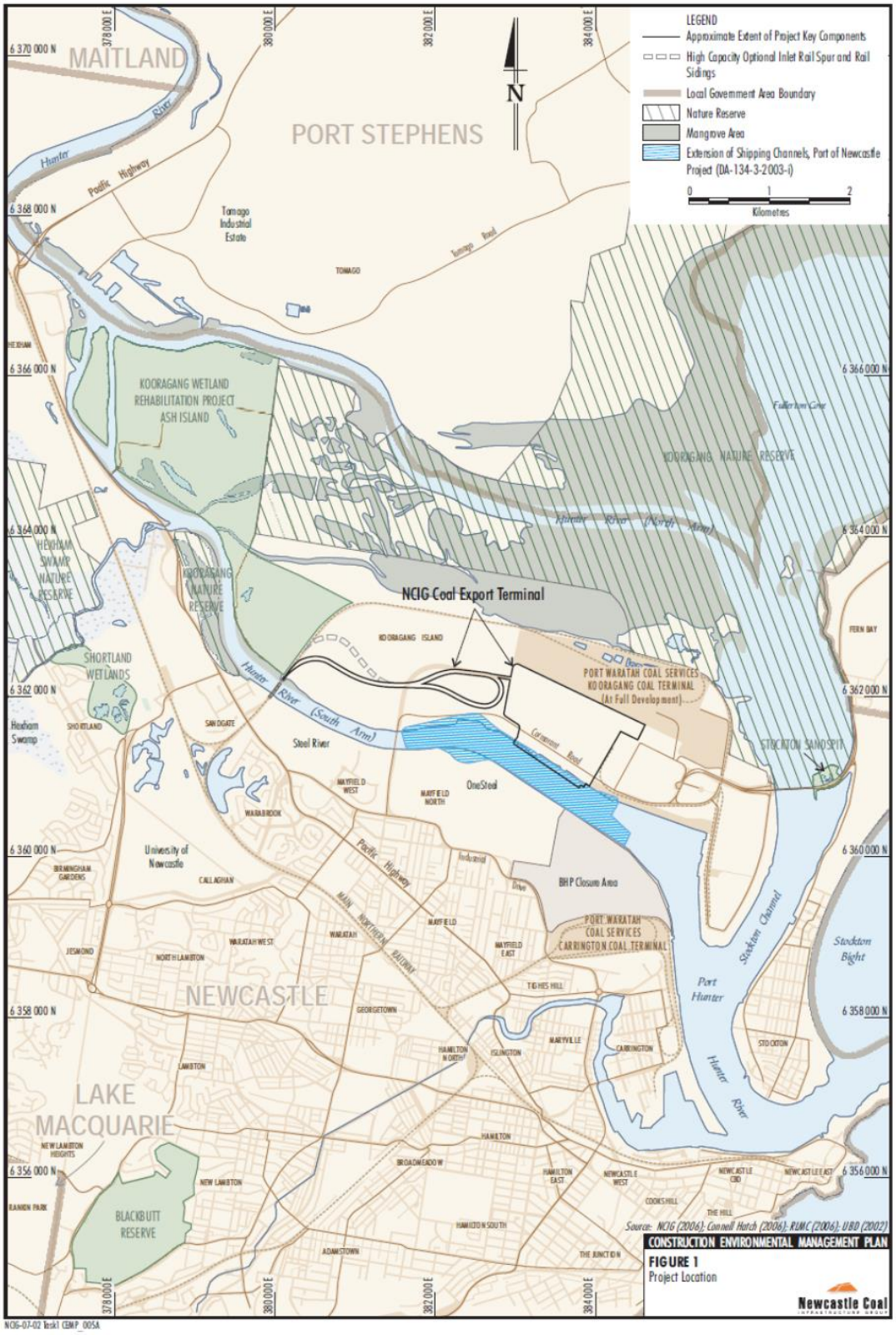


Figure 1: Project location

NCIG is the proponent of the Project and is a consortium of the following five companies:

- Banpu Public Company Limited;
- Hunter Valley Energy Coal Limited;
- Peabody Energy Corporation;
- Yankuang Group; and
- Whitehaven Coal Mining Pty Ltd.

NCIG was formed in response to a call for Expressions of Interest for the development of land on Kooragang Island by the NSW State Government in 2004. The outcome of this process was that in 2006 NCIG was awarded the right to develop the parcel of land that is now the Project site. Project Approval (06_0009) was granted in April 2007 and construction of Stage 1 of the coal export terminal (30 Mtpa) commenced in April 2008. Stage 1 of construction is completed and was subsequently handed to NCIG for operation in July 2010. Stage 2AA construction commenced in the first half of 2010, with mechanical completion achieved in June 2012. Stage 2F construction commenced in June 2012 and was completed in June 2013. The Rail Flyover commenced in October 2013 and was completed in August 2015.

The Project general arrangement is shown on Figure 2. The general arrangement is based on the planned maximum coal throughput of 66 Mtpa. The main activities associated with the construction of the Project include:

- 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 (*NB/ NCIG did not conduct dredging operations during the reporting period*);
- construction of a coal storage area including coal stockpiles, conveyors, transfer points and combined stacker/reclaimers;
- construction of wharf facilities, ship loaders, conveyors and buffer bins;
- foundation preparation, formation construction and capping of a rail corridor traversing the existing Kooragang Island Waste Emplacement Facility (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;
- 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; and
- other associated minor infrastructure, plant, equipment and activities.

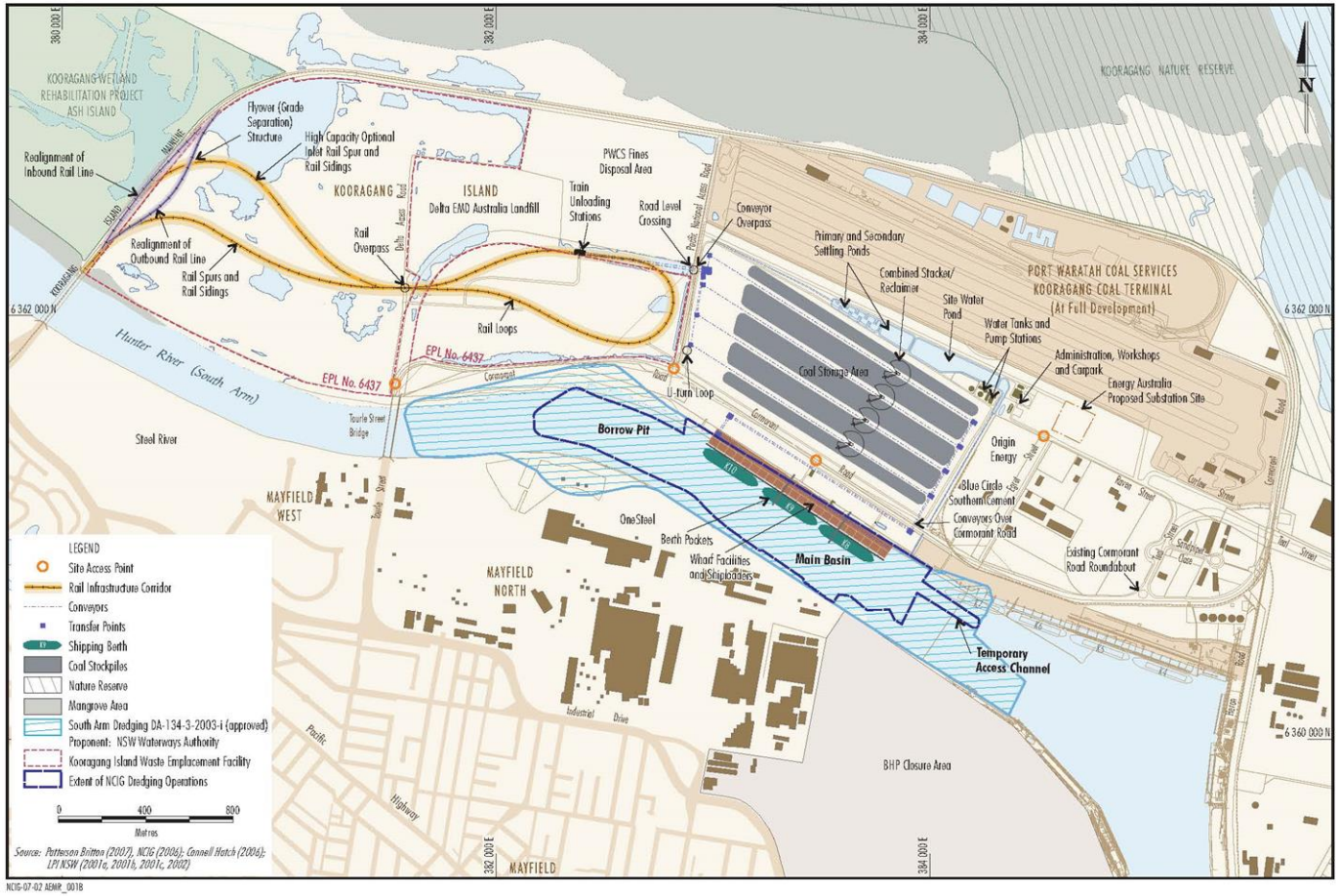


Figure 2: Project Layout

2. OVERVIEW OF ACTIVITIES

2.1 Operation

April 2014 to June 2015 reporting period included a continuation of Stage 1, Stage 2AA and Stage 2F operations. This means that all mechanical equipment within the approved project were operational during the period, namely Dump Stations 1 and 2, Stacker/Reclaimers 1, 2, 3 and 4 and Ship loaders 1 and 2, along with associated inbound and outbound conveyor systems. Commissioning completed on Milestones achieved in this reporting period include:

- Provided 65.5 million tonnes of capacity.
- Loaded 49.5 million tonnes of coal.
- Record financial year average Gross Load Rate (GLR) 5233tph onto 506 vessels.
- Financial year record Gross Unload Rate (GULR) of 7927.

Operational activities are shown in Figures 3 to 13.

Figure 3: NCIG Site Overview Facing West, June 2014

Figure 4: NCIG Site Overview Facing South, June 2014

Figure 5: Rail Flyover in Operation, June 2015

Figure 6: Stockyard with Dust Suppression System

Figure 7: Stockyard with Stacker Reclaimers in Operation

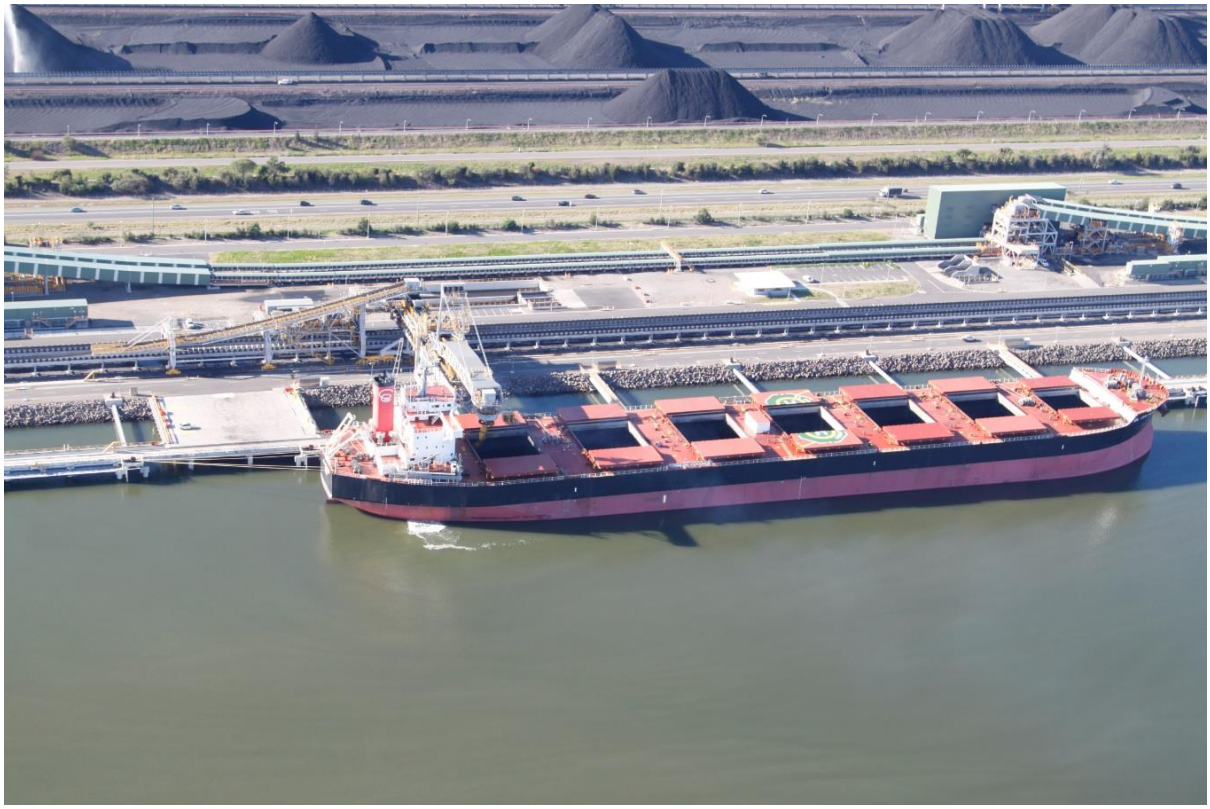


Figure 8: Ship Loading

Figure 9: Completed Screen to mitigate train light impacts on birds using Deep Pond

Figure 10: New Training Room

Figure 11: New Stores Building Exterior

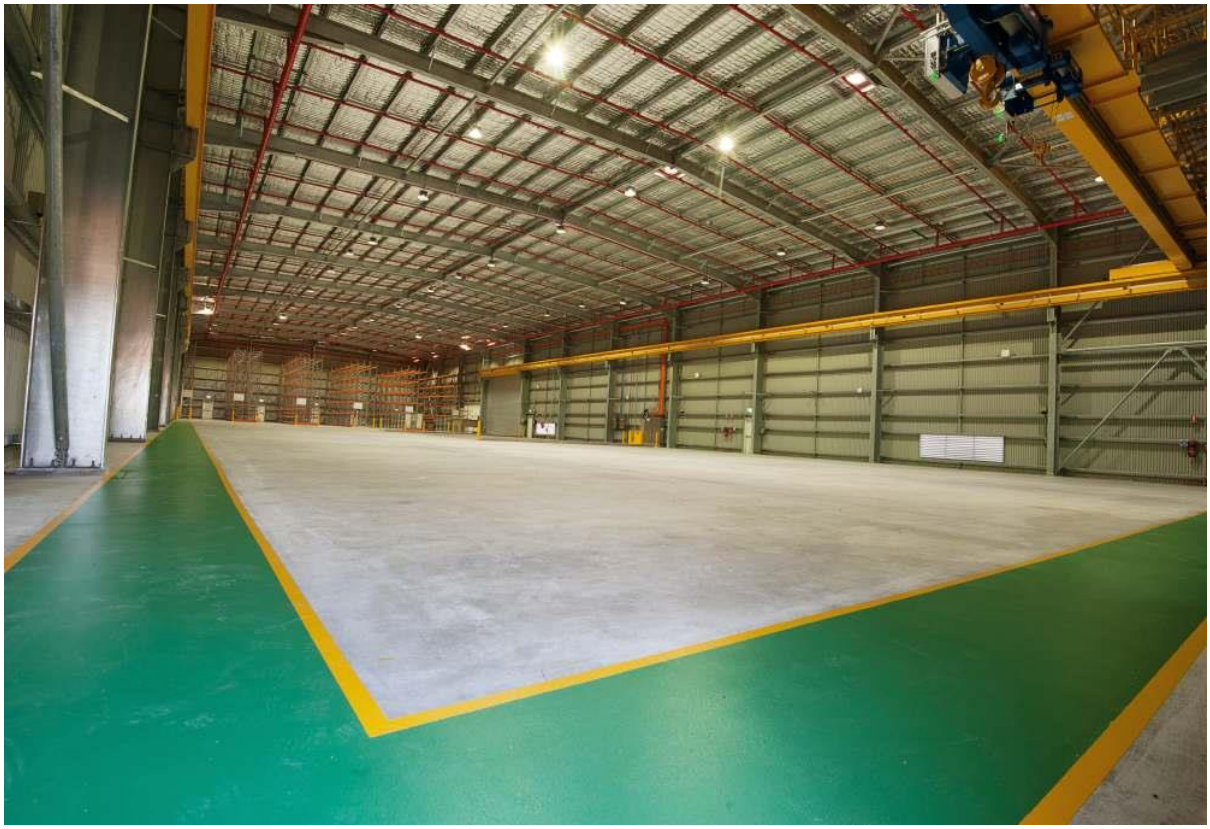


Figure 12: New Stores Building Interior

Figure 13: NCIG Administration Building Extension

2.2 Construction

Construction activities during this reporting period were associated with the completion of the Rail Flyover. The main milestone achieved for construction in the reporting period was completion of the Rail Flyover construction in June 2015.

Construction activities are shown in Figures 14 to 20. Aerial photographs of the Project site at the start and end of this reporting period are shown in Figures 21 and 22.

Figure 14: Rail Flyover Construction - Sediment and Erosion Control

Figure 15: Rail Flyover Construction, including Ground Improvement works

Figure 16: Rail Flyover Foundation Construction

Figure 17: Rail Flyover Construction - Culvert Installation

Figure 18: Rail Flyover Construction

Figure 19: Western Deviation and Flyover Construction

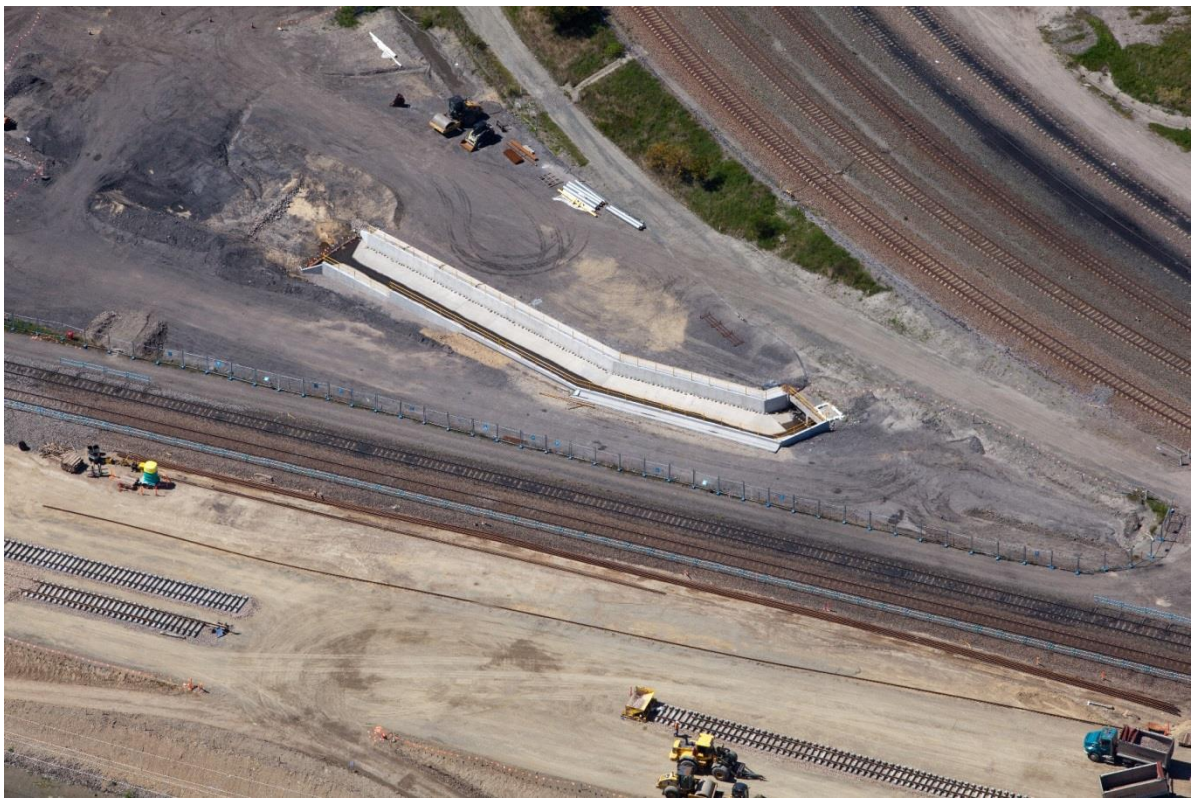


Figure 20: Open Drain Construction, Rail Flyover

Figure 21: March 2014 Aerial Photograph of Project

Figure 22: May 2015 Aerial Photograph of Project

3. ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

3.1 Meteorology

3.1.1 Environmental Management

In accordance with Condition 2.8, Schedule 2 of the Project Approval (06_0009), an on-site automated meteorological monitoring station was operated during the reporting period to monitor weather conditions representative of the site. This station was installed on the NCIG site (see Figure 24) in accordance with the requirements of the CEMP.

The automated meteorological monitoring station allows parameters such as wind direction to be used in the control of stockyard sprays. This includes activation of sprays based on evaporation of surface moisture from the coal stockpiles and deactivation of sprays under wind conditions where sprays would otherwise be ineffective in reaching coal stockpiles.

3.1.2 Environmental Performance

Table 2 outlines the monitoring locations, meteorological parameters recorded and frequency of monitoring for the Project in accordance with the CEMP.

Table 2 Summary of the Meteorological Monitoring Program

Monitoring Parameter	Monitoring Sites	Frequency	Criteria
• Temperature • Relative humidity • Net solar radiation • Rainfall • Wind speed and direction • Sigma theta (rate of change of wind direction).	Project automated meteorological station [1].	Continuously monitored and the data averaged over 15 minute periods.	N/A

1 The location of the monitoring sites is shown on Figure 24.

3.1.3 Monitoring summary

The meteorological monitoring results for the reporting period are summarised below. Monthly statistical information for rainfall is detailed in Table 3.

Table 3 Rainfall statistics by month

Month	Total rainfall (mm)	Daily average (mm)	Daily maximum (mm)
April 2014	119.8	3.9	28.2
May 2014	85.6	2.76	8.2
June 2014	67.8	2.26	5.8
July 2014	30.4	0.98	15.2
August 2014	146.0	4.7	28.4
September 2014	40.2	1.34	7.0
October 2014	39.8	1.28	9.0
November 2014	45.2	1.5	24.2
December 2014	96.0	3.1	20.8
January 2015	169.2	5.45	71.0
February 2015	54.8	1.95	27.8
March 2015	62.0	2.0	22.8
April 2015	377.0	12.56	47.0
May 2015	119.4	3.85	24.2
June 2015	87.8	2.9	49.8
Annual	1,541		

The monthly statistical information for each of the meteorological monitoring parameters is detailed in Appendix A.

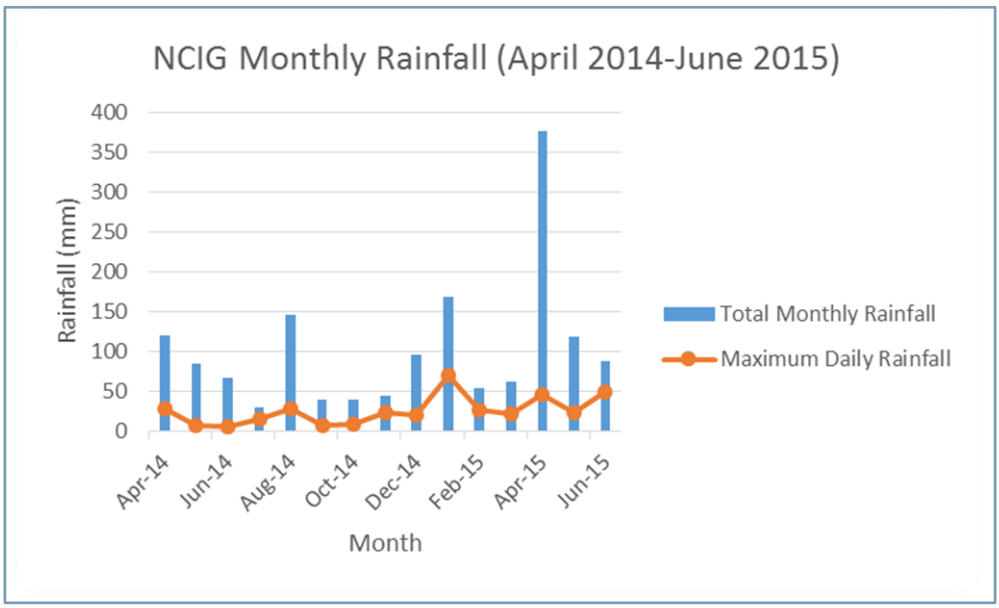


Figure 23: Total and maximum daily rainfall by month

The monthly and daily rainfall recorded at the project site is shown in Figure 23. A total of 1,541 mm of rain was received on the site during the reporting period with the highest rainfall recorded in April 2015. Low rainfall was recorded during July 2014 and the September to November 2014 period.

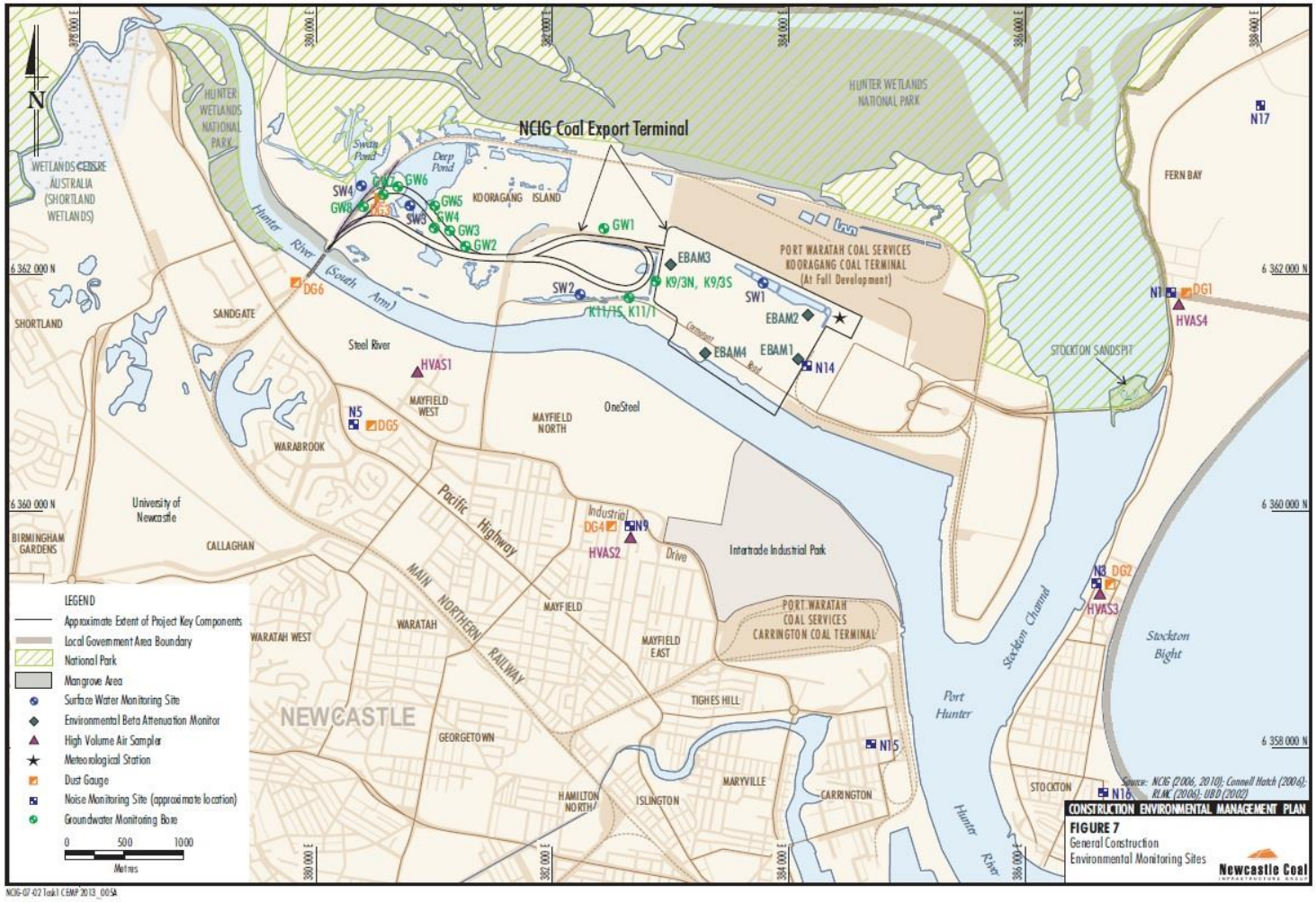


Figure 24: Environmental Monitoring Sites - Meteorology

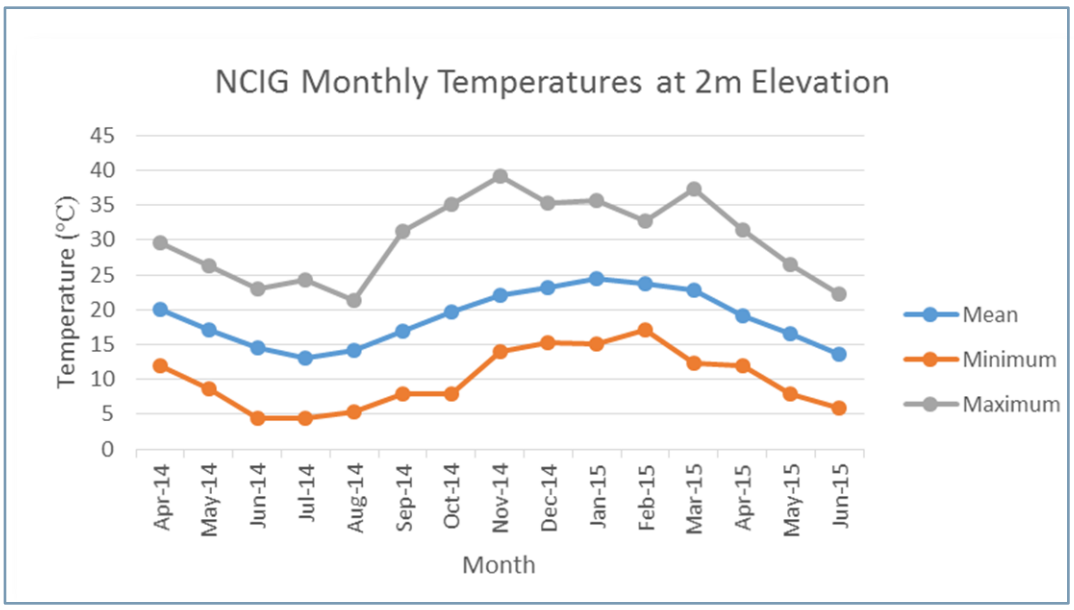


Figure 25: Temperature by month

Figure 25 illustrates the variation in average temperature during the reporting period. These variations from the winter to summer seasons are the expected seasonal normal variations. Figure 26 illustrates seasonal wind conditions.

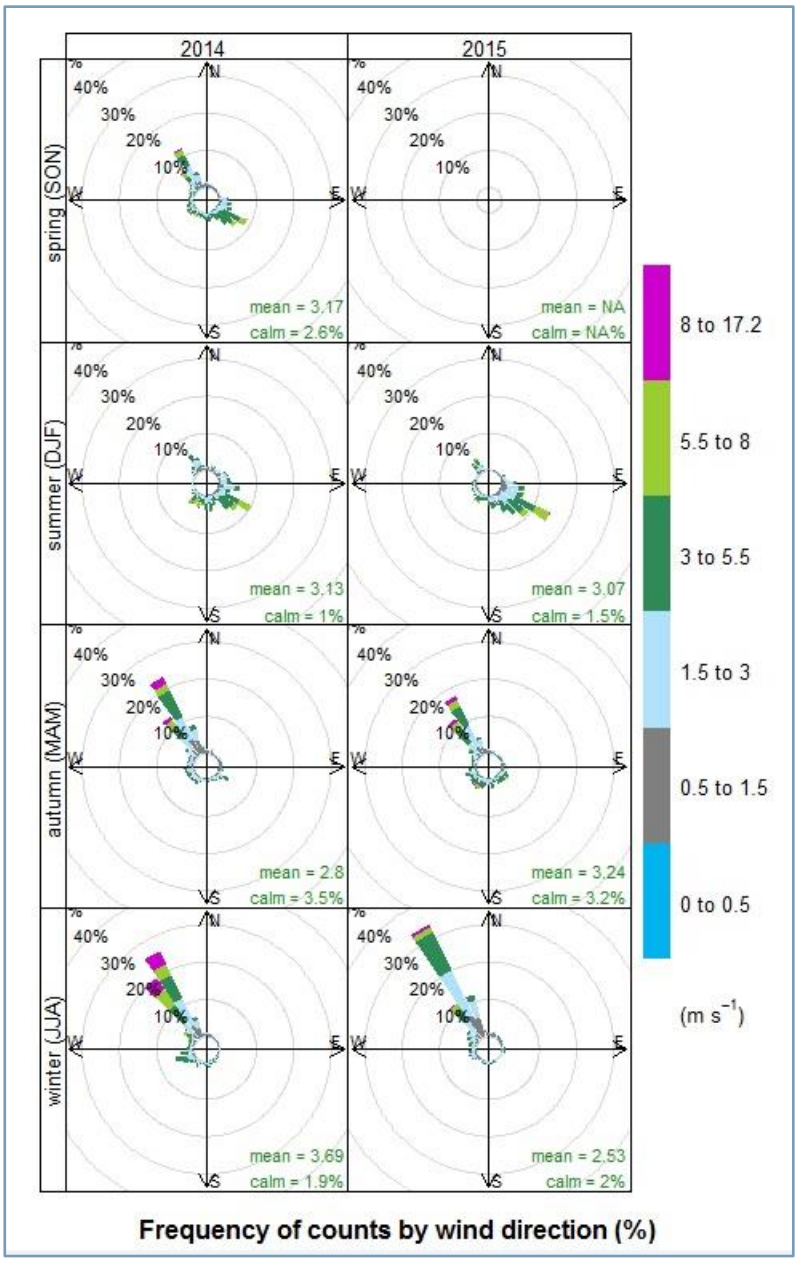


Figure 26: Seasonal Wind Conditions

3.1.4 Reportable incidents

No environmental incidents or complaints relating to meteorological conditions were made during the reporting period.

3.1.5 Further Improvements

No major improvements are anticipated for the meteorological system. Notwithstanding, elements of the existing meteorological station will be maintained as necessary.

3.2 Air Quality

3.2.1 Environmental Management

In accordance with Conditions 2.2 and 2.4, Schedule 2 of the Project Approval (06_0009) NCIG designed and constructed the Project in a manner that minimises or prevents the emission of visible dust beyond the boundary of the site (including windblown and traffic generated dust).

In accordance with Condition 2.5, Schedule 2 of the Project Approval (06_0009) dust emissions are being controlled on all internal roads, trafficable areas and manoeuvring areas by sealing, or otherwise treating surfaces to minimise the potential for dust generation.

In accordance with Condition 2.1, Schedule 2 of the Project Approval (06_0009) NCIG did not permit any offensive odour, as defined under section 129 of the *Protection of the Environment Operations Act, 1997*, to be emitted beyond the boundary of the Project site.

3.2.2 Environmental Performance

Table 4 outlines the monitoring locations, air quality parameters recorded, frequency of monitoring and air quality criteria for the Project in accordance with the CEMP.

Table 4 Summary of the Air Quality Monitoring Programme

Monitoring Parameter	Monitoring Sites	Frequency	Criteria
Dust deposition[2].	DG1, DG2, DG3, DG4, DG5 and DG6[1].	Monthly during the first three months of construction, then quarterly.	4 g/m^2/month.
Total Suspended Particulates (TSP).	HVAS1, HVAS2, HVAS3*, HVAS4.	6-daily.	90µg/m^3 (NHMRC annual average)
Particulate Matter <10 microns (PM10).	HVAS1, HVAS2, HVAS3*, HVAS4.	6-daily.	50µg/m3 (OEH 24hr daily limit, NEPM 24hr daily limit – allows for 5 exceedences in a year) 30µg/m³(OEH annual average).

* HVAS3 at Stockton was monitored until June 2015, when it was decommissioned and replaced by the Lower Hunter Air Quality Monitoring Network.

1 The location of monitoring sites is shown on Figure 24.

2 Dust deposition was analysed in accordance with AS/NZS 3580.10.1-2003 *Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method.*

3 TSP was analysed in accordance with AS/NZS 3580.9.3-2003 *Methods for Sampling and Analysis of Ambient Air – Determination of suspended particulate matter – Total suspended particulate matter (TSP) – high volume sampler gravimetric method.*

4 PM10 was analysed in accordance with AS/NZS 3580.9.6-2003 *Methods for Sampling and Analysis of Ambient Air – Determination of suspended particulate matter – PM10 high volume sampler with size selective inlet – Gravimetric method.*

The depositional dust monitoring (insoluble solids) results for the reporting period are displayed in Figure 27 and Figure 28 below.

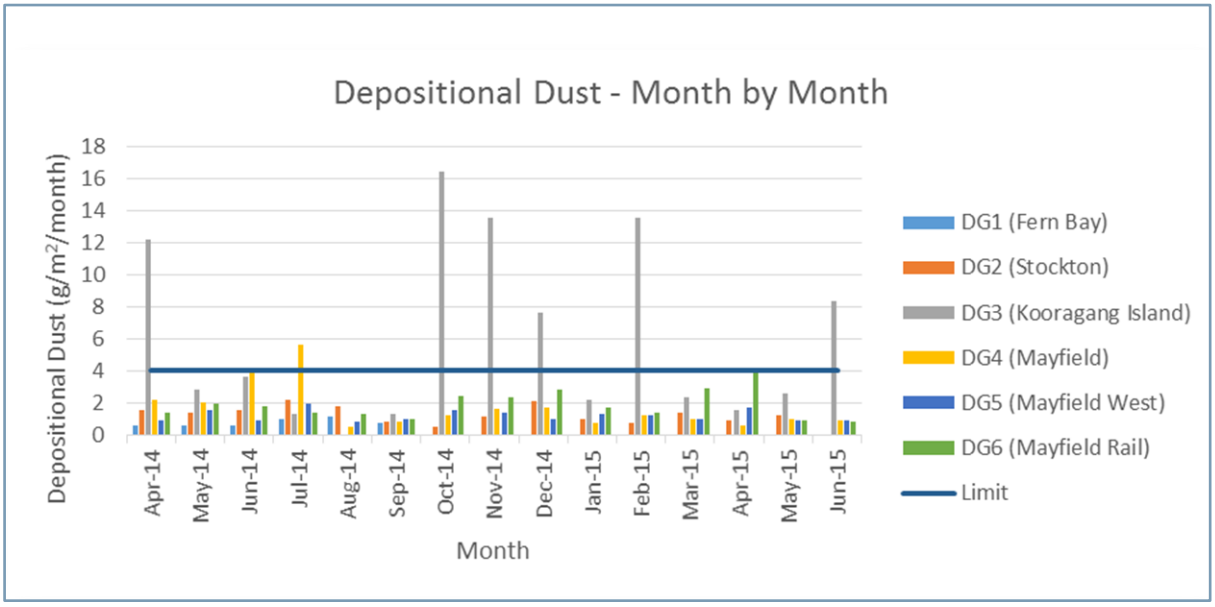


Figure 27: Monthly Depositional Dust

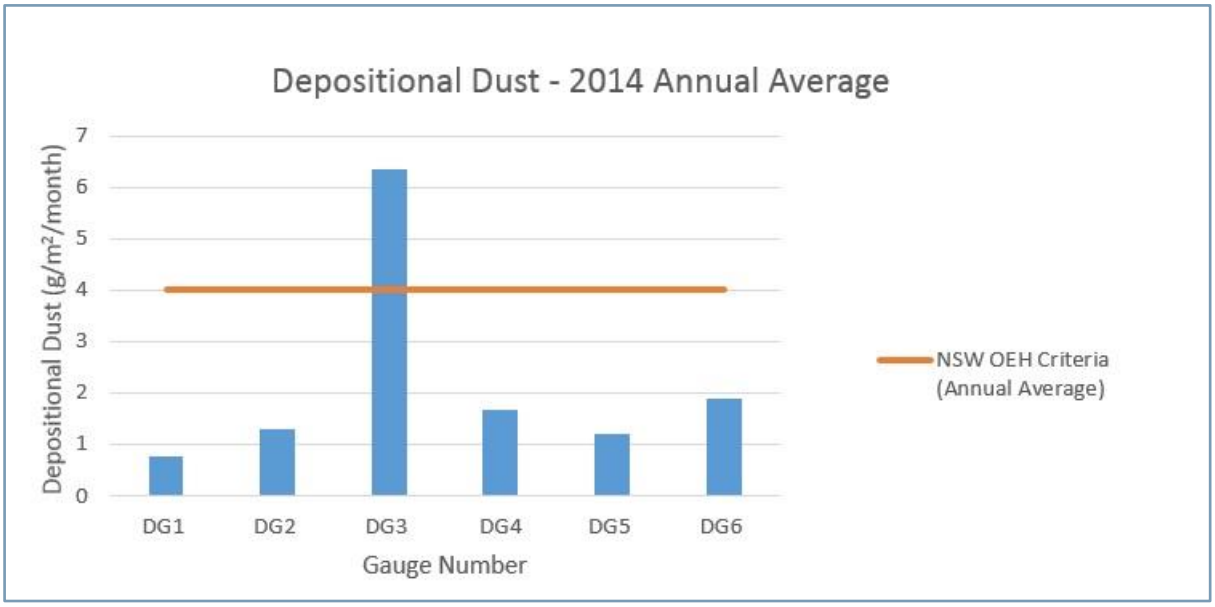


Figure 28: Annual Average Depositional Dust

Average depositional dust results were below the monthly criteria of 4 grams per square metre per month at all depositional dust gauge locations aside from DG3 located at Kooragang Island (Figure 28).

Figure 27 shows that individual monthly samples from DG3 exceeded the 4g/m^2/month criteria in April 2014, between October 2014 and December 2014 and in February and June 2015. Note that data from August 2014 has not been included for Kooragang Island as the gauge was contaminated with insect and bird droppings. It is also noted that samples from April 2014 (no percentage given), October 2014 (30%), November (50%), December (20%), February (20%) and June (10%) were all contaminated to various levels.

A 3-month study was conducted by the construction Principal Contractor, to investigate potential causes of depositional dust exceedances. This included installation of a portable aerosol monitor, that measures the concentration of PM10 in real-time. The monitor was placed adjacent the dust gauge and data was recorded at 10-minute increments. The monitor was run from July to September 2014. Analysis of data over this period failed to find a correlation between real-time

PM10 trends or daily PM10 averages, and depositional dust levels for the corresponding month. While some spikes in the PM10 data set were likely caused by false positives (e.g. moisture entrained within the aerosol detector), the lack of correlation was unable to be explained. Despite being unable to definitively identify a cause of the depositional dust exceedances, additional management measures were employed to control construction dust, e.g. increased water cartage, progressive rehabilitation of unsealed surfaces.

Figure 27 also shows that individual samples from DG4 in Mayfield exceeded the 4g/m^2/month criteria in July 2014. The exceedance at DG4 would not be sourced from NCIG. Construction on a property immediately adjacent to the location of the dust gauge is on-going.

Air quality monitoring results from High Volume Air Sampling (HVAS), as they relate to both Total Suspended Particulate (TSP) and Particulate Matter with an equivalent aerodynamic diameter less than 10 Microns (PM_{10}), are displayed in Figure 29 and Figure 30.

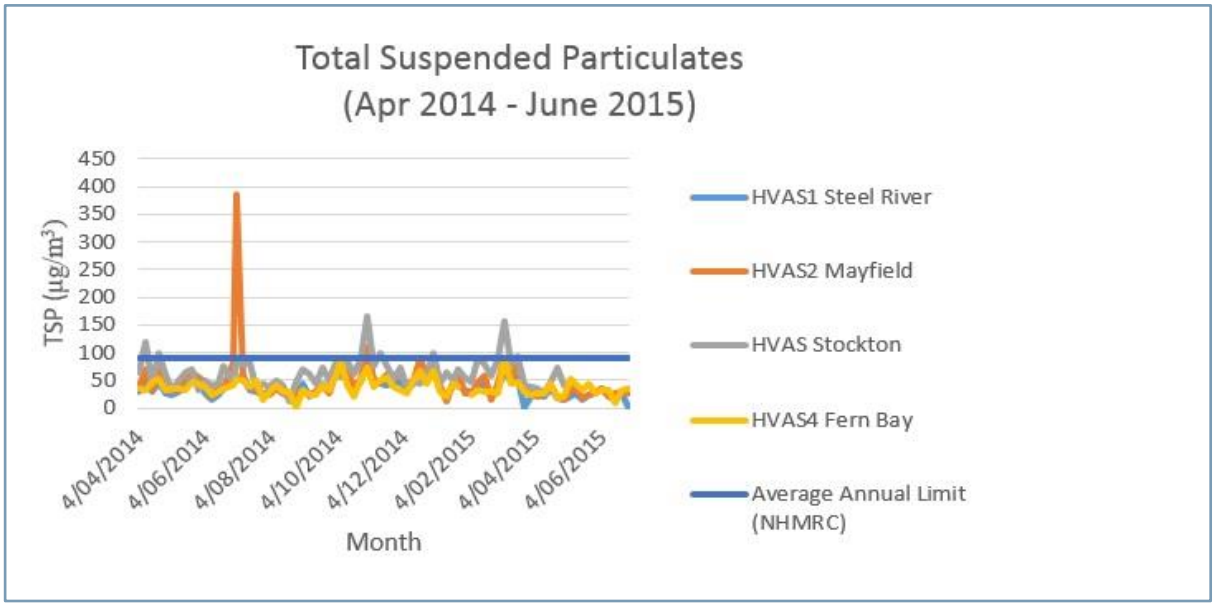


Figure 29: Total Suspended Particulates (TSP)

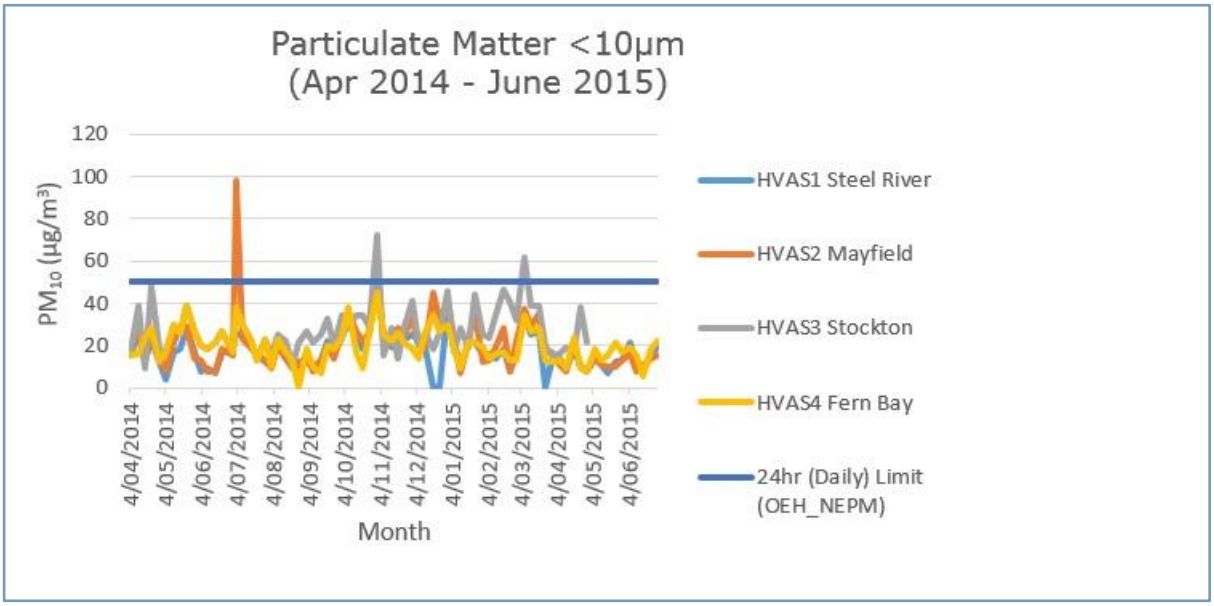


Figure 30: Particulate matter <10µm (PM10)

The annual average TSP concentrations for three of the four monitoring locations were below the NHMRC Annual Average Limit of 90µg/m^3, as shown in Table 6. Average TSP concentrations at HVAS2 in Mayfield exceeded the limit of 90µg/m^3 due to the continuation of construction at an adjacent property in Mayfield.

Daily concentrations of PM_{10} were also below their respective guideline of 50µg/m^3 (OEH and NEPM), with the exception of HVAS2 in Mayfield on 3 July 2014, HVAS2 and HVAS3 in Stockton on 31 October 2014, and HVAS3 on 6 March 2015. Meteorological conditions were reviewed on these days to assess the likelihood that NCIG had contributed to these elevated levels as shown in Table 5 below.

For the Mayfield monitoring station, the elevated PM_{10} events are considered to be associated with the continuation of construction at the adjacent residential property in Mayfield, with nor easterly wind direction on both days with the PM_{10} events greater than 50µg/m^3.

For the Stockton monitoring station, a nor westerly wind direction at elevated wind speeds above 5m/s gives rise to a high risk of particulate emissions sourced from the Kooragang Island vicinity. The nor westerly wind conditions do not necessarily mean that the source of elevated particulates at the Stockton monitoring station is the NCIG CET as there are several potential sources of particulates in the upwind direction from the monitoring station. In addition, dust suppressant sprays are activated at NCIG in high wind erosion risk conditions. Daily PM_{10} events greater than 50µg/m^3 guideline value at Stockton are discussed further in Table 5.

Table 5 Daily PM_{10} events greater than 50µg/m^3 guideline value at Mayfield and Stockton

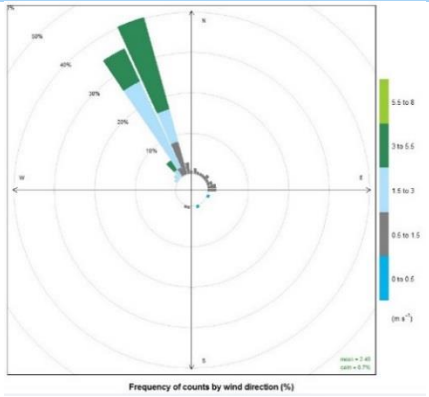
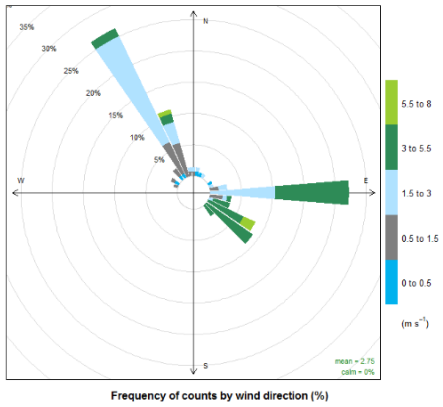
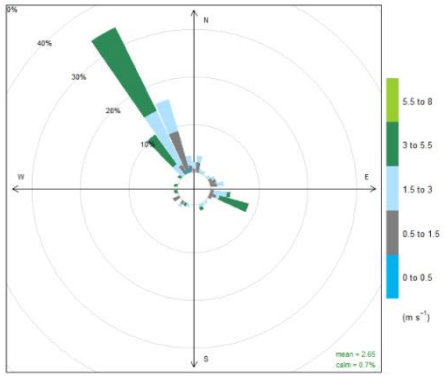
Event	Wind patterns	Comments
3-July-14 98 µg/m^3 at Mayfield		NCIG is to the northeast of the Mayfield air quality monitor. Prevailing winds on this day were from the northwest. Therefore: – Activities at NCIG were unlikely to have contributed to the measured result at Mayfield on this day. Outcome: Compliance
31-Oct-14 53 µg/m^3 at Mayfield 72 µg/m^3 at Stockton		NCIG is to the northwest of the Stockton monitor and to the northeast of the Mayfield monitor. Prevailing winds on this day were mainly from the northwest and also from the east. Given the wind direction, the activities at NCIG were unlikely to have contributed to the measured result at Mayfield on this day. There was no rainfall on this day or the preceding day. Wind speeds ranged from 0.5 to 6.3 m/s. Measured PM_{10} concentrations at Beresfield (upwind of Kooragang Island on the day were 44.1 µg/m^3 (EPA, 2013). The 24-hour average TSP concentration measured by the BAM on NCIG's eastern boundary was 86 µg/m^3, which is below the NHMRC annual average criteria. Therefore: – It is unlikely that NCIG activities have greatly contributed to the exceedance, due to the relatively low TSP concentration at the eastern boundary. Real-time trends of TSP during the day also indicate no clear spike correlating with the rise in wind speed. – Modelling in the Environmental Assessment suggested that the maximum 24-hour average PM_{10} concentration at Stockton, due to NCIG activities, would be up to around 5 µg/m^3. Outcome: Compliance

Table 5 Daily PM_{10} events greater than 50µg/m^3 guideline value at Mayfield and Stockton		
16-Mar-15 62 µg/m^3 at Stockton	 Frequency of counts by wind direction (%)	NCIG is to the northeast of the Mayfield air quality monitor. Prevailing winds on this day were from the northwest. Therefore: – Activities at NCIG were unlikely to have contributed to the measured result at Mayfield on this day. Outcome: Compliance

The OEH Annual Average Goal of 30µg/m^3 (formerly NSW DEC, 2005) for PM_{10} was not exceeded at any of the monitoring stations between January and December 2014 as shown in Table 6 below.

Table 6 Annual Average TSP and PM_{10} Concentrations (µg/m^3)

Annual Average Jan 2014 – Dec 2014	HVAS1 Steel River	HVAS2 Mayfield	HVAS3 Stockton	HVAS4 Fern Bay
TSP annual average criteria (NSW DEC, 2005)		90		
TSP	41.3	93	65.1	40.8
PM_{10} annual average criteria (NSW DEC, 2005)		30		
PM_{10}	18.8	29.7	29.3	22.1

Dust from coal handling operations was managed primarily through suitable design of plant and machinery, including enclosures and housed areas at the dump station, conveyors, transfer houses, the buffer bin and feeders throughout the site. Additional measures include operation of dust suppression and moisture addition sprays at transfer points positioned both in transfer houses and on the machines (i.e. Stacker/Reclaimers and the Ship loader). Dust suppression spray guns have also been positioned along the stockyard berms directly adjacent the coal stockpiles. These operate on an automatic sequence, which takes into account varying weather conditions and evaporation rates of water from stockpiles. The onsite weather station is also connected to the system. This system is managed in accordance with the Operations Dust Management Plan (ODMP), including programming logic known as an Integrated Dust Management System.

In addition, NCIG trialled a "Fog Cannon" during the reporting period to control dust from stacking and reclaiming operations. A photograph of the "Fog Cannon" is provided in Figure 31. Conclusions on the effectiveness of the cannon will be made in the following reporting period.

Figure 31: Trial of Fog Cannon

In accordance with Condition 3.2 e) of Project Approval (06_0009), NCIG utilises real-time monitoring data to inform environmental management decisions associated with the project. This is done through interaction with real-time Beta Attenuation Monitors (BAMs), which measure Total Suspended Particles (TSP). These are located at the boundaries of the stockyard and are used to assist the management of operation to ensure compliance with project obligations.

The eastern dust monitor was relocated in June 2014 from the upper level of Transfer House 6 to a dedicated elevated platform nearby location approximately equidistant between Transfer House 6 and Transfer House 7. Analysis of results from this monitor in its original location indicated that erroneous spikes in the data were corresponding with conveyor belt activity, particularly when the yard conveyors were in stacking mode and the belt sprays adjacent to the monitor were not in operation. Prior to its relocation, a one month trial was completed at the new location using a portable light-diffraction particulate monitor to ensure that the new location is not subject to the same erroneous readings that were occurring at the original location and to assess if other localised events are likely to disproportionately affect the location. The trial results indicated that the new location of the monitor is not impacted by localised conveyors or transfer houses. This dust monitor was placed on an elevated structure at the new location such that the inlet of the monitor is at approximately 4m elevation, as shown in Figure 32. The new location of the eastern dust monitor will assist in the understanding of dust issues crossing the NCIG boundary, in particular from the stockyard.

Figure 32: New Location of Eastern Dust Monitor

3.2.3 Reportable Incidents

There were no air quality incidents during the reporting period.

Complaints regarding air quality received during the reporting period (see Section 3.14) were responded to in accordance with the Complaints Response Procedure.

3.2.4 External Dust Studies

Two studies on air quality in the Lower Hunter were commenced or conducted during the reporting period, including the Lower Hunter Particle Characterisation Study and the Lower Hunter Dust Deposition Study.

The Lower Hunter Particle Characterisation Study studied the composition of airborne particles 2.5 micrometres and smaller in diameter ($PM_{2.5}$) in the Lower Hunter Region and the composition of particles 10 micrometres and smaller in diameter (PM_{10}) in the vicinity of the Newcastle Port. The study was undertaken to provide communities in the Lower Hunter with scientific information about the composition and likely sources of these particles, which are invisible to the eye. The study included one year of sampling from March 2014 to February 2015 at four sites in Newcastle, Beresfield, Mayfield and Stockton followed by sample analysis and modelling to identify the source of air particles. Four progress reports have been completed dated July 2014, October 2014, January 2015 and April 2015, with the Final Study Report due for publication in early 2016.

The Lower Hunter Dust Deposition Study was commissioned to examine the quantity, composition and likely sources of depositional dust in the Lower Hunter. An interim study report for the first 6 months of the study between October 2014 and July 2015 has been released. The six-month averages for dust deposition data collected from the twelve monitoring sites range from 0.7g/m^2.month to 1.4g/m^2.month, below the EPA criterion of 4g/m^2.month. Soil or rock dust comprised the greatest proportion of the samples, followed by coal, soot, black rubber and halite (rock salt). Insect debris, plant debris and miscellaneous fibre were found in many of the samples. No detailed analysis was considered in the interim report. A final report is expected in November 2016.

NCIG is aware of these two studies and will be considering the outcomes of the studies on its operations.

3.2.5 Further Improvements

The effectiveness of the "Fog Cannon" trial will be assessed in late 2015. Further changes will be a part of the ongoing continuous environmental improvement programs at NCIG.

3.3 Water Quality

3.3.1 Environmental Management

In accordance with Condition 7.6 c), Schedule 2 of the Project Approval (06_0009), an Operations Water Management Plan (OWMP) was developed which defines the surface water, stormwater and groundwater controls on the NCIG Project site during operation. The Plan includes specific measures designed to avoid sediment-laden, coal-laden or hydrocarbon-impacted surface water from entering Deep Pond, wetland areas or the Hunter River. The Plan also includes a monitoring programme of surface water utilised on and around the Site. The plan identifies water management infrastructure and water requirements for activities such as dust suppression and plant washdown. A site water balance is included, which accounts for water captured on site through rainfall and volumes of water that may be required from the local potable water system.

In accordance with Condition 7.3b), Schedule 2 of Project Approval (06_0009), a Construction Surface Water Management Plan (CSWMP) was developed which defines how surface water and stormwater is managed on the NCIG CET site during construction. The Plan includes the definition of appropriately-sized stormwater controls, in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004). The Plan also includes specific measures designed to avoid sediment-laden stormwater from entering Deep Pond, wetland areas or the Hunter River, and a monitoring programme for stormwater leaving the Site. This plan was updated in June 2013 to include information relating to the construction of the rail flyover.

The CSWMP and OWMP identify that surface water runoff from disturbance areas during construction and operation of the Project could potentially contain sediments, soluble salts, fuels, oils, grease and other contaminants, in particular coal residue. The potential surface water quality impacts that relate to these contaminants from each area of the Project site are summarised in Table 7.

Table 7 Potential surface water quality impacts

Project Site	Potential Impact Scenario	Potential Contaminant
Rail Infrastructure Corridor	Uncontrolled drainage of sediment laden runoff to downstream waterbodies within the Kooragang Island Waste Emplacement Facility (KIWEF) during construction of rail embankments.	Sediments, soluble salts, heavy metals, organic contaminants, fuels, oils and grease.
	Uncontrolled drainage of runoff from access roads and construction areas to downstream waterbodies within the KIWEF.	
	Uncontrolled drainage of runoff from exposed soils within the existing KIWEF to downstream waterbodies.	
	Potential erosion and sedimentation resulting from runoff from the rail corridor and associated drainage system.	
	Release/spill into downstream waterbodies.	Coal, diesel, lubricants and hydrocarbons.
Coal Storage Area	Uncontrolled drainage to downstream waterbodies during construction of the coal storage area.	Sediments, soluble salts, heavy metals, organic contaminants, fuels, oils, lubricants and low pH water.
	Uncontrolled drainage of runoff from access roads and construction areas to downstream waterbodies.	
	Spillage/overflow of site water to downstream waterbodies.	
	Release/spill into downstream waterbodies due to rupture of fuel tank (diesel/petrol).	Sediments, coal, diesel, lubricants and hydrocarbons.
Wharf Facilities and Ship loader Area	Uncontrolled drainage of sediment laden runoff to the south arm of the Hunter River during construction of the berths and wharf structure, excavation on or near the banks of the South Arm of the Hunter River and during piling operations.	Sediments, soluble salts, fuels, oils and grease.
	Uncontrolled drainage of runoff to the south arm of the Hunter River from access roads and wharf construction areas including excavation on or near the banks of the South Arm of the of the Hunter	

Table 7 Potential surface water quality impacts

Project Site	Potential Impact Scenario	Potential Contaminant
	River.	
	Release/spill into South Arm of the Hunter River.	Sediments, coal, diesel, lubricants, hydrocarbons.

This identification of surface water flows was utilised to develop the monitoring programme defined in both the CSWMP and the OWMP which aim to ensure adjacent water bodies are not impacted by NCIG construction activities. The CSWMP and OWMP were approved by the Department of Planning (now NSW Department of Planning and Environment) as part of the Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) respectively.

The surface water management strategies, as detailed in both the CSWMP and OEMP, are:

- the separation of surface water runoff generated from within the active CET and Project construction areas from that generated from surrounding areas;
- containment and reuse of water onsite;
- the implementation of adequate water management controls to minimise the potential for impacts to off-site water resources such as adjacent wetland areas, Deep Pond and the Hunter River (Figure 21).

The management of erosion and sedimentation is outlined is Section 3.5.

3.3.2 Environmental Performance

Table 8 outlines the monitoring locations, frequency of monitoring and monitoring parameters for the Project in accordance with the CEMP, OEMP and OWMP. These monitoring elements form the Surface Water Monitoring Program for the Project.

Table 8 Surface Water Monitoring Program

Monitoring Locations	Frequency	Parameters
Primary and secondary settling ponds, overflow pond.	Monthly	• pH; • Electrical conductivity (EC); • Turbidity; • Temperature.
	During period of heavy rainfall (i.e. more than 20 mm of rainfall in a 24 hour period).	• Water level.
Surface water monitoring sites.[1]	Monthly	• pH; • EC; • Turbidity; • Temperature.
Drainage, erosion and sediment control infrastructure.	Monthly	• Structural stability and effectiveness in controlling sediment migration.
Collection sumps	Weekly	• Level of collected sediment.

[1] The location of monitoring sites is shown in Figure 33

A site drainage network was established to capture site runoff. The topography grades to the north and west of the Project site and the existing flow path for surface runoff was incorporated into the completed site surface profile.

The drainage network that was established for dredging activities was incorporated into the design of the permanent water management infrastructure on the site. This design involves stormwater draining from east to west in the coal stockpile area at which point it collects in an open drain and is directed to the north-west of the site (see Figure 33). Additional subsurface drainage was constructed as part of Stages 2AA and 2F, specifically beneath the extended stockpile area. Surface water captured in the construction area of the stockyard is redirected both to the east and west. Both operations and construction surface water is then captured in primary settling ponds across the north of the site where fines are allowed to settle. This water cascades from the primary ponds into a secondary settlement pond prior to collection in the clearwater pond where it is then pumped to water storage tanks and is then available for reuse on the site. This water resource is to be utilised primarily for dust suppression purposes across the site, but also wash-down and belt cleaning activities.

Within the design of the drainage network, stormwater from the wharf and rail areas of the site are also directed into the stockyard water management system. Stormwater collected on the wharf is accumulated in an on-site pond and then pumped across Cormorant Road. Stormwater captured in the vicinity of the train unloading station is also pumped to the stockyard, with both sources eventually made available for reuse after treatment in the northern settlement ponds. This includes additional controls constructed as part of Dump Station 2. The existing surface water management controls in the rail loop and sidings allowed for the increased catchment capacity from Stages 2AA and 2F rail construction. Subsurface drainage from beneath Coal Stockpile Pads 4 and 5, and associated collection sumps were constructed as part of the Stage 2F construction works. Surface

water drainage controls were also constructed at K10 wharf and the extension of the portside facility.

Sampling of surface water ponds was also undertaken during the reporting period in accordance with the CSWMP and OWMP. The location of the sampling undertaken is illustrated in Figure 33 with the water quality results recorded detailed in Appendix B.

Values for pH on site were slightly higher than the previous reporting period with a range of 7.73 to 9.8, although this is considered to be a healthy range and within historical range. The off-site water resources (7.69 to 9.12) were less variable than onsite sampling locations, although this is also considered to be a healthy range and within the historical range. Electrical conductivity (EC) was generally low onsite, with higher values reported at Swan Pond off-site. Dissolved Oxygen (DO), while being seasonally variable, was comparable between sites. Turbidity values were variable across all sites, which is likely due to discrete weather events (i.e. rainfall) and the settlement process within onsite ponds.

Biannual surface water sampling was completed by RCA in June 2015, with 10 surface water samples collected for analysis and comparison of the results to the trigger levels adopted in the Surface Water Monitoring Plan. The Surface Water Monitoring Program was originally developed in 2012 as an outcome of the Independent Environmental Audit (IEA), as precautionary measure to assess potential pollutants from the NCIG terminal, that were not investigated as part of monthly water quality monitoring measurements. Surface water samples were collected from operational locations, including the Trade Waste Pond, Wharf Sump, Hunter River Wharf, Rail Settling Basin (WT01) and Clear Water Pond; and from reference locations, including Deep Pond, Delta Pond, Pond I, Black Swan Pond and the Hunter River and compared to trigger values that were either site-specific trigger values or ANZECC triggers for protection of 95% Aquatic Species. Concentrations of TRH, PAHs, nitrate, ammonia and some heavy metals were below the trigger values. Concentrations of phosphorous marginally exceeded the trigger value at the Hunter River (reference site). Concentrations of various metals, including aluminium, boron, copper and zinc exceeded the trigger values at the Hunter River Wharf, Wharf Sump, Trade Waste Pond, Rail Settling Basin, Clearwater Pond (operational sites) and at Black Swan Pond, Delta Pond, Deep Pond, Pond I and the Hunter River (reference sites).

In accordance with the Surface Water Monitoring Program, NCIG will commission further sampling in the following reporting period, to either develop more robust site specific trigger values or establish that trigger values were temporarily exceeded, i.e. a data set anomaly. It is noted that many site specific trigger values currently developed for the monitoring program are based on a limited data set, and therefore should be treated as low reliability. It is also noted that many exceedances were observed at reference locations, in particular the Hunter River.

3.3.3 Water Studies

During the reporting period an assessment was undertaken of the design capacity of the site water infrastructure. Condition 2.42 of the NCIG Project Approval (PA 06_0009) requires that NCIG

> *"… design, construct, maintain and operate surface water and stormwater management infrastructure on the site to accommodate a 1 in100 ARI rainfall event…."*

The Aurecon Hatch report finalised in July 2014 determined that, with the addition of a small earth bund wall in the north western corner of the stockyard, the NCIG facility will satisfy the criteria of no discharge for the 100 year ARI, 2 hour rainfall event. The earth bund was appropriately constructed in August 2014, thus ensuring compliance to this requirement.

3.3.4 Reportable Incidents

During the reporting period, a landslip occurred at the rail flyover construction site. This triggered a Pollution Incident Response Management Plan (PIRMP) and incident report and subsequent close

out with NSW EPA. The EPA was satisfied with the response provided by NCIG and have taken no further action.

In addition, discharge of water occurred from the Terminal site across Clearwater Pond during the April 2015 East Coast Low (ECL) storm event. NSW EPA was notified of the discharge, however a PIRMP was not triggered, as it was determined that no material environmental harm was caused as a result of the discharge. NCIG received a response from the EPA on this matter shortly after the AEMR reporting period, confirming that they did not deem this to be a pollution incident.

3.3.5 Further Improvements

Additional surface water controls will be completed as part of ongoing operational capital investment, particularly the separation of clean and dirty water and increase in settling pond capacity.

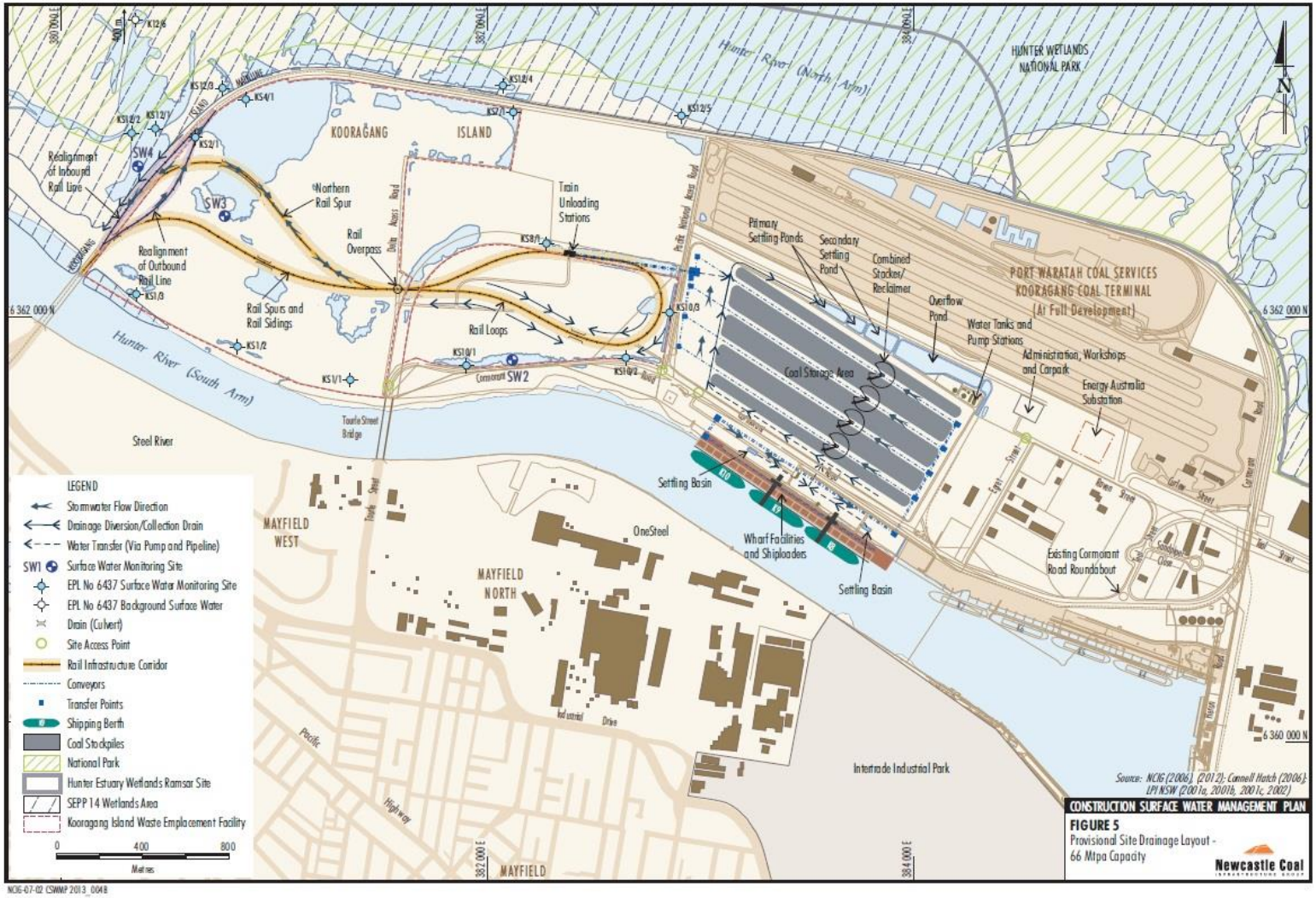


Figure 33: Permanent site drainage layout

3.4 Groundwater

3.4.1 Environmental Management Relating to EPL

Groundwater monitoring requirements were changed during the 2011 monitoring period as specified in EPL 12693. Monitoring Points GW2, GW3 and GW4 were removed from the licence and replaced with K9/3N, K9/3S, K11/1S and K11/1 (as shown in 34), referred to as Monitoring Points 20, 21, 22 and 23 in the EPL. The reason for this change was to detect potential migration of contaminants of concern which may be mobilised as a result of settlement from the NCIG constructed rail embankments. The source of contamination is the former Kooragang Island Waste Emplacement Facility (KIWEF), which lies beneath the NCIG rail loop. Contaminants of concern include mainly hydrocarbons and some inorganic compounds. A series of Groundwater Trigger Values are established in the EPL, which activate further monitoring at additional locations and a notification process if exceeded. Monitoring of GW1 remains a requirement.

3.4.2 Environmental Performance Relating to the EPL

Table 9 outlines the monitoring locations, groundwater monitoring parameters recorded, frequency of monitoring and groundwater criteria for the Project in accordance with Section M2.3 of EPL 12693.

Table 9 Summary of the Groundwater Monitoring Program (EPL)

Monitoring Parameter	Monitoring Sites	Frequency	Criteria
Al, Ammonia, Benzene, Co, Conductivity, Cu, Cyanide (Free), Cyanide (Total), Ethyl Benzene, Fe, m+p-Xylene, Mg, Mn, Ni, o-Xylene, pH, Phenol, K, Na, Toluene, Total PAH, TPH C6-9, TPH C10-36, Zn.	GW1 (Monitoring Point 1)	6 monthly	Refer EPL 12693
Ammonia, Benzene, Conductivity, Cyanide (Free), Cyanide (Total), Ethyl Benzene, m+p-Xylene, o-Xylene, pH, Phenol, Toluene, Total PAH, TPH C6-9, TPH C10-36.	K9/3S, K9/3N, K11/1S, K11/1 (Monitoring Points 20-23)	6 monthly	Refer EPL 12693
Al, Ammonia, Benzene, Co, Conductivity, Cu, Cyanide (Free), Cyanide (Total), Ethyl Benzene, Fe, m+p-Xylene, Mn, Ni, o-Xylene, pH, Phenol, K, Na, Toluene, Total PAH, TPH C6-9, TPH C10-36, Zn.	K11/3E, K11/3W, K11/2E, K11/2W, K9/4E, K9/4W, K9/2E, K9/2W, K10/4W, DM10 (Monitoring Points 24-33)	Only if Trigger Criteria is exceeded at Monitoring Points 20, 21, 22 or 23 and is confirmed through second monitoring round.	Refer EPL 12693

[1]The location of monitoring sites is shown on Figure 34

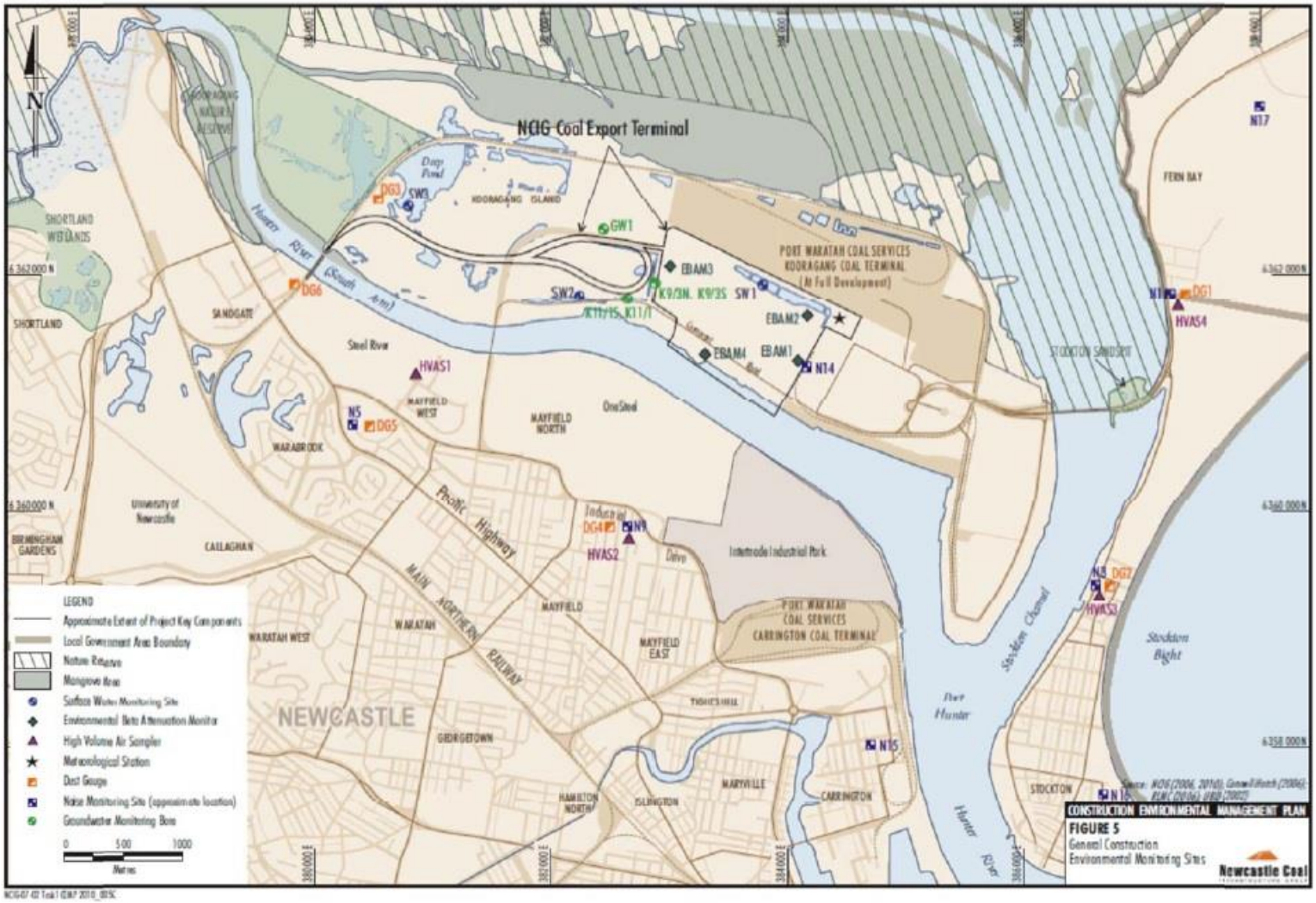


Figure 34: Location of Groundwater Monitoring Wells for EPL

The Project site includes a relatively shallow groundwater table in areas of fill from previous landuse activities. Consequently, any affect on the groundwater system as a result of Project operations is being managed. NCIG has incorporated into the design of the Project a comprehensive suite of construction methods and design systems. In response to groundwater conditions encountered on the project site the following groundwater management contingency measures were adopted for specific Project elements:

- piled foundations together with diaphragm sub-surface perimeter walls and jet-grouted base for construction of the train unloading stations base and adjacent conveyors were constructed to minimise groundwater inflow or connection (this was constructed in the tunnel beneath Dump Station 2 as part of Stage 2AA during the 2012/2013 reporting period); and
- groundwater bores were established to monitor groundwater levels, and water quality around the perimeter of the coal storage area and along the rail infrastructure corridor.

A summary of the groundwater monitoring results recorded during the reporting period is provided in Appendix D and Table 10.

Table 10 Summary of Groundwater Monitoring Results (EPL)

Monitoring Sites	Dates of Sampling	Exceedances of EPL Requirements?	Exceedances of CEMP/ OWMP	Comments
GW1 (Monitoring Point 1)	6/6/14, 1/12/14, 18/6/15	N/A	Cu, Mn, Zn	Review indicates insufficient data to complete trend analysis or develop site-specific trigger values currently. On-going monitoring recommended.
K9/3N (Monitoring Point 20)	6/6/14, 1/12/14, 18/6/15	No	Mn	
K9/3S (Monitoring Point 21)	6/6/14, 1/12/14, 18/6/15	No	Cu, Mn, Zn	
K11/1 (Monitoring Point 22)	6/6/14, 1/12/14, 18/6/15	No	Mn, Zn	
K11/1S (Monitoring Point 23)	6/6/14, 1/12/14, 18/6/15	No	pH, Mn	
K11/3E, K11/3W, K11/2E, K11/2W, K9/4E, K9/4W, K9/2E, K9/2W, K10/4W, DM10 (Monitoring Points 24-33).	Not required	N/A	N/A	Not required to be sampled as no exceedances of Trigger Values for Further Investigations (Section E1.1 of EPL 13693).

An assessment of the monitoring records found the following:

- that the Trigger Values For Further Investigation (as outlined in Section E1.1 of EPL 13693) were not exceeded at any of the required monitoring locations;
- that exceedences of criteria outlined in the CEMP and OWMP (ANZECC (2000) trigger level for the protection of 95% of marine water species) occurred at Monitoring Points 1, 20, 21, 22 and 23, typically for manganese, copper and zinc;
- These exceedences are similar for the previous reporting period.

A review of the current NCIG groundwater management plans and supplied monitoring data for NCIG's operational areas was undertaken by Ramboll Environ in January 2015. The review was completed in response to comments received by Department of Planning and Environment following their review of the 2013/2014 AEMR.

Initial screening of groundwater data indicated that very few analytes are detected frequently enough to provide sufficient data for detailed analysis of trends. Petroleum hydrocarbons and PAHs have been largely non-detect across the monitoring network over time and were not considered to be of concern from routine NCIG operations. A few select metals and metalloids, including arsenic, bromine, iron, manganese, nickel and zinc, were commonly detected with sufficient data above the laboratory detection limit for detailed trend analysis.

Mean and median values of metals and metalloids were compared against ANZECC (2000) trigger values for protection of 90% of freshwater species. None of the median values of any analyte exceeded the trigger values. Mean concentrations of aluminium, copper and zinc exceeded the trigger values, however analytes aluminium and copper have insufficient data for statistical analysis. Interestingly, these are the same analytes above relevant trigger values from surface water sampling. The presence of so many non-detects within the data is an indication that the groundwater quality is not currently of concern with respect to the parameters monitored at the site. The absence of widespread and/ or repeated exceedance of ANZECC (2000) trigger values indicates that groundwater quality is generally within an acceptable range of quality. Updates to the way groundwater monitoring results are compared to guidelines not related directly to EPL trigger values, will be made in the next update to the Operations Water Management Plan (OWMP).

3.4.3 Environmental Management Relating to Flyover Construction

Additional groundwater monitoring requirements were introduced during the 2013/2014 reporting period for the construction of the rail flyover. Environmental Earth Sciences (EES) developed a Groundwater Management Plan in September 2013 to satisfy Conditions 2.45A and 2.45B of the Modification of the Minister's Approval MP06_0009. This plan includes the monitoring of bores BH19s/BH19d, BH21s/BH21d and BH23s/BH23d on a quarterly basis. It is noted that BH19s and BH19d were sampled in October 2013 but were found to be damaged in the next sampling round in January 2014 and wells BH20s and BH20d were substituted for the damaged wells. In addition, monitoring of surface water at Deep Pond and Swan Pond are required on a quarterly basis.

3.4.4 Environmental Performance Relating to Flyover Construction

Table **9** 11 outlines the monitoring locations, groundwater and surface water monitoring parameters recorded, frequency of monitoring and criteria for the flyover construction in accordance with Conditions 2.45A and 2.45B of the Modification of the Minister's Approval MP06_0009.

Table 11 Summary of the Groundwater Monitoring Program (Flyover)

Monitoring Parameter	Monitoring Sites	Frequency	Criteria
TRH (fraction C6-C40), BTEX, naphthalene, dissolved heavy metals(Al, As, Br, Cr, Cu, Fe, Mn, Ni, Pb, Zn), Biochemical Oxygen Demand (BOD)	BH20s/BH20d, BH21s/BH21d, BH23s/BH23d	3 monthly	Refer EES (2013) GMP
	Deep Pond, Swan Pond (surface water)		

[1]The location of monitoring sites is shown on Figure 35

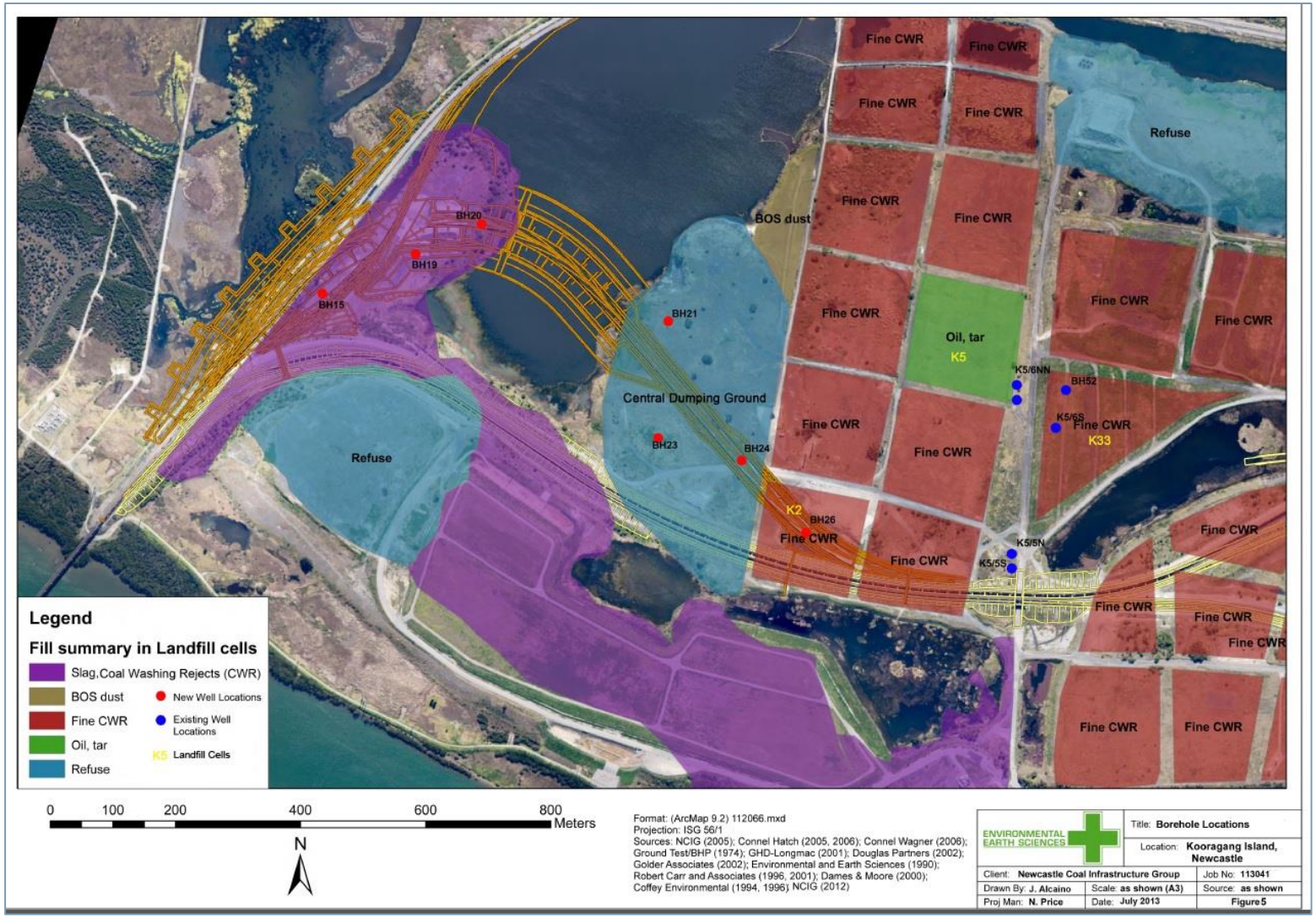


Figure 35: Location of Groundwater Monitoring Wells for Flyover

The area over which the rail flyover is being constructed, known as KIWEF, comprises filling up to 11m bgs, including building rubble, coarse and fine coal washery reject, slag, fly ash, flue dust and liquid waste. Consequently, any interception of the groundwater table during Project construction activities is being managed. In response to groundwater conditions encountered on the project site the following groundwater management contingency measures were adopted for specific Project elements:

- a low permeability capping layer was incorporated into the rail embankment formation to minimise infiltration; and
- groundwater bores were established to monitor groundwater levels, and water quality along the rail infrastructure corridor.

A summary of the groundwater monitoring results recorded during the reporting period is provided in Appendix D and Table 12.

Table 12 Summary of the Groundwater Monitoring Results (Flyover)

Monitoring Sites	Dates of Sampling	Exceedences of EES (2013) GWMP	Comments
BH20S (BH19S damaged)	31/7/14, 28/10/14, 29/11/14, 28/4/15	Al, As, Cd, Cu, Fe, Mn, Ni, Zn	A 12 monthly review of quarterly monitoring from the Flyover Construction was completed, which identified that exceedences were largely either consistent with baseline readings, stable or within natural fluctuations in groundwater chemistry. Re-testing for iron, manganese and aluminium was completed by NCIG, as recommended. This is further discussed below.
BH20D (BH19D damaged)	31/7/14, 28/10/14, 29/11/14, 28/4/15	BOD, As, Mn	
BH21S	31/7/14, 28/10/14, 29/11/14, 28/4/15	BOD, TRH C6-C40, anthracene, BaP, fluoranthene, naphthalene, phenanthrene, Al, As, Cr, Fe, Fe, Mn, Ni, Zn	
BH21D	31/7/14, 28/10/14, 29/11/14, 28/4/15	BOD, benzene, TRH C6-C40, fluoranthene, naphthalene, phenanthrene, Al, As	
BH23S	31/7/14, 28/10/14, 29/11/14, 28/4/15	BOD, TRH C6-C40, Al, As, Cr, Fe, Pb, Mn, Zn	
BH23D	31/7/14, 28/10/14, 29/11/14, 28/4/15	BOD, Al, Cu, Fe, Mn, Zn	
Deep Pond (SW1)	31/7/14, 28/10/14, 29/11/14, 28/4/15	Al, Mn	
Swan Pond (SW2)	31/7/14, 28/10/14, 29/11/14, 28/4/15	As, Mn	

An assessment of the monitoring records found the following:

- that exceedences of the criteria outlined in the EES (2013) GWMP (ANZECC (2000) trigger level for the protection of 90% of marine and/ or fresh water species) occurred at the six shallow and deep monitoring points for a range of heavy metals, including aluminium, arsenic, cadmium, chromium, copper, iron, lead, nickel, manganese and zinc, biochemical oxygen demand, TPH and PAHs.

In accordance with the GWMP requirements, a review of the first 12 months (October 2013 to October 2014) of quarterly groundwater and surface water monitoring data for the rail flyover construction was completed by Ramboll Environ in February 2015. Five rounds of monitoring data were reviewed, with the initial round (October 2013) completed prior to the start of the flyover construction considered representative of baseline groundwater conditions. Trend analysis was completed on each analyte at each well. In general, no trends were apparent for metals, TPH, BTEX or PAHs. In well BH21S, detectable concentrations of TRH were observed however concentrations appear to the relatively stable, with a peak concentration in August 2014. These TRH concentrations were comparable to the baseline concentration. In BH21D, elevated concentrations of naphthalene and detectable concentrations of TRH were observed in all five rounds, however concentrations appear stable and are comparable with the baseline concentrations. Metals were generally below the guidelines, aside from manganese in BH20S and BH21D, aluminium in BH21D and BH23D and copper and iron in BH23D. Manganese and aluminium concentrations were considered to be within the range of natural fluctuations for groundwater within the site.

3.4.5 Reportable Incidents

No environmental incidents or complaints relating to groundwater quality conditions were made during the reporting period.

3.4.6 Further Improvements

In the following reporting period, the flyover groundwater monitoring program and the current EPL groundwater monitoring program will be consolidated. The consolidation will be based on analysis of the current groundwater monitoring programs, including trend analysis and the development of an appropriate and consistent contingency program for the rationalised monitoring program. Based on current reviews, Ramboll Environ recommended that annual or biannual monitoring of the groundwater network should continue in the short term. NCIG's groundwater database should be updated with each additional data set and trend analysis undertaken to assess potential changes in groundwater quality over time. If no trends are identified in the next two years, the frequency of groundwater monitoring could be decreased to biennial (every two years) or greater. If trends are not identified within the next five years and operations across the site have not changed significantly, groundwater monitoring may not be required due to the NCIG activities posing minimal risk of impact to groundwater quality.

3.5 Erosion and Sediment Control

3.5.1 Environmental Management

In accordance with Condition 2.43, Schedule 2 of the Project Approval (06_0009) NCIG took all reasonable measures to prevent soil erosion and the discharge of sediments and pollutants from the site during construction activities.

In accordance with Condition 2.42, Schedule 2 of the Project Approval (06_0009) NCIG has designed and constructed surface water and stormwater management infrastructure on the site to accommodate a 1 in 100 annual recurrence interval (ARI) rainfall event.

All erosion, sediment and pollution control infrastructure is being maintained on the Project site at or above design capacity during construction of the Project and will continue to be until such time as all ground disturbed by the works has been stabilised and rehabilitated so that it no longer acts

as a source of sediment, in accordance with Condition 2.44, Schedule 2 of Project Approval (06_0009).

All stockpiled construction materials have been managed to minimise erosion or dispersal of the materials in accordance with Condition 2.45 of Project Approval (06_0009). All fill/preload material brought to the Project site is managed in a manner that minimises erosion and dispersal of those materials to the downstream waters (e.g. south arm of the Hunter River).

In accordance with Condition 2.49, Schedule 2 of the Project Approval (06_0009), all stormwater and surface water management infrastructure associated with the operation of the Project is lined with a low-permeability material to minimise potential leakage. Stormwater is reused onsite for beneficial purposes such as the wetting of coal to reduce dust emissions from the Site.

All grey wastewaters from the site are directed to sewer in accordance with a Trade Waste Licence, approved through Hunter Water Corporation, in accordance with Condition 2.51, Schedule 2 of Project Approval (06_0009).

Erosion and sediment control measures and general surface water management measures for the Project are documented in the approved Construction Surface Water Management Plan (CSWMP) and the Operations Water Management Plan (OWMP).

3.5.2 Environmental Performance

Table 13 outlines the monitoring locations, erosion and sediment control parameters recorded, frequency of monitoring and criteria for the Project in accordance with the CEMP.

Table 13 Summary of the Erosion and Sediment Control Monitoring Program

Monitoring Parameter	Monitoring Sites	Frequency	Criteria
Structural stability and effectiveness in controlling sediment migration.	Drainage, erosion and sediment control infrastructure.	Monthly and following significant rainfall events (i.e. greater than 20 mm in 24 hours)	N/A

The management of erosion and sedimentation for the NCIG Project is detailed by the Erosion and Sediment Control Plan (ESCP). The ESCP is a document that is continually modified to account for project areas and activities of identified risk of erosion and sedimentation. Activities that have the potential to cause or increase soil erosion at the Project have been identified and are primarily due to exposure of soils during construction activities.

The general erosion and sediment control principles adopted take into account the general recommendations for site drainage works presented in Managing Urban Stormwater: Soils and Construction – Volume 1 (Landcom, 2004) which underpin the goal of protecting adjacent wetland areas, Deep Pond and the Hunter River. These principles involve:

- Minimising surface disturbance and restricting access to undisturbed areas.
- separation of runoff from disturbed and undisturbed areas where practicable.
- Construction of surface drains to facilitate the efficient transport of surface runoff or utilisation of existing stormwater systems.
- Construction of the site drainage network including perimeter bunds, internal bunds, primary settling ponds and hydraulically controlled discharge structures.
- Construction of primary and secondary settling ponds, site water pond and sediment dams to contain runoff up to specified design criterion.

- Installation of a silt curtain in the south arm of the Hunter River local to the disturbance area during construction of the shipping berth batters, wharf structure and during piling operations (in the River) that may create excessive material disturbance.
- Installation of silt curtains in Swan Pond and Deep Pond during construction of the Rail Flyover to contain mobilised sediments generated from ground disturbance.

In ensuring the erosion and sediment control principles are adhered to, development activities on the Project have been typically undertaken in the following order:

- Construction of sediment fences (down slope of disturbance areas) where required.
- Installation of silt curtains in identified water bodies, including the Hunter River, where required.

General construction works are only commenced once erosion and sediment control measures are in place.

- Construction of drainage diversions (typically upslope of disturbance areas) – these were only constructed where they significantly reduced the runoff catchment of disturbance areas and connected to the site drainage network where practicable.
- Construction of the primary and secondary settling ponds and a clearwater pond.
- Construction of collection drains (down slope of disturbance areas) where required to convey runoff to the site drainage network (including primary and secondary settling ponds and a site water pond).

Erosion and Sediment Control Plans (ESCP), detailing specific erosion and sediment control measures, are developed in a progressive manner prior to the development of each Project component requiring land disturbance. This is undertaken through a risk assessment process associated with the individual task proposed and are modified as required to ensure that the goal of protecting water bodies from erosion and sedimentation is achieved.

Temporary erosion and sediment controls (e.g. silt fences and sediment control structures) are installed prior to the commencement of construction activities on the Project site. Routine (i.e. monthly) inspections of sediment control structures, as well as inspections following significant rainfall events (e.g. 20 millimetres (mm) or more in a 24 hour period), are conducted by NCIG personnel. During these inspections, sediment control structures were inspected for capacity, structural integrity and effectiveness. Any deficiencies identified by these inspections are assessed, prioritised and rectified in the appropriate timeframe.

A network of permanent stormwater structures has been constructed to manage runoff around the site. All long-term site water management structures are lined with low permeability materials (e.g. compacted clay) to minimise the potential for leakage. Water management structures are designed with sufficient capacity for a 1 in 100 year average recurrence interval (ARI) rainfall event.

3.5.3 Reportable Incidents

A landslip occurred at the rail flyover construction site, which was a reportable incident, and has been mentioned in Section 3.3.3. No environmental incidents or complaints relating to erosion or sediment control were made during the reporting period.

3.5.4 Further Improvements

No scheduled improvement to erosion and sediment control is required for the next period as the construction of the permanent surface water management infrastructure on the terminal site was completed during this reporting period.

3.6 Land Contamination

3.6.1 Environmental Management

In accordance with Condition 2.53, Schedule 2 of the Project Approval (06_0009) NCIG engaged an appropriately qualified person to audit construction of the rail infrastructure over land used as part of the Kooragang Island Waste Emplacement Facility (KIWEF) against the commitments contained in the NCIG Project Environmental Assessment and supporting documents.

Prior to any excavation on the Project, a comprehensive surface and sub-surface soil sampling and analysis programme was undertaken in order to characterise the material to be excavated. The sampling programme was undertaken in accordance with the NSW Environment Protection Authority (EPA) (2004b) *Guidelines for the Assessment, Classification and Management of Liquid and Non-Liquid Waste*. The aim of the programme was to identify the risk associated with contamination across the stockyard and rail areas and to determine the suitability of the site for the development of the NCIG project. The findings of this process were that there existed a manageable risk associated with contamination and that the site was suitable for the proposed development.

In accordance with Condition 2.54, Schedule 2 of the Project Approval (06_0009) NCIG did not direct any contaminated materials removed from the site to a waste management facility that was not lawfully permitted to accept the materials.

3.6.2 Environmental Performance

During the reporting period, the following activities were completed as part of the Rail Flyover construction:

- Grade separation of the inbound track for the NCIG Northern Rail Spur.
- Minor realignment of the inbound (western) track of the Kooragang Island Main Line.
- Minor realignment and lowering of the outbound (eastern) track of the Kooragang Island Main Line.
- Establishment of capping where these works extend over a former waste emplacement area.
- Other associated ancillary infrastructure.

In accordance with Condition 2.53, Schedule 2 of the Project Approval (06_0009) Quarterly Progress Reports for July to September 2014, October to December 2014, January to March 2015 and April to June 2015 was provided by Ramboll Environ, who audited the capping of the waste emplacement area during the flyover construction. Specifically, Ramboll Environ was engaged to audit:

- Where rail loop modification works cross/ disturb landfill capping, the capping is established to the required specification, as presented below; and
- Where material is imported to site for use as capping materials, such material complies with the environmental specification.

The capping at the former waste emplacement area comprises:

- A seal bearing surface (subgrade);
- A 0.5m thick sealing layer with an effective permeability of not greater than $1x10^{-8}$m/s; and
- A drainage system along the rail corridor to maximise rainfall runoff and minimise infiltration.

The most recent Quarterly Progress report for April to June 2015 concluded that compaction and survey records for these areas indicated that all capping complied with Condition 2.53 of the Approval and that the consistent, ongoing management and record keeping, including the inspection/ test plan protocols and hot point records have given confidence that capping works have been undertaken in compliance with the Approval conditions.

3.6.3 Reportable Incidents

No environmental incidents or complaints relating to land contamination were made during the reporting period.

3.6.4 Further Improvements

Construction of the Rail Flyover was completed during the reporting period and the final audit report from Ramboll Environ will be reported in the 2015/16 AEMR. No further improvements relating to land contamination are required for the next reporting period.

3.7 Acid sulfate soils

3.7.1 Environmental Management

In accordance with Condition 7.3(a), Schedule 2 of Project Approval (06_0009), an Acid Sulfate Soil Management Plan (ASSMP) was developed in accordance with the guidance provided in the *Acid Sulfate Soil Manual* (ASSMAC, 1998). This addresses the management of Acid Sulfate Soils (ASS) identified during excavations on the Project site. The ASSMP was approved by the Department of Planning and Infrastructure.

3.7.2 Environmental Performance

Table 4 outlines the monitoring locations, ASS monitoring parameters recorded, frequency of monitoring and ASS criteria for the Project in accordance with the ASSMP.

Table 14 Summary of the acid sulfate soils monitoring programme

Monitoring Parameter	Monitoring Sites	Frequency	Criteria
Presence of acid sulphate soils or potential acid sulphate soils.	Excavation sites	Prior to any excavation.	See ASSMP.
	ASS treatment area	After treatment	

Soil testing and assessments of the ASS risk was undertaken during excavations and major earthworks in previous reporting periods and it was determined the potential and actual ASS risk associated with these activities was limited. The ASSMP was however prepared to provide sampling, validation and management measures if ASS is encountered during further construction of the Project.

The NSW Acid Sulfate Soil Management Advisory Committee (ASSMAC), *Acid Sulfate Soil Manual* (1998), presents guidelines for the sampling, determination and management of ASS materials dependent on the quantity of material to be disturbed and the type of disturbance (linear, bulk). The guidelines provided in the *Acid Sulfate Soil Manual* (ASSMAC, 1998) are considered appropriate for use at the Project site.

The *Acid Sulfate Soil Manual* (ASSMAC, 1998) outlines 'Action Criteria' based on laboratory analysis of ASS characteristics. These Action Criteria are based on the soil texture together with the volume of material which is to be disturbed to determine if the material is to be managed as an ASS. The Action Criteria was used to assess 'neutralisation' of lime treated soils.

3.7.3 Reportable Incidents

No incidents or complaints were reported relating to acid sulphate soils management during the reporting period.

3.7.4 Further Improvements

No improvement to acid sulphate soils management is required for the next period.

3.8 Noise and vibration

3.8.1 Environmental Management

In accordance with Condition 2.9, Schedule 2 of the Project Approval (06_0009) NCIG and its contractors minimised noise emissions from plant and equipment operated on the Project site as outlined in the *NSW Industrial Noise Policy* (EPA, 2000).

In accordance with Condition 2.10, Schedule 2 of the Project Approval (06_0009), general site preparation, filling/preloading and construction works that may generate an audible noise at any residential receptor was only undertaken between 7.00 am and 6.00 pm.

In accordance with Condition 2.11, Schedule 2 of the Project Approval (06_0009) piling works was not to be conducted on Sundays or public holidays.

Construction noise management measures are further detailed in the Construction Noise Management Plan (CNMP).

In accordance with Condition 2.13, Schedule 2 of the Project Approval (06_0009), Stage 1 of the NCIG Terminal has been designed, constructed, operated and maintained to ensure that the noise contributions from the plant do not exceed the maximum allowable noise contributions specified in Table below, at the locations and the time periods indicated.

In accordance with Condition 2.14, Schedule 2 of the Project Approval (06_0009), the assessment of noise contributions was:

- Measured at the most affected point on or within the Site boundary at the most sensitive receiver to determine compliance with $L_{Aeq(15\ minute)}$ night noise limits.
- Measured at one metre from the dwelling façade to determine compliance with $L_{A1(1\ minute)}$ noise limits.
- Subject to the modification factors provided in Section 4 of the New South Wales Industrial Noise Policy (EPA, 2000), where applicable.

In accordance with Condition 2.15, Schedule 2 of the Project Approval (06_0009), NCIG has taken steps to ensure that trains operated on the Site meet noise performance criteria established. This includes construction of dedicated noise abatement berms directly adjacent the NCIG rail line and design and construction of the rail alignment to reduce noise from locomotive and wagon wheels.

Operations noise management measures are further detailed in the Operations Noise Management Plan (ONMP).

3.8.2 Environmental Performance

Table outlines the monitoring locations, noise and vibration monitoring parameters recorded, frequency of monitoring and noise and vibration criteria for the Project in accordance with the CEMP and ONMP.

Table 15 Summary of the Noise and Vibration Monitoring Programme

Monitoring Parameter	Monitoring Sites	Frequency	Criteria
Attended and unattended noise monitoring	N1, N3, N5, N13 and N14[1].	Monthly for the first 3 months then quarterly.	See below.
Unattended continuous noise monitoring.	Selected locations.	Minimum period of one week per quarter.	See below.
Ground vibration.	Adjacent industrial receivers within 180 m of piling activities.	Weekly when piling within 180m of industrial receiver.	See CNMP.
Attended noise monitoring	All static and mobile elements of terminal operations.	Quarterly	See ONMP.

[1] The location of monitoring sites is shown on Figure 3.1.1.

The noise impact assessment criteria as defined by the Project approval and the Environmental Protection Licence (EPL12693) are provided in Table and Table .

A Noise Audit Report was completed in October 2013 to confirm cumulative Stage 1, Stage 2AA and Stage 2F noise performance of the NCET as per Conditions 3.6 and 3.7 of PA 06_0009 Schedule 2.

Noise and vibration monitoring was undertaken by specialist acoustic consultants during the reporting period. This monitoring was conducted on a quarterly basis to coincide with both construction works on the project and operations throughout the reporting period.

Table 16 Residential Noise Impact Assessment Criteria

Location	Site ID	Day, Evening Night At all times	Night 10.00 pm to 7.00am Monday to Saturday 10.00pm to 8.00 on Sundays and Public Holidays	
		$L_{Aeq(15\ minute)}$	$L_{Aeq(night)}$	$L_{A1(1\ minute)}$
Fern Bay West	N1	41	37	57
Fern Bay East	N17	39	36	55
Stockton West	N3	41	37	57
Stockton East	N16	38	35	56
Mayfield West	N5	45	40	55
Mayfield	N9	44	39	62
Carrington	N15	36	33	52

The maximum allowable noise conditions apply under:

a) wind speeds of up to 3m/s at 10 metres above ground level
b) b) temperature inversion conditions of up to 3 degrees (°C) pert 10 metres and 2 m/s at 10 metres above ground level.

Table 17 Industrial Noise Impact Assessment Criteria

Non-residential Location	Land use	Intrusive $L_{Aeq(15\ minute)}$			Acceptable Amenity $L_{Aeq(period)}$[1]			Maximum Amenity $LA_{eq(9\ hour)}$
		Day	Evening	Night	Day	Evening	Night	Night
Mayfield West	Commercial Steel River	Intrusive noise not applicable			65	65	65	70
Kooragang Island	Industrial	Intrusive noise not applicable			70	70	70	75
Mayfield North		Intrusive noise not applicable			70	70	70	75
Any	School	Intrusive noise not applicable			External 45 when in use			50
Any	Hospital	Intrusive noise not applicable			External 50 when in use			55

Note 1: Daytime 0700 hours to 1800 hours, Evening 1800 hours to 2200 hours, Night-time 2200 hours to 0700 hours.

The monitoring undertaken principally consisted of:

- Unattended noise monitoring – two (2) Type EL316 environmental noise loggers were deployed at the nearest potentially affected receptors for a period of one week. The noise loggers were programmed to record statistical noise level indices continuously in 15 minute intervals, including LAmax, LA1, LA50, LA90, LA99, LAmin and LAeq.
- Attended noise monitoring - operator attended noise survey was conducted at each noise logger location to assist in defining noise sources and the character of noise in the area and therefore to qualify unattended noise logging results. These measurements were conducted over 15 minute periods using a Bruel & Kjaer Type 2250 sound level meter.
- Vibration monitoring - In accordance with the CNMP, vibration monitoring was conducted during construction piling activities within 180m of adjacent industrial receivers (i.e. Blue Circle Southern). As mentioned, this did not take place during the monitoring period.

During the reporting period, off-site noise and on-site sound power monitoring was undertaken and reported per quarter, with reports for the quarter ending June 2014, September 2014, December 2014, March 2015 and June 2015. These reports concluded that off-site noise monitoring indicated compliance was achieved at both selected residential and industrial locations under prevailing conditions.

Construction noise and vibration monitoring for the fly over construction was also reported per quarter, with reports for May to July 2014, August to October 2014, November 2014 to January 2015 and February to April 2015. These reports concluded that results of daytime operator attended and unattended noise surveys indicate that noise emissions from construction activity comply with the relevant criteria. Overall noise emissions for night-time construction works were found to be within the adopted maximum allowable operational noise contribution.

A Noise Audit Report is currently in progress to confirm noise performance for the construction of the rail flyover, which will be reported in the 2015/16 AEMR.

3.8.3 Reportable Incidents

No environmental incidents were reported relating to noise or vibration during the reporting period.

3.8.4 Further Improvements

No improvement to noise monitoring is required for the next period. Notwithstanding, NCIG implements a Continuous Noise Improvement Program. The program will continue to be implemented as part of ongoing NCIG operations.

3.9 Heritage

3.9.1 Environmental Management

The DECCW advised that as the Project construction site has been the subject of extensive disturbance over a period of more than 50 years, it considers that no Aboriginal heritage objects of significance will be present (DEC, pers. comm. 15 February 2007).

Notwithstanding, the management of items of Aboriginal cultural heritage significance during construction of the Project incorporated the following elements:

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

- At the cessation of the Project, if any salvaged Aboriginal objects are stored on-site their ongoing management will be determined in consultation with the Aboriginal community and the OEH.

3.9.2 Environmental Performance

During the reporting period induction training was attended by all NCIG personnel. This training included information relating to aboriginal heritage and the potential identification of items of archaeological significance.

During the reporting period there were no items of potential Aboriginal cultural heritage significance identified.

3.9.3 Reportable Incidents

No incidents or complaints were reported relating to heritage during the reporting period.

3.9.4 Further Improvements

No improvement to heritage is required for the next period.

3.10 Flora and fauna

3.10.1 Environmental Management

In accordance with Conditions 2.16 and 2.19, Schedule 2 of the Project Approval (06_0009) NCIG employed two qualified ecologists (Dr David Goldney and Dr Arthur White), approved by the Director-General, to undertake a pre-construction survey of areas affected by construction works for the presence of *Litoria aurea* (the Green and Golden Bell Frog) (see Figure 36). These ecologists also provided advice on the mitigation and management of impacts to listed threatened species that may be affected by the NCIG Project works.

Figure 36: The Green and Golden Bell Frog (Litoria aurea)

While Green and Golden Bell Frog individuals were not identified during the pre-construction survey, previous surveys have identified the presence of the species on the Project site. Therefore a management plan for the relocation of Green and Golden Bell Frog individuals was prepared in accordance with Condition 2.16, Schedule 2 of the Project Approval (06_0009). The Green and Golden Bell Frog Management Plan (GGBFMP) was developed in consultation with DECC (now Office of Environment and Heritage) and the Regional Land Management Corporation (now HDC).

In accordance with Condition 2.17, Schedule 2 of the Project Approval (06_0009) NCIG has designed and constructed relevant rail infrastructure associated with the Project to include culverts, underpasses or other similar measures to permit the movement of *Litoria aurea* and other amphibian

species under the NCIG rail infrastructure (see Figure 36). The culverts and underpasses were installed to include suitable habitat for the Green and Golden Bell Frogs and to provide protection from predators in accordance with guidance provided by Dr Arthur White.

In accordance with Condition 2.18, Schedule 2 of the Project Approval (06_0009) all employees and contractors involved in construction of the Project are trained in site hygiene management in accordance with *Hygiene Protocol for the Control of Disease in Frogs* (NPWS, 2001) prior to the commencement of work.

A Compensatory Habitat and Ecological Monitoring Program (CHEMP) has also been prepared to guide the construction of Green and Golden Bell Frog habitat which suitably replaces habitat damaged or destroyed by construction works. This plan was initially submitted to DECCW (now EPA) and DoP (now NSW Planning and Infrastructure) in 2008. Through discussions and agreed amendments, the first version of the CHEMP was approved by DoP on 16 November 2010. Details of compensatory habitat work completed in the period are given in Section 3.10.3.

A Vegetation Clearance Protocol (VCP) was also prepared to satisfy those commitments of the Project Environmental Assessment (EA) that relate to vegetation clearance during construction of the Project.

3.10.2 Environmental Performance

The Green and Golden Bell Frog *Litoria aurea* is listed as Endangered under the *Threatened Species Conservation Act, 1995* (TSC Act) and Vulnerable under the EPBC Act. The Green and Golden Bell Frog is estimated to have disappeared from 90% of its former range within NSW.

Known and potential Green and Golden Bell Frog habitat is located across the Project site and surrounds. Disturbance to Green and Golden Bell Frog habitat occurred as a result of construction activities which primarily involved completely infilling Big Pond and partial disturbance of Ponds H, K and Q. Most of the known and potential Green and Golden Bell Frog habitat recorded across the Project site and surrounds (i.e. Ponds A, B, C, D, E, F, G, I, J, L, O, T, U, V, AA, AC, AD) has not however been directly disturbed by Project activities.

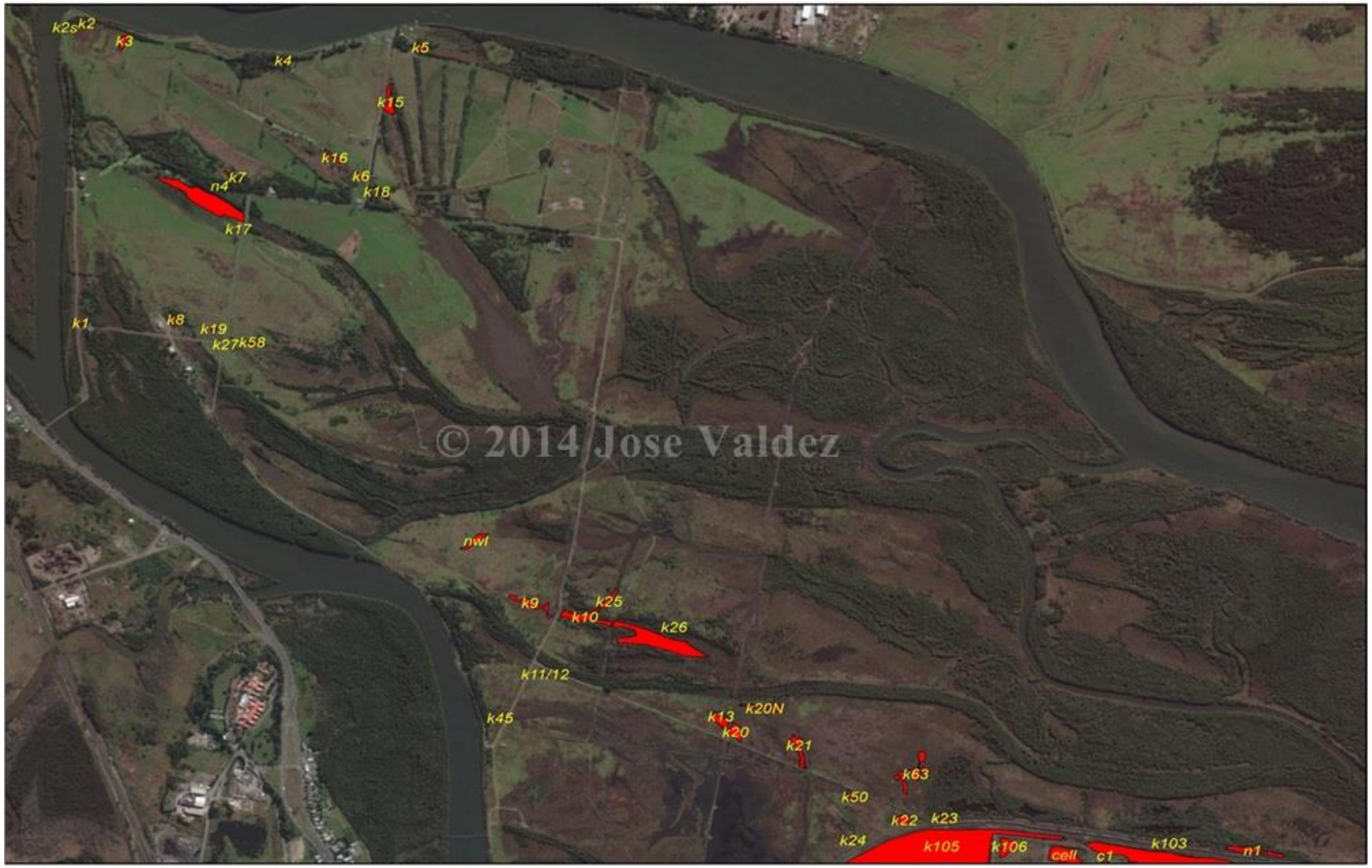


Figure 37: Green and Golden Bell Frog Surveyed Areas

In order to minimise Project-related impacts on the Green and Golden Bell Frog the following management procedures were implemented in accordance with the GGBFMP:

- environmental induction training;
- site hygiene management;
- delineation of disturbance areas;
- pre-clearance surveys;
- Green and Golden Bell Frog relocation procedures; and
- construction works procedures.

All employees and contractors involved in the construction of the Project were informed about the presence and importance of the Green and Golden Bell Frog as a part of the site induction process. Similarly, operations employees and contractors are informed about the presence of the Green and Golden Bell Frog in areas adjacent to the Stage 1/2AA operations site, in particular the NCIG rail facility. Training was also provided on appropriate site hygiene practices in accordance with *Hygiene Protocol for the Control of Disease in Frogs* (NPWS, 2001) prior to the commencement of work.

All major ground disturbance activities were completed previously on the site, therefore there were no pre-clearance surveys undertaken during the reporting period. Areas of active earthworks continued to be delineated by fencing, however, in order to prevent the movement of amphibian species back into a construction area that had been previously cleared, these fencelines were regularly monitored for the presence of the Green and Golden Bell Frog to confirm that there were no individuals in the vicinity that may be at risk.

If individual frogs were identified adjacent to the constructed delineation fencelines or elsewhere on the site, and thought to be at potential risk of harm, they were captured and translocated in accordance with the Green and Golden Bell Frog Management Plan. Details of the individual Green and Golden Bell Frogs managed in accordance to this process are outlined in Table 18.

Table 18 Translocated Green and Golden Bell Frogs

Date	Quantity	Health	Size (cm)	Location identified	Location translocated
9/4/2014	1	Good	7	NCIG Operations Admin Building	Pond I
12/9/2014	1	Good	5	Pond I Frog Fence	Pond I
10/11/2014	2	Good	5	Drainage Line 3 Outlet to Deep Pond Clearance	Pond I
18/11/2014	1	Good	5	In WT01 pump well	WT01 sump
25/11/2014	1	Good	5	Pond I Frog Fence	Pond I
15/12/2014	1	Good	6	Pond I Frog Fence	Pond I
12/01/2015	1	Good	7	Pond I Frog Fence	Pond I
21/01/2015	1	Good	6	Pond I Frog Fence	Pond I
22/6/2015	1	Poor (later euthanised)	8	CV01/02 Access Road	University

During the reporting period a total of ten (10) Green and Golden Bell Frogs were sighted on site and assessed as being at risk and subsequently translocated in accordance with the Green and Golden Bell Frog Management Plan. The majority of these animals were found at the Pond I Frog Fence. All specimens were alive and in good condition, with the exception of one individual which was in poor health, taken to the University of Newcastle for analysis, and later euthanised. The frogs were considered to be mostly adults and some juveniles, based on size.

Monitoring of the Green and Golden Bell Frog was conducted in areas adjacent to the NCIG Project site, particularly areas surrounding the NCIG Rail Facility. During the 2014/15 season, monitoring was conducted by the University of Newcastle. This was funded cooperatively by both NCIG and Port Waratah Coal Services (PWCS). This was to satisfy the requirements of the NCIG Project *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) Particular Manner Decision and to provide baseline data on areas proposed for the PWCS T4 Coal Export Terminal. The objective of the monitoring is to monitor the dynamics of the Green and Golden Bell Frog within habitat areas on Kooragang Island.

Two methods were used to estimate the population per surveyed pond, namely Visual Encounter Surveys (VES) and Mark-recapture Surveys. Both these methods utilise recording of morphometrics of individuals surveyed, location and environmental conditions where individual locations were found and micro-chipping using Passive Induction Transponder (PIT) tags. The mark-recapture surveys were conducted multiple times over short periods (eg. in excess of four night surveys no greater than 48 hours apart) at a sub-set of ponds within the overall survey area. Models for population estimates were generated for each surveyed pond using established statistical designs and computer-based modelling software (eg. MARK). These estimates were correlated with results of visual encounter surveys, using a number of assumptions and limiting factors, to generate population estimates for remaining ponds. Figure 38 below represents population estimates in the three main pond sites on Kooragang Island from the past four seasons.

The highest number of frogs estimated on Kooragang and Ash Islands from population estimates in the 2014/2015 breeding season occurred in December 2014 and January 2015 when a combined population size of 265 bell frogs were estimated in ponds K22/23, K29 and the Rail Loop. From visual encounter surveys, a total of 70% of all bell frogs encountered were in these four ponds. Extrapolation of the maximum population size across the whole island resulted in an estimate of 380 bell frogs. However, in February 2015, only 7% of all bell frogs encountered were in the four ponds where mark recapture was carried out (16 of a total 219 frog seen in visual encounter surveys across the island). This low percentage is due to the presence of over 150 juveniles in a single non-mark recapture pond (K104), which causes the extrapolated population size across the whole island to be much larger than the previous month, at 2965 frogs. This demonstrates the large impact that breeding events can have on extrapolated population size estimates.

The maximum estimated population size was 819 individuals for the 2011/12 breeding season (Stockwell, Clulow et al. 2012), and approximately 4000 and 1800 (assuming a 1:1 sex ratio) in years 2000 and 2001 respectively (Hamer, Lane et al. 2007). Based on the estimate for December/January 2014/15, a decline appears to be occurring across the island, however the February 2015 estimate suggests the population has increased since 2011 and is relatively consistent with the estimates for 2000 and 2001. The degree of variability between and within years in this population suggests that identifying trends with such estimates may be difficult (Penman and Lemckert 2008). Identifying the factors that cause such fluctuations may be more valuable for population management and conservation.

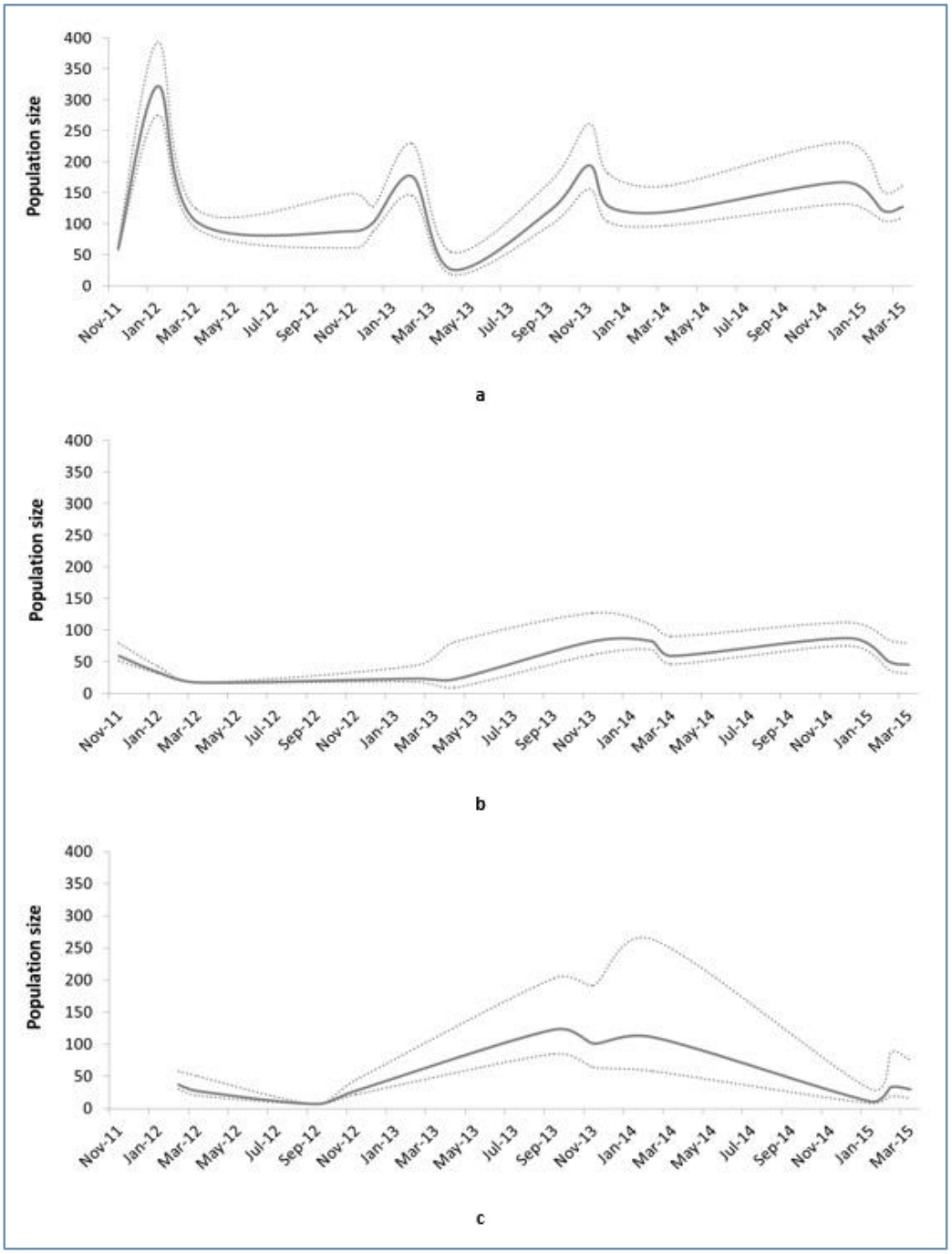


Figure 38: Population Size Estimates for GGBF from Ponds K22/23 (a), K29 (b) and the Rail Loop (c) on Kooragang Island between November 2011 and March 2015

A monitoring programme was also conducted during the reporting period to survey the utilisation of Deep Pond, adjacent to the NCIG rail infrastructure area, by bird species with the primary focus on shorebirds. This Avifauna Monitoring Programme was undertaken by the Hunter Bird Observers Club and the resulting information was provided to NCIG by way of agreement. The results of the monthly surveys conducted during the 2014 calendar year are illustrated by Table 20. The aim of the monitoring programme is to identify the pattern of usage of Deep Pond by all birds over the annual cycle and determined the extent of any potential impact by the NCIG activities on this usage.

In comparison to the 2013 results, there has been an increase (76%) in the total number of birds using the pond from 5,772 to 10,170 in 2014. Overall pond usage increased during most months, particularly January, February, March, July and October. This was likely due to:

- a peak in the resident shorebird population in the summer months (December 2013, January and February 2014) was likely due to favourable conditions in Deep Pond at that time;
- there was a high number of migratory shorebirds utilising the ponds due to below average pond levels. This encouraged shorebirds to use the pond as a refuge site.

Table 20 Avifauna 2014 Monitoring Results

Species	1/14	14/2/14	14/3/14	16/4/14	21/5/14	13/6/14	11/7/14	7/8/14	9/9/14	10/10/14	21/11/14	19/12/14	Total
Black Swan *Cygnus atratus*	267	34	6	18	52	48	37	51	24	39	113	56	745
Pacific Black Duck *Anas superciliosa*	1	54	26					2			11		94
Australasian Shoveler *Anas rhynchotis*	17	49	158	72		1					4	98	399
Grey Teal *Anas gracilis*	403	124	224	16				83			107	12	969
Chestnut Teal *Anas castanea*	910	220	57	6	1			12					1206
Pink-eared Duck *Malacorhynchus membranaceus*	31	2	77									83	193
Hardhead *Aythya australis*	103	124	92	8		2	81	2			26	6	444
Australasian Grebe Tachybaptus novaehollandiae	20	3	3	13	6	9	6	35	19	8	2	4	128
Hoary-headed Grebe *Poliocephalus poliocephalus*	88	73	71	14	17	18	10	4	8	23	18	5	349
Little Black Cormorant *Phalacrocorax sulcirostris*	8	10	8							2	13	10	51
Little Pied Cormorant *Microcarbo melanoluecos*	1												1
Great Cormorant *Phalacrocorax carbo*	2	4	2	4									12
Australian Pelican *Pelecanus conspicillatus*	47	19	34	2				3		18	30	38	191
White-faced Heron *Egretta novaehollandiae*	1		1		2					1			5
Little Egret *Egretta garzetta*	2	1			3		1						7
Eastern Great Egret *Ardea modesta*	1				2					1			4
Cattle Egret *Bubulcus ibis*	2												
Australian White Ibis *Threskiornis molucca*	1	2	1		2						1		7
Royal Spoonbill *Platalea regia*	8	3	11	3	6	2		1		2	2	7	45
Yellow-billed Spoonbill *Platalea flavipes*		2	2										4
Swamp Harrier *Circus approximans*					2								2
Purple Swamphen *Porphyrio porphyrio*	7	38	35	10			8	3	3	2		5	111
Dusky Moorhen *Gallinula tenebrosa*		1	1										2
Eurasian Coot *Fulica atra*	1245	402	126	142	90	50	270	380	318	845	606	314	4788

Table 20 Avifauna 2014 Monitoring Results

Species	1/14	14/2/14	14/3/14	16/4/14	21/5/14	13/6/14	11/7/14	7/8/14	9/9/14	10/10/14	21/11/14	19/12/14	Total
Red-necked Stint *Calidris ruficollis*				11	1								12
Red-necked *Avocet Recurvirostra novaehollandiae*			1					1			26	26	54
Black-fronted Dotterel *Elseyornis melanops*			3	4	4	1	1	1	2	4		7	27
Masked Lapwing *Vanellus miles*	2	4	6	2	5						5		24
Silver Gull *Chroicocephalus novaehollandiae*	1	1	1										3
Glossy Ibis *Plegadis falcinellus*			1										1
Spotless Crake *Porzana tabuensis*			2										2
Black-winged Stilt *Himantopus himantopus*	59	82			9	2		2			28	53	235
Marsh Sandpiper *Tringa stagnatilis*												41	41
Caspian Tern *Hydroprogne caspia*			2										2
Musk Duck *Biziura lobata*	1												1
Freckled Duck *Stictonetta naevosa*	1												1
White-bellied Sea Eagle *Haliaeetus leucogaster*				2	1				1				4
Whistling Kite *Haliastur sphenurus*			2										2
Double-banded Plover *Charadrius bicinctus*				2									2
Common Greenshank *Tringa nebularia*											2		2
Total 2014	3229	1525	953	329	203	133	414	480	375	945	994	765	10,170
Total 2013	1502	348	77	327	173	159	185	751	320	447	984	499	5772
% change on 2013	115	260	1137	0.6	17	-16	124	-22	17	111	1	53	76

The Vegetation Clearance Protocol (VCP) was implemented to minimise impacts on threatened flora and fauna species within the Project area. The key components of the VCP are outlined below and include:

- delineation of areas to be cleared of existing vegetation;
- pre-clearance surveys;
- managing impacts on fauna; and
- vegetation clearance procedures.

In accordance with Condition 2.19A, verification of the extent of habitat disturbance at the western deviation (western side of the Kooragang Main Rail Line) was undertaken following the completion of the rail flyover. Verification was achieved through pre and post construction ecological surveys and confirmed by the approved project ecologist Dr Arthur White. The surveys indicated that the total area of land disturbed, including fresh water wetland, saltmarsh, mangrove forest, disturbed land and water bodies, complied with the defined limits of habitat disturbance for the flyover infrastructure works.

3.10.3 Compensatory Habitat and Ecological Monitoring Program

A number of works have been undertaken in relation to the CHEMP between April 2014 and June 2015. The following points highlight the major works undertaken and milestones achieved during this reporting period.

Consultative Board –Consultative Board meetings were held on 10 July and 17 December 2014. The purpose of the Consultative Board meetings are to provide information on the Compensatory Habitat planning works completed to date and provide guidance on works to be completed, particularly in the coming 12 months. The Board consists of representatives from NSW Planning and Environment, NSW Office of Environment and Heritage (National Parks and Wildlife Service), Hunter-Central Rivers Catchment Management Authority, the University of Newcastle, the DoPI-Approved Ecologist for the NCIG Project and NCIG. At each meeting, papers have been presented on a range of topics for the consideration and discussion of Board members. The topics discussed included updates on the following:

- Research areas and monitoring;
- GGBF Compensatory habitat strategy;
- Achieving breeding in Compensatory Habitat;
- Migratory Shorebird habitat creation.

GGBF Compensatory Habitat Strategy – In July 2014 the GGBF Compensatory Habitat began construction, with 2800m^3 of material excavated for ponds. The excavated material was used locally at each stage to form mounds. Acid sulfate soil was treated using lime. Treated material was also used to form mounds. Construction was completed in November 2014, with adult frogs already observed using the compensatory habitat during the final stages of construction.

A management plan has been developed by NCIG for the GGBF habitat, including maintenance activities, safety controls, visitor interactions and stakeholder engagement. The management plan will be provided to NPWS as a modification to the existing habitat REF/Determination for approval. The management plan requires flexibility to allow for activities such as Typha removal to meet habitat objectives.

Research Areas and Monitoring – An update was provided in the July 2014 meeting on research, including release of 12,000 tadpoles and metamorphs into the research ponds over the 2012/13 summer; intensive monitoring showing that a population of 800-1,200 animals is using the Research Area; monitoring showing that frogs are currently not showing any preference for using warmer or saltier ponds, conversely no preference for low-salinity ponds and a likely preference for using ponds with a standing water level.

At the December 2014 meeting, additional information was provided on frogs showing no preference for pond type (i.e. based on salt or depth) in the trial site. In addition, there is a healthy adult female percentage of the trial site population but currently no breeding at the trial site. Natural breeding has been recorded on Kooragang Island and the southern end of Ash Island.

Figure 39: Construction at new CHEMP site, Ash Island

Achieving Breeding in Compensatory Habitat – A presentation was provided on the challenge of achieving two GGBF breeding events prior to the end of the 2018/19 season. Key points included:

- Limitations based on climatic conditions and behaviour of the species;
- Proposal to conduct translocation of captive-bred or adult wild animals into compensatory habitat to stimulate breeding;
- Need for a targeted translocation to improve chances of success, including providing a healthy environment (water quality/ habitat);
- Targeted monitoring required to identify any breeding events e.g. eggs, tadpoles, sexually mature males.

After summer rains were experienced in late January / early February 2015, observations were subsequently made of tadpoles and metamorphs in a number of NCIG's constructed ponds, both in the Trial Site and in the recently completed compensatory habitat. These animals were later confirmed by the University of Newcastle to be Green and Golden Bell Frog tadpoles and metamorphs (observed locations in Figure 40, tadpoles denoted by ★ and metamorphs denoted by ✦). This event represents the first successful breeding event within the NCIG compensatory habitat. This achievement has been recognised by the Department of Planning and Environment-approved Ecologist for the NCIG Project, Dr Arthur White. A brief report, with covering letter from

Dr White has been prepared and submitted to the DoPE as recognition of contribution to meeting the requirements of Condition 2.20, MOD 2, Project Approval 06_0009.

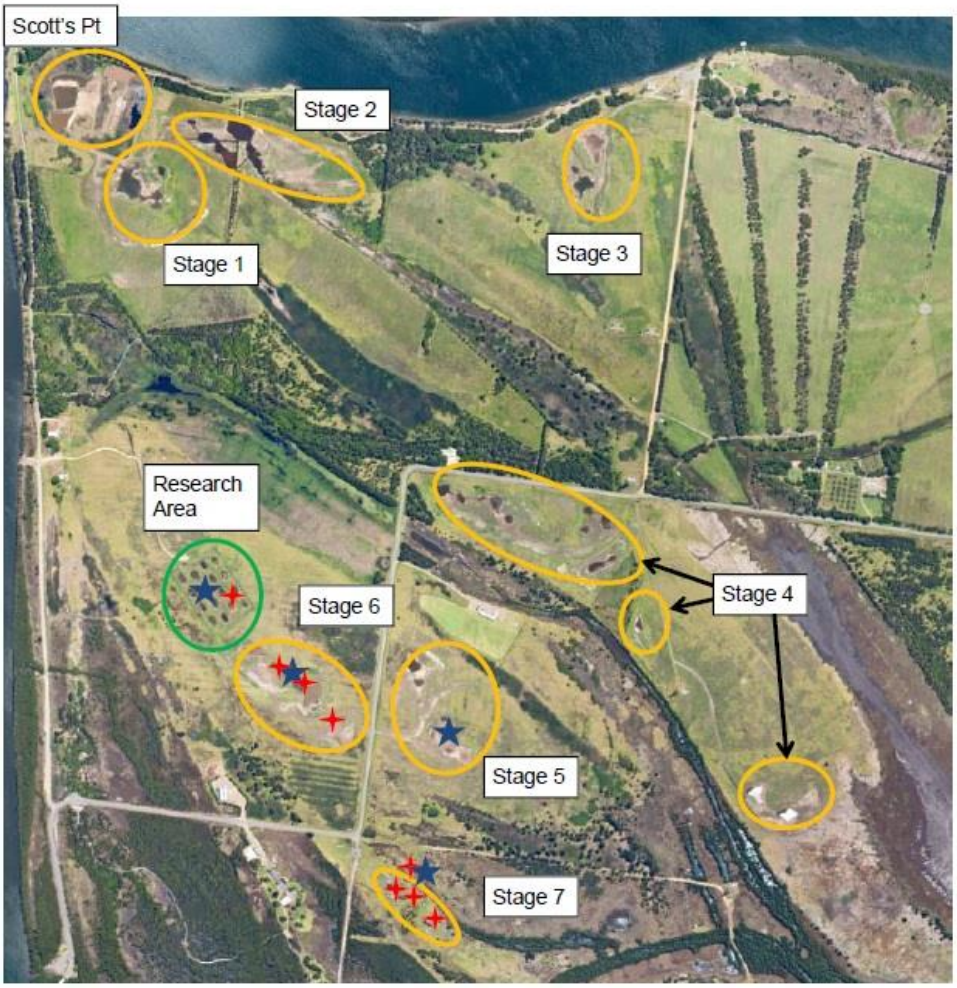


Figure 40: Locations where GGBF tadpoles and Metamorphs were observed January to March 2015

Figure 41: New Green and Golden Bell Frog CHEMP Site, Ash Island

Figure 42: New GGBF CHEMP Site at Scotts Point, Ash Island

Shorebird Compensatory Habitat – The milestones for the shorebird compensatory habitat have been revised to 30 December 2014 to secure the land and 30 December 2015 for completion of the works. The mechanism to protect this land in-perpetuity has been revised to a Deed of Agreement between NCIG and NPWS and will be included in NPWS Plan of Management and Statement of Management Intent. Confirmation was received from the Department of Planning and Environmental that NCIG has met the requirement for land security, in the form of a letter of in-principle support from the Minister for the Environment (dated 14 December 2014). The Approvals path and engineering/methodology study are occurring concurrently, with outcomes feeding into one another. The area for mangrove remove and subsequent management has increased to 23 hectares.
Pre-construction monitoring of the shorebird compensatory habitat was conducted from February to March 2015 by Avifauna Research and Services, and is continuing to date. Shorebird populations were monitored at three sub-sites and 2 reference sites at the shorebird compensatory habitat area and at five sites along the Hunter River estuary. A total of 17 species of shorebirds were observed during the monitoring period, with 7 resident and 10 migratory species. The most abundant species were resident Black-winged Stilt, with a peak count of 1,407 at high tide and 1,489 at low tide. The most common migratory species were the Bar-tailed and Black-tailed Godwit, Common Greenshank and Marsh Sandpiper. No shorebird species were recorded at the project site (Fish Fry Flats, Fish Fry and Wader Creek) prior to the removal of the mangroves, which was the expected result prior to habitat restoration works.

Planned and completed compensatory habitat and ecological monitoring program (CHEMP) milestones corresponding to the current reporting period are outlined in Table 21.

Table 21 CHEMP Annual Works Program – April 2014 to June 2015

Works/Milestone/Stage	Intended Completion Date
Consultative Board Meetings	July and December 2014
Formal GGBF population estimate planned for the trial site	1st to 4th quarter 2014
Groundwater characterization study at the trial site	1st to 4th quarter 2014
Study of overwinter habitat at the trial site	2nd and 3rd quarter 2014
GGBF Compensatory Habitat construction completed	4th quarter 2014
Inspections of the constructed Habitat by the Approved Ecologist	July and September 2014
45,000 wetland plants to be planted in first planting campaign	October 2014
Deed of Agreement provided by NCIG to NPWS for Shorebird Compensatory Habitat, currently under review by NPWS	30 December 2014
Continuation of Behavioural Research on the Green and Golden Bell Frog by the University of Newcastle	Throughout the coming reporting period
Completion of hydrological management in Creek 5 (Fish Fry Creek) to limit propagation and reduce existing area of mangroves, managed by Local Land Services (LLS) – Kooragang Wetlands Rehabilitation Project	4th quarter 2014

3.10.4 Reportable Incidents

No incidents or complaints were reported relating to flora and fauna management during the reporting period.

3.10.5 Further Improvements

In addition to ongoing implementation of the Compensatory Habitat and Ecological Monitoring Program, the lower reaches of the Rail Flyover embankment in Deep Pond will be managed as wading habitat for migratory shorebird habitat. This includes management of weeds and tall vegetation.

3.11 Traffic Management

3.11.1 Environmental Management

The Project Approval (06_0009) contains a range of requirements that pertain to road transport (Conditions 2.21 to 2.37, Schedule 2). These requirements are addressed where relevant in the Construction Traffic Management Protocol.

3.11.2 Environmental Performance

The road improvements proposed to conform to the Conditions of the Project Approval for the construction phase of the CET are generally those permanent works that would be required during the future operation of the proposed coal loader.

Traffic management during the construction phase focussed on the immediate imposition of movement restrictions at key intersections to limit the potential for delays to traffic flows on Cormorant Road.

NCIG has developed a Vehicle Traffic Management Plan (VTMP) in accordance with the Construction Traffic Management Protocol. This plan provides the approved traffic routes for NCIG construction traffic across the site. This plan also dictates the approved traffic routes for construction traffic on adjacent public roads, including the prevention of right-hand turns onto Cormorant Road from Egret Street, Pacific National Road and the NCIG Wharf Access Road intersection, in order to minimise any disruption to through traffic on this road. Each contractor on the NCIG project site also developed VTMPs to ensure that construction traffic is adequately managed on internal and external roads.

There were no road improvements performed during the reporting period.

In addition to the above, a Vehicle Traffic Management Plan has been developed for operational vehicles which came into effect at the commencement of NCIG operational activities.

3.11.3 Reportable Incidents

No incidents or complaints were reported relating to traffic management during the reporting period.

3.11.4 Further Improvements

No improvement to traffic management is required for the next period.

3.12 Waste management

3.12.1 Environmental Management

Measures to avoid and minimise the generation of wastes and promote waste re-use and recycling have been adopted during construction of the Project and include:

- waste avoidance – practices were developed that reduce the amount of waste on-site, via selective purchasing procedures and the use of bulk purchasing, where practicable;
- material reuse – reuse of recyclable or reusable materials where practicable; and
- recycling – materials such as metals, oil, timber, plastics, glass and paper were recycled where practicable.

In accordance with Conditions 2.54 and 2.56, Schedule 2 of the Project Approval (06_0009), all waste materials removed from the site were directed to a waste management facility lawfully permitted to accept the materials.

In accordance with Condition 2.57, Schedule 2 of the Project Approval (06_0009), waste was not received at the site during the reporting period. In addition, NCIG complied with the requirements of EPL No. 6437 as it relates to the on-going management of the Kooragang Island Waste Emplacement Facility.

3.12.2 Environmental Performance

The principles of waste management, being waste avoidance, material reuse and recycling have been adopted by NCIG and all construction contractors on the site during the reporting period. The focus of this process has been the avoidance of waste, however the recycling of waste

products was also actively pursued with paper, aluminium, steel, plastics, timber and glass being the primary materials collected. Recycled concrete has also been incorporated into the pavement design for the rail and stockyard areas as a means of improving reuse of waste materials.

A 12,000 litre (L) waste oil tank was installed prior to operations to enable the collection and storage of waste hydrocarbons during NCIG operational activities, before being removed by licensed waste transporters on a periodic basis. A purpose built oil/water separator system has also been installed at the workshop and truck washdown areas, which is inspected and maintained on a regular basis during operations.

A Waste Management Plan has been developed and incorporated into the environmental management system for the operations of the NCIG Terminal. Waste volumes are tracked on a monthly basis, with the assistance of NCIG's waste management contractor.

During the reporting period there was no waste material stored, treated, processed or reprocessed or disposed of on the Kooragang Island Waste Emplacement Facility that would constitute a breach of the conditions of EPL No. 6437.

3.12.3 Reportable Incidents

No incidents or complaints were reported relating to waste management during the reporting period.

3.12.4 Further Improvements

No improvement to waste management is required for the next period. A Waste Management Plan has been incorporated into the environmental management system for the operational site. This will be developed on an ongoing basis.

3.13 Community relations

3.13.1 Environmental Management

During Project construction the following complaints handling system was implemented:

- In accordance with Conditions 6.2, Schedule 2 of the Project Approval (06_0009), NCIG established a telephone number, postal address and email address prior to the commencement of construction for community complaints and enquiries. Current details are provided below:
  - 24-hour complaints telephone hotline: 1800 016 304
  - Postal address for written complaints: PO Box 644
Newcastle NSW 2300
  - Email address for electronic complaints: enquiries@ncig.com.au
- In accordance with Condition 6.2, Schedule 2 of the Project Approval (06_0009), the community were informed of the phone, email and postal addresses via the NCIG website (www.ncig.com.au), notices in local newspapers and signage adjacent to the Project.
- In accordance with Conditions 6.3, Schedule 2 of the Project Approval (06_0009), NCIG recorded all complaints received in a Complaints Register.
- In accordance with Condition 6.4 of the Project Approval (06_0009), NCIG established and maintained a website for the provision of electronic information associated with the Project including all relevant Management Plans.

3.13.2 Environmental Performance

The general structure of Complaint Response Procedure is shown on Figure 43. Upon receiving a complaint all details relating to the issue of concern were recorded in the Complaints Register including:

- the date and time, where relevant, of the complaint;
- the means by which the complaint was made (telephone, mail or email);
- any personal details of the complainant that were provided, or if no details were provided, a note to that effect;
- the nature of the complaint; and

- a record of any operational or meteorological conditions that may have potentially contributed to the complaint.

Within 2 working days of a complaint being registered, an initial response was provided to the complainant and a preliminary assessment commenced to determine likely causes of the complaint using relevant available information (i.e. climatic conditions, environmental monitoring results and current construction activities). Table 22 provides a summary of the complaints received during the reporting period. In every case the investigation of the complaint determined that the issue of concern was not as a result of an exceedence of relevant Project Approval or EPL criteria.

The outcome of the complaints handling process was recorded in the Complaints Register, including:

- action taken by NCIG in relation to the complaint, including all follow-up contact with the complainant; and
- details of the finding of the investigation and the reason(s) why no action was taken.

Every effort was made to ensure that the concerns of the complainant were addressed in a manner that resulted in a mutually acceptable outcome.

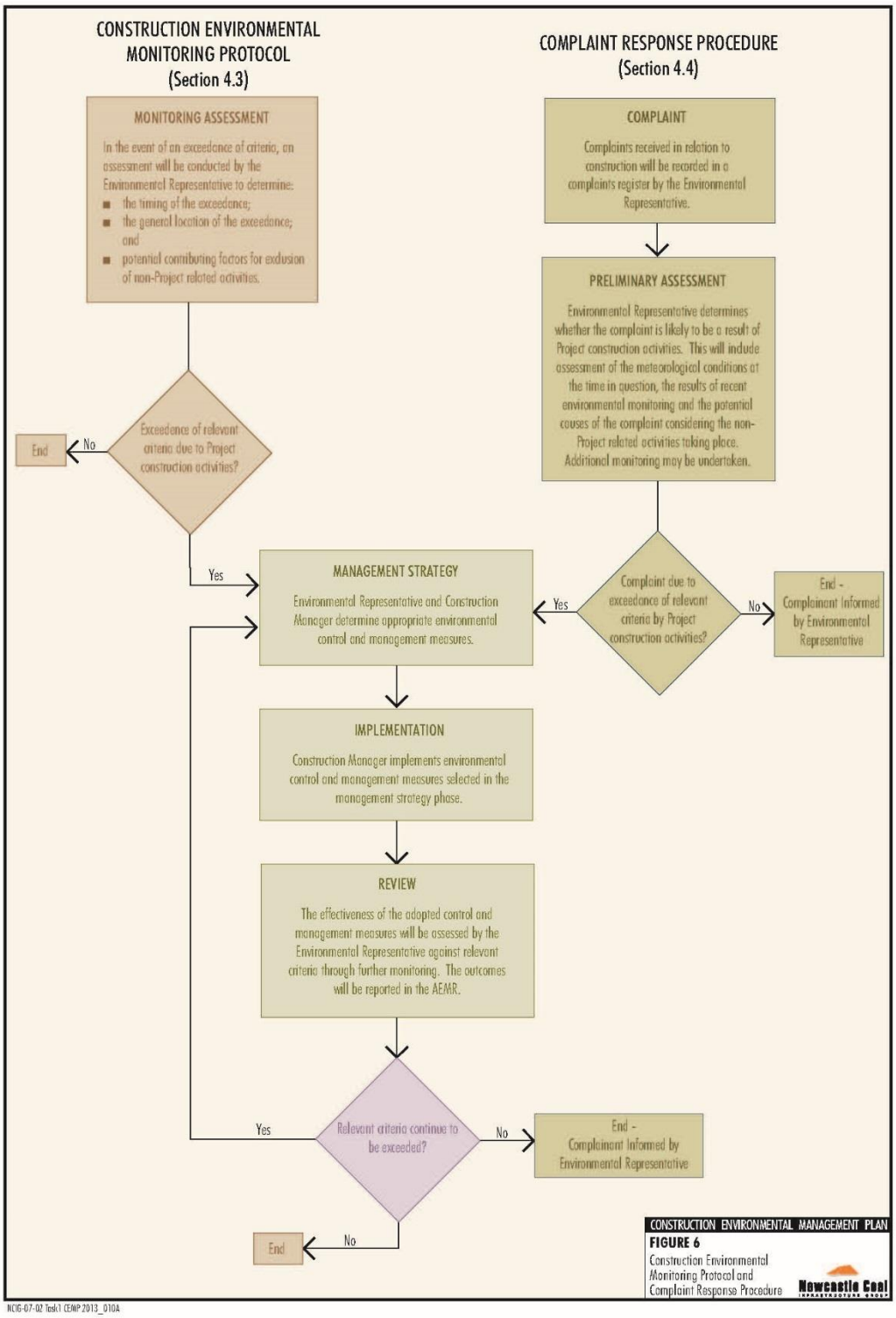


Figure 43: Complaint Response Procedure

Table 22 Community Complaints register summary

Date of complaint	Environmental concern raised	Issue	Action taken
14-May-14	Odour	EPA rang enquiring about an odour identified by a member of the public. They asked whether there was anything at NCIG which may lead to an identifiable odour.	Called back EPA officer after discussing issue with Process Leader. Relayed that there was no known spontaneous combustion on the site that would be producing odour. No other odour related issues. PL undertook full inspection of stockyard during the night and confirmed.
22-May-2014	Noise	Stockton resident called and complained of a noise that is keeping him awake. Described the noise as a beeping like an alarm that can be heard on and off over 24 hour period. The alarm has been evident for the last few weeks.	Discussed concern with resident. Agreed on a course of action which is to undertake monitoring at home.
24-Jun-2014	Dust	EPA Officer called P.Reid at 3.10pm regarding a complaint made at 9.50am that morning. Complainant said that dust was coming from Kooragang Island (assumedly NCIG) and "going all over the place", and "heading towards Stockton". EPA Officer wanted to know if Dust Management System was operating and healthy. Records showed that system was operating as intended and there was no observable dust during site inspections or from Control Room observations.	Email sent to EPA Officer providing evidence that NCIG Dust Management System was operation at the time of the complaint. SCADA graphs showing that stockyard sprays had initiated at 9.50am and 10.30am. Inspections of the stockyard did not indicate any observable dust.
30-Sept-2014	Radio communications	Australian Communications and Media Authority (ACMA) attended site to investigate radio interference coming from NCIG. 913MHz being broadcast from NCIG dump station area. Tech Services engineers provided assistance to investigate and found two RFID antennae at dump station broadcasting on 913MHZ which is slightly outside of the allowable Lower Power unlicenced band.	Removed devices from service and reprogrammed onto correct frequency. The devices had recently been moved onto this frequency to avoid other site technical problems. ACMA representative was helpful and suggested that they issue a formal letter notifying NCIG of the incurrence.
18-Nov-2014	Traffic	A member of the public notified AH Staff that on two separate occasions, rocks thrown from vehicles exiting site have chipped the widescreens of his vehicles at the intersection of Delta Rd and Cormorant Rd. The first instance was a concrete agitator and the second was a truck and dog.	Member of the public did not want to make a formal complaint in regards to the matter. Simply wanted construction to be aware of the issue and wanted to know that something was being done to address it.
6-Mar-2015	Miscellaneous	A Warabrook resident wrote a hand-written letter to NCIG after receiving the March 2015 Community Newsletter. The letter writer expressed they did not want to receive the newsletter, were not in support of the community support that NCIG provides, and believed the coal industry	None

Table 22 Community Complaints register summary			
Date of complaint	**Environmental concern raised**	**Issue**	**Action taken**
		(generally) is causing health issues in their community. Also mentioned that they are in contact with the EPA regularly about smells that take over the air.	

NCIG participated in community consultation during the reporting period, in particular in conjunction with PWCS through their community consultation program. This happens between two and four times per year.

NCIG has developed an initiative titled the Community Support Program (CSP). This process involves engagement with local community groups and providing support to community based events and projects. The Program seeks applications on a six monthly basis from community groups that are seeking support for their endeavours. NCIG would undertake an assessment process and provide primarily financial support to these community events and projects. NCIG participated with the community groups in these project and events wherever possible. Through this process groups within the Fern Bay, Stockton, Mayfield and greater Newcastle area were assisted by NCIG. For example, NCIG assisted Harry's House Stockton (see Figure 44), a retreat for families with children living with cancer or for families grieving the loss of a child to cancer, in the 2014/15 reporting period.

The chronology of community liaison held during the reporting period is outlined in Table 23 below.

Table 23 Community Liaison Summary	
Date	**Type**
April 2014	Community Support Program – submissions called, 17 successful applicants
July 2014	Community Newsletter
September 2014	Community Support Program – submissions called, 21 successful applicants.
February 2015	Community Newsletter
March 2015	Community Support Program – submissions called, 13 successful applicants.

Figure 44: NCIG CSP Selection Committee visit Harry's House, Stockton

3.13.3 Reportable Incidents

No incidents were reported relating to community relations during the reporting period. Complaints received during the period are detailed in the section above.

3.13.4 Further Improvements

No improvement to community relations is required for the next period.

3.14 Environmental Monitoring Program

An Environmental Monitoring Programme was implemented to monitor the environmental performance of the Project during construction in accordance with the Project Approval (06_0009), environmental licences and other statutory conditions. The programme was established and implemented at the commencement of construction works.

The Environmental Representative was responsible for the implementation of the construction environmental monitoring programme and is responsible for ensuring that adequate environmental monitoring is maintained throughout the Project construction.

The details of the monitoring undertaken are provided in the previous sections, however, an overview of the construction Environmental Monitoring Programme, as they are in both the Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP), is provided in Table 24 and Table 25.

Table 24 Construction Environmental Monitoring Program

Monitoring Focus	Monitoring Sites	Frequency	Criteria
Meteorology			
Temperature, relative humidity, net solar radiation rainfall, wind speed and direction and sigma theta (rate of change of wind direction).	Project automated meteorological station[1].	Continuously monitored and the data averaged over 15 minute periods.	N/A
Erosion and Sediment Control			
Structural stability and effectiveness in controlling sediment migration.	Drainage, erosion and sediment control infrastructure.	Monthly and following significant rainfall events (i.e. greater than 20 mm in 24 hours).	Structural stability and sediment load
Noise			
Attended and unattended noise monitoring.	N1, N3, N5, N9, N13 and N14[1].	Quarterly.	Contained in EPL12693 and Construction Noise Management Plan
Unattended continuous noise monitoring.	Selected locations.	Minimum period of one week per quarter.	
Attended noise monitoring.	Reference locations proximal to the Project[1].	At the commencement of night-time works, where modelling indicates the potential for audibility at receptor locations.	
Air Quality			
Dust deposition[2].	DG1, DG2, DG3, DG4, DG5, DG6[1], HVAS1, HVAS2, HVAS3, HVAS4, BAM1, BAM2, BAM3, BAM4	Monthly.	Maximum increase of 2g/m^2/month, up to a maximum of 4g/m^2/month, relevant NEPM and NHMRC Guidelines
Vibration			
Ground vibration.	Adjacent industrial receivers within 180 m of piling activities.	Weekly during piling activities.	Contained in Construction Noise Management Plan
Surface Water			
pH, electrical conductivity (EC), total dissolved solids (TDS) and total	Primary settling ponds.	Monthly.	Contained in Construction Surface Water Management Plan
	Surface water	Monthly.	

Table 24 Construction Environmental Monitoring Program

Monitoring Focus	Monitoring Sites	Frequency	Criteria
suspended solids (TSS).	monitoring sites.		
	Excavation sites that have accumulated water.	Weekly	
Water level.	Primary settling pond and EPL Release Point.	Following heavy rainfall (i.e. more than 20 mm of rainfall in a 24 hour period).	
Groundwater			
pH, EC, TDS, TSS, sulfate, polycyclic aromatic hydrocarbons (PAH), As III, Cd, Cu, Pb, Hg, Zn, Cr VI, Mn and Ni (refer Table 5).	GW1, K9/3S, K9/3N, K11/1S, K11/1.	6-Monthly	Contained in EPL12693
Groundwater level.		6-Monthly	Contained in Construction Environmental Management Plan.
TRH, BTEX, naphthalene, dissolved heavy metals (Al, As, Br, Cd, Cr, Cu, Fe, Mn, Ni, Pb and Zn), Biochemical Oxygen Demand (BOD)	BH19s/BH19d, BH21s/BH21d, BH23s/BH23d, Deep Pond, Swan Pond	3-Monthly	Contained in Groundwater Management Plan – Site D1, Kooragang Island, Newcastle, NSW
Acid Sulfate Soils			
Presence of acid sulfate soils or potential acid sulfate soils.	Excavation sites.	Prior to any excavation.	Contained in Acid Sulphate Soil Management Plan
	ASS treatment area.	After treatment.	

[1] The location of monitoring sites is shown on Figure 3.1.1.

[2] Dust deposition was analysed in accordance with AS/NZS 3580.10.1-2003 *Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method.*

Table 25 Operations Environmental Monitoring Program

Monitoring Focus	Monitoring Sites	Frequency	Criteria
Meteorology			
Temperature, relative humidity, net solar radiation rainfall, wind speed and direction and sigma theta (rate of change of wind direction).	Project automated meteorological station[1].	Continuously monitored and the data averaged over 15 minute periods.	N/A
Erosion and Sediment Control			
Structural stability and effectiveness in controlling sediment migration.	Drainage, erosion and sediment control infrastructure.	Monthly and following significant rainfall events (i.e. greater than 20 mm in 24 hours).	See Appendix C.
Noise			
Attended and unattended noise monitoring.	Fern Bay, Stockton, Mayfield, Carrington per Section 4.2 ONMP.	Quarterly.	See Appendix B.
Attended noise monitoring in case of complaint.	Reference locations proximal to the Project[1].	At the commencement of operation.	
Air Quality			
Dust monitoring.	DG1, DG2, DG3, DG4, DG5, DG6[1].	Monthly	See Appendix A.
	HVAS1, HVAS2, HVAS3, HVAS4.	Every 6 days	
	BAM1, BAM2, BAM3, BAM4.	Continuous	
	PWCS	Through regular consultation.	
Surface Water			
pH, electrical conductivity (EC), total dissolved solids (TDS) and total suspended solids (TSS).	Secondary settling ponds[4].	Monthly.	See Appendix C.
	Surface water monitoring sites[4].	Monthly.	
Water level.	Primary and secondary	Following heavy rainfall (i.e. more than 20 mm of rainfall in a 24 hour	

	settling ponds[4].	period).	
Drainage, erosion and sediment control.	All areas of NCIG	Monthly.	
Groundwater			
pH, EC, TDS, TSS, sulfate, polycyclic aromatic hydrocarbons (PAH), As III, Cd, Cu, Pb, Hg, Zn, Cr VI, Mn and Ni (refer Table 5).	GW1, K9/3S, K9/3N, K11/1S, K11/1.[1].	6 Monthly.	See Appendix C.
Groundwater level.		6 Monthly	

1 The location of monitoring sites is shown on Figure 4.

2 Dust deposition will be analysed in accordance with AS/NZS 3580.10.1-2003 Methods for Sampling and Analysis of Ambient Air- Determination of Particulate Matter – Deposited Matter – Gravimetric Method.

3 PM_{10} will be monitored in accordance with the Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (EPA,2001).

4 The location of monitoring sites in detailed in the OWMP (Appendix C) and Figure 4.

4. COMPLIANCE AUDITS

Audits were undertaken in relation to NCIG Construction activities which considered the compliance status of the Project for the reporting period. These reviews were conducted to meet the requirements of Condition 5.1 of development Approval 06-009 a) as outlined below:

5.1 The Proponent shall develop and implement a Compliance Tracking Program to track compliance with the requirements of this approval. The Program shall include, but not necessarily limited to:

a) provisions for periodic review of the compliance status of the project against the requirements of this approval;

c) a program for independent auditing at least annually, or as otherwise agreed by the Director-General, in accordance with ISO19011:2002, Guidelines for Quality and/or Environmental Management Systems Auditing.

The details and outcomes of the audits conducted are illustrated below:

April 2014

A review of the compliance status of the NCIG Coal Export Terminal operational activities was undertaken by an NCIG Environmental Representative in April 2014. This review was undertaken to confirm the ongoing compliance of the NCIG project against the requirements of the Project Approval (06_0009). This review determined that NCIG met the requirements for all aspects of the consent that were relevant to the stage of the project development as at April 2014. With completion of the review, the Compliance Tracking Program document was revised and submitted to the Department of Planning.

November 2014

An independent audit of compliance against the Project Approval (06_0009) and the Modification of the Minister's Approval MP06_0009 requirements was undertaken in November 2014 by Trevor Brown and Associates consultants. This was completed to the standards of *ISO19011:2002 Guidelines for Quality and/ or Environmental Management system Auditing*. This review audited air quality, noise, biodiversity, traffic and transport, rail infrastructure and management, soil and water, surface water monitoring, groundwater, heritage, waste management, compliance tracking program, incident reporting and community complaints.

The following recommendations were made in the audit:

- That a framework be set out describing the indicators that would be used to determine whether a documented decline in either Green and Golden Bell Frog population or Shorebird habitat usage is above natural variation or due to activities associated with development and operation of the CET.
- That the Operation Water Management Plan be revised to include relevant water level triggers for the settling and Clearwater ponds in Table 5; include actions in the event that water level triggers are reached in the overflow pond; reflect any other improvements to sediment and surface water controls across the site that have occurred; include triggers for sump clean out in the maintenance work order for sump clean-out inspections; and a survey of the as-built bund wall be completed to verify compliance with design.
- That the Operation Water Management Plan be revised to include:
    - the location of SW4, if monitoring at that location is to continue post construction;
    - clarify the locations of sampling points SW1 and SW2 as Deep Pond and Swan Pond for sampling included in the Groundwater and Surface Water Monitoring Program;
    - triggers included in Table 5 of the Operations Water Management Plan require review;
    - Include surface water quality criteria relevant for the site;

    - Include actions in the event that water level triggers are reached in the settling and overflow ponds;
    - Revise the Operational Water Management Plan to reflect relevant triggers for surface water monitoring;
    - Laboratory detection limits should be below the guideline criteria for all parameter analyses.
- That the Operation Water Management Plan be revised to:
    - Incorporate all groundwater monitoring required across the site;
    - A recommendation has been made to include water quality criteria for individual PAHs consistent with the recommendations in ANZECC Guidelines and EPL Condition E1.1;
    - Establish trigger values that are relevant to the groundwater conditions;
    - Establish detection limits for all contaminants of concern;
    - Is it also recommended that the 2014 data be evaluated for significance where exceedence of criteria has occurred.

This review determined that NCIG met the requirements for all aspects of the consent that were relevant to the stage of the project development as at November 2014. With completion of the review, the Compliance Tracking Program document was revised and submitted to the Department of Planning.

Response to January 2014 Audit

NCIG provided a formal response to NSW Department of Planning and Environment regarding the actions from the January 2014 Independent Environmental Audit, as follows:

Recommendation
- That a framework be set out describing the indicators that would be used to determine whether a documented decline in either Green and Golden Bell Frog population of Shorebird habitat usage is due to activities associated with development and operation of the CET over and above natural variation.

NCIG Response
- GGBF - The University of Newcastle undertake a number of research and monitoring activities for NCIG including consideration of the spatial distribution of GGBF occupied ponds and genetic variation within the population, in particular animals recorded on either side of the NCIG rail infrastructure, including within the NCIG rail loop. The intent is to use changes in pond occupancy and genetic indices to monitoring potential declines in the population of separation in the existing population. This monitoring is conducted annually with PWCS. An Addendum Report has been produced by the University of Newcastle to address this recommendation from the January 2014 (and November 2014) Independent Environmental Audit – see Appendix 6.
- Shorebirds – The Hunter Bird Observers Club currently monitors Deep Pond on a monthly basis as a part of a wider estuary monitoring basis. As a part of an agreement with NCIG, every 3 years HBOC have been considering trends in site usage to identify any decline. This information is reported to the Department of Environment as a requirement of the NCIG Project Particular Manner Decision. NCIG relies on interpretation of the data by HBOC to understand any impacts the NCIG terminal and its activities may have on migratory shorebird populations. To date, fluctuation in shorebird usage of Deep Pond and surrounding water bodies was deemed to be a function of regional environmental conditions (inland rainfall) or the advent of more suitable local habitat, eg. Hexham Swamp, Tomago Wetlands.

Recommendation
- That a review of the appropriateness of the 1:100 year ARI design capacity of the site's stormwater structures be implemented.

NCIG Response

- NCIG commissioned a third party review of its water management strategy, including the appropriateness of the 1:100 year ARI design capacity. The findings of this review were that NCIG water management system generally complies with this requirement. Minor findings and improvements will be implemented in the next update of the NCIG Operations Water Management Plan, to be completed in Q3 2015. NCIG are currently discussing the performance of the NCIG water management system during extreme weather events, such as those experienced in April 2015, with the EPA. Outcomes of this discussion will be communicated with the Department of Planning and Environment.

Recommendation

- In relation to surface water monitoring, to include consistent nomenclature between the documents and inclusion of surface water quality criteria within the Operation Water Management Plan. It was also recommended that sample identification nomenclature consistent with the Construction Surface Water Management Plan Figure 5 sampling points be used in the water monitoring electronic database and include surface water quality criteria consistent with the Construction Surface Water Management Plan and Operations Water Management Plan (note these are being reviewed as part of the Site Specific Trigger Value development).

NCIG Response

- Consistent nomenclature between the OWMP and the surface water monitoring database has been completed. NCIG has also had a review of the surface water quality criteria (Site Specific Trigger Value development). These updated criteria will be included in updates to the NCIG Operations Water Management Plan, to be completed in Q3 2015. Please note that with the completion of construction activities at NCIG the Construction Surface Water Management Plan is no longer actively implemented.

Recommendation

- Recommendations similar to surface water monitoring data are made for groundwater quality criteria recording.

NCIG Response

- NCIG has commissioned a review of the groundwater quality criteria (Site Specific Trigger Value development). These updated criteria will be included in updates to the NCIG Operations Water Management Plan, to be completed in Q3 2015.

EPA Compliance Audit May 2014

NSW EPA completed a compliance audit on loss of coal during rail transport at the Project site. The site was audited as part of an EPA compliance audit program on coal train loading and unloading facilities, which had a focus on management methods and procedures in place to prevent or minimise the loss of coal in the form of leaks, spills and dust emissions during rail transport.

The objective of the audit was to assess compliance with operating conditions O1 and O2 attached to EPL 12693 in relation to the audit scope and criteria and to develop an action program to be implemented by the licensee to address any non-compliance(s) identified during the audit.

The audit identified the following action required by NCIG:

- NCIG must ensure that train unloading activities are carried out in a manner which minimises or prevents coal dust emissions from the interior of empty wagons during rail transport.

No actions were required to be undertaken in relation to compliance with EPL 12693.

5. STANDARDS

A gap audit of NCIG's Environmental Management System (EMS) against ISO14001 in May 2015 was undertaken by Jacobs Group (Australia). The audit included a desktop review of EMP documentation, a site visit, a review meeting, a report with a rating system to demonstrate adherence with the ISO14001 requirements and priority assigned to the recommendations identified in the audit.

The audit identified several recommendations for the NCIG EMS, to achieve compliance with the ISO14001 standard (both 2004 and draft 2015).

NCIG will consider the outcome of the audit and the recommendations made in future planning of EMS.

6. ACTIVITIES PROPOSED IN NEXT AEMR PERIOD

Significant activity is proposed to be undertaken in the next AEMR period in accordance with the Project Approval and environmental management and monitoring programmes. The principle elements are:

- Continued operation and maintenance of the full 66Mtpa Coal Export Terminal.
- Internal planning for optimisation of existing plant to provide additional capacity, if required in the future.
- Review Operational Environmental Management Plan, including a review of the environmental monitoring program.
- Review of EPL 12693, in accordance with the EPA's Risk-based Licensing review.
- Monitoring of carry-back coal from coal wagons.
- Commence construction of the migratory shorebird habitat at Area E.
- Further development and continuous improvement of the NCIG Environmental Management System.

The next AEMR reporting period will be July 2015 to June 2016 (12 month period) aligning the end of the reporting period with the end of financial year. This will better align with timing of subreports required to complete the AEMR, including the annual Green and Golden Bell Frog Monitoring on Kooragang Island.

7. REFERENCES

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Avifauna Research & Services (April 2015) NCIG Shorebird Compensatory Habitat Monitoring, Pre-Construction Period Jan-Mar 2015

Biosphere Environmental Consultants (June 2015) Western Deviation Disturbance Works

EES (2013) Groundwater Management Plan – Site D1 – Kooragang Island, Newcastle, NSW

ENVIRON (June 2014) Draft Revised Surface Water Monitoring Plan

ENVIRON (January 2015) Review of Groundwater Monitoring

ENVIRON (February 105) Draft Quarterly Groundwater and Surface Water Review – Fly Over

Hunter Bird Observers Club (2014) Deep Pond (Kooragang Island) Avifauna Data Summary 0214

Jacobs (July 2015) EMS Gap Audit, NCIG

NCIG (July 2014) Compensatory Habitat and Ecological Monitoring Program – Quarterly Report

NCIG (October 2014) Compensatory Habitat and Ecological Monitoring Program – Quarterly Report

NCIG (December 2014) Compensatory Habitat and Ecological Monitoring Program – Quarterly Report

NCIG (May 2015) Compensatory Habitat and Ecological Monitoring Program – Quarterly Report

NCIG (July 2015) Compensatory Habitat and Ecological Monitoring Program – Quarterly Report

NSW EPA (December 2014) Loss of Coal During Rail Transport Compliance Audit Program, Final Compliance Audit Report, Newcastle Coal Infrastructure Group Pty Ltd, EPL 12693

Ramboll Environ (August 2015) NCIG Rail Flyover Modification Compliance Report, Summary Audit Report 2013 - 2015

RCA (May 2014) Groundwater and Surface Water Monitoring, Kooragang Island, Newcastle

RCA (August 2014) Groundwater and Surface Water Monitoring, Kooragang Island, Newcastle

RCA (November 2014) Groundwater and Surface Water Monitoring, Kooragang Island, Newcastle

RCA (February 2015) Groundwater and Surface Water Monitoring, Kooragang Island, Newcastle

RCA (May 2015) Groundwater and Surface Water Monitoring, Kooragang Island, Newcastle

RCA (July 2015) Report Compiled for Newcastle Coal Infrastructure Group Detailing the Analysis of Biannual Surface Waters June 2015

SLR (August 2014) Construction Noise and Vibration Monitoring, Newcastle Coal Export Terminal – Flyover Construction, Second Quarter 2014 May 2014 to July 2014

SLR (August 2014) Newcastle Coal Export Terminal, Off-site Noise and On-site Power Monitoring, Quarter Ending June 2014

SLR (October 2014) Newcastle Coal Export Terminal, Off-site Noise and On-site Power Monitoring, Quarter Ending September 2014

SLR (January 2015) Newcastle Coal Export Terminal, Off-site Noise and On-site Power Monitoring, Quarter Ending December 2014

SLR (January 2015) Construction Noise and Vibration Monitoring, Newcastle Coal Export Terminal – Flyover Construction, Third Quarter 2014 August 2014 to October 2014

SLR (April 2015) Newcastle Coal Export Terminal, Off-site Noise and On-site Power Monitoring, Quarter Ending March 2015

SLR (June 2015) Construction Noise and Vibration Monitoring, Newcastle Coal Export Terminal – Flyover Construction, Fourth Quarter 2014 November 2014 to January 2014

SLR (July 2015) Construction Noise and Vibration Monitoring, Newcastle Coal Export Terminal – Flyover Construction, First Quarter 2015 February 2015 to April 2015

SKM (2013), NCIG Coal Export Terminal Model Validation Report Conditions 3.3 and 3.4 of Project Approval 06_009

Trevor Brown and Associates (November 2014) Independent Environmental Audit, NCIG Coal Export Terminal, Kooragang Island

University of Newcastle (November 2015) Research Program on the Green and Golden Bell Frog (Litoria aurea) on Kooragang Island, Annual Report on the 2014/15 Field Season for Port Waratah Coal Services

8. LIMITATIONS

Ramboll Environ Australia Pty Ltd (Ramboll Environ) prepared this report in accordance with the scope of work as outlined in our proposal to NCIG dated July 2015 and in accordance with our understanding and interpretation of current regulatory standards.

The conclusions presented in this report represent Ramboll Environ's professional judgment based on information made available during the course of this assignment and are true and correct to the best of Ramboll Environ's knowledge as at the date of the assessment.

Ramboll Environ did not independently verify all of the written or oral information provided to Ramboll Environ during the course of this investigation. While Ramboll Environ has no reason to doubt the accuracy of the information provided to it, the report is complete and accurate only to the extent that the information provided to Ramboll Environ was itself complete and accurate.

This report does not purport to give legal advice. This advice can only be given by qualified legal advisors.

8.1 User Reliance

This report has been prepared exclusively for NCIG and may not be relied upon by any other person or entity without Ramboll Environ Australia's express written permission.

APPENDIX 1
METEOROLOGICAL (OTHER THAN RAINFALL) SUMMARY

Table 10 Meteorological statistics by month

Month	Wind speed			Sigma theta			Solar radiation		
	Monthly average	Hourly min	Hourly max	Monthly average -	Hourly min -	Hourly max -	Monthly average	Hourly min	Hourly max
	m/s	m/s	m/s				W/m²	W/m²	W/m²
April 2014	2.4	0.1	9.8	21.0	1.2	76.1	121.5	6.0	784.7
May 2014	3.0	0.2	12.7	17.2	1.1	71.8	108.6	7.0	618.8
June 2014	4.0	0.3	16.2	16.3	3.2	93.9	91.4	7.7	445.0
July 2014	3.9	0.1	12.6	16.5	2.4	84.8	101.1	7.5	504.7
August 2014	3.0	0.0	10.2	17.6	0.8	73.8	116.8	8.2	655.8
September 2014	2.9	0.0	8.8	21.0	1.0	89.1	172.0	6.7	781.2
October 2014	3.0	0.0	9.1	22.1	2.6	80.6	215.4	5.0	911.0
November 2014	3.4	0.1	11.9	19.7	3.9	77.8	234.5	4.3	946.5
December 2014	3.1	0.3	8.2	24.8	3.3	83.9	218.1	5.0	982.0
January 2015	3.2	0.2	8.4	18.3	3.2	69.9	233.1	5.0	983.2
February 2015	2.8	0.1	7.9	18.7	5.4	65.0	216.2	6.0	1028.7
March 2015	2.8	0.0	8.8	21.8	0.1	92.5	174.5	5.0	849.8
April 2015	3.2	0.0	13.7	21.0	1.3	76.9	120.9	6.0	720.8
May 2015	3.4	0.2	13.7	16.9	3.3	81.1	94.9	6.5	537.0
June 2015	2.5	0.2	9.5	20.0	2.2	91.1	86.1	9.0	467.7

	Temperature @ 2 m elevation, (T_2)			Temperature @ 10 m elevation, (T_{10})			Delta Temp (T_{10}-T_2)	
	Monthly average	Hourly min	Hourly max	Monthly average	Hourly min	Hourly max	Number of hours when T_{10}>T_2.	
	°C	°C	°C	°C	°C	°C	Hours	% of month
April 2014	20.1	12.1	29.5	19.6	11.3	28.8	17	2
May 2014	17.2	8.8	26.1	16.7	8.3	25.4	22	3
June 2014	14.6	4.9	22.4	14.1	4.3	21.4	26	4
July 2014	13.0	4.7	24.3	12.6	4.4	23.7	73	10
August 2014	14.1	5.7	21.3	13.6	5.0	20.4	31	4
September 2014	16.9	7.9	30.9	16.3	7.0	30.6	19	3
October 2014	19.7	8.2	33.6	19.1	7.5	32.3	22	3
November 2014	22.1	14.0	39.0	21.5	13.5	38.0	2	0
December 2014	23.1	15.4	34.4	22.5	14.7	33.1	7	1
January 2015	24.5	15.4	35.0	23.9	14.5	34.1	4	1
February 2015	23.8	17.3	31.7	23.2	16.5	30.8	0	0
March 2015	22.9	12.8	36.2	22.2	12.2	35.1	5	1
April 2015	19.2	12.3	31.2	18.7	11.6	30.4	4	1
May 2015	16.6	8.2	26.5	16.1	7.3	26.1	17	2
June 2015	13.7	5.9	22.1	13.2	4.6	21.9	33	5

APPENDIX 2
SURFACE WATER MONITORING RESULTS

	pH	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15
SW1(a)	Pond 1	8.54	8.12	8.65	8.28	8.6	8.86	8.32	8.23	8.28	7.6	8.26	8.21	7.86	8.41	8.03
SW1(b)	Pond 2	8.54	8.17	8.49	8.17	8.63	8.8	8.36	8.24	8.28	7.94	8.19	8.11	8	8.38	8.21
SW1(c)	Pond 3	8.58	8.23	8.51	8.07	8.46	8.78	8.39	8.29	8.26	7.99	8.12	8.09	8.07	8.39	8.25
SW1(d)	Clearwater	8.48	8.12	8.56	8.11	8.44	8.86	8.03	7.68	8.26	7.91	8.34	8	8.14	8.29	8.42
SW2	Black Swan Pond	8.56	8.78	9.79	8.91	9.38	8.76	8.4	8.54	9.35	8.74	8.86	8.59	7.75	8.66	8.04
SW3	Deep Pond	8.66	8.4	7.73	7.77	8.24	9.8	9.41	8.34	8.66	8.97	9.06	8.51	7.19	7.31	7.42
SW4	Swan Pond	8.8	8.38	8.06	8.27	9.12	8.76	8.03	8.34	8.11	8.3	7.84	7.67	7.69	8.78	7.83

	EC (mS/cm)	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15
SW1(a)	Pond 1	2.991	*	2.286	2.161	1.708	2.599	2.446	2.035	2.307	1.094	1.458	1.243	1.558	1.901	2.59
SW1(b)	Pond 2	2.184	*	2.485	1.847	1.338	2.633	2.365	-	1.608	0.718	1.464	0.874	1.189	1.548	1.737
SW1(c)	Pond 3	1.631	*	2.474	2.142	1.052	2.023	2.111	1.989	1.429	0.509	1.34	1.349	1.109	1.125	1.577
SW1(d)	Clearwater	2.202	*	2.427	3.425	1.332	2.041	5.165	8.377	5.464	0.758	1.459	2.961	0.784	1.256	1.518
SW2	Black Swan Pond	3.715	*	3.091	3.65	2.015	2.453	3.293	4.494	4.101	1.675	2.278	1.589	1.506	2.109	2.382
SW3	Deep Pond	2.232	*	2.184	2.537	2.177	2.149	2.35	3.074	3.303	1.712	1.946	2.195	0.839	1.47	1.56
SW4	Swan Pond	29	*	37.59	41.62	23.83	33.413	61.64	74.49	65.918	25.86	43.557	39.768	12.14	17.101	24.03

* – inaccurate values (monitor error)

	Turbidity (NTU)	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15
SW1(a)	Pond 1	179	26.5	166	*	151.3	278	23.3	41.7	88.9	80.1	85.6	118	116	49.2	73.2	55.7
SW1(b)	Pond 2	6.4	30.7	22	*	55	80.1	40.1	28.3	60.3	40.1	139	88.9	85.4	14.3	47.1	15.1
SW1(c)	Pond 3	82	31.7	26.1	*	78.9	65.2	28.4	2.9	20.3	48.6	207	67.6	33.8	26.3	12.8	10.7
SW1(d)	Clearwater	1.2	129	431	*	83.5	47.2	18.9	12	31.6	21.9	65.1	34.6	48.6	52.7	8.6	14.4
SW2	Black Swan Pond	19.4	5.6	8.3	*	3.7	17	7.7	40.9	95.9	78.1	11.8	71.2	3.9	14.5	18.9	8.9
SW3	Deep Pond	143	6.5	73.3	*	0	14.2	3.5	35	113	42.7	4	20.5	24.2	43.6	9.7	2.9
SW4	Swan Pond	112	15.5	21.5	*	12	33.4	46.9	17.6	10.7	27.6	9.1	34	35.4	19	14.4	11.3

* – inaccurate values (monitor error)

	Water Temp (°C)	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15
SW1(a)	Pond 1	22	19.5	10.9	13.6	16.3	23.2	24.1	22.8	23.8	22.7	27.8	21.1	21.4	19.8	15.2
SW1(b)	Pond 2	21.7	19.1	10.1	13.3	16.6	22.4	24.3	22.9	24.4	22.4	26.5	22.2	20.5	17.5	14.5
SW1(c)	Pond 3	21.8	18.9	9.6	12.7	16.7	22.1	23.6	22.9	24.4	22	26.2	23.3	20.1	16.8	14
SW1(d)	Clearwater	24.6	19.7	9.2	13.6	16.6	24.2	24.1	23.4	24.5	22	26.6	20.2	19.4	17.1	13.6
SW2	Black Swan Pond	22.8	22.2	9.9	12.9	16.2	24	20.4	24.3	24.2	21.3	26.6	21.1	20.7	20.2	13.1
SW3	Deep Pond	26.1	21.3	9.6	12.3	16.1	22.6	22.7	23.9	23.3	19.2	25.3	19	17.5	19.2	13.8
SW4	Swan Pond	25.9	22.2	9.2	12.1	16.9	25.5	25.1	24.6	24.7	18.9	26.1	20.9	18.1	20.5	13.7

APPENDIX 3
DUST DEPOSITION MONITORING RESULTS

Month	Limit	DG1 (Fern Bay)	DG2 (Stockton)	DG3 (KI)	DG4 (Mayfield)	DG5 (Mayfield West)	DG6 (Mayfield Rail)
Apr-14	4	0.6	1.5	12.2	2.2	0.9	1.4
May-14	4	0.6	1.4	2.8	2	1.5	1.9
Jun-14	4	0.6	1.5	3.6	4	0.9	1.8
Jul-14	4	1	2.2	1.3	5.6	1.9	1.4
Aug-14	4	1.1	1.8	102.5*	0.5	0.8	1.3
Sep-14	4	0.7	0.8	1.3	0.8	1	1
Oct-14	4	0.8	0.5	16.4	1.2	1.5	2.4
Nov-14	4	1.4	1.1	13.5	1.6	1.4	2.3
Dec-14	4	0.7	2.1	7.6	1.7	1	2.8
Jan-15	4	0.6	1	2.2	0.7	1.3	1.7
Feb-15	4	0.5	0.7	13.5	1.2	1.2	1.4
Mar-15	4	0.4	1.4	2.3	1	1	2.9
Apr-15	4	1.9	0.9	1.5	0.6	1.7	4.2
May-15	4	0.5	1.2	2.6	1	0.9	0.9
Jun-15	4	0.4	NS	8.3	0.9	0.9	0.8

KI Kooragang Island

* Insect and bird droppings

APPENDIX 4
GROUNDWATER MONITORING RESULTS

Cells with a green shade indicate that the trigger level associated with this result has not been exceeded									
Cells with a yellow shade indicates that the LOR is greater than the trigger value,and although undected by the laboratory could exceed criteria									
Cells with a red shade indicate that the trigger level associated with this result has been exceeded									
Indicates no guideline specified (site specific or ANZECC)									
ID = Insufficient data to provide trigger value									
					Bore GW1				
	Reporting Units	**95% Marine Waters ANZECC Trigger Level**		**EP Licence Trigger Level (Site specific)**	13/06/2013	2/12/2013	6/06/2014	1/12/2014	18/06/2015
		Sourced from CEMP	**Sourced from OWMP**						
EPA Point Number					1	1	1	1	1
Sample Number					06136902001	12136902001	061410481001	121410481001	061510481007
Date of Sampling					13/06/2013	2/12/2013	6/06/2014	1/12/2014	18/06/2015
Time of Sampling					11:05	13:15	11:10	11:20	10:35
Sampler					K. Hawes	K. Hawes	K. Hawes	K. Hawes	K. Hawes/C. South
Groundwater Level	metres				1.32	1.49	1.57	1.57	1.29
Temperature	°C				19.4	20.5	17.5	21.8	19.0
Analyte									
pH	pH units	7.0-8.5	7.0-8.5		7.8	7.95	7.2	7.2	7.7
EC	µS/cm				11410	9900	11160	9980	11800
TDS	mg/L				7082	7288	7327	7052	6606
TSS	mg/L				33	42	21	38	26
Metals - Dissolved									
Al	mg/L		ID		<0.01	<0.01	<0.01	<0.01	<0.01
Cd	mg/L	0.0055			0.0002	0.0001	<0.0001	<0.0001	<0.0001
Co	mg/L		0.001		<0.001	<0.001	<0.001	<0.001	<0.001
Cu	mg/L		0.0013		0.004	0.003	<0.001	<0.001	0.002
Pb	mg/L	0.0044			<0.001	<0.001	<0.001	<0.001	<0.001
Mn	mg/L	0.08	0.08		0.03	0.132	0.004	0.39	0.009
Ni	mg/L	0.07	0.07		0.002	<0.001	<0.001	<0.001	0.002
Zn	mg/L	0.015	0.015		0.046	0.038	0.022	0.016	0.042
Fe	mg/L		ID		<0.05	<0.05	<0.05	0.15	<0.05
As III	µg/L	ID			<1	<1	<1	<2	<2
Hg	mg/L	0.0004			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Hexavalent Cr	mg/L	0.0044			<0.01	<0.01	<0.01	<0.01	<0.01
Cations - Dissolved									
Mg	mg/L		ID		151	119	115	107	109
Na	mg/L		ID		2800	1920	2220	2150	2070
K	mg/L		ID		173	114	130	128	113

Cells with a green shade indicate that the trigger level associated with this result has not been exceeded									
Cells with a yellow shade indicates that the LOR is greater than the trigger value,and although undected by the laboratory could exceed criteria									
Cells with a red shade indicate that the trigger level associated with this result has been exceeded									
Indicates no guideline specified (site specific or ANZECC)									
ID = Insufficient data to provide trigger value									
					Bore GW1				
	Reporting Units	**95% Marine Waters ANZECC Trigger Level**		**EP Licence Trigger Level (Site specific)**	13/06/2013	2/12/2013	6/06/2014	1/12/2014	18/06/2015
		Sourced from CEMP	**Sourced from OWMP**						
PAH									
Polynuclear Aromatic Hydrocarbons - 16 analytes	µg/L		ID		<0.5	<1.0	<0.5	<0.5	<0.5
TPH									
C6-9 Fraction	µg/L				<20	<20	<20	<20	<20
C10-14 Fraction	µg/L				<50	<50	<50	<50	<50
C15-28 Fraction	µg/L				<100	<100	<100	<100	<100
C29-36 Fraction	µg/L				<50	<50	<50	<50	<50
BTEX									
Benzene	µg/L				<1	<1	<1	<1	<1
Toluene	µg/L				<2	<2	<2	<2	<2
Ethyl Benzene	µg/L				<2	<2	<2	<2	<2
m+p Xylene	µg/L				<2	<2	<2	<2	<2
o Xylene	µg/L				<2	<2	<2	<2	<2
Cyanide									
Free	µg/L				<4	<4	<4	<4	<4
Total	µg/L				<4	<4	<4	<4	<4
Ammonia	µg/L				50	470	20	630	140
Phenol	µg/L				<1.0	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L				638	628	571	547	484

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Cells with a red shade indicate that the trigger level associated with this result has been exceeded
Indicates no guideline specified(site specific or ANZECC)
ID= Insufficient data to provide trigger value

					Bore K9/3 N				
	Reporting Units	95% Marine Waters ANZECC Trigger Level		EP Licence Trigger Level (Site specific)	13/06/2013	2/12/2013	6/06/2014	1/12/2014	18/06/2015
		Sourced from CEMP	Sourced from OWMP						
EPA Point Number					20	20	20		20
Sample Number					06136902002	12136902002	061410481002	121410481002	061510481008
Date of Sampling					13/06/2013	2/12/2013	6/06/2014	1/12/2014	18/06/2015
Time of Sampling					12:55	15:15	10:20	11:45	11:05
Sampler					K. Hawes	K. Hawes	K. Hawes	K. Hawes	K. Hawes/C. South
Groundwater Level	metres				2.57	2.62	2.80	2.90	2.57
Temperature	°C				20.3	21.0	18.5	22.0	20.5
Analyte									
pH	pH units	7.0-8.5	7.0-8.5		7.5	7.77	7.47	7.41	7.61
EC	µS/cm				7560	6560	7390	5950	6620
TDS	mg/L				4376	4575	4088	3921	3687
TSS	mg/L				44	27	1152	142	160
Metals - Dissolved									
Al	mg/L		ID		0.02	<0.01	0.03	0.02	0.02
Cd	mg/L	0.0055			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Co	mg/L		0.001		<0.001	<0.001	<0.001	<0.001	<0.001
Cu	mg/L		0.0013		<0.001	<0.001	<0.001	<0.001	<0.001
Pb	mg/L	0.0044			<0.001	<0.001	<0.001	<0.001	<0.001
Mn	mg/L	0.08	0.08		0.541	0.49	0.234	0.528	0.397
Ni	mg/L	0.07	0.07		<0.001	0.001	0.001	<0.001	<0.001
Zn	mg/L	0.015	0.015		<0.005	0.01	0.005	<0.005	0.008
Fe	mg/L		ID		0.14	<0.05	<0.05	<0.05	0.06
As III	µg/L	ID			<1	<1	<1	<2	<1
Hg	mg/L	0.0004			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Hexavalent Cr	mg/L	0.0044			<0.01	<0.01	<0.01	<0.01	<0.01
Cations - Dissolved									
Mg	mg/L		ID		109	90	70	130	62
Na	mg/L		ID		1890	1340	1310	1910	1200
K	mg/L		ID		113	58	64	87	59

Cells with a green shade indicate that the trigger level associated with this result has not been exceeded

Cells with a yellow shade indicates that the LOR is greater than the trigger value,and although undected by the laboratory could exceed criteria

Cells with a red shade indicate that the trigger level associated with this result has been exceeded

Indicates no guideline specified (site specific or ANZECC)

ID = Insufficient data to provide trigger value

					Bore K9/3 N				
	Reporting Units	95% Marine Waters ANZECC Trigger Level		EP Licence Trigger Level (Site specific)	13/06/2013	2/12/2013	6/06/2014	1/12/2014	18/06/2015
		Sourced from CEMP	Sourced from OWMP						
PAH									
Polynuclear Aromatic Hydrocarbons - 16 analytes	µg/L		ID	1	<0.5	<1.0	<0.5	<0.5	<0.5
TPH									
C6-9 Fraction	µg/L			20	<20	<20	<20	<20	<20
C10-14 Fraction	µg/L			50	<50	<50	<50	<50	<50
C15-28 Fraction	µg/L			100	<100	<100	<100	<100	<100
C29-36 Fraction	µg/L			50	<50	<50	<50	<50	<50
BTEX									
Benzene	µg/L			700	<1	<1	<1	<1	<1
Toluene	µg/L			180	<2	<2	<2	<2	<2
Ethyl Benzene	µg/L			5	<2	<2	<2	<2	<2
m+p Xylene	µg/L			75	<2	<2	<2	<2	<2
o Xylene	µg/L			350	<2	<2	<2	<2	<2
Cyanide									
Free	µg/L			4	<4	<4	<4	<4	<4
Total	µg/L			81.1	<4	<4	<4	<4	<4
Ammonia	µg/L				3580	510	100	3300	4970
Phenol	µg/L			400	<1.0	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L				400	433	312	350	289

Cells with a green shade indicate that the trigger level associated with this result has not been exceeded									
Cells with a yellow shade indicates that the LOR is greater than the trigger value,and although undected by the laboratory could exceed criteria									
Cells with a red shade indicate that the trigger level associated with this result has been exceeded									
Indicates no guideline specified(site specific or ANZECC)									
ID= Insufficient data to provide trigger value									
				Bore K9W3 S					
	Reporting Units	**95% Marine Waters ANZECC Trigger Level**		**EP Licence Trigger Level (Site specific)**	13/06/2013	2/12/2013	6/06/2014	1/12/2014	18/06/2015
		Sourced from CEMP	**Sourced from OWMP**						
EPA Point Number					21	21	21	21	21
Sample Number					06136902003	12136902003	061410481003	121410481003	061510481009
Date of Sampling					13/06/2013	2/12/2013	6/06/2014	1/12/2014	18/06/2015
Time of Sampling					12:40	15:25	10:05	12:10	11:15
Sampler					K. Hawes	K. Hawes	K. Hawes	K. Hawes	K. Hawes/C. South
Groundwater Level	metres				2.00	2.00	1.98	2.20	1.80
Temperature	°C				19.3	21.5	18.0	22.0	19.3
Analyte									
pH	pH units	7.0-8.5	7.0-8.5		7.6	7.89	7.32	7.47	7.99
EC	µS/cm				8960	7520	7790	8100	4030
TDS	mg/L				4770	5003	4708	5345	2372
TSS	mg/L				4350	2902	1960	2460	3150
Metals - Dissolved									
Al	mg/L		ID		0.02	0.01	<0.01	0.01	0.08
Cd	mg/L	0.0055			0.0003	0.0003	<0.0001	<0.0001	0.0001
Co	mg/L		0.001		<0.001	<0.001	<0.001	<0.001	<0.001
Cu	mg/L		0.0013		0.004	0.012	<0.001	0.002	0.005
Pb	mg/L	0.0044			<0.001	<0.001	<0.001	<0.001	<0.001
Mn	mg/L	0.08	0.08		0.39	0.328	0.279	0.425	0.113
Ni	mg/L	0.07	0.07		0.002	0.005	<0.001	0.001	0.002
Zn	mg/L	0.015	0.015		0.013	0.102	<0.005	0.025	0.009
Fe	mg/L		ID		0.05	<0.05	<0.05	<0.05	<0.05
As III	µg/L	ID			<1	<1	<1	<2	<1
Hg	mg/L	0.0004			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Hexavalent Cr	mg/L	0.0044			<0.01	<0.01	<0.01	<0.01	<0.01
Cations - Dissolved									
Mg	mg/L		ID		139	83	80	102	37
Na	mg/L		ID		2380	1270	1490	2010	800
K	mg/L		ID		129	55	72	119	38

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Cells with a red shade indicate that the trigger level associated with this result has been exceeded
Indicates no guideline specified(site specific or ANZECC)
ID = Insufficient data to provide trigger value

					Bore K9W3 S				
	Reporting Units	95% Marine Waters ANZECC Trigger Level		EP Licence Trigger Level (Site specific)	13/06/2013	2/12/2013	6/06/2014	1/12/2014	18/06/2015
		Sourced from CEMP	Sourced from OWMP						
PAH									
Polynuclear Aromatic Hydrocarbons - 16 analytes	µg/L		ID	1.1	<0.5	<1.0	<1.0	<0.5	<0.5
TPH									
C6-9 Fraction	µg/L			20	<20	<20	<20	<20	<20
C10-14 Fraction	µg/L			50	<50	<50	<50	<50	<50
C15-28 Fraction	µg/L			100	<100	<100	<100	<100	<100
C29-36 Fraction	µg/L			50	<50	<50	<50	<50	<50
BTEX									
Benzene	µg/L			700	<1	<1	<1	<1	<1
Toluene	µg/L			180	<2	<2	<2	<2	<2
Ethyl Benzene	µg/L			5	<2	<2	<2	<2	<2
m+p Xylene	µg/L			75	<2	<2	<2	<2	<2
o Xylene	µg/L			350	<2	<2	<2	<2	<2
Cyanide									
Free	µg/L			4	<4	<4	<4	<4	<4
Total	µg/L			21.8	<4	<4	<4	<4	<4
Ammonia	µg/L				1610	1170	1300	2050	690
Phenol	µg/L			400	<1.0	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L				538	380	386	494	263

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Cells with a yellow shade indicates that the LOR is greater than the trigger value,and although undected by the laboratory could exceed criteria										
Cells with a red shade indicate that the trigger level associated with this result has been exceeded										
Indicates no guideline specified(site specific or ANZECC)										
ID= Insufficient data to provide trigger value										
Bore K1W1										
	Reporting Units	**95% Marine Waters ANZECC Trigger Level**		**EP Licence Trigger Level (Site specific)**	13/06/2013	2/7/13 *Retest*	2/12/2013	6/06/2014	1/12/2014	18/06/2015
		Sourced from CEMP	**Sourced from OWMP**							
EPA Point Number					22	22	22	22	22	22
Sample Number					06136903004	07136902001	12136902004	061410841004	121410481004	061510481010
Date of Sampling					13/06/2013	2/07/2013	2/12/2013	6/06/2014	1/12/2014	18/06/2015
Time of Sampling					12:10	14:55	16:00	9:55	12:50	12:23
Sampler					K. Hawes	C. South	K.Hawes	K.Hawes	K. Hawes	K. Hawes/C. South
Groundwater Level	metres				1.49	1.41	1.30	1.53	1.89	1.21
Temperature	°C				19.2	22	18	16	19.25	18.1
Analyte										
pH	pH units	7.0-8.5	7.0-8.5		7.3		8.25	7.24	7.48	7.60
EC	µS/cm				854		879	1016	1116	843
TDS	mg/L				504		550	606	718	470
TSS	mg/L				208		850	470	162	910
Metals - Dissolved										
Al	mg/L		ID		0.04		<0.01	<0.01	<0.01	<0.01
Cd	mg/L	0.0055			<0.0001		<0.0001	<0.0001	<0.0001	<0.0001
Co	mg/L		0.001		<0.001	Retest analysis	<0.001	<0.001	<0.001	<0.001
Cu	mg/L		0.0013		<0.001	conducted due	0.009	<0.001	<0.001	<0.001
Pb	mg/L	0.0044			<0.001	to TPH C10-C14	0.001	<0.001	<0.001	<0.001
Mn	mg/L	0.08	0.08		0.17	Fraction result	1.16	0.391	0.724	0.155
Ni	mg/L	0.07	0.07		0.001	from June 2013	0.001	0.002	<0.001	<0.001
Zn	mg/L	0.015	0.015		0.046	sampling.	0.006	0.032	0.007	0.005
Fe	mg/L		ID		0.19		<0.05	0.11	0.23	0.18
As III	µg/L	ID			<1	Only TPH	<1	<1	<2	<1
Hg	mg/L	0.0004			<0.0001	analysis	<0.0001	<0.0001	<0.0001	<0.0001
Hexavalent Cr	mg/L	0.0044			<0.01	conducted on	<0.01	<0.01	<0.01	<0.01
Cations - Dissolved						this event.				
Mg	mg/L		ID		15		12	10	13	12
Na	mg/L		ID		85		52	49	122	62
K	mg/L		ID		12		4	5	9	8

Cells with a green shade indicate that the trigger level associated with this result has not been exceeded

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Cells with a red shade indicate that the trigger level associated with this result has been exceeded

Indicates no guideline specified (site specific or ANZECC)

ID = Insufficient data to provide trigger value

					Bore K11					
	Reporting Units	**95% Marine Waters ANZECC Trigger Level**		**EP Licence Trigger Level (Site specific)**	13/06/2013	2/7/13 *Retest*	2/12/2013	6/06/2014	1/12/2014	18/06/2015
		Sourced from CEMP	**Sourced from OWMP**							
PAH										
Polynuclear Aromatic Hydrocarbons - 16 analytes	µg/L		ID	2.2	<0.5		<1.0	<0.5	<0.5	<0.5
TPH										
C6-9 Fraction	µg/L			20	<20	<20	<20	<20	<20	<20
C10-14 Fraction	µg/L			50	130	<50	<50	<50	<50	<50
C15-28 Fraction	µg/L			100	<100	<100	<100	<100	<100	<100
C29-36 Fraction	µg/L			50	<50	<50	<50	<50	<50	<50
BTEX										
Benzene	µg/L			700	<1	Retest analysis conducted due to TPH C10-C14 Fraction result from June 2013 sampling	<1	<1	<1	<1
Toluene	µg/L			180	<2		<2	<2	<2	<2
Ethyl Benzene	µg/L			5	<2		<2	<2	<2	<2
m+p Xylene	µg/L			75	<2		<2	<2	<2	<2
o Xylene	µg/L			350	<2		<2	<2	<2	<2
Cyanide										
Free	µg/L			4	<4		<4	<4	<4	<4
Total	µg/L			16.6	<4		<4	<4	<4	<4
Ammonia	µg/L				0.11		250	140	350	70
Phenol	µg/L			400	<1.0		<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L				32		75	76	63	46

Cells with a green shade indicate that the trigger level associated with this result has not been exceeded									
Cells with a yellow shade indicates that the LOR is greater than the trigger value,and although undected by the laboratory could exceed criteria									
Cells with a red shade indicate that the trigger level associated with this result has been exceeded									
Indicates no guideline specified (site specific or ANZECC)									
ID = Insufficient data to provide trigger value									
				Bore K1W1 S					
	Reporting Units	**95% Marine Waters ANZECC Trigger Level**		**EP Licence Trigger Level (Site specific)**	13/06/2013	2/12/2013	6/06/2014	1/12/2014	18/06/2015
		Sourced from CEMP	**Sourced from OWMP**						
EPA Point Number					23	23	23	23	23
Sample Number					06136902005	12136902005	061410481005	121410481005	061510481011
Date of Sampling					13/06/2013	2/12/2013	6/06/2014	1/12/2014	18/06/2015
Time of Sampling					11:50	15:45	9:20	12:30	12:11
Sampler					K. Hawes	K. Hawes	K. Hawes	K. Hawes	K. Hawes/C. South
Groundwater Level	metres				2.13	2.52	2.47	2.54	1.99
Temperature	°C				19.3	18.5	16.5	19.3	19.1
Analyte									
pH	pH units	7.0-8.5	7.0-8.5		7.4	7.8	6.74	7.36	7.66
EC	µS/cm				17250	12490	15240	13210	16700
TDS	mg/L				10772	9163	10132	10189	39425
TSS	mg/L				16	48	7	<5	5
Metals - Dissolved									
Al	mg/L		ID		<0.01	0.02	<0.01	<0.01	0.01
Cd	mg/L	0.0055			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Co	mg/L		0.001		<0.001	<0.001	<0.001	<0.001	<0.001
Cu	mg/L		0.0013		<0.001	<0.001	<0.001	<0.001	<0.001
Pb	mg/L	0.0044			<0.001	<0.001	<0.001	<0.001	<0.001
Mn	mg/L	0.08	0.08		0.39	0.317	0.209	0.506	0.186
Ni	mg/L	0.07	0.07		<0.001	0.001	0.001	<0.001	<0.001
Zn	mg/L	0.015	0.015		<0.005	0.009	<0.005	<0.005	<0.005
Fe	mg/L		ID		<0.05	<0.05	<0.05	<0.05	<0.05
As III	µg/L	ID			<2	<1	<1	<1	<1
Hg	mg/L	0.0004			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Hexavalent Cr	mg/L	0.0044			<0.010	<0.01	<0.01	<0.01	<0.01
Cations - Dissolved									
Mg	mg/L		ID		158	125	142	135	142
Na	mg/L		ID		3530	2600	2860	2930	3060
K	mg/L		ID		174	136	146	152	143

Cells with a green shade indicate that the trigger level associated with this result has not been exceeded									
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Cells with a red shade indicate that the trigger level associated with this result has been exceeded									
Indicates no guideline specified (site specific or ANZECC)									
ID = Insufficient data to provide trigger value									
				Bore K11W1 S					
	Reporting Units	**95% Marine Waters ANZECC Trigger Level**		**EP Licence Trigger Level (Site specific)**	13/06/2013	2/12/2013	6/06/2014	1/12/2014	18/06/2015
		Sourced from CEMP	**Sourced from OWMP**						
PAH									
Polynuclear Aromatic Hydrocarbons - 16 analytes	µg/L		ID	1.5	<0.5	<1.0	<1.0	<0.5	<0.5
TPH									
C6-9 Fraction	µg/L			20	<20	<20	<20	<20	<20
C10-14 Fraction	µg/L			50	<50	<50	<50	<50	<50
C15-28 Fraction	µg/L			100	<100	<100	<100	<100	<100
C29-36 Fraction	µg/L			50	<50	<50	<50	<50	<50
BTEX									
Benzene	µg/L			700	<1	<1	<1	<1	<1
Toluene	µg/L			180	<2	<2	<2	<2	<2
Ethyl Benzene	µg/L			5	<2	<2	<2	<2	<2
m+p Xylene	µg/L			75	<2	<2	<2	<2	<2
o Xylene	µg/L			350	<2	<2	<2	<2	<2
Cyanide									
Free	µg/L			4	<4	<4	<4	<4	<4
Total	µg/L			75.6	<4	<4	<4	<4	<4
Ammonia	µg/L				5360	5840	5560	5830	5690
Phenol	µg/L			400	<1.0	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L				567	472	485	493	435

APPENDIX 5
CHEMP QUARTERLY REPORTS AND MINUTES

APPENDIX 6
GGBF ANNUAL REPORT ON 2014/15 FIELD SEASON AND ADDENDUM OF THE ANNUAL POPULATION MONITORING PROGRAM FOR THE GREEN AND GOLDEN BELL FROG ON KOORAGANG ISLAND