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Prepared for:

BHP Billiton

Cnr Selwyn St & David Baker Rd
Mayfield NSW 2304

BHP Billiton's Hunter River Remediation Project:

Application for Approval to Proceed to Stage 2

Final

ENSR Australia Pty Ltd (ENSR)

19 December 2008

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Distribution

Stage 2 Approval
Hunter River Remediation Project

19 December 2008

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	19/12/08

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Abbreviations

°C	Degrees Celsius
%	Percent
ADTOAC	Awabakal Descendants Traditional Owners Aboriginal Corporation
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ALALC	Awabakal Local Aboriginal Land Council
ANZECC	Australia and New Zealand Environment and Conservation Council
ARI	Average Recurrence Interval
AS	Australian Standards
ATOAC	Awabakal Traditional Owners Aboriginal Corporation
BHPB	BHP Billiton Limited
CAKA	Citizens and Kooragang Alliance
CBD	Central Business District
CCC	Community Consultative Committee
Cd	Cadmium
CDF	Confined Disposal Facility
Ce	Cerium
CEMP	Construction Environmental Management Plan
CEP	Community Engagement Program
CHRP	Complaints Handling and Response Protocol
CPT	Cone Penetration Tests
CPTu	Piezocone Penetration Tests
Cr	Chromium

CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cu	Copper
DA	Development Application
dB	Decibel
DCP	Development Control Plan
DECC	Department of Environment and Climate Change
DEET	Department of Education, Employment and Training
DEWHA	Department of the Environment, Water, Heritage and the Arts (Cth)
DIPNR	Department of Infrastructure Planning and National Resources
DoP	Department of Planning
EA	Environmental Assessment
ECRTN	Environmental Criteria For Traffic Noise
EIS	Environmental Impact Statement
EMD	Electrolytic Manganese Dioxide
EMMP	Excavated Materials Management Plan
ENM	Environmental Noise Model
ENCM	Environmental Noise Control Manual
EPA	Environment Protection Authority (NSW)
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection License
GGBF	Green and Golden Bell Frog
GWCHC	Gidawaa Waland Cultural Heritage Consultancy
ha	Hectares
HBOC	Hunter Bird Observers Club
HCEC	Hunter Community Environment Centre
HCF	Hunter Catchment Forum

HDC	Hunter Development Corporation
HDPE	High Density Polyethylene
hr	Hour
HRRP	Hunter River Remediation Project
HSO	Harper Somers O'sullivan
INP	Industrial Noise Policy
KI	Kooragang Island
KIWEF	Kooragang Island Waste Emplacement Facility
km	Kilometres
kPa	Kilopascal
kV	Kilovolts
KWRP	Kooragang Wetlands Rehabilitation Project
Leq	Equivalent Continuous Noise Level
LEP	Local Environmental Plan
LGA	Local Government Area
L/min	Litres Per Minute
m	Metres
m^2	Square Metres
m^3	Cubic Metres
mm	Millimetres
mm^2	Square Millimetres
MGA	Map Grid Australia
MR	Major Road
m/s	Metres Per Second
m/yr	Metres Per Year
NCC	Newcastle City Council
NCIG	Newcastle Coal Infrastructure Group

NES	National Environmental Significance
Ni	Nickel
NOx	Nitrous Oxide
NPC	Newcastle Port Corporation
NP&W Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
NSWM	NSW Maritime
OH&S	Occupational Health and Safety
ou	Odour Unit
P&C	Parents and Citizens
PAHs	Polycyclic Aromatic Hydrocarbons
PASS	Potential Acid Sulphate Soils
pH	pH is a measure of acidity or basicity
PHA	Preliminary Hazard Analysis
POEO Act	*Protection Of The Environment Operations Act 1997*
PRZ	Primary Remediation Zone
PVC	Polyvinyl Chloride
PWCS	Port Waratah Coal Services
REP	Regional Environmental Plan
RH	Relative Humidity
RL	Relative Level
RLMC	Regional Land Management Corporation
RTA	Road and Traffic Authority
SEP	Stakeholder Engagement Plan/Program
SEPP	State Environmental Planning Policy
SOER	Specific Odour Emission Rates
SOS	Stabilisation Optimisation Study

SOS-WTP	Stabilisation Optimisation Study Water Treatment Pilot
SRoH	Significant Risk of Harm
SRZ	Secondary Remediation Zone
SWMP	Soil and Water Management Plan
TPH	Total Petroleum Hydrocarbons
TRP	Trial Remediation Project
UCS	Unconfined Compressive Strength
UNSW	University of New South Wales
VOC	Volatile Organic Compounds
VRA	Voluntary Remediation Agreement
VRP	Voluntary Remediation Proposal
Zn	Zinc

Certification

	Submission of Environmental Assessment (EA) prepared under the Environmental Planning and Assessment Act 1979 Section 75F
EA prepared by	
Name	Andrew Cook
Qualifications	Bachelor of Town and Regional Planning Workgroup Manager Environmental Services
Address	ENSR Australia Pty Ltd Level 5, 828 Pacific Highway Gordon NSW 2072
in respect of Project application	Stage 2 of Hunter River Remediation Project
Applicant name	BHP Billiton Limited
Applicant address	Cnr Selwyn Street and David Baker Road, Mayfield, NSW, 2304
Land to be developed lot no., DP/MPS, vol/fol etc	The proposed project is to be carried out on the land detailed in **Section 2** of this EA.
Proposed project	Stage 2 (full scale) remediation works associated with the Hunter River Remediation Project (HRRP) in Newcastle. The HRRP involves the removal , treatment and disposal of contaminated sediments from the South Arm of the Hunter River. The Stage 2 works essentially involve: • The full-scale remediation of contaminated sediments dredged from the Hunter River on land that was previously occupied by the BHP-owned Newcastle Steelworks (known as the Mayfield Site); • The construction of an emplacement facility for the treated sediments on a former landfill site on KI to the north west of the Tourle Street Bridge (known as the Kooragang Island Waste Emplacement Facility - KIWEF); and • The transport and placement of treated sediment from Mayfield to KIWEF (or other facility lawfully able to accept it).
	Map(s) attached
Environmental Assessment	an Environmental Assessment (EA) is attached
Certification	I certify that I have prepared the contents of this Environmental Assessment and to the best of my knowledge it is true in all material particulars and does not, by its presentation or omission of information, materially mislead.

Signature

Name: Andrew Cook

Date: 19 December, 2008

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Executive Summary

Introduction

ENSR Australia Pty Ltd (ENSR) has been engaged by BHP Billiton Limited (BHPB) to prepare this Environmental Assessment (EA) to accompany an application to obtain Ministerial approval to continue to Stage 2 (full-scale) remediation activities as part of the Hunter River Remediation Project (HRRP).

BHPB is seeking Ministerial approval to proceed to Stage 2 works in accordance with Conditions A2.2(a) and A2.3 of the development consent (DA-134-3-2003-i) – referred hereafter as "the development consent" - for the extension of shipping channels within the Port of Newcastle including dredging, excavation, treatment and disposal of sediments from the South Arm of the Hunter River. This development consent was issued by the Minister for Planning on 9 August 2005.

This application is made on the basis of the significant body of work including trial remediation, bench-scale studies, characterisation of sediments, engineering design and other investigations undertaken to date. This work has been successful in confirming the Stage 2 remediation process.

In accordance with Condition C2.16 of the development consent, BHPB is also seeking approval from the Department of Planning (DoP) to undertake the proposed Stage 2 activities on a 24 hours per day, 7 days per week basis. Operating on a 24 hour, 7 days per week basis will help ensure the HRRP is undertaken in the shortest possible timeframe whilst still achieving the necessary engineering, environmental and wider outcomes.

The HRRP Stage 2 remediation activities (including the construction, operational and site decommissioning phases) are expected to occur over an approximate 18 month to two year period, commencing February 2009.

Project Description

Stage 2 of the HRRP involves three primary activities:

1) treatment via cement stabilisation at the former Newcastle Steelworks site at Mayfield (the Mayfield Site) of contaminated sediments dredged from the adjacent South Arm of the Hunter River;

2) transport by truck of this treated sediment from the Mayfield Site via public roads, including Selwyn Street, Industrial Highway and Tourle Street, to the nearby Kooragang Island Waste Emplacement Facility (KIWEF). Trucks will return via the same route except for safety reasons at the exit from KIWEF, they will turn left (instead of right) onto Cormorant Road and travel east before undertaking a U turn at the Teal Street roundabout and then returning to the Mayfield Site; and

3) emplacement of treated sediment at purpose-built landfill at KIWEF that features design principles and controls to prevent interaction of ground and surface waters with treated sediments and which achieve targeted engineering and environmental outcomes.

Other related activities as part of Stage 2 work include, but are not limited to, wastewater collection and treatment, materials handling and stockpiling activities and odour management controls.

The proposed method of treatment is 'treat-and-haul' that minimises the time delays between each phase of activity including dredging, treatment, transport and emplacement. Using the treat-and-haul approach, sediments would typically be dredged, treated, and placed at the emplacement cell within 24 to 48 hours.

It is conservatively estimated that there will be up to 930,000 m^3 of treated material disposed of in the emplacement cell(s) at KIWEF.

The treatment process of cement stabilisation binds the contaminated sediments into a matrix which immobilises or 'locks up' the contaminants and helps prevents the leaching of contaminants once the treated sediments are placed within the emplacement cell.

The treatment process was approved by the Department of Environment and Climate Change (DECC) in their Immobilisation Approval granted 22 October 2008 (Approval Number 2008-S-03). This approval was critical to obtain prior to submitting this application to proceed to Stage 2. It provides evidence that DECC, as the key regulatory authority for the treatment process, considers that the results from the trial remediation and bench-scale studies undertaken by BHPB until now have been adequate to satisfy their stringent immobilisation requirements. This means that the remediation works can now proceed from Stage 1B to Stage 2.

Obtaining this immobilisation approval was considered essential in order to satisfy the relevant requirement of Condition A2.3 (d) of the development consent. This condition refers to the relevant matters which must be demonstrated in seeking Ministerial approval to proceed to Stage 2, including DECC concurrence.

Community Consultation

BHPB has implemented a comprehensive, inclusive and proactive Community Engagement Program (CEP) for the HRRP. The CEP involves active direct engagement with specific interest groups via meetings, briefings, phone call discussions and written correspondence, as well as reaching out to the broader community via newsletter letter box drops, community survey and media advertisements.

A wide range of community groups and their representatives, other stakeholder groups, residents, and agencies have been, and continue to be, consulted and provided with information regarding the HRRP.

BHPB has met with more than 40 community-based interest and environmental groups over the last six months regarding the HRRP, and notably the proposed Stage 2 remediation activities.

A range of tools have been used to engage with stakeholders including the 24/7 community hotline, website (www.bhpbilliton.com/hrrp), Community Newsletters, stakeholder meetings (community and government agencies), local community survey, fact sheets and complaints and enquiries protocols.

Community and stakeholder feedback received during the stakeholder engagement program to date closely aligns with those issues anticipated and the issues raised in submissions made by the community as part of NSW Maritime's 2003 Environmental Impact Assessment and DoP's 2005 development consent process. There are few 'new' issues that have emerged from discussions to date.

During Stage 2 works, BHPB will continue to engage the community to ensure that ongoing information is disseminated and community attitudes continue to feedback into the HRRP design and execution.

Issues Prioritisation

A preliminary assessment of environmental issues associated with the HRRP was undertaken for this EA. The prioritisation of issues recognises that a higher degree of assessment and the development of more specific and detailed environmental safeguards are required for the environmental issues which are identified with the potential for higher severity and greater consequences.

This assessment indicates that:

- the high priority issues include ecology and noise;
- the medium priority issues include traffic, soils, surface water, groundwater, odour and lighting;
- the low priority issues include Aboriginal heritage, infrastructure, visual, air quality, climate change and waste.

Ecology

RPS Harper Somers O'Sullivan was engaged by BHPB to undertake ecological investigations and subsequently prepare a Flora and Fauna Assessment regarding the proposed Stage 2 activities on Kooragang Island.

Dr Arthur White from Biosphere Environmental Consultants (BEC) was engaged to contribute to this ecological assessment given his extensive survey experience and knowledge of the Kooragang Island area.

Kooragang Island is a highly modified environment that has been used for disposal of industrial wastes and other material since the 1970's. Some threatened flora and fauna species have colonised the area during this time.

One threatened flora species (*Zannichellia palustris*), eight threatened fauna species (Green and Golden Bell Frog, Australasian Bittern, Australian Painted Snipe, Red-backed Button Quail, Grass Owl, Magpie Goose, Blue Billed Duck and Freckled Duck) and three EECs (Freshwater Wetland, Swamp Oak Floodplain Forest and Coastal Saltmarsh) were recorded or considered to have at least a moderate chance of occurring within the site.

Whilst the proposal will result in the removal of some known or potential habitat for these species, BHPB has already undertaken or committed to substantial avoidance and mitigation measures, including significant redesign of the emplacement footprint to conserve more than 80% of the core habitat for the Green and Golden Bell Frog and other threatened species and communities.

In addition, BHPB will also provide an offsets package, in accordance with the framework determined by DECC, to ensure that an overall holistic and balanced outcome is achieved for the ecology of the Lower Hunter estuary.

Odour

Odour sources from the HRRP would most likely be from the dredging, temporary stockpiling and treatment of contaminated sediments.

In the context of the Mayfield site, the most sensitive receptors would be the residences located approximately 680 m to the south of the site boundary. The closest residential areas to KIWEF are located at Warabrook and Mayfield West, approximately 1.2 km to the south of the site.

Given the reduced odour emissions expected from the treated sediment and the significant distance to the closest residential receptors, odour impacts from the emplacement cell(s) at KIWEF are not expected to be significant.

Odour management measures are recommended for consideration and are consistent with the findings from trials and other investigative studies undertaken until now. As part of the December 2008 trial remediation project, referred to as the Sediment Optimisation Study (SOS), additional monitoring data and information relating to the effectiveness of odour controls is being obtained to refine the management strategy and determine the final suite of control to be applied during Stage 2.

This final management regime will be documented in the Odour Management Plan to be prepared in consultation with the DECC and approved by the DoP prior to the commencement of Stage 2 works.

Noise

Spectrum Acoustics has undertaken an acoustic assessment of the proposed Stage 2 activities. The assessment also considers the potential impacts from operating 24 hours a day, 7 days a week.

Condition C2.17 of the existing development consent specifies the maximum allowable noise contributions for the remediation activities and associated works. The noise limits apply under specified meteorological conditions (gentle winds, temperature inversions and relative humidity).

The closest receivers to the Mayfield site are in the suburb of Mayfield East approximately 680m to the south of the site boundary. The closest receivers to the KIWEF site are in the suburb of Mayfield West approximately 1.2km to the south of the sediment emplacement cell.

The assessment conservatively modelled the significant noise generating items or activities that may be occurring 24 hours per day at both the Mayfield and KIWEF sites.

The noise contour results for each of the modelled operating scenarios (Scenarios 1, 2, 3 & 4) show that received noise as a result of emissions from the Mayfield and KIWEF sites will not exceed the allowable noise contribution at any residential receivers or the two schools located along Industrial Drive (Mayfield East Public School and Hunter Christian School) under the assessed worst case conditions.

The noise contour results for each of the modelled sleep disturbance scenarios (Scenarios 5, 6 & 7) show that received noise as a result of emissions from the operations at the Mayfield and KIWEF sites including on site trucking will not exceed the sleep disturbance criteria at any receivers under the assessed conditions.

The proposed operations would also generate traffic noise from heavy vehicle traffic along Selwyn Street, Industrial Drive, Tourle Street and Cormorant Road, particularly late at night. For the purposes of this assessment the average haulage scenario was assessed where there will be between 13 and 17 truck trips per hour (depending on whether truck and dog or a semi-trailer option is used) plus an extra 1 cement truck delivery per hour.

The calculation of traffic noise levels show that the received noise at the worst case residential receptor (21 Crebert St, Mayfield) would be below the relevant criterion, after allowances are made for existing traffic noise levels.

The results also show that the received noise at the two schools located along Industrial Drive (Mayfield East Public School and Hunter Christian School) would be below the relevant criterion for school playgrounds and internal classrooms, except for the school playground at the Hunter Christian School which would be marginally above the criterion. However, it is important to note that existing road traffic noise at this school playground already easily exceeds this criterion.

Cumulative noise impacts were considered that included the construction of the NCIG coal loader, HRRP dredging works in the Hunter River and the proposed remediation works. This assessment shows that the combined noise from these projects may result in an increase in the total noise level, however, the increases are considered acceptable particularly in lieu of the limited project duration.

Traffic

Condition C2.19 of the existing development consent requires a Treated Materials Transport Strategy to be prepared and approved by the RTA. Connell Wagner prepared a Treated Materials Transport Strategy in 2006 for this project which was accepted by the Roads and Traffic Authority (RTA) and which was updated for this EA. The revised report has been prepared in consultation with the RTA and Newcastle City Council.

Since the preparation of this 2006 Transport Strategy there have been a number of material changes to the transport aspects of the HRRP including the proposed hours of operation, the volume of sediment to be emplaced at KIWEF, the length of the haulage period and the cycle times for truck haulage.

The proposed haulage route return from the Mayfield Site to KIWEF has a total length of 18.6km and is shown on **Figure 1**. The road network which will be utilised for the haulage route is well developed serving industrial and port facilities either side of the Hunter River. The major roads involved include Industrial Drive, Tourle Street and Cormorant Road which are designated arterial roads.

The impact of the project on the road network of an additional 250 to 334 trips per day or between 13 and 17 trips per hour under average haulage conditions has been assessed as negligible with increased volumes being approximately 2.0–3.0% of existing total daily flows or 20-25% of discrete heavy vehicle flows.

The detailed analysis of intersection performance for Selwyn Street/Industrial Drive and for Industrial Drive/Tourle Street intersections indicates little or no change in delays, queues or levels of service for the critical right turn movements on the outbound journey.

A new intersection at Cormorant Road/KIWEF is being constructed as part of the Tourle Street Bridge replacement which will adequately accommodate the movement of haulage vehicles for the HRRP. Haulage vehicles would only be allowed left in/left out movements at this intersection.

Haulage vehicles would undertake a U-turn at the Teal Street roundabout but, given the configuration of the roundabout and the estimated number of haulage vehicles, these movements should not cause excessive delays to existing peak flows or to the proposed haulage fleet.

Potential road safety impacts associated with material spilling from trucks, lighting of the KIWEF/Cormorant Road intersection and truck queuing at the KIWEF entry have been addressed in the project design.

All of the above impacts would be restricted to an approximate 40 week haulage period, currently scheduled to commence from around mid-2009.

Soils, Geology and Geotechnical

Based on the available site history information, the KIWEF site has not been filled by engineered landfill. The site comprises loosely dumped refuse and fill, largely comprising blast furnace slag and coal washery reject.

Based on this information and additional soil screening results, the site is considered unlikely to contain large amounts of gross chemical contaminants.

Based on total contaminant concentrations, fill materials are expected to range in classification from “General Solid Waste” to “Hazardous Waste” (DECC Waste Classification Guidelines, April 2008).

An Excavated Materials Management Plan (EMMP) will be prepared for the construction of the emplacement cell(s). The purpose of this EMMP will be to assist in managing potentially contaminated materials as they are encountered during the excavation and used in the bund wall construction for the emplacement cell.

The emplacement cell has been designed to accommodate future industrial development once the emplacement of treated sediment has been completed and the cell has been capped including landowner criteria relating to foundations, long term settlement and associated infrastructure.

The assessments undertaken by Douglas Partners to date have found that the geotechnical properties of the proposed KIWEF site are suitable for the proposed cell design and the landowner's final landform and land-use requirements. Additional investigations will be undertaken to continue to validate and confirm current knowledge of the geotechnical properties of the site and the preparation of site development guidelines.

The EMMP is the primary tool used to manage the impacts of soil contamination, PASS and the acid generation potential of the excavated soils. The EMMP includes management actions and control requirements that protect soil quality and integrity in the event that contaminated or acidic material is excavated or uncovered during the construction of the emplacement cell.

Surface Water Management

Contaminated water at the Mayfield Site including free water decanted from the excavated sediment material on the barges, water that drains from the sediment receiving areas and dump trucks, and truck wash water, would be pumped and stored in contaminated water holding ponds and then treated in a water treatment plant to meet DECC requirements before being discharged to the Hunter River.

The Mayfield site has been predominantly capped with asphalt as part of the former remediation works at the site and the stormwater drainage network is already in place.

Non contaminated stormwater that originates from roofed areas and sealed surfaces outside the bunded sediment stockpile areas will be allowed to flow overland to the existing grated stormwater drains for discharge to the Hunter River.

Stormwater management features at the KIWEF emplacement cell include open drains to the south and west of the cell, sediment ponds to the north and south of the cell, erosion control blankets and silt fences on the exterior slopes to minimise erosion and sedimentation along the north and north east sides of the cell and use of a perimeter bund to separate surface waters inside and outside of the bund.

Stormwater that comes into contact with the emplaced sediments before the cell is capped would be managed as leachate and conveyed by leachate pipes to the leachate dam and treatment facility. The treatment of leachate may consist of basic treatment including sedimentation in the leachate storage pond and pH adjustment. It is proposed that, if required, leachate would be treated to meet DECC requirements before being discharged to the Hunter River.

Hatch was engaged by BHPB to investigate the effect of the proposed cell on the existing and future KIWEF surface water flows and adjacent pond water levels. The study concluded that the proposed stormwater infrastructure would be sufficient to remove any overflows from within the whole catchment in the event of the 1 in 100 year Average Recurrence Interval (ARI) storm and existing stormwater culverts would prevent the back-up of flows in pond levels.

The study also found that the water level in the pond immediately north of the emplacement cell (Deep Pond), known to be critical habitat for the GGBF (*Litoria aurea*), is unlikely to incur any backflow from downstream ponds, due largely to a 0.6m differential in standing water levels and the large surface area of this pond.

Both the Mayfield and KIWEF sites are not subject to flooding under the simulated 1 in 100 year flood event.

A range of environmental safeguards are also proposed to ensure that any potential adverse impacts on surface waters are appropriately managed.

Groundwater

Groundwater is generally present at the KIWEF site within two aquifers - the upper unconfined fill aquifer, and the underlying estuarine aquifer. The groundwater flow direction in the aquifers is to the south-west (i.e. towards the Hunter River).

Groundwater levels observed in response to rainfall suggests that recharge is occurring in the upper fill aquifer, and increasing heads in the confined estuarine aquifer.

Generally there was no visual or olfactory evidence (i.e. staining, odours or floating product) to suggest the presence of gross contamination within seepage water/groundwater and surface water. Although slight PAH odours or organic odours were observed in some wells during gauging or development.

Groundwater chemical analysis results were generally within the ANZECC 2000 trigger values for slightly to moderately disturbed systems (marine waters), although some elevated contamination levels (Manganese, sulphide and pH) were recorded. The presence of PAH concentrations within the fill aquifer in all upgradient wells may indicate that PAH levels are a result of upgradient sources.

A long term groundwater monitoring program is proposed that will ensure that the effects of the emplacement cell on ground water quality are known, measured and recorded. A total of 24 groundwater well locations are currently proposed for long term monitoring of groundwater at the KIWEF site, including 14 up-gradient, 4 across-gradient, and 6 down-gradient of the landfill site.

Groundwater quality will be monitored at the perimeter of the site to confirm that treated sediments are not leaching or causing an adverse impact on surrounding groundwater. Groundwater trigger levels will also be determined in consultation with the DECC for given chemical parameters to ensure the protection of groundwater quality at the site during and after works.

The remediation activities at the Mayfield site are being located as much as possible to be within the boundary of the underground bentonite wall that confines an area of existing groundwater contamination at the site.

The ground surface in this area has been extensively capped by the landowner over recent years in accordance with the DECC and Site Auditor requirements. This bitumen cap provides an effective seal over the area for the proposed handling and treatment of contaminated sediments, effectively preventing the potential for spills or other incidents that may contaminate the underlying aquifer system.

It should be noted that at the Mayfield site a separate system is proposed to isolate, capture and treat (via a water treatment plant) contaminated water from the dredging process, trucks and truck wash area, sediment stockpile areas and sediment treatment process. In addition a range of environmental safeguards are proposed to avoid or minimise the potential for escape of contaminated water.

In addition to this, BHPB is conforming to the strict requirements of the landowner and statutory authorities, including the DECC and DoP, to ensure the preservation of this bitumen cap during Stage 2 works including Site Auditor verification that this has occurred.

Infrastructure and Resources

Stage 2 of the HRRP has the potential to impact on a range of infrastructure at and immediately surrounding the Mayfield Site and KIWEF. This infrastructure includes roads, rail, pipelines, power, water, drainage, sewer, telecommunications and easements. In addition, Stage 2 activities will use resources such as electricity, water, fuel and other liquids and materials.

With respect to all relevant matters, no significant impact is expected on existing infrastructure or services and a number of environmental safeguards are proposed.

Aboriginal Heritage

Specialists from ENSR were engaged to prepare an Aboriginal Heritage assessment of the proposed works associated with the construction and operation of the emplacement cell at KIWEF.

Aboriginal community consultation was undertaken in accordance with the DEC (2004) *Interim Community Consultation Requirements for Applicants.*

In all, 6 Aboriginal community groups registered their interest in being involved. Consultation with the Aboriginal community groups has been ongoing throughout this HRRP and all registered stakeholders were invited to comment upon the draft of the Aboriginal heritage assessment report prior to its finalisation.

The most appropriate methodology for Aboriginal heritage assessment of the study area was deemed to be a detailed desktop assessment based on the history of land use in the study area, the extent of disturbance and modification to the landscape and a review of previous Aboriginal cultural heritage assessments in the vicinity of the study area. This approach was also discussed and agreed between BHPB and the DECC (*per comms Grahame Clarke, Regional Manager, DECC Hunter Region*).

On that basis, an Aboriginal heritage survey of the study area was not conducted. This methodology was agreed to by the local Aboriginal community.

The study area is entirely a modified landscape comprised of introduced industrial waste.

There are no known existing Aboriginal sites in the study area that can be assessed and it is likely that all material evidence of Aboriginal occupation has been destroyed by previous land use practices, and all original land surfaces have been destroyed by industrial dumping of coal rejects and slag.

Consequently it is considered that any physical evidence (artefacts) that may occur in the study area are likely be the result of secondary deposition and would no longer contain any contextual information. On that basis, it is considered that the study area has little or no archaeological potential and that no further archaeological investigation of the study area is required.

Whilst Aboriginal stakeholders regard the study area as having social/cultural value, no specific cultural heritage values were identified for the study area. Based on the combined scientific, educational and social/cultural value assessments, no cultural heritage values were identified specifically for the study area.

This assessment does not imply that the site is devoid of all value; rather it suggests that the cultural heritage values are not significant when considered in the wider context of Aboriginal sites in the Lower Hunter region.

Since all ground-breaking activities will be confined to the disturbed upper soil levels and the majority of the cell constructed above the current ground level, it is considered that there will be no adverse impacts on the Aboriginal cultural heritage values of the study area.

The report concludes that no further archaeological excavation, collection or monitoring is warranted for the construction project, however, should any Aboriginal objects be located during the HRRP, work should cease and DECC and the local Aboriginal community informed immediately.

Visual

The Mayfield Site is relatively flat and low lying and surrounded by industrial and port related development. The Koppers above ground pipeline is the main visible structure on the site. Previously the site was part of the large BHP Steelworks development.

The nearest residential areas are located some 680 m to the south in Mayfield. While these areas are elevated in comparison to the Mayfield site, views are relatively restricted.

The proposed Stage 2 works at Mayfield will introduce new structures, equipment and lighting, however the resultant changes will not be significant when viewed in the context of the surrounding industrial built form.

It is also relevant to note that the site is zoned to accommodate port and industrial development in the future.

The KIWEF site is located in an area which has been heavily disturbed as a result of landfilling activities and the current condition of the site is degraded with some artificially created ridgelines occurring in some areas. A mature stand of trees occurs in the south east portion of the site.

Surrounding land uses include landfills, the NCIG rail line (under construction) and port and industrial development further to the east. The Tourle Street Bridge is located to the south east.

The nearest residential areas are located some 1.2 km to the south in Warrabrook and Mayfield West. While these areas are elevated in comparison to the KIWEF site, the views are quite distant.

The proposed Stage 2 works will introduce new structures to the KIWEF site such as bund walls, stockpile areas and sediment/leachate ponds, equipment and lighting, and the site will become more visibly exposed given the proposed removal of existing trees.

The proposed elevation of the emplacement cell will be noticeable in the context of the existing landform. However, the landforms in this area have changed significantly over time as a result of landfill activities and the new NCIG rail line.

The resultant changes in views will not be significant when viewed in the context of the surrounding landfills, rail and road infrastructure and industrial built form.

It is also relevant to note that the site is zoned to accommodate port and industrial development in the future.

Other Environmental Issues

Dust

Potential dust impacts associated with Stage 2 of the HRRP are likely to be generated during earthworks and construction of the emplacement cell at KIWEF and to a lesser extent during the operation of the emplacement cell.

Given the sealed surface at Mayfield and the moisture content of the sediments, dust emissions are unlikely to be a significant issue. Transport of sediment is also unlikely to be a significant generator of dust emissions given that the haulage route is sealed and all trucks will be lined and covered.

Standard dust control measures would be implemented as required during Stage 2 works including regular watering of exposed areas, control of vehicle movements to defined areas and vegetating exposed surfaces where appropriate. It is expected these control measures would effectively manage any adverse impacts.

Lighting

Lighting at both the Mayfield and KIWEF sites is required in order to safely undertake remediation activities 24 hours per day, seven days per week. This would be a combination of permanent and temporary lighting of site areas, access roads, intersections, etc.

The Mayfield and KIWEF sites are located in the context of surrounding port and industrial development and the 24 hour activity and lighting that is associated with these developments. The closest residential areas are some distance away from both sites.

Lighting controls will be applied during construction and operations. Controls will include ensuring lights are directed down and towards work areas and feature louvres, shields or equivalent controls where adjacent to the wetlands at KIWEF to minimise the potential for impacts on the GGBF and other species.

Climate Change

Given the limited timeframe for this project the potential impacts from climate change (sea level rise and temperature increase) on the proposed construction and emplacement are expected to be minimal.

Sediment storage and treatment areas and contaminated water holding ponds on the Mayfield site will all be bunded. On the KIWEF site, the bunds of the emplacement cell, sediment and leachate ponds will be well setback from and elevated above the river level.

Waste

A Waste Management Plan will be implemented to facilitate correct waste segregation, maximise recycling and re-use, encourage responsible workplace behaviours and ensure all wastes are appropriately classified and disposed of in accordance with legislative and DECC guideline requirements.

Cumulative Impacts

Cumulative impacts have been assessed for the Stage 2 activities. These impacts have been assessed with respect to the combined effects of discrete environmental impacts (eg. the impact of the emplacement cell footprint, lighting and changes to water quality on the Green and Golden Bell Frog habitat) and the cumulative impacts when Stage 2 activities are considered together with other approved developments underway (e.g. NCIG coal export terminal and river dredging) or planned in the local area.

The assessment concluded whilst there is the potential for increases in cumulative noise, ecological, traffic and other impacts from the combined effects of this development, it is occurring within a framework in which impacts are being closely monitored and managed and are of limited duration. There are also agreed protocols in place, for example between BHPB and NCIG, for the joint investigation and response to complaints or environmental incidents that may be attributable to cumulative impacts.

Environmental Safeguards

The EA identifies a significant number of safeguards to responsibly and effectively manage each of the environmental issues referred above. These measures include avoidance, mitigation, management and offsetting measures to prevent otherwise control and compensate for the impacts caused.

In accordance with development consent conditions, a large number of Environmental Management Plans are to be prepared and approved by the relevant statutory authorities prior to the commencement of Stage 2 works. These Plans will provide additional levels of detail to that reported in this EA regarding the specific management, monitoring and reporting measures to be applied. As part of this process, the requirements of the DECC, DoP and other statutory approval authorities will be satisfied.

All relevant conditions of the development consent and other related approvals will be complied with during the implementation of the Stage 2 works.

Conclusion

It is the position of BHPB that the requirements of Condition A2.2(a) of the development consent have been satisfied from the Stage 1B (trial remediation) and other bench-scale and investigative studies undertaken to date. The current SOS will provide additional information used to confirm and refine some elements of the remediation activities and associated environmental management but the fundamental processes will remain unchanged.

This being the case, approval is now being sought to commence Stage 2 remediation works on a 24 hours per day, 7 days per week basis from early 2009 for an estimated timeframe of between 18 months to 2 years. The Stage 2 works will be subject to the existing suite of controls as contained in the existing development consent and will augment these controls where necessary. It will also be subject to the obtainment of all other relevant approvals including Environmental Management Plans.

1.0 Introduction

1.1 Background

ENSR Australia Pty Ltd (ENSR) has been engaged by BHP Billiton Limited (BHPB) to prepare this Environmental Assessment (EA) for the proposed Stage 2 (full-scale) remediation works associated with the Hunter River Remediation Project (HRRP).

The HRRP is located on the South Arm of the Hunter River and two adjacent sites at Mayfield and Kooragang Island (KI) near Newcastle, NSW (refer **Figure 1**). The HRRP involves the removal, treatment and disposal of sediments from the South Arm of the Hunter River that have been contaminated from the operations on adjacent lands of the former BHP-owned Newcastle Steelworks that closed in 1999.

The HRRP will provide a number of significant benefits, but primarily it will:

- Remove the potential Significant Risk of Harm (SRoH) to the environment that the contaminated sediments represent in the river, thereby providing a cleaner river environment;
- Meet BHPB's statutory obligation to address the SRoH that the contaminated river sediments represent in accordance with a Voluntary Remediation Agreement (VRA) between BHPB and NSW Department of Environment and Climate Change (DECC); and
- Allow for the extension of shipping channels in the South Arm of the Hunter River thereby supporting the on-going expansion of port and industrial facilities within the Port of Newcastle.

The Stage 2 works essentially involve:

- The full-scale remediation of contaminated sediments dredged from the Hunter River on land that was previously occupied by the BHP-owned Newcastle Steelworks (known as the Mayfield Site);
- The construction of an emplacement facility for the treated sediments on a former landfill site on KI to the north west of the Tourle Street Bridge (known as the Kooragang Island Waste Emplacement Facility - KIWEF); and
- The transport and placement of treated sediment from Mayfield to KIWEF (or other facility lawfully able to accept it).

The HRRP Stage 2 remediation activities (including the construction, operational and decommissioning phases) are expected to occur over an approximate 18 month to two year timeframe commencing around February 2009.

BHPB is seeking approval to proceed to Stage 2 works under the original development consent (DA-134-3-2003-i) – referred hereafter as "the development consent" - for the extension of shipping channels within the Port of Newcastle including dredging, excavation, treatment and disposal of sediments from the South Arm of the Hunter River. The original development consent was issued by the Minister for Planning on 9 August 2005 and has been subsequently modified on a number of occasions since, most recently in July 2008.

The development consent provided for a staged approach to development as follows:

a) *Stage 1A comprising all dredging works of clean and contaminated materials, and transfer of those materials off-site for treatment and/or disposal*

b) *Stage 1B comprising all works associated with the remediation of up to 6,500m3 of contaminated material from Stage 1A, including handling and transfer of treated materials off-site for further treatment and/ or disposal, and*

c) *Stage 2 comprising all works associated with remediation of contaminated materials from Stage 1A not the subject of Stage 1B works.*

Specifically BHPB is seeking approval in this application to proceed to Stage 2 in accordance with Condition A2.2(a) of the development consent. Condition A2.3 sets out the matters which must be demonstrated to the Minister's satisfaction in seeking such an approval.

Works associated with the dredging and transfer to shore of river sediments (Stage 1A) and trial remediation at Mayfield (Stage 1B) have already been approved. As part of this approval process ecological and Aboriginal heritage issues associated with the Mayfield site have already been assessed.

In accordance with Condition C2.16 of the development consent, in this application, BHPB is also seeking approval from the DoP to undertake the proposed Stage 2 operations on 24 hours per day, 7 days per week basis.

Operating on a 24 hour, 7 days per week basis would help ensure the HRRP is undertaken in the shortest possible timeframe whilst still achieving the necessary engineering, environmental and wider outcomes. It will:

- align with the approved hours of operation for dredging and related activities (defined as Stage 1A in the development consent) to enable real-time dredging, treatment, transport and emplacement. This will provide efficiency and environmental gains, including reduced stockpile areas and so less odour and water quality impacts from the Mayfield site;
- ensure treated sediments are delivered to KIWEF in a timely fashion prior to the setting of the slag cement;
- minimise the duration of potential amenity and traffic impacts on the local community;
- provide necessary flexibility and contingency in the event of unforeseen operational interruptions (e.g. prolonged periods of adverse weather, equipment failures, traffic delays, etc); and
- reduce the potential for delays to the dredging of the shipping channels in the Port of Newcastle for other activities and the redevelopment of the former Newcastle Steelworks site.

Table 1 identifies where the specific requirements of these development consent conditions are addressed within this EA report including where any potential associated environmental impacts and safeguards are discussed.

Table 1: Location of Consent Condition Requirements in EA Report

Development Consent Requirements	
Requirement	**Section Addressed**
Condition A2.2(a)	
a) where Stage 1B works are successful in achieving the remediation outcomes specified under this consent, the Minister's approval may be sought to continue Stage 1B works as Stage 2, without the need for a new modification or development application under the *Environmental Planning and Assessment Act 1979*.	**Section 1.3** **Section 4.2** **Section 6.2.3**
Condition A2.3	
a) all conditions of this consent applicable to remediation works have been complied with and will continue to be complied with during Stage 2;	**Section 6.2.3** **Section 21**
b) the Stage 1B works can be applied without change to the achievement of remediation outcomes during Stage 2, including demonstration that the works will not require expansion beyond the physical footprint of the Stage 1B works;	**Section 6.2.3**
c) all mitigation, management and monitoring measures applied to the Stage 1B works have been updated to reflect application to Stage 2;	**Section 21**
d) the DEC [DECC] has been consulted in relation to continuation of Stage 1B works as Stage 2, and that the DEC [DECC] is satisfied with the application of Stage 1B works to Stage 2.	**Section 1.3** **Section 4.2** **Section 6.2.3**
Condition C2.16	
The time restrictions specified under Condition C2.15 of this consent may be varied with the Director-General's agreement with the proposed variation in times, including the results of any community consultation that the Director-General may require to be undertaken, and after considering any information necessary for the Director-General to reasonably determine that activities undertaken during the varied hours will not adversely impact on the acoustic amenity of receptors in the vicinity of the site.	**Section 6.2.4** **Section 7** **Section 11** **Section 21** **Appendix A** **Appendix C** **Appendix D**

1.2 Extension of the Shipping Channels: Port of Newcastle

The Waterways Authority (now NSW Maritime, NSWM), on behalf of the NSW Government, proposed to dredge the South Arm of the Hunter River to extend the shipping channel in the Port of Newcastle. The extended shipping channel would provide deep water access to future berth sites and facilitate the expansion of port related facilities along the South Arm of the Hunter River.

The deeper shipping channel would enable Panamax and Cape class vessels to travel 3km further upstream along the South Arm of the Hunter River to a point immediately east of the Tourle Street Bridge. A new swing basin is proposed adjacent to the OneSteel site which would allow partially loaded Panamax and Cape class vessels to turn, or swing, around before berthing or continuing downstream.

The need for the shipping channel extension was based on the existing port facilities having insufficient capacity to cater for the anticipated increase in demand for such facilities and particularly the growth in coal exports which is the Port of Newcastle's main export product.

The South Arm of the Hunter River was identified as the appropriate location for shipping channel expansion due to the availability of suitable industrial land, access to transport infrastructure and its comparatively passive hydraulic characteristics compared to the North Arm of the Hunter River (preferred for vessel navigation).

In 2003, an Environmental Impact Statement (EIS) was commissioned by the Waterways Authority for the proposed extension of the shipping channel. The key foci of the EIS were an in depth examination of the dredging and bank protection processes, a review of the treatment options for the dredged contaminated sediments and an outline of the methods and options for the disposal of clean and contaminated sediments, sand and rocks dredged from the river.

The original application and EIS were lodged with the Department of Infrastructure Planning and Natural Resources (DIPNR) in March 2003 and November 2003, respectively and a supplementary report was submitted to the DIPNR in November 2004. In August 2005 the Minister for Planning approved the proposed development (DA-134-3-2003-i).

The EIS acknowledged the need for suitable disposal of treated contaminated and non-contaminated sediments and identified KI as potentially being an appropriate location for the waste emplacement facility. The development approval proposed that the overall HRRP should be undertaken in stages so that the proposed remediation method for the contaminated sediments could be tested before the full scale treatment and disposal (Stage 2) proceeded.

BHPB has now undertaken the work required by the development consent to establish the suitability of the treatment and disposal option which is proposed and accordingly submits this EA under the relevant conditions contained in the development consent.

1.3 Identification and Remediation of Contaminated Sediments

1.3.1 EPA Declaration of Remediation Site

In 1999, BHP Limited (now BHPB) notified the Environment Protection Authority (EPA), which is now part of the DECC, of a potential Significant Risk of Harm at a number of industrial sites related to the former BHP Steelworks operation at Mayfield.

In mid-2001, the EPA declared both the former BHP Steelworks site and bed sediments of the Hunter River which fall within 120 m of the Steelworks site as a remediation site under Section 21 of the *Contaminated Land Management Act 1997*.

This declaration triggered the requirement for further investigation and remediation works to be undertaken, to address the potential Significant Risk of Harm.

Subsequently, BHPB has entered into a VRA with the DECC for this declaration area.

In the context of the EPA declaration and the VRA, the HRRP seeks to effectively remove and remediate contaminated sediments from the South Arm that have resulted from the operation of the former Newcastle Steelworks.

1.3.2 Nature of Contamination

The contaminated sediments have been identified within two zones: the Primary Remediation Zone (PRZ) that includes two smaller surgical dredging areas and the Secondary Remediation Zone (SRZ) as shown in **Figure 1**.

The contaminated material generally consists of fine-grained silty clays that have been principally contaminated from industrial developments along the southern bank during the last 100 years. The principal contaminant of concern within the river sediment is polycyclic aromatic hydrocarbons (PAHs) in particular naphthalene derived from coking coal. Coal tar, a by-product of the coke ovens, is also believed to have been released through leaks, spills, and disposal in waste pits. Other contaminants of concern in the sediment include ammonia, cyanide, total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, and xylenes (BTEX) and trace metals (cadmium, chromium, copper, lead, mercury, nickel and tin).

Based on the most recent volumetric assessment, the approximate quantity of contaminated material to be dredged from the PRZ and SRZ is 740,000 m^3. A 25% contingency allowance has been made for potential over dredging and for bulking up of the sediment after slag cement treatment. On this basis, it is conservatively estimated that there would be up to 930,000 m^3 of treated material to be disposed of in the emplacement cell at KIWEF.

The final figure may be somewhat less than this as it is likely that some of the dredged sediment material may not be contaminated to the extent that it requires treatment. This material would be classified in accordance with relevant DECC guidelines and disposed of at an appropriate landfill facility which is licensed to accept such material.

Since the original EIS was prepared in 2003 there has been a significant increase in the estimated volume of contaminated sediments that require dredging and treatment. Primarily this is because there has been significant additional work undertaken since this time to more accurately characterise the extent of contamination in the river sediments through more river coring, analyses and modelling.

Also the criteria for determining what constitutes sediment requiring onshore treatment versus what is suitable for offshore disposal has changed from some of the original EIS assumptions were made. This criteria has been modified to be more conservative during the ongoing discussions BHPB has had with the relevant statutory authorities, including the DECC and the Department of the Environment, Water, Heritage and the Arts (DEWHA). On this basis, the results of this additional work to characterise the full extent of contamination within this section of the South Arm have been accepted by the DECC and the DEWHA.

1.3.3 Previous Remediation Investigations

Since closure of the Newcastle Steelworks, BHPB has commissioned several studies to confirm the contaminated sediments in the South Arm and determine the preferred remediation process. These studies have included:

- Sediment Remediation Options Study undertaken by URS in 2001;
- Bench-scale testing was undertaken by URS in 2003, 2004 and 2005 to evaluate the efficacy of cement stabilisation;
- A trial remediation project (TRP) was conducted by URS in 2006 on approximately 1,250 m^3 of contaminated sediment to demonstrate that cement stabilisation could successfully treat the contaminated sediments; and
- Further investigation and bench scale testing was undertaken by CH2M Hill in 2007 and 2008 to progress the technical and engineering details to a level necessary to satisfy the immobilisation and other approval requirements of the DECC.

These studies have confirmed the location, concentration and distribution of contaminated sediments and characterised their physical and chemical properties. This has enabled informed decisions to be made regarding the preferred treatment and disposal processes.

BHPB is currently completing a Stabilisation Optimisation Study (SOS), or second trial remediation project. The SOS is scheduled for completion in late December 2008. Under Stage 1B of the modified development consent, BHPB can remediate up to 6,500m^3 of contaminated material on a trial basis to inform the full-scale remediation process.

The main objectives of the SOS are to refine the optimal operating conditions and key environmental management measures, such as odour and water management, for the full-scale dredging and treatment processes.

However, results from the SOS are not considered material nor required in order to obtain approval to proceed to Stage 2 given firstly, the significant level of work already undertaken and secondly, the immobilisation approval obtained from the DECC in October 2008 that endorses the treatment process to be applied.

It should also be noted that the environmental management plans (EMPs) required by the development consent and that are currently being prepared will capture additional levels of detail where appropriate, including any relevant results from the SOS, with respect to refinement of processes and management measures.

1.3.4 Dredging of Contaminated Sediments

Contaminated sediments are to be removed from the South Arm of the Hunter River by using mechanical dredges and engineering controls, including a temporary in-river sheet pile wall, permanent onshore sheet pile wall, silt curtains, and the use of specialised environmental dredge buckets. Contaminated dredged material is to be transported by barges or other methods to the sediment receiving areas at the Mayfield site.

All dredging work has been assessed and approved as part of Stage 1A of the original development consent (DA-134-3-2003-i).

1.3.5 Treatment Process for Contaminated Sediments

An assessment of the available options for the treatment of the contaminated sediments was examined in the original EIS. The original EIS determined that, based on the alternative treatment options available, cement stabilisation would be the most appropriate technology for the treatment of contaminated sediments.

Cement stabilisation is an immobilisation or fixation process whereby contaminated sediments are mixed together using a select cement product (that includes slag to enhance strength) and allowed to cure.

Cement stabilisation is usually performed using equipment similar to that of a standard concrete batching plant to blend the sediments with the cement. This process binds the contaminated sediments into a matrix which immobilises or ‘locks up’ the contaminants and helps prevents the leaching of contaminants once the treated sediments are placed within the emplacement cell.

The treatment process has been approved by the DECC in their immobilisation approval granted 22 October 2008 (Approval Number 2008-S-03). This approval was critical to obtain prior to submitting this application to proceed to Stage 2 as it provides evidence that DECC, as the key regulatory authority for the treatment process, considers that the results from the trial remediation and bench-scale studies undertaken until now have been adequate to satisfy DECC's immobilisation approval requirements, so that remediation can proceed from Stage 1B to Stage 2 works.

Obtaining this immobilisation approval was considered essential by BHP Billiton in order to satisfy the relevant requirement of Condition A2.3 (d) of the development consent that refers to matters which must be demonstrated to the Minister's satisfaction in seeking approval to proceed to Stage 2.

1.4 Environmental Assessment (EA)

1.4.1 Purpose of this EA

This EA has been prepared by ENSR to support BHPB's request to obtain approval for the following:

- to commence Stage 2 works under Condition A2.2(a) of the development consent; and
- to operate remediation activities 24 hours a day, 7 days a week under Condition C2.16 of the development consent.

The EA assesses the environmental effects of the Stage 2 remediation activities and describes the measures necessary to minimise potential for adverse impacts that have been identified.

The EA is intended to enable the DoP to make a determination regarding the progression of activities to Stage 2.

As noted earlier, activities associated with the dredging of river sediments (Stage 1A) and trial remediation works at Mayfield (Stage 1B) have already been approved and therefore are not assessed as part of this EA.

1.4.2 Preparation of the EA

An analysis of the proposed Stage 2 remediation activities identified a number of environmental and other issues which warranted investigation and assessment. As such, a range of technical specialists were engaged to support the preparation of this EA including:

- CH2M HILL (design of Mayfield remediation and KIWEF landfill cell, odour);
- Douglas Partners (soil, geology, geotechnical and groundwater);
- Harper Somers O'Sullivan (flora and fauna);
- Spectrum Acoustics (noise);
- Connell Wagner (transport);
- ENSR (Aboriginal cultural heritage); and
- Hatch (surface water).

A number of Appendices have been included in the EA document as follows:

- Appendix A – Hours of Operation
- Appendix B – Flora and Fauna Assessment
- Appendix C – Noise Impact Assessment
- Appendix D – Treated Materials Transport Strategy
- Appendix E – Aboriginal Heritage Assessment

2.0 Project Site and Surrounding Area

2.1 Mayfield Site

The Mayfield site is located on the south bank of the South Arm of the Hunter River and immediately adjoins the OneSteel site which is to the west. The site has an area of approximately 25 hectares and is accessed from Selwyn Street.

The site is relatively flat and is largely devoid of vegetation. The majority of the site has been sealed with asphalt as part of the land based remediation works for the former BHP Steelworks site. An elevated pipeline structure owned by Koppers runs west to east through the site roughly parallel to the south bank of the Hunter River. The site is secured with chain wire fencing and security entrance gates.

The Mayfield site was formerly occupied by the BHP Steelworks which operated from 1915 until 1999. The Steelworks operations included receiving and storage facilities for iron ore, limestone, coal and the necessary infrastructure for sintering, iron making, and coke making. Site activities included processing coke oven by-products, steel making, bloom casting, and billet production.

All above ground hazardous and contaminated materials and process residues were removed in accordance with environmental requirements during the demolition period, completed in June 2004.

The site has recently undergone a comprehensive sub-surface remediation operation. The remediation works included the construction of a subterranean barrier wall to contain contamination in part of the site and the capping of contaminated areas with asphalt/bitumen.

The Newcastle Port Corporation (NPC) now manages the site on behalf of the NSW Government. It is proposed that once the Stage 2 remediation works are completed the Mayfield site will be developed for port related uses such as a container terminal, together with associated general industrial and technology/commercial land uses and a new rail siding extending through the site. This proposal is known as the Intertrade Industrial Park.

2.2 KIWEF Site

The KIWEF site is located on the western part of KI immediately to the north west of the Tourle Street Bridge. The site has an area of approximately 36 hectares and is accessed from Cormorant Road some 150 m north of the Tourle Street Bridge.

The site has operated as a landfill since the early 1970s and as a result the landscape is not uniform. There are a number of pronounced ridgelines and some natural depressions in the north, north east and south west portions of the site where water bodies (ponds) have formed. At its southern extent the site falls away toward the South Arm of the Hunter River.

The site supports a range of vegetation including low level grasses which have established after the completion of landfill activities. These include introduced native landscape planting, mangrove and saltmarsh areas adjacent to the Hunter River and freshwater wetland areas in the north, north east and south west parts of the site.

KI was originally a series of islands (including Ash Island, Dempsey Island, Moscheto Island and Walsh Island) near the mouth of the Hunter River. European settlers initially used the islands for agriculture. KI was substantially filled in the 1950s as part of the Hunter River Islands Reclamation Scheme, which joined Dempsey, Moscheto and Walsh Islands with dredged sand and fill material. The development was completed in 1960 and officially named KI in 1968.

The island covers an area of approximately 2,600 ha and large areas have been designated for industrial development and port related activities. In 1972, BHP commenced operating an industrial landfill on KI. Industrial waste materials (e.g. coal washery rejects, steel manufacturing waste and construction waste) were deposited in the landfill.

Today land on the western part of KI, including the KIWEF, is zoned to accommodate port related industrial development in the future. Further to the north and west is the railway line (currently under construction) for the Newcastle Coal Infrastructure Group (NCIG) coal export terminal and then the KI Wetlands. The eastern section of KI is populated by industrial developments that include Port Waratah Coal Service (PWCS), Orica, Simsmetal, Cargill, Cleanaway, Boral and Transfield.

The locations of the Mayfield and KIWEF sites can be seen in **Figure 1.**

2.3 Land Title and Ownership Details

The NSW Maritime Authority (NSWM) is the owner of the riverbed in the South Arm of the Hunter River.

The NSW Government is the owner of the Mayfield site and the land is currently managed by the NPC, on its behalf. This area of the former Newcastle Steelworks site was transferred by BHPB to the NSW State Government in 2002. The site is formally described as Lot 33 on DP 1116571.

The KIWEF is also owned by the NSW Government and is managed by the Hunter Development Corporation (HDC) on its behalf. The site is formally described as Part Lot 12 DP111972.

2.4 Surrounding Area

Table 2 and **Table 3** below summarises the surrounding land-uses to the Mayfield and KIWEF sites.

Table 2: Surrounding land uses to the Mayfield site

Direction	Surrounding Land Use and Ownership
North	Directly to the north lies the South Arm of the Hunter River and beyond that is KI which contains a number of port related industrial activities. On the north bank of the river is land being developed by the Newcastle Coal Infrastructure Group (NCIG) which will be developed as a coal export terminal. Further north are a number of industrial operations and the Port Waratah Coal Services coal export facilities.
East	Directly to the east of the site lies the South Arm of the Hunter River and beyond that is the south eastern extent of KI. On this section of KI are operations such as Incitec Pivot, Orica Australia, Agriterminal (grain exporter) and Sawmillers Exporters (woodchip exporter).
South	Directly to the south is the balance of the former BHP Steelworks site, which is currently vacant and being managed by the NPC and HDC. The proposed land use includes a bulk container storage area, general industry and technology/commercial land uses (known as the Intertrade Industrial Park). Further to the south is the PWCS coal export facility at Carrington and across Industrial Drive are the residential areas of Mayfield.
West	Directly to the west of the site is the OneSteel facility and further west is the Koppers Carbon Materials & Chemicals facility.

Table 3: Surrounding land uses to the KIWEF site

Direction	Surrounding Land use
North	Directly to the north is vacant land that has previously been used as an industrial landfill, predominately coal washery rejects and, to a lesser extent, steel making by-products such as fly ash. The NCIG rail spur associated with the new coal export terminal is currently being constructed on the northern boundary of the site. On the northern side of this rail line easement is also a major local water feature known as Deep Pond. North east of the site lies the former Delta EMD landfill site.
East	Directly to the east is vacant land that has previously been used as an industrial landfill. Further to the east is the proposed coal storage area associated with the new NCIG coal export terminal.
South	Directly to the south is the South Arm of the Hunter River and the Tourle Street Bridge. Directly across the River is Delta EMD and the Steel River Eco Industrial Estate. Further to the south are the residential areas of Mayfield West and Warabrook.
West	To the immediate west of the site is vacant land that is a former general refuse landfill site. Further to the west is the rail line which services the PWCS and (under construction) NCIG coal export facilities. Further to the west and north lies the Kooragang Wetlands and Ash Island.

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3.0 Project Justification

3.1 Environmental Justification

The bed sediments of the Hunter River which fall within 120 m of the Steelworks site were declared by NSW EPA to be a SRoH site in 2001. BHPB has subsequently entered into a VRA with DECC that requires active removal of the contaminated sediments from the South Arm and their proper treatment and disposal.

The Stage 2 activities the subject of this application would provide a number of direct environmental benefits, primarily creating a healthier river system for its intrinsic worth and value to current and future generations.

3.2 Strategic Justification

The development of the Port of Newcastle is consistent with the NSW Government's strategic direction for ports in NSW as documented in the 'Newcastle Port Environs – Concept Proposal' prepared in 2003 on behalf of Planning NSW (now Department of Planning). This concept proposal identified that:

- the long-term strategy for the region should strive to facilitate port related industry which is a significant employment generator; and
- improved deep water access to the port would provide significant opportunities in terms of attracting additional heavy industry.

The dredging, treatment and disposal of the contaminated sediments is a critical element of the broader shipping channel extension project for the South Arm of the Hunter River which was the subject of the development consent granted on 9 August 2005.

Extension of the shipping channels will provide deep water access to future berth sites and facilitate the expansion of port related facilities. This would secure the potential for the continued sustainable economic growth of the port, which is an economic and trade centre for the Hunter Valley Region as well as for much of north and north-western NSW (GHD, 2003). The port is the key export centre for the NSW coal industry.

The need for the shipping channel extension is due to the insufficient capacity of existing port facilities to cater for the anticipated future increase in demand for such facilities. The port facilities have experienced a 10 per cent increase in shipping movements between 2006/07 and 2007/08 and further growth is expected in the future.

The South Arm of the Hunter River was identified as the most appropriate location for the shipping channel expansion due to:

- the availability of suitable industrial land;
- access to transport infrastructure; and
- its comparatively passive hydraulic characteristics compared to the North Arm of the Hunter River which makes it more suited for vessel navigation.

The proposed extension of the shipping channel would lengthen the channel from the end of the existing shipping channel, adjacent to the PWCS Coal Loader, to approximately 3km up river to terminate just east of the Tourle Street Bridge. The extension of the shipping channel would also include a swing basin adjacent to the OneSteel site. The swing basin will allow partially loaded Panamax and Cape class vessels to turn, or swing around before berthing or continuing downstream.

The dredging activities associated with the extension of the shipping channels are constrained by the location of the contaminated sediments in the PRZ and SRZ adjacent to the Mayfield site. As a result, the timely removal of these sediments is important to enable the planned extension of the shipping channels and associated development.

Operating 24 hours, 7 days per week will reduce the time needed to complete the Stage 2 activities whilst also providing a capacity to cope with unforeseen events and achieve improved environmental and engineering outcomes.

3.3 Economic Justification

The HRRP would generate positive economic benefits for Newcastle and the Hunter Region through the removal of materials from the South Arm of the Hunter River adjacent to the former Newcastle Steelworks site at Mayfield, and subsequent extension of the shipping channel to provide deep water access to future berth sites.

The outcomes of this process would facilitate the expansion of port related facilities along the South Arm of the Hunter River thereby supporting the economic development and growth of the Hunter region in a manner consistent with regional economic development strategies.

The Port of Newcastle is critical to the economic development of the Hunter region. Total trade handled through the Port in 2007/08 was 93.31 million tonnes compared to 85.60 million tones in the 2006/07 financial year and the value of trade through the Port rose by $2 billion between 2006/07 and 2007/08.

The HRRP also involves a substantial investment by BHPB to address the environmental legacies associated with its former Steelworks operation. The excavation, treatment, transport and emplacement of contaminated sediments from the South Arm is estimated to cost in the order of hundreds of millions of dollars.

The HRRP would generate employment during its pre-planning, construction and operational phases over an 18-24 month timeframe. As a result of this employment, there would be additional indirect economic activity created for the local economy.

3.4 Justification of Location

The Mayfield site is considered an appropriate and suitable place to temporarily store and treat the sediments as the site is adjacent to the PRZ and SRZ areas of the river from which the contaminated sediments would be dredged (refer **Figure 1**).

The site comprises part of the former BHP Steelworks site which has been remediated, capped and is now predominantly sealed with asphalt/bitumen. It is largely undeveloped, provides direct river access for barge unloading and would be suitable for undertaking the temporary works associated with the treatment of contaminated sediment.

The site has historically been used for industrial purposes and is located to provide reasonable separation from the closest residential areas in Mayfield to the south and south west. It is also well connected to the arterial road system via Selwyn Street.

The KIWEF is an existing licensed landfill facility which can accept certain wastes and it has been used for this purpose since the early 1970s. The site has good access to the arterial road network and importantly it has sufficient area to accommodate the expected volume of treated sediments. The soil profile is such that settlement and gross contamination are not likely to be major issues. On completion of emplacement the cell would be capped and the site prepared for future industrial development consistent with its nominated zoning.

4.0 Consideration of Alternatives

4.1 Overview

Throughout the development of the HRRP, a number of alternatives were considered in respect of:

- Treatment of contaminated sediments;
- Location of the emplacement cell on KI;
- Footprint and design of the emplacement cell;
- Transport of treated sediments; and
- Operating hours.

These alternatives are discussed below together with the consequence of not proceeding.

4.2 Treatment of Contaminated Sediments

A number of alternative options for remediation of the contaminated river sediment were considered, including cement stabilisation, bio-remediation, solvent extraction, incineration and thermal desorption. An evaluation of these different alternatives was provided in the original 2003 EIS for the extension of the shipping channel in the South Arm of the Hunter River.

The most appropriate remediation option was considered to be cement stabilisation (supported by the original 2003 EIS and by subsequent trial remediation and bench-scale studies). This option involves immobilising the sediment by binding it with material (in this case slag cement) into a solid matrix.

This option was considered to be most appropriate because:

- It is a proven technology which has previously been used to deal with similar or equivalent primary contaminants in Australia and overseas;
- It is a simple and repeatable mixing process similar to that used to produce concrete in a concrete batching plant and it uses commonly available materials (i.e. commercial grade slag cement);
- There are limited environmental issues during treatment in contrast with some of the alternatives;
- The process is efficient, reliable and able to deal with the range of contamination expected within the dredged sediments;
- The sediments extracted from the river will contain a high moisture content which can be dealt with in the stabilisation process unlike other treatment methods;
- The stabilised sediment will effectively immobilise the contaminants thereby minimising potential for migration to soil or groundwater when they are emplaced in the landfill cell;
- It increases the strength of the treated sediment which makes it more suitable for re-use, in this case as an engineering fill material should the landfill site be developed (as intended) for industrial purposes in the future.

The cement stabilisation treatment methodology proposed for Stage 2 has been endorsed by DECC, and a specific Immobilisation Approval (Ref: 2008-S-03) was issued for the treatment process on 22 October 2008.

4.3 Location of Emplacement Cell

Three sites on KI were considered in selecting the location of the emplacement cell(s). All of the sites examined were previously used for landfilling activities and were located in the wider area to the north, north west and north east of the Tourle Street Bridge.

After investigation of various siting options, the KIWEF was chosen as the most appropriate location for the placement of treated sediments as:

- The site is an existing licensed landfill facility which can accept certain wastes and it has been used for this purpose since the early 1970s;
- It is in reasonable proximity to the Mayfield site and is readily accessible from the arterial road network (Industrial Drive and Tourle Street/Cormorant Road);
- Of the three potential sites investigated on KI it was the only site which provided sufficient capacity for the expected volume of treated sediments;
- The site's soil profile is such that the emplacement cell is expected to have lower future settlement (the extent of settlement can potentially influence the integrity of the emplacement cell structure);
- Based on soil investigations and the known history of the landfill site, it was expected to contain primarily coal washery reject and blast furnace slag associated with the former BHP Steelworks operation at Mayfield and it was less likely to contain gross chemical contaminants, and
- It would allow for future beneficial re-use of the site for port related industrial land uses consistent with its zoning, subject to appropriate design of the emplacement cell structure and capping.

All sites evaluated had the potential to cause adverse ecological impacts without careful and considered management.

4.4 Footprint and Design of Emplacement Cell

The KIWEF site contains ecological constraints primarily associated with the recognised habitat of the Green and Golden Bell Frog. The layout and design of the emplacement cell has been significantly revised and modified to protect areas of critical habitat from direct and indirect impacts.

Originally the proposed emplacement footprint required the filling of much of the wetland habitat of the Eastern Low-lying Area. However, following the identification of ecological constraints within the site, further refinement of the emplacement design was undertaken by BHPB.

Significant consultation was undertaken with the DECC, specialist ecological consultants and local community environmental groups in order to support a design that represented the best feasible environmental outcome.

Several design iterations were undertaken which involved a contraction of the emplacement cell footprint with a commensurate increase in height of the cell so that the overall emplacement volumes were maintained.

This process resulted in more than 80% of the existing wetland habitat being conserved in the emplacement design. The wetlands are considered to be core habitat for Green and Golden Bell Frog (*Litoria aurea*) in addition to providing habitat opportunities for the aquatic plant *Zannichellia palustris* and several avifauna species. This retention of habitat through avoidance measures also allowed a contiguous corridor to be preserved between Ponds H and I, which was considered an important issue.

The substantial redesign of the emplacement will incur a cost of millions of dollars to BHPB (paid as penalties to the landowner for an increase in height of the emplacement to offset the smaller footprint) and has delayed finalisation of the project design (for a critical project schedule) by more than 3 months. This demonstrates BHPB's firm commitment to significantly reducing its potential for ecological impacts as part of the HRRP.

Figure 15 shows the original emplacement cell footprint in comparison with the revised footprint which is discussed within this EA report.

The revised emplacement will have a maximum final surface height of approximately 14.5m AHD at the ridge peak. The northern bund of the landfill has been located to avoid the existing wetland habitats (with only the toe of the side batter encroaching on the edges of Ponds H and I) and the southern bund has been located so as to avoid existing freshwater wetland and estuarine habitats to the south along the Hunter River.

Options continue to be assessed as part of the emplacement cell design to enhance and provide additional habitat for the Green and Golden Bell Frog population. This includes the opportunity to provide shelter and foraging habitat along the side batters and within the sediment pond areas of the emplacement cell. Creation of this additional habitat will be the subject of ongoing consultation with DECC.

In addition to the changes in footprint design, an assessment of environmental safeguards has been undertaken to minimise or manage potential residual effects. These safeguards are detailed in **Section 21** of this report.

4.5 Transport of Treated Sediment

A range of options for transporting the treated sediment to KIWEF were investigated including transport by barge, pumping by pipeline and road haulage.

Barge transport was not supported as it was not considered to be efficient, involved safety risks associated with vessels travelling beneath the Tourle Street Bridge and required alteration to the more sensitive riverine environment along the bank of the Hunter River at KIWEF. Pipeline transport was rejected as it carried significant environmental risks, including spills over or near water of untreated sediment and management of a significant volume of contaminated water at KI. It also required negotiations with various landowners to create an easement and there were limited contingencies available in the event of a pipe failure.

As a result, road haulage was settled on as the most appropriate option for transport of the treated sediment.

TA number of haulage route options were considered including a route which used George Bishop Drive on the return trip to the Mayfield site. This route was not supported because the road is in relatively poor condition and there were safety and capacity constraints.

The proposed haulage route was selected as the most appropriate route option as:

- It is a relatively direct route which is focused on the main arterial road system (Industrial Drive, Tourle Street and Cormorant Road) and avoids roads that do not cater for heavy industrial vehicles;
- The route has the capacity to safely accommodate the expected increase in traffic flows;

- The route utilises existing traffic control infrastructure (signalised intersections, new KIWEF site access road and Teal Street roundabout) and upgrade of this infrastructure for the haulage activity is not required;
- The route avoids significant potential conflicting traffic movements (e.g. right turning trucks from the KIWEF site onto Cormorant Road would be prohibited), and
- It is currently understood the replacement of the Tourle Street Bridge will be completed by the latest mid 2009 and so is unlikely to overlap with the start date for Stage 2 road haulage.

4.6 Operational Hours

A range of operational hour scenarios have been considered. Adopting operational hours as specified in the existing development consent would result in:

- significant delays to the completion of the project;
- process issues from misalignment with approved dredging hours;
- increasing the scale of environmental impacts related to odour and water management from having larger stockpile areas at Mayfield to store sediment awaiting treatment and transport to KI;
- undermining the immobilisation process by not allowing a rapid transfer of treated sediment to KI where it needs to cure to achieve the targeted engineering strength outcomes;
- compromising the ability to cope and quickly recover from unforeseen events, including prolonged and/or severe adverse weather conditions, and significant equipment or process failures.

The scenario to operate for 24 hours per day, 7 days per week, which is the subject of this application to proceed to Stage 2, addresses these constraints.

4.7 Consequence of Not Proceeding

By not proceeding with Stage 2, BHPB would be failing to meet its statutory obligations to address the SRoH associated with the contaminated river sediments in the South Arm. Amongst other approvals, the statutory obligations are primarily defined within the:

- development consent; and
- VRA approved by DECC.

Not proceeding with this work would leave the contaminated river sediments in place resulting in a significant residual environmental risk for the Hunter River and its dependant ecosystems in addition to its many users.

It would also prevent the extension of the shipping channel within the South Arm which is critical to the future expansion of the port facilities and related industrial development. This would have significant downstream economic and social impacts.

5.0 Project Description

Stage 2 of the HRRP involves four main components:

- the temporary storage and treatment of contaminated sediments dredged from the Hunter River (known as the Mayfield site)
- the transport of treated sediments between the Mayfield and the KIWEF sites
- the construction and operation of an emplacement cell and associated facilities to place the treated sediments (known as the KIWEF)
- operation of the Stage 2 works 24 hours a day, 7 days a week.

5.1 Mayfield Site

The proposed layout of the Mayfield site is graphically depicted in **Figure 2** and the main activities at this location are described below.

Note there may be minor variations to elements of the process, including the choice of plant and equipment and stockpile capacities described below, however, these changes will not be material in nature to the scale of environmental impacts from the Site activities.

5.1.1 Dredging of Contaminated Sediment

The mechanical dredging of contaminated sediments is to be performed in two areas, the PRZ and the SRZ as shown in **Figure 1**.

The PRZ has the highest concentrations of contaminants whilst contaminant concentrations in the SRZ are typically lower and more interspersed as layers within clean sediment.

Dredging is to occur within a temporary in-river sheet pile wall surrounded by a silt curtain. An environmental dredging bucket and absorbent booms and silt control barriers will be used to contain suspended solids and floating debris. A permanent inshore sheet pile wall is to be installed that stabilises the shoreline and prevents the river bank eroding after the dredging of sediment.

Based on the most recent volumetric assessment, the approximate quantity of material to be dredged from the PRZ and SRZ is 740,000 m^3. A 25% contingency allowance has been made for potential over dredging and for bulking up of the sediment after treatment. On this basis it is conservatively estimated that there would be up to 930,000 m^3 of treated material to be disposed of in the emplacement cell at KIWEF.

The final figure may be somewhat less than this as it is likely that some of the dredged sediment material may not be contaminated to the extent that it requires treatment. This material would be classified in accordance with relevant DECC guidelines and disposed of at an appropriate landfill facility which is licensed to accept such material.

The proposed dredging activities have previously been approved under Stage 1A of the development consent.

5.1.2 Treatment of Contaminated Sediment

The key activity at the Mayfield site is the treatment of contaminated sediments and the subsequent dispatch of treated sediments to the emplacement facility at KI. The treatment process adopts a treat-and-haul approach. This minimises the potential adverse impacts, including odour, associated with larger than otherwise stockpiles of untreated and treated sediment being stored on-site for longer periods. Using the treat-and-haul approach, sediments would generally be treated and placed at the emplacement cell(s) on KI within 48 hours.

The Mayfield site would provide three sediment treatment trains that would receive and treat contaminated dredged material which would allow for some redundancy during the treatment process. In the instance that one sediment treatment train is disabled, treatment continues at full capacity with two functioning treatment trains.

The combined rate of sediment treatment of the three treatment trains is estimated at an average of approximately 30,000 m^3 per week. This average is based on a 6 day working week and an average of 20 hours a day to allow for poor weather, downtime for maintenance of plant/equipment and rest periods for truck drivers.

There will be occasions when the rate of sediment treatment will exceed this average figure and work will be undertaken 7 days a week and 24 hours a day. On these occasions, maximum sediment treatment could reach approximately 40,000m^3 per week. However, this is only likely to occur on a limited basis.

Each treatment train would consist of a barge unloading area, sediment receiving area, an untreated sediment area, a treated sediment area, and a truck loading area. The Mayfield site also includes water holding ponds and a water treatment plant. All of these facilities are discussed briefly below.

The proposed trial remediation activities have previously been approved under Stage 1B of the (modified) development consent. The SOS underway is to be completed in December 2008.

The subsequent full-scale remediation activities are what comprise Stage 2 works and are described in this application.

Barge Unloading

The dredged contaminated material is to be unloaded from the barges by a mechanical excavator and/or onshore crane directly onto trucks for transport to either the untreated sediment areas or to the sediment receiving areas (if temporary storage is required). Prior to unloading, excess water that is free-standing within the barge would be pumped to the water holding pond for treatment.

Sediment Receiving Areas

The sediment receiving areas are to be located along the bank of the Hunter River and act as an intermediary zone between the dredging operations and land. Sediments would be transferred from the sediment receiving areas to the untreated sediment areas by dump trucks with two dump trucks working in each sediment treatment train. Alternative methods for the transfer of sediments (such as pumps or conveyors) to the untreated sediment areas are not excluded and would be evaluated by the principal contractor.

The sediment receiving areas are to be used to temporarily store dredged sediments and also to segregate debris. They would have a combined storage capacity of approximately 10,000m^3 and would be constructed as concrete pads with side walls that are designed to hold wet sediment and contain run-off. A watertight HDPE liner below the pad and along the side walls would protect the surrounding soils should there be cracks in the pads or leakage through the concrete joints.

Untreated Sediment Areas

The untreated sediment areas would be used to hold the dredged material prior to treatment. Screening of debris would occur as needed to meet the requirements of the treatment plant (grizzly and mixing plant).

The untreated sediment areas would be constructed as concrete pads with side walls that would be designed to hold wet sediment. A watertight HDPE (high-density polyethylene) liner below the pad and along the side walls will protect the surrounding soils should there be cracks in the pads or leakage through the concrete joints. The areas would be roofed to reduce further wetting of the untreated sediment and generation of contaminated water during rain events.

Each of the untreated sediment areas would include:

- Storage space for up to approximately 3,333 m^3 of untreated sediment;
- A zone for receiving untreated sediment from a dump truck; and
- Stockpile area for oversized material and other debris.

Sediment Treatment Process

A sediment treatment process flow diagram is depicted in **Figure 3** and shows the flow of sediment through each of the sediment treatment trains.

The sediments would be screened for oversize debris and then fed through a grizzly/screen/magnetic separator where medium size and metallic objects are removed from the sediment. After the grizzly/screen/magnetic separator, the sediments would be transported to the continuous mixing plant where they are placed in a sediment feed hopper.

From the sediment feed hopper the untreated sediment would be released onto a conveyor belt that travels under the silo where the slag cement reagent is stored. The silo releases the slag cement onto the untreated sediments at a ratio equal to what is prescribed in the treatment matrix approved by DECC as part of the Immobilisation Approval. The slag cement reagent addition ranges from 15% to 22.5% depending on the moisture level of the sediment. The conveyor unloads the untreated sediments and slag cement into the continuous mixing plant (pug mill). The pug mill simultaneously grinds and blends the untreated sediments with the slag cement. The treated sediments are then loaded onto trucks for direct transport to either the KIWEF or to the temporary storage area for treated sediments at the Mayfield site.

The stabilisation process of mixing slag cement with the untreated sediments immobilises the contaminants and achieves specific strength outcomes, including a nominal 1 MPa Unconfined Compressive Strength (UCS) for sediments with less than 13,000 mg/kg PAH (note exception approval may be obtained from DECC for very low contaminant levels) and minimum 1.5 MPa UCS for sediment with more than 13,000 mg/kg PAH, as required by DECC's Immobilisation Guidelines. The stabilisation process is aimed to prevent the leaching of contaminants once the treated sediments are placed in the emplacement cell.

The treated sediment has a "toothpaste" type consistency and can be compacted within 24 to 48 hours.

Treated Sediment Areas

Following treatment, the treated sediments would be loaded onto trucks for transport or placed in the treated sediment stockpile areas for temporary storage if necessary. The trucks prepare for loading along the southern boundary of the treated sediment stockpile areas and proceed to the truck wash and weighbridge before leaving the Mayfield site.

The treated sediment areas would be used to store treated sediment only if necessary. Temporary storage space for up to approximately 3,333 m^3 is provided at each of the three sediment treatment trains.

The treated sediment areas would be constructed of concrete pads with bunded side walls. A watertight HDPE liner below the pad and along the side walls would protect the surrounding soils should there be cracks in the pads or leakage through the concrete joints.

5.1.3 Contaminated Water Management

Free water decanted from the excavated sediment material on the barges, contaminated water that drains from the sediment receiving and other stockpile areas and dump trucks and truck wash water would be pumped to, and stored in, contaminated water holding ponds. This water would then be treated in a water treatment plant to achieve appropriate water quality to allow discharge to the Hunter River in accordance with the requirements of DECC.

More detail in relation to contaminated water management at the Mayfield site is discussed in **Section 14** of this report.

5.1.4 Stormwater Management

Stormwater that falls on the sealed areas of the site would flow to the existing drainage system before being discharged to the Hunter River.

More detail in relation to stormwater management at Mayfield is discussed in **Section 14** of this report.

5.1.5 Security and Access

A high chain wire fence would secure the Mayfield site. Security gates at the site entrance would control access by personnel and trucks and the contractor would be responsible for the maintenance of the security facilities. Vehicle access would be via Selwyn Street and then through the security gate to the site.

5.1.6 Lighting

The Mayfield site would require lighting to allow for 24 hour operation in a safe workplace environment. Temporary tilt-top lighting towers would be used throughout the site and along the main access road which connects to Selwyn Street. All trucks and plant equipment would also be illuminated.

5.1.7 Decommissioning

All the proposed facilities to be constructed for the Mayfield site are designed to be disassembled and removed from the site upon completion of the remediation works unless otherwise authorised by the landowner to be retained. The structures and materials are to be decontaminated and checked as being uncontaminated before they leave the site. Where practicable, all materials such as steel and concrete would be recycled.

The Mayfield site would be returned to the original condition after remediation activities have been completed in accordance with the current agreement with the landowner (represented by NPC).

The proposed remediation works, including decommissioning, at the Mayfield Site are expected to be completed in 2010/11.

The site is zoned to accommodate port and related industrial land uses in the future.

5.2 Transport of Treated Sediment to the KIWEF Site

The proposed haulage route from the Mayfield site to the KIWEF site and back largely follows the arterial road network. The return trip has a total distance of 18.6 km and is summarised below:

From Mayfield - Selwyn Street, right turn to Industrial Drive, right turn to Tourle Street cross the Bridge and then left turn from Cormorant Road to the KIWEF.

From KIWEF – left turn to Cormorant Road, U-turn at Teal Street roundabout, back along Cormorant Road/Tourle Street cross the bridge, left turn to Industrial Drive, left turn to Selwyn Street and then to the Mayfield site.

The proposed haulage route is shown in **Figure 1**.

It is estimated that on average 30,000 m^3 of treated sediments would be transported per week based on average working hours of 20 hours per day and 6 days per week. For limited periods this figure may increase to a maximum of 40,000m^3 per week by extending operations to 24 hours a day, 7 days per week. The trucks would be either semi trailer (24 tonne capacity) or truck and dog (32 tonne capacity).

Carrying out remediation works and transport over extended operating hours would enable the movement of the treated sediments in the shortest possible timeframe. It also allows the trucking movements to be spaced out over a longer period during the day and night in comparison to a situation with limited hours of operation where truck movements would be more concentrated during the day time period.

All trucks will be sealed to prevent material loss and covered. To ensure contaminated sediments are not spread by the wheels of the trucks a truck wheel wash facility and wash station would be installed at both the Mayfield and KIWEF sites.

5.3 KIWEF Site

The proposed layout of the KIWEF site is graphically depicted in **Figure 4** and is described below.

Note there may be minor variations to elements of the process, including the choice of plant and equipment and stockpile capacities described below, however, these changes will not be material in nature to the scale of environmental impacts from the site activities.

5.3.1 Construction Works

Construction Program

It is planned that the construction of the emplacement cell would begin in February 2009, subject to the attainment of relevant approvals. It is anticipated that the duration of the construction period would be approximately 6 months. It is anticipated that the treatment and placement of sediment would occur over a 40 week period with completion in 2010.

The construction of the emplacement cell includes the plans and specifications for four stages of landfill construction: site preparation and grading (including pre-start environmental clearances), landfill construction, treated sediment emplacement, and final closure. The site gradient, preparation and earth works would be undertaken first. This includes the cut/fill, perimeter bunds and the sediment and leachate ponds.

The total volume of contaminated sediments after treatment is conservatively anticipated to be approximately 930,000 m^3. It is projected that this volume of treated sediments would create a maximum ridge elevation of 14.5 m AHD on completion of emplacement and after capping of the landfill.

The final figure may be somewhat less than this as it is likely that some of the dredged sediment material may not be contaminated to the extent that it requires treatment. This material would be classified in accordance with relevant DECC guidelines and disposed of at an appropriate landfill facility which is licensed to accept such material.

If the total volume figure is reduced then the overall height of the emplacement cell would also reduce by a corresponding amount.

Cell Layout

The overall footprint of the landfill would consist of three adjoining cells. The cells would be lined with HDPE liner and each cell would have its own leachate collection system designed and constructed in accordance with the NSW EPA Solid Waste Guidelines Benchmark Techniques.

Cell 1 would be the western cell, Cell 2 would be the central cell and Cell 3 would be the eastern cell. The cells would be constructed sequentially thereby enabling the placement of treated sediment in one cell while construction of the remaining cells is undertaken.

In the unlikely event of leakage, this layout would also limit the leakage to the cell in which the leak occurs and would not affect leachate collection in the other cells.

To provide a barrier for leachate containment and to prevent surface water run-off, a bund would be provided around the perimeter of each cell. The existing north and west batters would be flattened by adding fill material over the existing slopes and would be incorporated into the design of the perimeter bund.

Horizontal and Vertical Limits

Existing ground elevations in the western part of the site range between 10 and 11 m AHD. The eastern and central regions of the proposed site are approximately 5 to 8 m AHD. The predicted elevation of the emplacement cell would be 14.5 m AHD at the ridgeline, inclusive of all capping and vegetation layers.

The emplacement cell would be created by a combination of cut and fill earthworks across the site as shown in **Figure 5**. It is estimated that the cut and fill would largely balance and on completion of the emplacement cell there will be surplus spoil of approximately 80,000 m^3. This surplus may be used in recontouring of the disturbance areas external to the emplacement cell(s) on-site or disposed at licensed facilities located off-site that are lawfully able to accept that material.

DECC current requirements stipulate that the base of the containment cell should be no less than 1.5 m above the highest recorded groundwater level at the site (DECC, 2007). The 1.5 m separation is to be maintained after the bottom of the cell settles from the weight of the emplaced sediment or as otherwise agreed with DECC. This is a significant factor in determining the overall finished ridgeline of the cell capping.

On its north side the emplacement cell would be located adjacent to existing ponds (known as Ponds H and I) which have been identified as core habitat for the Green and Golden Bell Frog. The north western extent of the cell would also be located adjacent to the NCIG rail spur for the new coal export facility which is currently under construction.

The South Arm of the Hunter River would be approximately 120 m south of the emplacement cell and the South Sediment Pond is approximately 85 m from the River. The southern part of the site, including the South Sediment Pond, has been reserved for a future 80 m wide easement for Energy Australia.

Bottom and Side Wall Lining Systems

The construction detail of the lining system is represented in **Figure 6**.

The bottom and side-wall lining system has been designed to minimise potential risk of leachate leaking into the soil and groundwater. The bottom and side-wall lining system will consist of 1.5mm thick HDPE geomembrane. The HDPE liner would be chemically resistant to the leachate and would able to withstand the weight of the compacted treated sediments and any structures proposed to be constructed on the emplacement cap.

The elongation characteristics of the HDPE liner would ensure that it does not tear during the placement of the immobilised material or the settlement of the landfill.

The base of the cell would be graded to enable leachate collection.

Final Cover System

A final cover for the emplacement cell would be constructed over the treated sediments. The final cover system includes a composite drainage net, 1.5mm HDPE geomembrane, drainage layer, filter geotextile, select fill and topsoil cover as shown in **Figure 6**. Low-growing species (e.g. native grasses) are proposed to be planted in the final cover system to control the potential for erosion until future development occurs.

It is anticipated that the final surface grading would incorporate a 2% slope to allow for drainage as agreed with DECC and HDC.

The final topography would blend with the adjacent ground levels, as per HDC requirements. The final surface grading requirements are depicted in **Figure 11**.

Gas Collection and Venting

The treated sediments that would be placed at the emplacement cell might contain low quantities of organic matter that could slowly decompose and produce low quantities of gas. Slow gas production beneath a very low permeable final cover system may cause pressure to build up over time resulting in damage to the geo-membrane capping layer.

As a precautionary measure a gas venting system would be installed in the cap to prevent the build up of pressure within the emplacement cells and allow gas to passively vent to the atmosphere. It should be noted that the cement added to the contaminated sediments during stabilisation and the chemistry of the treated sediments (high pH) is expected to impede the decomposition process and limit the production of gas.

The gas collection system would be connected to the passive vents in the geo-membrane cover system to allow gas to escape from the landfill. Gas collection and venting details are provided in **Figure 8**.

5.3.2 Leachate Collection System

The leachate collection and removal system would collect leachate from the bottom liner system and pump it to a leachate pond or storage tank for treatment and disposal. The leachate drainage layer would consist of a 300 mm thick layer of river gravel and a herringbone system of perforated HDPE pipes. The pipes would be spaced approximately 50 m apart. The longitudinal fall would be 1% while the lateral fall would be 3% to ensure adequate flow of the leachate. It is proposed to use a minimum 200 mm diameter collection pipes on the base of the landfill for increased reliability and ease of cleaning. The leachate collection system is shown in **Figure 7**.

Stormwater that comes into contact with the emplaced treated sediments before the cell is capped would be managed as leachate and conveyed to the leachate collection and removal system. Drainage lines would be provided at the interior of the perimeter bund to intercept contaminated runoff from the top and side slopes of emplaced sediments prior to installation of the cap and final cover. Important aspects of the leachate collection system include:

- The leachate pumping system and transfer pipes would remain in service after the cells have been capped;
- The leachate pumping system would include submersible pumps which would be located inside the leachate riser. The pumps would be capable of transferring the projected volumes of leachate and would withstand the corrosive environment of the leachate;
- An automated control and alarm system that would be activated if the leachate rises to a level more than 300 mm above the cell's base liner at the sump;
- Interlocks that prevent leachate being pumped out of the cell in the event that the leachate pond (or storage tank) would overflow;
- The capacity of the leachate storage pond would be large enough to contain the direct rainfall on the pond from a 1 in 25 year rainfall event of 24-hours duration (approximately 200 mm);
- The leachate storage pond would be lined with a 1.5 mm HDPE liner; and
- A closed leachate storage tank to replace the leachate pond would be installed after the landfill final cover has been established on the emplacement facility and leachate production declines to very low volumes if at all.

A range of options exist for the treatment of leachate during the construction and operation of the emplacement cell depending on the quality of the leachate and the required quality of discharge. Options may include pH adjustment and/or a chemical feed system of activated carbon for organic contamination (e.g. PAH and naphthalene). The requirements of DECC in this regard to enable licensed discharge from site will be met.

After the emplacement facility's final cover is in place, leachate volumes are predicted to be very low if at all. These low volumes would be capable of being handled by tank storage, periodic removal, and disposal at an industrial waste treatment facility. Therefore the leachate pond and the leachate treatment area may not be necessary in the long term but has been incorporated within the design as a contingency measure.

5.3.3 Stormwater Management System

Stormwater from outside the emplacement cell would predominantly be directed via drainage lines to either the North or South Sediment Ponds. The stormwater would settle in these ponds and then be discharged to:

- Pond H in the case of the North Sediment Pond; and
- The Hunter River in the case of the South Sediment Pond.

The exception to this is stormwater that falls on the north eastern bund wall which would directly drain to Ponds H and I via the erosion and sediment control devices which are designed to control the rate and quality of run-off.

The sediment ponds are designed to hold run-off from a 25 year interval, 24 hour storm event. In the unlikely event that this capacity is not sufficient the sediment ponds have both been designed with a spillway to allow controlled discharge.

5.3.4 Erosion and Sedimentation Control

A range of erosion and sedimentation controls are proposed for the KIWEF site including stormwater drains, sediment ponds, erosion matting, silt fences, vegetation of exposed areas, sealed internal road and delineation of clearing limits prior to construction. These controls are discussed in more detail in **Section 14** of this report.

5.3.5 Contractor Staging Area

The contractors staging area is to be located to the east of the leachate storage pond and close to the site entrance from Cormorant Road. The staging area would include temporary staff amenities such as toilets and showers, allowances for a limited amount of vehicle parking for staff, the main site office and the waste receiving station for the incoming trucks from the Mayfield site (refer **Figure 4**).

5.3.6 Western Stockpile and Storage Area

The area adjacent to and west of the emplacement facility is the western stockpile and storage area (refer **Figure 4**). This area would contain excavated soil stockpiles and storage of materials and equipment for construction.

During excavation of the emplacement facility, potentially contaminated excavated materials would be segregated and temporarily stored in a designated bunded area while awaiting classification prior to disposal. Stormwater run-off from this bunded area would be directed to the leachate pond prior to treatment and licensed discharge from site and/or transported off-site for disposal.

5.3.7 Lighting

The site would require lighting to allow for 24 hour operation in a safe workplace environment. The emplacement cell would require permanent lighting around the site access point from Cormorant Road and along the new internal sealed access road to the south of the emplacement cell.

In other areas of the site such as within the cell, the contractor staging area or the western stockpile and storage area temporary, tilt top lighting towers would be used. Care would be taken to ensure that lighting is controlled in near vicinity of the core habitat areas for the Green and Golden Bell Frog along the north and eastern sides of the emplacement cell.

5.3.8 Treated Sediment Emplacement

Sediment emplacement would occur sequentially following the staged construction of the cells. The treated sediments would be placed in each cell in a series of approximately 300 mm lifts (layers). This process would be repeated until all treated sediments have been placed in the emplacement cell.

The treated sediments would then be compacted as necessary to achieve sufficient geotechnical strength to support additional lifts of treated sediment, the final cover, and ultimately industrial development on the capped landfill. Bulldozers, or equivalent, would be used to evenly spread the sediments as they are delivered. The surface of each lift of treated sediment would be compacted and rolled smooth to minimise retention of surface-water runoff within the emplaced sediments.

In order to enable the trucks to deliver the treated sediments, access ramps down into the cells would be constructed. The trucks would use a reinforced tipping pad at the bottom of each cell to deposit the sediments without impacting on the integrity of the cell liner (refer **Figure 9**).

A truck wash \ wheel wash facility would be provided within the footprint of each cell. Treated sediments would be washed off into the cell from the wheels and undercarriage of the trucks before they exit the cell. Portable high pressure washers would be used to wash out the inside of the trucks on a daily basis. Water resulting from the truck wash \ wheel wash would be diverted to the leachate collection system.

5.3.9 Equipment

Equipment that would be used during operations at the KIWEF site would be subject to the contractor's chosen methods to place, spread, and compact the treated sediments. The following is an estimate of typical equipment that could be used during treated sediment emplacement operations:

- D10 bulldozers to spread treated sediments in each cell;
- hydraulic excavator or large backhoe to assist with treated sediment placement in close quarters;
- vibratory drum compactors to compact treated sediments in each cell;
- pumps at the temporary truck wash areas in each cell and to pump stormwater from within each cell to the leachate pond and from the leachate pond to the treatment area and/or discharge area (as required);
- water truck for dust control;
- diesel refuelling truck;
- front end loader and dump trucks; and
- pick-up trucks for contractor personnel.

5.3.10 Security and Access

The emplacement cell would be secured with a high chain wire fence around the facility, including the sediment ponds and the leachate pond. A security gate would be provided near the site entrance from Cormorant Road for authorised personnel and a boom gate for vehicles.

Vehicular access to the site would be via Cormorant Road. The site access road would be sealed and 9 m wide to allow for 2 way truck movements and for future industrial development of the site. The site access road would integrate with the newly constructed intersection with Cormorant Road which has been re-aligned as part of the Tourle Street Bridge upgrade.

5.3.11 Decommissioning

Disposal of treated sediments in the emplacement cell is scheduled to take place over a period of approximately 40 weeks.

A number of the key elements of the emplacement cell would be decommissioned after the facility has been capped. These include the contractor staging area, the leachate pond (being replaced by a contained tank system), the western stockpile and storage area. All the disturbed areas (including the emplacement cell bund walls and capping) would be grassed, unless otherwise required by the landowner, upon decommissioning of the temporary site infrastructure (refer **Figure 11**).

The sealed access road, the two sediment ponds and gas venting system would be retained.

The emplacement cell and its capping have been designed to support future development of the site for industrial purposes consistent with its current zoning.

5.4 Operating Hours

It is proposed that construction activity and operations on the Mayfield and KIWEF sites would occur 24 hours per day, 7 days a week.

In reality given periods of downtime for poor weather, maintenance of plant/equipment and rest periods for truck drivers, it is likely that operations would occur on average 6 days per week and an average of 20 hours per day.

However, there would be periods during which it is necessary to operate 24 hours per day, 7 days a week although these are expected to be relatively limited.

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6.0 Statutory Planning Framework

6.1 Environmental Planning and Assessment Act 1979

The Environmental Planning and Assessment (EP&A) Act 1979 and the EP&A Regulation provide the framework for environmental planning in NSW and include provisions to ensure that proposals which have the potential to impact the environment are subject to detailed assessment.

6.2 Existing Development Approval

6.2.1 Overview

Development consent (DA-134-3-2003-i) for the *'Extension of shipping channels within the Port of Newcastle,* was approved by the Minister for Planning on 9 August, 2005 under Section 80(4) and 80(5) of the EP&A Act 1979.

This development consent was structured to allow for a staged approach to development.

The three stages are outlined in Condition A2.1 of the development consent as follows:

a) *Stage 1A comprising all dredging works of clean and contaminated materials, and transfer of those materials off-site for treatment and/or disposal*

b) *Stage 1B comprising all works associated with the remediation of up to 6500m3 of contaminated material from Stage 1A, including handling and transfer of treated materials off-site for further treatment and/ or disposal, and*

c) *Stage 2 comprising all works associated with remediation of contaminated materials from Stage 1A not the subject of Stage 1B works.*

Stage 1A (dredging works) and Stage 1B (trial remediation works) have previously been approved with Stage 2 activities the subject of this application.

6.2.2 Approved Modifications

Since the original development approval was issued on 9 August 2005, there have been a number of modifications approved by the DoP, including:

28 February, 2006 (MOD-139-11-2006-i) – increased the volume of contaminated materials to be treated as part of the trial remediation from 1,000m^3 to 2,000m^3. Also clarified that any contaminated material obtained during the trial remediation could be sent for treatment at an approved thermal desorption facility.

23 September, 2007 (MOD-65-7-2007-i) – allowed the applicant to submit any management plans or monitoring requirements on a staged or progressive basis. Introduced additional conditions in relation to turbidity, water quality and water discharge. Also introduced additional conditions requiring delineation of the extent of mangrove clearing and a requirement for the establishment of a compensatory habitat package to the satisfaction of DEC and DPI.

8 July, 2008 (MOD-17-5-2008-i) – increased the volume of contaminated materials to be treated as part of the trial remediation from 2,000m^3 to 6,500m^3. Introduced a requirement for remediation works to be carried out so that they did not cause contamination of existing capped or other ground surfaces. Also introduced requirements relating to the disposal or reuse of treated and/or untreated materials at the completion of the Optimisation Study.

6.2.3 Stage 2 Works

Below are the relevant approval conditions of the development consent that relate to this Stage 2 application.

Condition A2.2(a)

According to Condition A2.2(a) of DA-134-3-2003-i, Stage 2 works shall be subject to further approval, as follows:

> *where Stage 1B works are successful in achieving the remediation outcomes specified under this consent, the Minister's approval may be sought to continue Stage 1B works as Stage 2, without the need for a new modification or development application under the Environmental Planning and Assessment At 1979;*

BHPB is currently completing an SOS, or second trial remediation project. The SOS is scheduled for completion in late December 2008. Under Stage 1B of the modified development consent, BHPB can remediate up to 6,500m^3 of contaminated material on a trial basis to inform the full-scale remediation process.

The main objectives of the SOS are to refine the optimal operating conditions and key environmental management measures, such as odour and water management, for the full-scale dredging and treatment processes.

However, results from the SOS are not considered material nor required in order to submit an application to obtain approval to proceed to Stage 2. This position has been determined on the basis that firstly there has been a substantial level of work already undertaken to inform and confirm the engineering design for Stage 2 and secondly, that the immobilisation approval obtained from the DECC in October 2008 endorses the treatment process to be applied.

More specifically BHPB is confident that it can proceed to Stage 2 works in advance of obtaining the SOS (Stage 1B) results for the following reasons:

- an extensive body of work, including bench scale testing, a trial remediation project and further investigations, has been undertaken since the development consent was issued in August 2005;
- these investigations, bench scale testing and trials demonstrate that the proposed cement stabilisation technology is appropriate and preferred to effectively treat the sediments; and
- DECC has issued a specific Immobilisation Approval (No. 2008-S-03) which endorses the proposed treatment methodology.

The DECC immobilisation approval demonstrates that BHPB has satisfied the requirements of Condition A2.2(a).

It should also be noted that the environmental management plans (EMPs) required by the development consent and that are currently being prepared will capture additional levels of detail where appropriate, including any relevant results from the SOS, with respect to refinement of processes and management measures.

Condition A2.3

Condition A2.3 of the development approval is also relevant and states as follows:

> *In seeking the Minister's approval to condition Stage 1B works as Stage 2 under condition A2.2(a) of this consent, the following matters must be demonstrated to the Minister's satisfaction:*

a) *all condition of this consent applicable to remediation works have been complied with and will continue to be complied with during Stage 2;*

b) *the Stage 1B works can be applied without change to the achievement of remediation outcomes during Stage 2, including demonstration that the remediation works will not require expansion beyond the physical footprint of the Stage 1B works;*

c) *all mitigation, management and monitoring measures applied to Stage 1B works have been updated to reflect application to Stage 2;*

d) *the DEC has been consulted in relation to continuation of Stage 1B works as Stage 2, and the DEC is satisfied with the application of Stage 1B works to Stage 2.*

A brief discussion of the matters outlined in Condition A2.3 is provided below:

- All conditions of the development approval relating to remediation works have been complied with and will continue to be complied with during Stage 2;
- The remediation works proposed as part of the SOS (Stage 1B) can be continued during Stage 2 without material changes to the treatment process and remediation outcomes already agreed with the DECC for immobilisation and without expanding beyond the current approved Stage 1B footprint at the Mayfield site. Note, a new footprint at KI for the KIWEF site is defined in this application;
- All mitigation, management and monitoring measures applied to the SOS (Stage 1B) have been either maintained or updated for Stage 2 activities (refer Section 24 of this report for details);
- DECC has been consulted regarding the continuation of the remediation processes applied during the SOS (Stage 1B) in Stage 2, particularly in relation to the treatment methodology (as authorised in the Immobilisation Approval received in October 2008). As confirmed with DECC, other key matters, including odour management and water discharge criteria from the Mayfield and KI sites, will continue to be refined during the subsequent approval phases for the Environment Protection Licences (EPLs) and relevant EMPs for the Stage 2 activities.

6.2.4 24/7 Operation

Condition A2.15 of the development consent currently limits all activities associated with the remediation works to between 7.00am and 6.00pm Monday to Friday, between 8am and 1pm on Saturdays and no work on Sundays and public holidays.

In this application, BHPB is seeking approval to undertake Stage 2 activities on a 24 hour per day, 7 days per week basis.

It is expected that the remediation project will have an overall timeframe of approximately 18 months, starting with construction in February 2009, subject to all relevant approvals being obtained, and finishing operations in 2010/11.

Operating on a 24 hour, 7 days per week basis will help ensure the HRRP is undertaken in the shortest possible timeframe whilst still achieving the necessary engineering, environmental and wider outcomes. It will:

- align with the approved hours of operation for dredging and related activities (defined as Stage 1A in the development consent) to enable real-time dredging, treatment, transport and emplacement. This will provide efficiency and environmental gains, including reduced stockpile areas and so less odour and water quality impacts from the Mayfield site;
- ensure treated sediments are delivered to KIWEF in a timely fashion prior to the setting of the slag cement;
- minimise the duration of potential amenity and traffic impacts on the local community;
- provide necessary flexibility and contingency in the event of unforeseen operational interruptions (e.g. prolonged periods of adverse weather, equipment failures, traffic delays, etc); and
- reduce the potential for delays to the dredging of the shipping channels in the Port of Newcastle for other activities and the redevelopment of the former Newcastle Steelworks site.

Condition C2.16 allows these time restrictions to be varied with the Director General's agreement after considering the results of any community consultation that may require to be undertaken and after considering any information necessary to determine that activities undertaken during the varied hours will not adversely impact on the acoustic amenity of receptors in the vicinity of the site.

Extensive community consultation has been conducted by BHPB in relation to the various aspects of the HRRP including the proposed 24 hour operation (refer **Section 7** of this report).

In addition, an acoustic report has been prepared to assess the impact of the additional operating hours for treatment, transport and emplacement of sediment on the amenity of receptors in the vicinity of the site (refer **Section 11** of this report).

The specific issues associated with the proposal to operate 24 hours a day, 7 days a week are discussed in **Appendix A** of this report.

6.3 State Environmental Planning Policies

6.3.1 State Environmental Planning Policy (SEPP) 33 – Hazardous and Offensive Development

SEPP 33 was designed to ensure that sufficient information is provided to consent authorities to determine whether a development is hazardous or offensive. Conditions can then be imposed on the development to reduce or minimise adverse impacts. Any development application for a potentially hazardous or potentially offensive industry must be supported by a Preliminary Hazard Analysis (PHA).

The Risk Assessment undertaken for the 2003 EIS identified that the proposed development was not potentially hazardous with respect to any dangerous goods to be stored.

The proposed Stage 2 works involve the remediation of contaminated sediment from the Hunter River via a process of treatment and emplacement of sediment in a landfill cell on KI. It does not meet the SEPP 33 criteria for being classified as a 'potentially hazardous industry' or a 'potentially offensive industry'. Specifically the proposed works cannot be classified as an industry or industrial storage facility.

On this basis it is not appropriate to apply SEPP 33 requirements, particularly the requirement for preparation of a Preliminary Hazard Assessment, to this proposal.

6.3.2 State Environmental Planning Policy (SEPP) 55 – Remediation of Land

SEPP 55 aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. SEPP 55 specifies when development approval is required for remediation works and also details the range of considerations that are relevant in determining a development application.

Development consent has already been granted for the proposed remediation works including the dredging of contaminated sediment from the South Arm of the Hunter River and the land based remediation activities at Mayfield. This consent noted that the development was classified as State Significant by virtue of it being designated as Category 1 remediation work under SEPP 55.

It is also noted that the land based site at Mayfield has already been subject to remediation works to address contamination legacies associated with the former BHP Steelworks operations and these land based remediation works have been successfully completed by HDC.

In relation to the KIWEF site, Clause 7 of SEPP 55 requires a consent authority to consider whether the land is contaminated and whether it is suitable (or can be made suitable) for any proposed development.

Given the history of the KIWEF as a landfill, it is likely that the site may contain contaminated material which would be disturbed during the construction of the emplacement cell. This issue is discussed in some detail in Section 14 of this report. It is proposed that an Excavated Materials Management Plan (EMMP) will be prepared, to outline measures for identifying and managing the handling of potentially contaminated materials during earthworks at the KIWEF site.

Once the emplacement of treated sediment is complete the cell will be capped to prepare the site for future industrial development in keeping with the zoning of the land.

6.3.3 State Environmental Planning Policy (SEPP) 71 – Coastal Protection

The proposal is located within the coastal zone as defined by SEPP 71 which makes provisions regarding protection of coastal attributes, protection of natural and cultural heritage elements, protection of the coastal environment, and the retention of foreshore public access.

Clause 8 of the SEPP details the matters to be considered by a consent authority when determining an application to carry out development within the coastal zone. The relevant clauses of this SEPP include:

d) the suitability of development given its type, location and design and its relationship with the surrounding area,

e) any detrimental impact that development may have on the amenity of the coastal foreshore, including any significant overshadowing of the coastal foreshore and any significant loss of views from a public place to the coastal foreshore,

f) the scenic qualities of the New South Wales coast, and means to protect and improve these qualities,

g) *measures to conserve animals (within the meaning of the Threatened Species Conservation Act 1995) and plants (within the meaning of that Act), and their habitats,*

   i. *existing wildlife corridors and the impact of development on these corridors,*

   ii. *the likely impact of coastal processes and coastal hazards on development and any likely impacts of development on coastal processes and coastal hazards,*

   iii. *measures to protect the cultural places, values, customs, beliefs and traditional knowledge of Aboriginals,*

l) *likely impacts of development on the water quality of coastal waterbodies,*

m) *the conservation and preservation of items of heritage, archaeological or historic significance,*

n) *only in cases in which a development application in relation to proposed development is determined.*

   i. *the cumulative impacts of the proposed development on the environment, and*

   ii. *measures to ensure that water and energy usage by the proposed development is efficient.*

Listed below are some comments in response to the HRRP compliance with these considerations:

- The KIWEF is an appropriate site for the emplacement cell based on its previous use as a landfill (it is subject to an existing EPL) and its location amongst surrounding industrial development (existing and proposed);
- The emplacement cell will be a fully engineered designed landfill with in built mechanisms to assist in managing potential environmental impacts (e.g. cell liner and capping, leachate management system, stormwater management system, gas venting). This compares favourably with the existing landfill operation;
- No detrimental impact on the amenity of the coastal foreshore is envisaged. This stretch of coastal foreshore has limited public access, overshadowing created by the changes to the existing landform will be minimal and the impact on public views to the coastal foreshore will not be significant (refer discussion in **Section 18** of this report);
- The proposal will have minimal impact on the scenic qualities of this section of the coast which is visually dominated by the surrounding port and industrial activities (existing and proposed);
- The proposed emplacement cell footprint has been revised to minimise direct impacts on threatened flora/fauna (Green and Golden Bell Frog habitat) and a series of management measures are proposed to mitigate other identified potential impacts. Measures to conserve threatened flora and fauna species and to protect wildlife corridors are discussed in **Section 9** of this report;

- Given the siting and elevation of the emplacement cell, sediment/leachate ponds, and stockpile storage areas relative to the river bank no adverse impact is expected from coastal processes and coastal hazards. The design of the development and the proposed management measures in relation to flora/fauna, soil excavation, stormwater and groundwater would assist in ensuring that the development does not adversely impact on coastal processes and hazards;
- An Aboriginal heritage assessment has been undertaken which indicates that there is a very low likelihood of the development impacting on items or places of cultural significance given the history of the site as a landfill and the extensive filling that has occurred on KI over a long period of time. Discussion of this issue is contained at Section 17 of this report;
- The design of the emplacement cell and the proposed management measures in relation to soil excavation, stormwater, groundwater and leachate management would assist in ensuring that the development does not adversely impact on water quality of the South Arm of the Hunter River, and
- Issues relating to cumulative impacts and efficient water and energy use are discussed in **Sections 20** and **16** of this report.

In an overall context it is considered that HRRP is consistent with the objectives of SEPP 71 primarily because the proposed remediation of contaminated sediments in the South Arm of the Hunter River will improve the environmental quality of the existing river environment and the surrounding coastal areas.

6.4 Draft Three Ports State Significant Site Proposal (May 2008)

The DoP issued the "Three Ports State Significant Site Proposal for New South Wales Major Ports of Newcastle, Botany and Port Kembla". This is a draft document which was placed on public exhibition during May/June 2008.

The document recognised the importance of the three ports to the State's economy through the provision of employment and port related income and proposed that the areas of the three ports be designated as State Significant under SEPP (Major Projects) 2005. This designation would:

- protect the ports from the encroachment of conflicting land uses which may limit their operations;
- provide a strategic approach to development for these lands, reducing complexity and providing consistency and uniformity for proponents whether operating at Newcastle, Port Kembla or Botany.

The document highlights that:

- In the year ending June 2007 the Port of Newcastle handled total trade valued at $8.3 billion
- 14% of Australia's total exports are sent to international markets through the Port of Newcastle
- Newcastle is Australia's largest port in bulk terms and the world's largest coal exporting port
- The Port of Newcastle will continue to grow and will be the next major container facility in NSW when Port Botany reaches capacity

The document notes that the strategic planning for the Newcastle Port must ensure that the port has sufficient berth sites, transport connections and back up land to accommodate the forecast growth. Kooragang Island and the former BHP Steelworks sites at Mayfield were identified as being strategically important areas for future development of port activities and related industrial development.

The importance of ensuring 24/7 transport access to the port was also recognised so that the port could achieve the cost effectiveness required to participate in the competitive global trade environment.

The document specifically comments on the proposed Intertrade Industrial Park at Mayfield on the former BHP Steelworks site. This is a 150 hectare intermodal gateway site offering opportunities for port, logistics, distribution services and general industrial and commercial development. The site is identified as being appropriate for a major container facility including berthing facilities, however, development will not proceed until the land and river based remediation works at the Mayfield site have been completed reinforcing the importance of the effective completion of the Stage 2 works in a timely manner.

The document suggests that the Newcastle Port lands be zoned as either SP1 Special Activities (Port Industry) or IN1 General Industrial with the inclusion of a transitional area along the north side of Industrial Drive where port related commercial uses would be permitted, providing a buffer between residential areas and port industry land uses.

6.5 Hunter Regional Environmental Plan, 1989

The Regional Environmental Plan (REP) of relevance to the subject site is Hunter REP 1989. The aims of the Hunter REP are:

(a) *to promote the balanced development of the region, the improvement of its urban and rural environments and the orderly and economic development and optimum use of its land and other resources, consistent with conservation of natural and man made features and so as to meet the needs and aspirations of the community,*

(b) *to co-ordinate activities related to development in the region so there is optimum social and economic benefit to the community, and*

(c) *to continue a regional planning process that will serve as a framework for identifying priorities for further investigations to be carried out by the Department and other agencies.*

The HRRP is consistent with the aims of the Hunter REP in that the proposed remediation works will:

- improve the environmental quality of the Hunter River
- contribute to the broader goal of improving shipping channels within the Port of Newcastle so that further development of port related industrial uses can occur with subsequent social and economic benefits for the community
- be designed to allow for future industrial development of the KIWEF site consistent with the zoning of the site and surrounding area.

6.6 Newcastle Local Environmental Plan 2003

The site is located within the Newcastle City LGA where the relevant local environmental planning instrument is the Newcastle Local Environment Plan (LEP 2003).

The map to LEP 2003 shows the Mayfield and KIWEF sites both being located within the 4(b) – Port and Industry zone. The relevant objectives of the 4(b) zone are:

d) *To accommodate port, industrial, maritime industrial, and bulk storage activities which by their nature or the scale of their operations require separation from residential areas and other sensitive land uses.*

a) *To require that development of land within 750 m from the high-water mark of the shores of the Port of Newcastle, capable of docking ocean-going vessels, is used for purposes that:*

   i. *require a waterfront location that provides direct access to deep water, or*

   ii. *depend upon water-borne transport of raw materials or finished products, or*

   iii. *have a functional relationship that necessitates proximity to the activities described above.*

b) *To facilitate sustainable development through the application of industrial ecology.*

c) *To provide for other development which will not significantly detract from the operation of large scale industries or port-related activities, that is primarily intended to provide services to persons employed in such industries and activities.*

Both the Mayfield and KIWEF sites are well separated from the nearest residential areas and other sensitive land uses such as schools which will assist in mitigating any potential amenity impacts such as noise, dust or odour arising from the remediation works.

The proposed sediment transport route will travel along Industrial Drive relatively close to residential areas of Mayfield at a number of points. Impacts of traffic noise on the amenity of these residential properties is discussed in **Section 11** of this EA report.

One of the outcomes of the remediation works is to prepare both sites for future port related industrial development in a manner which is consistent with the designated zoning of the land.

The remediation works are to be designed and managed in an environmentally sensitive and sustainable manner.

Other relevant matters prescribed within the Newcastle LEP 2003 include:

- Clause 25 Acid Sulphate Soils - identifies the location of 'Potential Acid Sulphate Soils' (PASS) and the nature of works requiring consideration of these soils in the development process. The KIWEF is identified as 'disturbed terrain' and therefore the provisions of this clause do not apply.
- Clause 31 Development affecting places or sites of Aboriginal heritage significance – requires the consent authority to consider the likely impact of HRRP on a place or item of Aboriginal heritage significance.

Given the site's previous use as a landfill, an Excavated Materials Management Plan (EMMP) will be prepared for the KIWEF to address issues surrounding the disturbance of potential contaminated soils, including Acid Sulphate Soils (ASS), during excavation of the emplacement cell.

An Aboriginal Heritage assessment has been prepared in relation to the KIWEF site and the results of this assessment are discussed in **Section 17** of this report. No Aboriginal heritage assessment was carried out for the Mayfield site because this site has already been assessed as part of the original EIS in 2003.

6.7 Newcastle Development Control Plan 2005

Element 7.4 of the Newcastle DCP 2005 relates to the Kooragang Port and Industrial Area. This element aims to promote and maximise the agglomeration advantages for long-term port-related industrial development within the core economic areas centred around the Port of Newcastle and the Kooragang Port and Industrial Area. It also aims to protect, enhance and reinforce the important cultural, heritage and biodiversity values of Kooragang Island.

A number of other elements under the Newcastle DCP are relevant to the HRRP including:

- Element 4.2 Contaminated Land Management - This element outlines requirements relating to the use and/or development of land that is or may be contaminated. This element is also a policy of the Council adopted in accordance with the NSW Contaminated Land Planning Guidelines.
- Element 4.3 Flood Management - This element outlines requirements for flood risk management practices that achieve balanced environmental, social and economical outcomes.
- Element 4.4 Landscaping - This element outlines requirements and procedures for landscape planning and design for development sites.
- Element 7.1 Industrial Development - This element provides detailed guidelines for industrial land and buildings within the Newcastle LGA.

The proposal will support the objectives of the DCP by improving shipping channel access within the Port of Newcastle so that further development of port related industrial uses can occur and by allowing, once remediation works are complete, future industrial development of the Mayfield and KIWEF sites consistent with their designated zoning.

Neither the Mayfield nor KIWEF sites are identified as being located in an area that is subject to flood risk.

Given its location, the emplacement cell proposal is not considered likely to have a detrimental impact on the environmental values of the nearby Kooragang Nature Reserve and Kooragang Wetland Rehabilitation Project. Although located in closer proximity, the estuarine habitats along the South Arm of the Hunter River should not be impacted by HRRP having regard to the design features and management measures which are proposed during the construction and operation of the emplacement cell.

It is proposed that a landscape plan will be prepared to show how the site would be revegetated once the emplacement cell is capped and other site infrastructure is decommissioned.

6.8 Other NSW Legislation

There is a range of other State legislation which is of relevance to the current proposal:

- ***Contaminated Land Management Act* 1997** – This Act is relevant as in mid-2001, the NSW EPA declared both the former BHP Steelworks site and bed sediments of the Hunter River which fall within 120 m of the Steelworks site as a remediation site under Section 21 of the Act. This declaration triggered the requirement for remediation works to be undertaken to address the Significant Risk of Harm and ultimately led BHPB to enter into a VRA with the DECC.

- ***Protection of the Environment Operations Act 1997 and Environmental Planning and Assessment Regulation 2000*** – This Act (and regulation) prohibits any person from causing pollution of waters, land or air, and provides penalties for pollution offences relating to water, land, waste, air and noise. The Act provides a regulatory framework for the licensing of all activities listed in Schedule 1 to the Act that have the potential to impact on the environment. The HRRP will require a new or a variation to the existing EPL for the Mayfield Site and a new EPL for the KIWEF site.

- ***Threatened Species Conservation Act 1995*** - The purpose of this Act is to:

  - conserve biological diversity and promote ecologically sustainable development
  - prevent the extinction and promote the recovery of threatened species, populations and ecological communities
  - protect the critical habitat of those species, populations and ecological communities that are endangered
  - eliminate or manage certain processes that threaten the survival or evolutionary development of threatened species, populations and ecological communities
  - ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed, and
  - encourage the conservation of threatened species, populations and ecological communities through co-operative management.

  These threatened species issues are addressed in the flora and fauna assessment (refer **Section 9**).

- ***Water Management Act 2000*** – This Act identifies Water Management Principles to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations. The proposed remediation works aim to improve the existing environmental quality of the South Arm of the Hunter River and management measures are proposed to ensure that any discharges to the River from the Mayfield or KIWEF sites will be of a suitable quality. The emplacement cell will be an engineered designed landfill with the appropriate controls to ensure compliance with relevant environmental guidelines.

- ***National Parks and Wildlife Act 1974*** – This Act governs the establishment, preservation and management of national parks, historic sites and certain other areas, and the protection of certain fauna, native plants and Aboriginal relics. These issues are addressed in the Flora and Fauna assessment (refer **Section 9**) and the Aboriginal Heritage assessment (refer **Section 17**).

- ***Fisheries Management Act 1994 –*** this Act aims to protect marine vegetation including mangroves from harm and a permit is required to remove mangroves from DPI. Mangroves are protected in recognition of the valuable role that they play in providing fish habitat. This requirement is recognised.
- **DECC Waste Management and Landfill Guidelines** - Under the NSW EPA Solid Waste Guidelines (Waste Classification Guidelines, 2008) it is a requirement to provide DECC with information regarding the design and management of the emplacement cell at KIWEF during construction and operation. This includes design plans and the preparation of management plans for stormwater, leachate, contaminated materials and monitoring programmes. The following DECC waste and landfill guidelines are relevant:
  - Waste Classification Guidelines, 2008
  - Environmental guidelines: Solid Waste landfills 1996, and
  - Draft environmental guidelines for industrial waste land filling, 1998.

BHPB is acting in accordance with these requirements for the Stage 2 activities.

6.9 Environment Protection Licence

BHPB will make application to the DECC seeking approval to construct and operate a landfill on KIWEF which will include the acceptance and placement of immobilised material.

The application for an EPL will demonstrate to the DECC that BHPB is capable of managing all of the environmental impacts associated with the development of the landfill and ensuring the facility will be operated in accordance with the NSW EPA Solid Waste Guidelines for the acceptance and placement of waste material.

The approval process consists of two stages. The first stage involves the preparation of a formal application and the accompanying documents that support the application.

The second stage will involve the approval to accept and place the immobilised material into the landfill. The DECC will provide this approval once they are satisfied that the construction of the landfill has been carried out in accordance with the landfill design plans and the NSW EPA Solid Waste Guidelines.

There is an existing EPL (No.1708) issued by DECC which covers the dredging, handling and treatment of contaminated sediments at the Mayfield site. If necessary this EPL will be amended to facilitate the Stage 2 works.

6.10 Commonwealth EPBC Act 1999

The requirement for approval under the *Environment Protection and Biodiversity and Conservation Act 1999 (as amended 2006)* (EPBC Act) is triggered by a proposal that has the potential to significantly affect matters of National Environmental Significance (NES) or will affect Commonwealth land and the environment, or the environment where Commonwealth agencies are proposing to undertake an action. In these circumstances, approval from the Commonwealth is required in addition to approvals under state legislation.

The EPBC Act also provides for the identification, conservation and protection of places of national heritage significance and provides for the management of Commonwealth heritage places.

The EPBC Act lists seven matters of NES that must be addressed when assessing the impacts of a proposal. These are:

- World Heritage properties
- National Heritage places
- wetlands of international importance
- listed threatened species and ecological communities
- migratory species protected under international agreements
- Commonwealth marine areas, and
- nuclear actions (including uranium mines).

In the context of the proposed emplacement cell at KIWEF the relevant matters of National Environmental Significance relate to: wetlands of international significance; listed threatened species and ecological communities; and migratory species protected under international agreements.

In December 2008, BHPB submitted an EPBC referral for the KIWEF to the Department of the Environment Water Heritage and the Arts (DEWHA). Based on the low likelihood of any significant impacts, and the management and mitigation framework which is proposed, BHPB has recommended to DEWHA that the HRRP emplacement activities are not a controlled action when applying the Particular Manner assessment process. It is anticipated that advice will be received from DEHWA in mid-January 2009 as to whether this is a Controlled Action or not and the subsequent approval process to be followed.

A previous EPBC referral for the HRRP was submitted by NPC to DEWHA in 2003. This referral was subsequently approved on 30 May 2007. The scope of that referral included, amongst other matters:

- Dredging of clean and contaminated sediments in the South Arm of the Hunter River;
- Construction of a swing basin to facilitate turning of Panamax and Cape class vessels;
- Remediation of contaminated sediments using technology approved by the NSW EPA; and
- Subsequent use/disposal of the remediated material.

The project (in relation to the dredging in the Hunter River South Arm) was determined as a Controlled Action and was accredited under the NSW planning approval process.

An EIS was prepared under Part 4 of the EP&A Act with the Minister for Planning acting as the consent authority by reason of the project being declared as State Significant.

Approvals were subsequently gained at both State and Commonwealth levels for the Stage 1 dredging and remediation activities and the relevant requirements of these approvals are currently being complied with by BHPB.

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7.0 Consultation

This Section provides a synopsis of the results of consultation undertaken by BHPB with the community, other stakeholders and agencies regarding the HRRP.

The HRRP has in place a comprehensive, inclusive and proactive Community Engagement Program (CEP). The Program involves active direct engagement with specific interest groups via meetings, briefings, phone call discussions and written correspondence, as well as reaching out to the broader community via newsletter letter box drops, community survey and media advertisements.

A wide range of community groups and their representatives, other stakeholder groups, residents, and agencies have been, and continue to be, consulted and provided with information regarding the HRRP. Central to this approach is the valuing and implementation of clear communication, fair processes and strong relationships between BHPB and external stakeholders.

The HRRP engagement program described in this Section is further to previous consultation undertaken by NSW Maritime and the DoP as part of the 2003 EIS and 2005 Development Consent approvals process.

7.1 Statutory

The HRRP is subject to government regulation within current approval conditions. At the time of writing, there are three approval documents which include community, stakeholder or consultation provisions.

The existing *Development Consent (Department of Infrastructure, Planning and Natural Resources, July 2005, Determination of DA-134-3-2003-i, Proponent NSW Waterways*) sets out requirements for the HRRP to:

- Ensure the public availability of documents upon request
- Manage and record community complaints, and
- Develop a river access protocol in relation to dredging works.

The *Environment Protection Licence No 1708,* granted by the NSW DECC for the BHPB HRRP Mayfield site, imposes requirements related to complaints handling and response, including promotion of the complaints hotline.

The project's *Voluntary Remediation Protocol (VRP)* agreed by DECC on (24 October) includes an undertaking to develop a communication strategy to inform interested parties of details and timing of remediation activities, including development of a Community Consultative Committee (CCC).

Table 4 summarises stakeholder and community consultation provisions currently required by the above approval documents.

Table 4: Stakeholder and Consultation Related Statutory Requirements

Instrument	Requirement	Clause	Status
Development Consent	Complaints Handling and Response Procedure and Protocol	Sch 2, Sub-sch A3.2, A3.3 and A3.4	In place
	Public and Commercial Access Protocol	Sch 2, Sub-sch B2.44	In development
	Public availability of documentation upon request	Sch 2, Sub-sch A3.1	In place
EPL	Complaints Procedure	M4 and M5	In place
VRP	Communication strategy	Undertaking 8	In place
	CCC	Undertaking 8	In development

7.2 Stakeholder Engagement Plan

BHPB has developed a (non-statutory) Stakeholder Engagement Plan/Program (SEP) which has been central to guiding the consultation and communication program undertaken by BHPB during the early stages of the HRRP. It will continue to guide stakeholder and community engagement during Stage 2 works.

The overall aim of the SEP is to provide opportunities to exchange information, enable community input into project planning and build confidence and trust between BHPB and external stakeholders.

The SEP was prepared to satisfy BHPB's own standards regarding community and stakeholder relations, and in doing so also sets out the processes required to meet consultation conditions set out in statutory approval documents.

Table 5 Engagement Approach is an extract from the SEP (*SEP Table 5: Stakeholder Strategy: Elements and Approach*) and sets out the HRRP's overall approach to consultation and engagement.

Table 5: Engagement Approach

Method	Summary
Accessible information	Preparation of accurate and easy-to-access and read information across a range of media, including project updates, engagement and monitoring results.
Two way communication	Targeted distribution of information and receipt of feedback to ensure an informed community and discussion.
Valued relationships	Opportunities for stakeholders to meet the HRRP team, openly discuss issues, share constructive suggestions and work in partnership or be supported.
Effective monitoring, management and response	Timely and measured monitoring, management and response to community concerns and issues.

A range of tools and engagement methods have been and will continue to be used to connect in differing ways to the wide range of stakeholders. **Table 6** provides a summary of key engagement tools and how they fit with the HRRP's overall consultation and engagement approach:

Table 6: Key Engagement Tools

Tool	Rationale
24 hour community hotline	24 hour free call telephone line enabling accessible and direct two way communication between public and HRRP team
Website (including feedback form)	Web pages enabling accurate, accessible and up to date information to a wider audience
Newsletters	Accurate and accessible communication and information
Stakeholder meetings – community	Ongoing series of meetings with community based groups (e.g. residents, community forums, environment groups) enabling communication of information and identification and response to community issues.
Stakeholder meetings – government, landowners, industry	Ongoing series of meetings enabling communication of information and identification and response to range of issues, including regulatory, operational and interaction issues
Community survey	–Community doorknock and telephone survey of 600 residents (500 local suburbs, 100 wider Newcastle LGA)
Fact sheets	Information sheets providing specific and/or technical information about particular aspects of the project.
Complaints and enquiries protocols	DoP approved processes for dealing with complaints, including Complaints Register (refer **Section 7.3**)
Potential for amenity alerts for odour, noise and heavy traffic	May be used to alert nearest residents and/or commuters if potential for specific instances of higher odour, noise or high traffic flow
Potential for open days and field visits	May be used if sufficient interest emerges from the community. Field visits available to government agencies upon request.
Community relations coordinator	A full time Community Relations Coordinator is in place to be the interface between the HRRP and the community
Media communication plan	HRRP directed media coverage enabling communication to wider Newcastle – e.g. advertise CCC, promote contact details
Community Fund	Funds available for sponsorship upon request

* Local suburbs are Mayfield East, Mayfield, Tighes Hill, Carrington, Stockton and Fern Bay

7.2.1 Status and Schedule of Engagement

The HRRP stakeholder engagement program is currently in Phase 2, Wider Community Engagement, as described in the SEP. This phase includes contact with all identified stakeholders (refer **Section 7.4** Stakeholder Assessment) and the preparation and distribution of a range of communication material. It intends to ensure that all stakeholders are informed of the HRRP and have had an opportunity to have input into HRRP development prior to commencement of Stage 2 works.

Table 7, Status and Schedule of Engagement, provides a summary of actions undertaken for and outcomes of the consultation phase of the HRRP, as well as an indication of ongoing schedule.

Table 7: Status of Engagement (as of November 19 2008)

Tool	Status	Schedule
Newsletters	12,500 of 1st edition distributed (including 10 500 posted to local households and businesses via Australia Post in July).	2nd edition scheduled for December – will report on community feedback and BHPB's response to community issues.
Website	Web pages (www.bhpbilliton.com/hrrp) and feedback form operational and promoted. To date, Website has received approximately 1500 hits and 12 feedback forms	Continually monitored and updated, will be ongoing for life of HRRP, including stage 2.
Stakeholder meetings	Approximately 40 completed across a range of stakeholders (resident groups, community forums, environmental organisations, business groups, fishing industry, local government, schools) – approximately 300 attendees in total. 2nd meetings have been held with 3 key groups with particular interest in emplacement site – Hunter Bird Observers (HBO), Newcastle University Green and Golden bell Frog (GGBF) Researchers, Citizens and Kooragang Alliance (CAKA). A number of organisations that were directly offered a briefing have declined – reasons given have included 1) insufficient interest 2) sufficient information has been provided via newsletter, or 3) group members have already been contacted / briefed via their membership of other groups.	Will be ongoing for life of HRRP on an as needs basis during Stage 2. Availability of meetings promoted in community newsletters

Tool	Status	Schedule
24 hour Community Hotline	Operational and promoted via Newcastle Herald (26 June 2008), newsletter, newsletter, site signage business cards. To date, 32 calls have been received (3 were considered of a negative nature, the remainder positive, neutral or no rating (i.e. seeking employment, confirming meetings etc). The negative calls were concerned with groundwater, treatment selection and noise from trucks.	Will be operational and promoted for life of HRRP, including Stage 2
Email communication	Operational and promoted via website and Newcastle Herald (26 June 2008) – 8 emails received by close of September - 4 from same person). Emails have asked regarding employment, information for university projects. Issues raised include immobilisation criteria, treatment selection process, and protection of habitat.	Will be operational and promoted for life of HRRP, including Stage 2
Letters to groups	Approximately 40 groups that were not called directly to arrange briefings have been sent a letter offering more information, and attaching a newsletter. There has been no follow up from these groups requesting a meeting, expressing concern or requesting further information.	Groups will be posted all future editions of the Community Newsletter, with cover letter offering follow up if requested.
Community Survey	Completed – 500 local residents, 100 Newcastle residents. Survey results found that the top community issues for the clean up are 1) River health, 2) Public health, and 3) Protection of plants and animals.	Community Survey may be repeated during Stage 2
Fact sheets	First three available on line and via contacting community hotline– 1) History, 2) PAHs, 3) Dredging.	Further factsheets on 4) treatment and 5) Survey findings and 6) Transport are currently being prepared. Fact sheets will continue to be developed in response to community issues
Display advertisements	Contact details promoted in Newcastle Herald 26 June 2008. CCC advertised, Newcastle Herald, 7 November 2008	Display advertisement will announce start of Stage 2 works, including promotion of community complaint facilities

Tool	Status	Schedule
CCC	Currently in development – Call for nominations closes 28 November. First meeting scheduled by end of January 2009.	CCC will meet prior Stage 2 works, and continue to meet quarterly or by milestone during Stage 2.
Complaints Protocol	In place and approved by DoP (29/08/08) (refer Section 8.3 below)	Will be operational and promoted for life of HRRP, including Stage 2. Will need to be approved for Stage 2 works.

7.3 Complaints Handling and Response Protocol

The HRRP's Complaints Handling and Response Protocol (CHRP) was developed in response to the requirement under Condition A3.4 of the development consent issued by the Minister in 2005 (DA-134-3-2003-i) for the Extension of Shipping Channels in the Port of Newcastle which covered all activities associated with dredging, treatment, and disposal of sediments within the South Arm of the Hunter River as part of the HRRP. It provides information on the processes to be applied for recording and responding to public complaints and enquiries received regarding the HRRP.

The CHRP is approved by the DoP for Stage 1 works (including the Optimisation Study). It will be re-submitted for approval for Stage 2 works, and will continue to inform the complaints and enquiries handling procedures during treatment and transport of sediment, and emplacement at the KIWEF site.

7.4 Stakeholder Assessment and Consultation

7.4.1 Identification of Stakeholders

BHPB has identified over 100 stakeholders across a range of broad stakeholder groups for inclusion in the consultation process. This has included resident, community, environmental, local business, government, industry, academic and other stakeholders.

Stakeholders have been assessed according to geography (refer **Figure 12**) and interest in and influence over the HRRP, and includes those groups who made a submission during the original 2003 EIS and 2005 Development Consent approval and consultation process. An outcome from BHPB's assessment has been the development of the strategy that identifies priorities, timeframes, resources and the specific approach for the most effective engagement of each stakeholder.

Guided by the principle of proactive engagement underlying the HRRP SEP, all identified stakeholders have been engaged via one or more of the following methods:

- Personal phone call and direct offer for briefing (this involved presentation of the HRRP, answering questions, and follow up of issues arising)
- Newsletter posted with a cover letter to local residents inviting the group's further interest in the HRRP
- Ongoing dialogue and interactions where there is a pre-existing or regulatory relationship, and
- Community Survey – used to gain local residents views and expectations.

Sections 7.4.2 and **7.4.3** detail the processes and outcomes of consultation with government and non-government stakeholders. **Figure 12** presents the area identified as the HRRP's local suburbs or geographic area of influence.

7.4.2 Agency Consultation

During the preparation of this EA, BHPB consulted with relevant agencies to discuss pertinent issues in relation to the HRRP, including Stage 2 works. Whilst many of these agencies are in ongoing consultation about the HRRP, the consultation program for each has included at least one delivery of the standard HRRP powerpoint presentation that is being used in all stakeholder briefings. This has ensured that there is consistency of information given to stakeholders, and has enabled government agencies to review the information that BHPB has been directly communicating to the public.

Table 8 below provides a summary of HRRP specific issues raised during consultation with these agencies, and references as to where the issues have been addressed in the EA.

Table 8: Agency and Landowner Consultation

Stakeholder	Main issues discussed	Reference in HRRP Stage 2 Approval to Proceed
Police NSW	Emergency response, site security, site access	**Sections 5**
Ambulance NSW	Emergency response, OH&S, site access	**Sections 5**
Fire NSW	Emergency response, site access	**Sections 5**
Dept of Education	Ability of DoE to respond to school's concerns, consultation processes were confirmed.	**Section 7.**
Department of the Environment, Water, Heritage and the Arts	Ecology, EPBC referral process	**Section 9**
Road Traffic Authority	Traffic movement, road capacity, impact on road users, traffic safety	**Section 12**
DoP	Land owner's consent, 24/7 modification, KI emplacement facility, transport of materials	**Sections 1, 2, 5, 6 and 12** **Appendix A**
DECC	Ecology, pollution response	**Section 9**
Port Stephens Council	Nature of PHAs, transport	**Sections 1 and 12**
Newcastle City Council (NCC) (Lord Mayor, Councillors, General Manager and senior management) (4 meetings)	Treatment method, emplacement, local traffic, community engagement, management of noise, odour amenity impacts and 24 hour operation	**Sections 1, 5, 7, 10, 11 and 12**
Newcastle Port Corporation	Port issues, site selection, approvals schedule of works, interaction with other river users	**Section 4 and 5** **Appendix A**
NSW Maritime	Ongoing discussion and licence processes	
Department of Health	Public health risks and management of odours.	**Section 10**
Hunter Estuary Governmental Steering Committee	Coordination issues of multiple river users	

Stakeholder	Main issues discussed	Reference in HRRP Stage 2 Approval to Proceed
HDC	Approvals, schedule, trucks, treatment method, operational interactions, emplacement monitoring, liability/responsibility, end land use	**Section 1, 4, 5, 6, 12 and 13**
Local Politicians*	Treatment choice, traffic impacts, community engagement, schedule.	**Sections 1, 4, 5, 7 and 12**

*Politicians include the then State Minister for Newcastle (now Minister for Hunter) Jodi Mckay, Federal Minister for Hunter and NCC Lord Mayor John Tate

7.4.3 Community and other Stakeholder Consultation

As outlined in the SEP, a range of resident, community, environmental and other stakeholder groups have been engaged in the consultation process. As with government agencies, a standard PowerPoint presentation was used to ensure consistency of information provided to stakeholder groups. Each presentation was followed by a question and answer session, or for more informal sessions, questions were taken and answered during the presentation.

A list of these community meetings to date, and references as to where the issues have been addressed in the EA, is summarised in **Table 9** below.

A number of community groups declined BHPB's direct offer to meet about the HRRP. Letters sent to community groups offering more information about the HRRP also received no follow up from community groups.

Table 9: Community and Stakeholder Consultation

Stakeholder	Main Issues and questions discussed	Reference in HRRP Stage 2 Approval to Proceed (EA)
Mayfield Community Forum	Treatment process, nature of transported material, health issues, selection of emplacement site, changing sea levels	**Sections 1, 3, 4, 5 and 19**
Stockton Community Forum	Emplacement site choice, health status of PAHs, treatment choice, water quality, visual amenity, emplacement site reuse	**Sections 1, 4, 5, 6, 14, 15,and 18**
Throsby Community Forum	Environmental impacts, Public accountability	**Sections 1, 4, 5, 7 and 9 - 20**
Commercial Fishing Cooperative	River access, water quality, dredging, schedule	**Sections 14 and 15**
Hunter River Prawn Trawl Fishers	River access, water quality, dredging, schedule	**Sections 14 and 15**
Hunter Business Chamber	Timeliness, re-use of sites, economic benefit	**Section 1, 3, 4, 5, and16**
Citizens and Kooragang Alliance(CAKA)	Need for Long term surety, treatment choice, cumulative trucks, emplacement site, river access, pubic accountability	**Sections 1, 4, 5, 7, and 12**

Stakeholder	Main Issues and questions discussed	Reference in HRRP Stage 2 Approval to Proceed (EA)
Newcastle Trades Hall Council	Industrial issues, community impact (traffic, amenity)	**Sections 5, 7, and 12**
Mayfield East Public School P&C and Principal	Odour, traffic, noise, water quality, site history, on-school noise monitoring requirements	**Sections 5, 10, 11, 12, 14, 15 and 21**
Hunter Community Environment Centre (HCEC)	Water quality, dredging controls, NCIG interactions, approval status, remediation criteria, government role	**Sections 1, 3, 4, 5, 6, 7, 14, 15, and 21**
Rising Tide	Water quality, dredging controls, NCIG interactions, approval status, remediation criteria, government role	**Sections 1, 3, 4, 5, 6, 7, 14, 15, and 21**
HBO Club (2 meetings)	Habitat loss, cumulative industrial impacts, habitat offsets; 2nd meetings – pleased with ecological assessment approach, satisfaction with modification to emplacement footprint, partnership opportunity,	**Sections 5, 9, 20 and 21**
University of Newcastle Green and Golden Bell Frog research team (2 meetings)	Impact to frog habitat and movement corridors, habitat offsets; 2nd meeting – pleased with ecological assessment approach, long term land use management, satisfaction with modification to emplacement footprint	**Sections 5, 9 and 21**
KWRP	Water quality, impact to emplacement site, cumulative impacts of industry on KI	**Sections 4, 5, 14, 15 and 20**
Hunter Catchment Forum (HCF)	Water quality, impact to emplacement site	**Sections 4, 5, 14 and 15**
Jodie McKay's office	Public enquiry handling, schedule, traffic, PAHs	**Sections 1, 5, 7 and12**
Toronto Rotary Club	Site history, dredging process, reuse of sites	**Sections 1, 2, 5, 6, and 16**

7.4.4 Aboriginal Community Consultation

Aboriginal community consultation was undertaken in accordance with the DEC (2004) *Interim Community Consultation Requirements for Applicants.*

These guidelines outline a process of inviting Aboriginal groups to register their interest in being party to consultation (including local newspaper advertising), seeking responses on proposed assessment methodology, and seeking comment on proposed assessments and recommendations. The guidelines require proponents to allow ten working days for Aboriginal groups to respond to invitations to register, and then 21 days for registered Aboriginal parties to respond to a proposed assessment methodology, unless all groups respond earlier.

The community consultation was undertaken as part of the Aboriginal Heritage Assessment (refer **Appendix E**). The methodology for the assessment comprised:

- a search of the DECC AHIMS database
- a review of relevant archaeological reports lodged in DECC's archaeological reports library at Hurstville, and
- consultation with Aboriginal community groups following DECC's interim guidelines with emphasis on the social cultural heritage values of the study area.

The Aboriginal groups involved in this consultation included:

- Awabakal Traditional Owners Aboriginal Corporation (ATOAC)
- Awabakal Local Aboriginal Land Council (ALALC)
- Nur-Run-Gee Pty Ltd
- Mur-Roo-Ma Inc
- Gidawaa Walang Cultural Heritage Consultancy (GWCHC), and
- Awabakal Descendants Traditional Owners Aboriginal Corporation (ADTOAC).

A meeting was arranged to discuss the proposed methodology for the Aboriginal heritage assessment and a combined methodology statement and methodology meeting invitation sent to each community group on 29 October 2008 for comment. The meeting was held as a proactive approach to discussing the issues directly with the registered groups rather than waiting for responses to written notification.

A series of three meetings was subsequently held at the BHPB Property Services Group office, Mayfield, in November 2008 to disseminate information about the HRRP. A presentation was given to the groups who attended which included a detailed synopsis of the HRRP background, as well as a briefing on the proposed Aboriginal heritage assessment methodology, with emphasis on the reasoning behind the proposed methodology.

All groups gave verbal agreement to the methodology at the meeting. A copy of the methodology presentation was emailed to all groups on November 2008 for agreement/comments regarding the proposed methodology, to which agreed responses were received from all parties.

During the consultation phase there were several responses from Aboriginal stakeholders regarding their views on the cultural value of the study area. Correspondence from ATOAC and Nur-Run-Gee Pty Ltd indicate that KI (and by implication the study area) has cultural heritage value to Aboriginal stakeholders. Those cultural heritage values derive from the fact that the area, like all other parts of the landscape, was used by Aboriginal people.

As indicated in the Aboriginal Heritage Assessment (refer **Appendix E**), the following conclusions are made in light of the findings of the desktop survey, consultation with the Aboriginal community, the assessment of impacts, the assessment of significance and the relevant legislation protecting Aboriginal and historic heritage in NSW:

- The proposed excavation for the emplacement cell is not for the purpose of locating Aboriginal objects. Therefore an application for a AHIP (consent) under section 86 of the NP&W Act 1974 is not required
- There are no known Aboriginal sites within the study area. Therefore an application for a AHIP (consent) under section 90 of the NP&W Act is not required
- No further archaeological excavation, collection or monitoring is warranted for the construction project

- Should any Aboriginal objects be located during the HRRP, work should cease and DECC and the local Aboriginal community informed immediately, and
- Members of the Aboriginal community have recommended that an on-site familiarisation meeting be held to identify any social/spiritual values for the study area.

7.5 Incorporation of Community Consultation Outcomes

Community and stakeholder feedback received during the stakeholder engagement program to date closely aligns with the issues initially anticipated in BHPB's stakeholder assessment and the issues raised in submissions made by the community as part of NSWM's 2003 EIS and DoP's 2005 Development Consent process. There have been few 'new' or 'surprise' issues emerging from discussions.

Most issues emerging have been previously identified as potential issues and addressed in HRRP planning, or included by regulatory bodies as conditions of consent, for example, noise and odour management plans. Where a new issue has emerged from community consultation it has been fed into HRRP planning and addressed in design phase, for example, the protection of habitat at KI and steps to decrease congestion on public roads.

All questions from community and other stakeholders have been responded to immediately (i.e. at meetings, via Community Hotline), or if more complex, have been provided in written form.

Table 10: summarises the major issues emerging from community consultation and HRRP inclusions that will minimise, prevent, mitigate or offset the potential impact.

Table 10: Main Issues and HRRP Response

Issue	Specific Concerns	HRRP Response
Water quality	Concern re groundwater and river health	Communication of dredging controls and river and groundwater monitoring, emplacement design and contingency measures Preparation of dredging fact sheet Water quality section in 2nd newsletter
Public health	Concern re PAHs	Preparation of PAH fact sheet Public Health section in 2nd newsletter
Habitat protection	Concern re impact on threatened species	Ongoing discussions with specific interest groups – HBO and the University GGBF researchers Modification of emplacement footprint to protect approx 80% of habitat Offset package with DECC (in development)
Traffic congestion	Concern re Tourle St bridge Concern re cumulative impacts of multiple industry	Seeking 24 hour approval to minimise truck movements during peak hours Truck movements to commence where feasible post completion of new Tourle St Bridge construction works
Treatment queries	Need for community to have confidence in treatment method	Development of a treatment fact sheet (in development) Communication of treatment selection process at meetings and in response to public enquiries Treatment section in 2nd newsletter

Issue	Specific Concerns	HRRP Response
Noise concerns	Concern re trucks on Industrial Highway	Compliance with consent noise limits, communication of noise management plan and complaints mechanisms
Odour	Concern re PAH odour for local residents' amenity	Communication of odour controls developed during Optimisation Study (future newsletters) Discussed in PAH fact sheet.
River access	Local fishermen concerned regarding impact to river access	Coordination with Newcastle Port Corporation Development of Public and Commercial Access Protocol (pending)
Scheduling and Operations	Need for timely completion – will minimise duration of impacts Need to coordinate interactions with other land users etc	Accelerated schedule Coordination with landowners and commercial neighbours

7.6 Future Direction and Commitments

During Stage 2 works, BHPB will continue to engage the community to ensure that ongoing HRRP information is disseminated and community attitudes continue to be feedback into the HRRP.

Consultation and engagement will focus on maintaining engagement channels, continuing to inform of HRRP updates and changes, and responding to potential operational issues, if any, that might emerge during execution of the HRRP.

BHPB's ongoing consultation commitment will be undertaken via:

- Preparation and dissemination of regular newsletters
- Preparation of additional fact sheets to respond to issues identified as important by the community
- Regular updating of the BHPB website, including monitoring results
- Display advertisements advising general public of HRRP milestones commencement of Stage 2 works
- Repeat meetings with interested stakeholder groups
- Continued promotion and maintenance of complaint and enquiry facilities, and
- Establishment of a CCC (first meeting to be held prior to commencement of Stage 2 works).

8.0 Issues Prioritisation

8.1 Approach to Prioritisation

A preliminary assessment of environmental issues associated with the HRRP was undertaken for this Environmental Assessment.

The prioritisation of issues for the HRRP was based on recognising that a higher degree of assessment is required for the environmental issues with the potential for higher severity and greater consequences.

Table 13: shows the issues prioritisation matrix used to identify priorities. Each issue was given a ranking between one and three for the severity of effects and the perceived consequences of those effects if left unmanaged. These two numbers were added together to provide a numerical ranking for the issue that was used to categorise each issue into high, medium and low priorities. These are outlined below in **Table 11** and **Table 12** respectively.

Table 11: Severity of Risk

Score	Severity	Description
1	Low	localised implications; imperceptible or short term cumulative impacts.
2	Medium	regional implications; modest or medium term accumulation of impacts.
3	High	inter-regional implications; serious or long term accumulation of impacts.

Table 12: Consequences of Unmanaged Effects

Score	Consequence	Description
1	Low	minor environmental change; offsets readily available.
2	Medium	moderate adverse environmental change; offsets available.
3	High	important adverse environmental change; offsets not readily available.

Table 13: Issues Prioritisation Matrix

Severity of Effects	Consequence of Unmanaged Effects		
	3 High	2 Medium	1 Low
1 Low	4 (Medium)	3 (Low)	2 (Low)
2 Medium	5 (High)	4 (Medium)	3 (Low)
3 High	6 (High)	5 (High)	4 (Medium)

8.2 Assessment

The prioritisation of environmental issues related to the HHRP is shown in **Table 14:** . The assessment does not consider the application of mitigation measures to manage environmental effects. This is discussed further in **Section 22** of this report.

Those issues with a higher level of potential risk were identified for a more detailed level of assessment and for the development of more specific and detailed environmental safeguards (refer **Section 21** of this report for details).

Some issues (ecology, Aboriginal heritage and groundwater) were only assessed in relation to the KIWEF site. This is because ecology and Aboriginal heritage issues have already been assessed at the Mayfield site in the context of the August 2005 development consent. Also, as the Mayfield site is sealed the potential for impacts to groundwater on this site are limited.

In **Table 13** under each issue there are some examples listed of the specific range of potential impacts. For example potential ecological impacts at KIWEF include impact on frog habitat areas by the emplacement cell footprint, impacts as a result of lighting, or impacts as a result of changes to water levels or water quality.

However, in the interests of simplicity and clarity the prioritisation of issues has been carried out at a more strategic level focussing on general rather than specific issues.

It is also important to note that the likelihood of the various environmental issues occurring will vary significantly and this is not recognised in **Table 14** below. For example the loss of habitat as a result of the footprint of the emplacement cell would have a very high likelihood of occurring while the traffic safety impacts of an accident during truck haulage would have a low likelihood.

Table 14: Prioritisation of Environmental Issues

Issue	Severity	Consequence	Priority
1. Ecology at KIWEF	**3**	**2**	**5 (High)**
Examples: Loss of Green and Gold Bell Frog breeding and foraging habitat due to emplacement cell footprint; Impact on local hydrology and water quality; Impacts of lighting			
2. Traffic and Transportation	**2**	**2**	**4 (Medium)**
Examples: Capacity of road network to accommodate extra movements; Traffic safety considerations			
3. Soils, Geology and Geotechnical at KIWEF	**2**	**2**	**4 (Medium)**
Examples: Erosion and sedimentation during construction/operation; Settlement of emplacement cell; Exposure of contaminated soils during construction			
4. Groundwater at KIWEF	**2**	**2**	**4 (Medium)**
Examples: Contamination of groundwater; Compression of groundwater table by cell settlement			
5. Noise	**2**	**3**	**5 (High)**
Examples: Potential noise impacts on residential receivers from 24 hour truck traffic; Potential noise impacts on residential receivers from construction\operation			
6. Odour	**2**	**2**	**4 (Medium)**
Examples: Impacts from Mayfield site operations; Impacts form transport of treated sediment			

Issue	Severity	Consequence	Priority
7. Aboriginal Heritage at KIWEF	**1**	**1**	**2 (low)**
Examples: Potential to discover Aboriginal artefacts or places			
8. Resources and Infrastructure	**1**	**1**	**2 (low)**
Examples: Demand upon resources (e.g. water and electricity); Impact on existing infrastructure (e.g. Koppers Pipeline)			
9. Lighting	**2**	**2**	**4 (Medium)**
Examples: Impacts on residential areas; Impacts on fauna at the KIWEF site			
10. Waste Management	**1**	**1**	**2 (low)**
Examples: Creation of unnecessary waste streams			
11. Visual Amenity	**1**	**1**	**2 (low)**
Examples: Impacts of development on visual landscape at Mayfield and KIWEF site			
12. Air Quality	**1**	**2**	**3 (low)**
Examples: Dust emissions; Greenhouse gas emissions			
13. Climate Change	**1**	**1**	**2 (low)**
Examples: Impacts as a result of flooding \ sea level rise; Impacts from increased intensity storm events			
14. Surfacewater	**2**	**2**	**4 (Medium)**
Examples: Management of clean and potentially contaminated stormwater during construction and operation; Discharge to the Hunter River; Managing soil erosion			

Table 15: identifies that the results of prioritisation of environmental issues. This indicates that the focus of this environmental assessment should be on the high and medium priority issues as identified below.

Table 15: Prioritisation of Issues

Low (2-3)	Medium (4)	High (5-6)
Aboriginal heritage Resources and infrastructure Waste management Visual amenity Air quality Climate change	Traffic and transportation Soils, geology and geotechnical Groundwater Odour Lighting Surfacewater	Ecology Noise

Each of these issues is discussed below, including the mitigation measures proposed to reduce the potential for impacts.

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9.0 Ecology

9.1 Introduction

A comprehensive flora and fauna assessment has been undertaken over lands in the vicinity of the emplacement cell by RPS Harper Somers O'Sullivan (RPS HSO) (refer **Appendix B**). Expert advice regarding the Green and Golden Bell Frog (GGBF) (*Litoria aurea*) was obtained from Dr Arthur White and incorporated into the assessment. Dr White has worked extensively on Kooragang Island for neighbouring projects, including NCIG.

Large areas of the site have historically been used as a landfill but there remains low-lying areas that hold water on either a permanent or semi-permanent basis. The site now supports a mix of vegetation communities including Grassy Waste Emplacement Lands (comprising predominantly exotics), Planted Vegetation, Freshwater Wetland Complex, Coastal Saltmarsh, Swamp Oak Floodplain Forest and Mangrove-Estuarine Complex.

9.2 Flora Survey

Vegetation Community Mapping

Five broad vegetation communities fall within the footprint of the proposed emplacement cell (refer **Figure 14**) and these include:

- Grassy Waste Emplacement Lands
- Freshwater Wetland Complex
- Landscape Planting
- Mangrove-Estuarine Complex and
- Saltmarsh

The vegetation communities of the KIWEF are dominated by Grassy Waste Emplacement Lands.

Additional vegetation communities occurring within the broader study area include:

- Swamp Oak Floodplain Forest.

None of these vegetation communities are listed under the EPBC Act.

Grassy Waste Emplacement Lands

These areas are characterised by filled substrates, predominantly capped with coal spoil, and covered by a sparse to relatively dense layer of exotic grasses and introduced herbaceous plants. The Grassy Waste Emplacement Lands occurring within the KIWEF are dominated by non-endemic plant species.

Freshwater Wetland Complex

This community occurs in a number of locations within the site and broader study area where unfilled low-lying areas retain water after rainfall. The northeast pond (Pond I in **Figure 13**) is largely ephemeral, although there are deeper areas within the impoundment that retain water into dry periods. The substrate of the impoundment is largely represented by slag making it difficult for plants to take hold and its ephemeral nature gives opportunity for terrestrial species like *Paspalum dilatatum* (Paspalum). The deeper areas contain *Typha orientalis* (Cumbungi) and *Phragmites australis* (Common Reed) at their edges and the introduced *Juncus acutus* (Sharp Rush) occurs as clumps within the impoundment.

The central pond (Pond H in **Figure 13**) is permanent, containing open deep water. Pond H has steep embankments with narrow edges that are dominated by stands of *T. orientalis* (Cumbungi).

The south-western occurrence of this community (Pond A in **Figure 13**) is partly ephemeral and contains shallow open water fringed by moderate stands of *T. orientalis* (Cumbungi), with *Schoenoplectus sp.* (a Club-rush) occurring in meadows and mudflats when water levels are low.

Other small areas of Freshwater Wetland Complex occur within areas indicated as Ponds AA and AC on **Figure 13**). Pond AC is a linear depression that has formed between two parallel embankments. It is dominated by *T. orientalis* (Cumbungi) and has a small portion of open water. Pond AA supports a dense reedland of *T. orientalis* (Cumbungi) in the west and *Phragmites australis* (Common Reed) in the east with no open water present.

This community is considered to be commensurate with Freshwater Wetlands on Coastal Floodplains, an EEC listed under the TSC Act.

Landscape Planting

Landscape Planting areas include species such as *Acacia longifolia* (Sydney Golden Wattle) and *Eucalyptus camaldulensis* (River Red Gum), that are not endemic to the site, with occasional plantings of *Casuarina glauca* (Swamp Oak). These appear to have been planted as visual screening for the KIWEF.

Mangrove-Estuarine Complex

This community is represented by a narrow linear strip of *Avicennia marina* (Grey Mangrove) along the shore of the Hunter River and some estuarine habitats immediately adjacent.

Mangroves are protected under the *Fisheries Management Act 1994*.

Saltmarsh

Saltmash was found to occur within the intertidal zone to the south of the utility road running parallel to the Hunter River. This community was found to have several variations where external influences contributed species from other communities within. This included co-dominants of Mangroves, Exotic Grasses and *Phragmites australis* (Common Reed). The dominant species within this community is *Sporobolus virginicus* with co-dominant species including *Sarcocornia quinqueflora ssp. quinqueflora* (Samphire) and *Suaeda australia* (Austral Seabite).

This community is considered to be commensurate with Coastal Saltmarsh, an EEC listed under the TSC Act.

Swamp Oak Floodplain Forest

The Swamp Oak Floodplain Forest was found to occur adjacent to the south west pond (Pond A as shown in **Figure 13**) and consisted of a grove of approximately 20 *Casuarina glauca* (Swamp Oak) trees and was located adjacent to Mangroves to the east / west and a steep embankment with Grassland-exotic species dominant to the north.

This community is considered to be commensurate with Swamp Oak Floodplain Forest, an EEC listed under the TSC Act.

Significant Flora

One flora species of conservation significance was recorded within the KIWEF, being *Zannichellia palustris*. This species is listed as Endangered under the TSC Act. *Z. palustris* has been recorded within the three major freshwater wetland areas (Ponds A, H and I in **Figure 13**). Potential habitat (although marginal) for this species is also considered to occur within Pond AA which is heavily vegetated with reeds.

No other flora species of conservation significance were recorded within the site, or are considered likely to occur within the site.

9.2.1 Habitat Survey

Faunal habitat within the site was found to be relatively depauperate with regard to structural diversity within the terrestrial environments, as most of the land is covered with sparse to dense occurrences of exotic grass species.

Although the grassy waste emplacement areas are limited in cover, they provide some foraging and shelter areas for open country birds. These grassland habitats may also provide intermittent foraging opportunities for Red-backed Button-quail (*Turnix maculosa*), a threatened species listed under the TSC Act which has been previously recorded in the vicinity of the site.

The landscape plantings provide limited foraging and shelter for songbirds due to the isolation of this habitat from similar vegetation in the region and, due to the young age cohort of onsite trees, there are no hollows that would provide nesting or shelter opportunities for Microchiropteran bats or other native fauna. The grassland areas represent some hunting opportunities for common small to medium raptors, and the presence of isolated shrubs offers shelter for common passerines.

Wetland communities within the site represent the greatest opportunities for local native fauna. Wetland habitat within the site can be broadly categorised into three different types based on the persistence of water, being: permanent, semi-permanent and ephemeral. The persistence of water within the site has a direct influence upon vegetation occurring within the wetland areas.

The eastern impoundment (Pond I in **Figure 13**) is represented by a mixture of permanent and semi-permanent habitat with deeper areas that hold water into dry times and a much greater area of shallow waters that periodically dry out. The ephemeral aspect of this impoundment is suited to the breeding habits of the GGBF.

Associated reed beds and dense vegetation provide cover and foraging opportunities for bitterns, rails and other reed bed frequenting birds. The shallow areas of this impoundment represent potential foraging habitat for the TSC Act listed Australasian Bittern (*Botaurus poiciloptilus*), however the vegetation within this impoundment is not considered to be of sufficient extent or density to represent potential breeding habitat for this species. There is potential for other locally occurring threatened bird species, such as Black-necked Stork (*Ephippiorhynchus asiaticus*), Magpie Goose (*Anseranas semipalmata*), Blue-billed Duck (*Oxyura australis*) and Freckled Duck (*Stictonetta naevosa*) to occur within the eastern impoundment on a rare occasion. However, this habitat is not highly suited to the foraging habits of any of these species.

The pond located immediately north of the proposed emplacement cell (Pond H in **Figure 13**) is characterised by permanent water of sufficient depth to suit the foraging requirements of diving ducks, such as the Musk and Blue-billed Ducks. Both the Freckled Duck and Magpie Goose may also potentially occur within the western pond, although this is only considered likely on a rare occasion. The surrounding reed beds provide shelter and foraging opportunities for bitterns, rails and reed bed avifauna, such as the Clamorous Reed Warbler (*Acrocephalus stentoreus*) and Little Grassbird (*Megalurus gramineus*). This pond and the surrounding vegetation also represent potential breeding / foraging and shelter habitat for the GGBF.

Within the footprint of the proposed cell there are a number of highly ephemeral shallow ponds, which occur during wet periods. GGBF tadpoles have been observed in the most easterly of these ponds, while the species has been heard calling in the two ponds occurring to the west (refer **Figure 15**). The area around these ponds and intervening areas between ponds are likely to represent foraging habitat for the GGBF and habitat across which this species would traverse to access different habitat areas.

Ponds A, H and I (refer **Figure 13**) contain wetland habitat within which the Endangered aquatic plant, *Zannichellia palustris*, has been recorded. Marginal habitat for this species also occurs within Pond AA which is heavily vegetated with reeds.

9.2.2 Fauna Survey

Mammal Species

The potential for threatened mammal species to occur within the site is limited to highly mobile species such as bats. However, habitat within the site for bat species is limited to aerial foraging opportunities for insectivorous Microchiropteran bats.

Spotlighting surveys recorded Grey-headed Flying-fox (*Pteropus poliocephalus*) flying over the site, however, there was no suitable roosting habitat on site for this species, and very limited seasonal foraging habitat within the landscaped areas.

Avifauna Survey

Terrestrial bird species within the site were found to be largely limited to common open country species. Where vegetation is denser and occasional shrubs occur, the increased habitat complexity provides shelter for other small birds. Landscape plantings provided foraging opportunities for common woodland bird species.

Wetland habitats within the site containing reed beds and dense grasses and rushes provide foraging and nesting opportunities for a number of waterbird and reed bed passerine (perching bird) species and provide resources for a number of other species. A range of common waterfowl and diving ducks were found to be utilising the pond to the immediate north of the emplacement cell (Pond H in **Figure 13**). Black Swan (*Cygnus atratus*) also breed within this pond.

A range of other bird guilds, including raptors, ravens, herons and egrets, use the site as part of a larger foraging range.

Herpetofauna Survey

The field survey and review of past studies identified GGBF within the KIWEF and broader study area. As indicated in **Figure 15**, these areas can be categorised into:

- core habitat
- foraging and shelter habitat, and
- probable dispersal areas.

A number of common frog species were also detected within the site.

9.3 Threatened Species and Communities Assessment

Threatened flora and fauna species (listed under the TSC Act and / or the EPBC Act) that have been recorded within an approximate 10 km radius of the KIWEF have been considered in the Flora and Fauna Assessment. Endangered Ecological Communities (EECs) known from the broader area have also been considered.

9.3.1 Identification of Subject Species and Communities

Threatened Fauna Species

Forty-eight listed threatened fauna species have been recorded within approximately 10 km of the study area and include birds, mammals, amphibians and one snake. An assessment of the likelihood of occurrence on the KIWEF and immediate surrounds was undertaken for each of these species.

Those species identified as having a moderate or greater chance of occurring within the site or immediate surrounds, or that have been recorded within this area, include the following:

Amphibians

- GGBF (*Litoria aurea*).

Birds

- Blue-billed Duck (*Oxyura australis*)
- Freckled Duck (*Strictonetta naevosa*)
- Australian Painted Snipe (*Rostratula australis*)
- Australasian Bittern (*Botaurus poiciloptilus*)
- Grass Owl (*Tyto capensis*), and
- Red-backed Button Quail (*Turnix maculosa*).

Mammals

- Eastern Bentwing-bat (*Miniopterus schreibersii*)
- Little Bentwing-bat (*Miniopterus australis*)
- Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Large-footed Myotis (*Myotis adversus*), and
- Greater Broad-nosed Bat (*Scoteanax rueppellii*).

Threatened Flora Species

Eleven listed threatened flora species have been recorded within approximately 10 km of the study area. An assessment of the likelihood of occurrence on the KIWEF was undertaken for each of these species.

One flora species of conservation significance was recorded within the KIWEF, being *Zannichellia palustris*. This species is listed as Endangered under the TSC Act. *Z. palustris* has been recorded within the three major freshwater wetland areas. Potential habitat (although marginal) for this species is also considered to occur within Pond AA, which is heavily vegetated with reeds.

No other flora species of conservation significance were recorded within the site, or are considered likely to occur within the site.

Endangered Ecological Communities

Four listed EECs (TSC Act) are known from the broader area. An assessment of the likelihood of occurrence on the KIWEF and immediate surrounds was undertaken for each of these communities.

Those communities considered to have a moderate or greater chance of occurring within the site or immediate surrounds, or that have been recorded within this area, include the following:

- Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bio-regions
- Coastal Saltmarsh in the North Coast Bioregion, and
- Swamp Oak Floodplain Forest on Coastal Floodplains.

Endangered Populations

No Endangered Populations (TSC Act) occur within the locality of the KIWEF that are of relevance to the site.

9.3.2 Key Threatening Processes

A Key Threatening Process (KTP) is defined in the TSC Act as a process that threatens, or could threaten, the survival or evolutionary development of species, populations or ecological communities. KTPs are listed in Schedule 3 of the TSC Act. Those KTPs considered relevant to HRRP include:

- Clearing of native vegetation
- Invasion of exotic perennial grasses
- Alteration of the natural flow regimes of rivers, streams, floodplains and wetlands
- Infection of frogs by amphibian chytrid causing the disease chytridiomycosis, and
- Human caused climate change.

9.4 SEPP 44 – Koala Habitat Protection

The site does not constitute Potential Koala Habitat as defined by State Environmental Protection Policy (SEPP) 44 – 'Koala Habitat Protection'. Subsequently, further provisions of the SEPP do not apply.

Furthermore, no sign of any Koala activity or Koalas was noted on site. The lack of habitat connection to occupied koala habitat would mean it is extremely unlikely that Koalas could ever access this site.

9.5 Commonwealth Matters

9.5.1 Matters of National Environmental Significance

The Commonwealth's EPBC Act 1999 requires assessment as to whether HRRP would have, or is likely to have, a significant impact on a matter of National Environmental Significance (NES). These matters of NES have been considered in the Flora and Fauna Assessment, and are summarised below.

World Heritage Areas

The site is not a World Heritage area, and is not in close proximity to any such area.

Wetlands Protected by International Treaty (the RAMSAR Convention)

The Hunter Estuary Wetlands (RAMSAR) occur in proximity to the site (>1 km north of the site). It is unlikely that this RAMSAR wetland, or any other wetlands of international importance, would be impacted by HRRP.

Nationally Listed Threatened Species and Ecological Communities

Threatened Species

A total of 18 threatened species nationally listed under the EPBC Act were identified as being present or having suitable habitat present within 10 km of the site (EPBC Protected Matters Search, accessed September 2008). Species recorded or considered at least moderately likely to occur within the site include:

- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- GGBF (*Litoria aurea*), and
- Painted Snipe (*Rostratula aus*tralis)

The EPBC assessment criteria were applied to each of these species. The assessment demonstrates that HRRP is unlikely to impact adversely on the Large-eared Pied Bat or the Painted Snipe.

The assessment demonstrates that HRRP, without implementation of strict environmental safeguards, has the potential to impact on the GGBF in the following way:

- lead to a long-term decrease in the size of an important population of a species
- reduce the area of occupancy of an important population
- disrupt the breeding cycle of an important population
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
- introduce disease that may cause the species to decline, and
- interfere substantially with the recovery of the species.

Specific mitigation measures designed to protect the GGBF are summarised in **Section 9.6.2.**

Threatened Ecological Communities

One nationally listed Threatened Ecological Community (TEC) was identified as being present or having suitable habitat present within 10 km of the site (EPBC Protected Matters Search, accessed September 2008). This comprised:

- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland

This community was not found to be present within HRRP site and is not known to occur within the locality.

Nationally Listed Migratory Species

The following nationally listed terrestrial migratory species were identified as being present or having suitable habitat present within 10 km of the emplacement cell. Species recorded or considered to have at least a moderate chance of occurring within the site include:

- White-bellied Sea-Eagle (*Haliaeetus leucogaster*), and
- White-throated Needletail (*Hirundapus caudacutus*).

The site is not considered to contain resources that would be of any significance to these species, particularly when compared to other preferred habitat areas occurring within the broader locality.

The site is not considered to contain resources that would be of any significance to nationally listed wetland migratory species, particularly when compared to other preferred habitat areas occurring within the broader locality.

All Nuclear Actions

No type of nuclear activity is proposed for the site.

The Environment of Commonwealth Marine Areas

The proposed activity on the site would not have a significant adverse effect on any Commonwealth Marine Area.

9.5.2 EPBC Referral

The proposal has been referred to the DEWHA under the EPBC Act due to the potential for a significant impact from the KIWEF activities on wetlands of international significance; listed threatened species and ecological communities and migratory species protected under international agreements.

In December 2008, BHPB submitted an EPBC referral for the KIWEF to the DEWHA. Based on the low likelihood of any significant impacts, and the management and mitigation framework which is proposed, BHPB has recommended to DEWHA that the HRRP emplacement activities are not a controlled action when applying the Particular Manner assessment process. It is anticipated that advice will be received from DEHWA in mid-January 2009 as to whether this is a Controlled Action or not and the subsequent approval process to be followed.

9.6 Discussion

9.6.1 Threatened Fauna

The fauna species identified as having a moderate or greater chance of occurring within the site or immediate surrounds, or that have been recorded within this area, were the subject of more detailed assessment in the Flora and Fauna Assessment. This assessment considered potential impacts of the proposed construction and operation of the emplacement cell on habitat quality, habitat fragmentation and connectivity, mortality, disease transmission, contamination, shading, noise, vibration, lighting and cumulative impacts.

The Flora and Fauna Assessment demonstrates that the Stage 2 activities at KI would only remove a small portion of habitat for the Blue-billed Duck, Freckled Duck, Australian Painted Snipe, Australasian Bittern, Grass Owl, Red-backed Button Quail and microchiropteran bat species and would not sever connectivity. The assessment also demonstrates that any short-term impacts during construction could be managed appropriately. Since large areas of more suitable habitat occur for these species within the Hunter Estuary and the KIWEF, and most of the habitat for these species within the site would remain after the HRRP, the assessment considered that it is unlikely that HRRP would adversely impact these species.

The HRRP has the potential to have a significant adverse impact on the GGBF if no mitigation measures, including avoidance, management and offset activities, are applied. Further consideration of these impacts is provided below.

9.6.2 Green and Golden Bell Frog

Impacts

The proposed KIWEF emplacement cell(s) and wider disturbance area has been specifically designed to minimise the disturbance of core wetland habitats for the GGBF to reduce the potential for impacts on this species.

This approach has meant that construction of the emplacement cell and related facilities at KIWEF would involve the direct removal of only small areas of core GGBF habitat (refer **Figure 15**). Core GGBF habitat is considered to be breeding habitat for the species in addition to providing some foraging and shelter habitat. A total of 1.37 ha of core habitat would be removed as a result of the KIWEF disturbance activities.

Pre-clearing surveys, frog exclusion fencing and frog relocation is proposed (refer to **Specific Mitigation Measures** below). This would significantly minimise the potential for frog mortality during construction.

Cumulative Impacts

The proposal has the potential to contribute to cumulative impacts on the GGBF in conjunction with other large scale industrial activities within KI. Cumulative impacts are likely to be loss of breeding, foraging and shelter habitat within industrial areas of KI. However, the DECC has formulated a framework for the management of this species which addresses the cumulative loss of habitat for the species and provides for the ongoing management of the species in or adjacent to industrial land on KI. BHPB is committed to contributing to and actively supporting this framework for GGBF management in collaboration with the other relevant parties.

Mitigation Measures

BHPB's approach to managing the potential for impacts on listed threatened species has been to first avoid impacts and conserve existing habitat then minimise, mitigate and offset any residual potential for adverse change. This approach is consistent with the DECC Draft Recovery Plan for the GGBF (DEC, 2005).

BHP Billiton's design philosophy has been to make informed decisions that reduce the potential for impacts on the GGBF and their habitat whilst ensuring other environmental design objectives, including protection of ground and surface waters, are achieved at the KIWEF site.

This process involved significant negotiations with the landowners representative, HDC, in mid to late 2008 to ensure the modified footprint and broader emplacement design was supported. The outcome from this three month negotiation process was a modified footprint that significantly reduces the area of impact on GGBF core habitat (more than 80% of the existing habitat being retained – refer **Figure 15**) which could be supported by HDC subject to certain conditions. These conditions included the incursion of cost penalties to BHP Billiton to raise the height of the cell(s) so that the overall volume capacity of the emplacement cell could be maintained. These cost penalties range in the order of millions of dollars and have delayed finalising the project engineering design for KIWEF by at least three months for a time critical project. This approach clearly demonstrates BHPB's firm commitment to reducing its potential for ecological impacts.

The original emplacement cell footprint would have resulted in approximately 5.8 hectares (ha) of GGBF core habitat being disturbed. As a result of the significant changes to the emplacement cell(s) design, incorporating feedback from DECC, interest groups including the University of Newcastle frog research team and Hunter Bird Observers Club, and the wider community, a total of 1.37ha of core habitat would be disturbed as a result of the current proposal.

The design changes specifically retained one pond on the northern edge of the site, with a view to retaining a contiguous wildlife corridor between existing ponds and out towards nature reserve areas to the west and north of the emplacement cell site via existing and proposed culverts/underpasses beneath the rail line.

In addition to the avoidance measures that retain significant areas of existing habitat, a significant number of specific mitigation measures to be implemented during construction and operation of the KIWEF are proposed. They include:

- Pre-clearing inspections by ecologists, frog exclusion fencing and frog relocation to minimise the potential for frog mortality during construction;
- Disinfection of footwear, equipment, vehicles and machinery as per the frog hygiene protocol to minimise the potential for the transmission of Chytrid fungus;

- Monitoring of groundwater and surface water within the emplacement cell, in addition to upstream and downstream monitoring of the Hunter River as required by the DECC and landowner, so that any contaminant movement in excess of extant background levels would be able to be detected;
- A contingency plan would be developed to address the scenario of excessive contaminant movement occurrence;
- Appropriate measures to prevent the suspension of sediments into the water column and to reduce turbidity would be put in place during construction to minimise impacts on core habitat;
- Lighting baffles should be installed adjacent to wetland areas to reduce the potential impacts of light spill on surrounding areas during construction; and
- The commitment of BHPB to the DECC Framework for the management of GGBF within KI through the enhancement, protection and provision of habitat for the species in conjunction with other relevant stakeholders.

Based on the above, it is considered that there will be no reduction in area of occupancy by the GGBF such that significant impacts would result.

9.6.3 Threatened Flora

The Flora and Fauna assessment demonstrates that HRRP would only remove a small portion of habitat for *Zannichellia pallutris*, would not sever habitat (wetland) connectivity and any potential short-term impacts during construction could be managed appropriately. Since large areas of more suitable habitat occur for the species within the Hunter Estuary and KIWEF, and most of the habitat for this species within the site would remain after HRRP, it is considered unlikely that HRRP would significantly impact this species.

9.6.4 Endangered Ecological Communities

The EECs having a moderate or greater chance of occurring within the site or immediate surrounds, or that have been recorded within this area, were subject to detailed assessment in the Flora and Fauna Assessment. This considered potential impacts of the proposed construction and operation of the emplacement cell on habitat quality, habitat fragmentation and connectivity, contamination and alteration to hydrology and water quality, shading and cumulative impacts.

Freshwater Wetlands and Coastal Saltmarsh EECs

The site has a long history of disturbance through reclamation and dumping of waste materials. The wetland vegetation contained within areas mapped as Freshwater Wetland EEC contain species consistent with the Scientific Determination of the EEC; however, they are in relatively poor condition due to weed invasion and the presence of slag substrates.

The proposed emplacement has been specifically designed to minimise the removal of wetland habitats to reduce potential impacts on this community and resident fauna. The proposed cell would involve the removal of approximately 1.52 ha of relatively poor quality Freshwater Wetland EEC within wetland fringes and small wetlands in the south of the site.

The proposal would only remove a small portion of this community, would not sever connectivity and any potential short-term impacts during construction could be managed appropriately. Since large, higher quality examples of this community occur within the broader Hunter Estuary and KIWEF, and most of the habitat for this community within the site would remain after HRRP, it is considered unlikely that HRRP would adversely affect this community.

Furthermore, commitment by BHPB to DECC programs targeting GGBF management would most probably involve the improvement and / or creation of additional freshwater wetland areas in the Hunter Estuary.

Coastal Saltmarsh

The Coastal Saltmarsh EEC mostly occurs outside the emplacement footprint (**Figure 14**). However, construction of the proposed licensed discharge point near the Hunter River would remove approximately 0.01 ha of Coastal Saltmarsh EEC from the area.

The proposal would only remove a very small portion of this community, would not sever connectivity and any potential short-term impacts during construction would be managed appropriately. Since large higher quality examples of this community occur within the Hunter Estuary and KIWEF, and most of the habitat for this community within the site would remain after HRRP, it is considered unlikely that HRRP would adversely impact this community.

Swamp Oak Floodplain Forest EEC

Since none of this community would be removed as a result of HRRP and since adequate mitigation measures have been recommended to minimise potential indirect impacts, it is considered unlikely that HRRP would adversely impact this community.

9.7 Offsets Proposal

The proposal includes the commitment to the provision of compensatory habitat to offset and minimise potential impacts on the GGBF and the Freshwater Wetlands EEC. The offset proposal would also provide habitat opportunities for the other relevant threatened species such as Australasian Bittern, Australian Painted Snipe and *Zannichellia palustris*.

The offsets proposal would be further developed in consultation with DECC, BHPB, HDC, NCIG, frog biologists and other relevant stakeholders.

The following compensatory habitat principles would be applied or as otherwise agreed with the DECC in the provision of offsets for the GGBF in accordance with the DECC presentation to BHPB and NCIG in August 2008:

- Compensatory habitat to have good connectivity to other areas of occupied or suitable habitat (reduce predatory opportunities through providing cover and minimise anthropogenic risks such as roads and vegetation management);
- Compensatory habitat to be at least twice the amount of wetland and foraging habitat to be removed. However, it should be noted that the focus should be on creating habitat that is most likely to be utilised by the GGBF in consultation with current best practice and expert knowledge. Compensatory habitat should mimic known habitats for the species within KI;
- A range of shelter habitat features such as rocks, logs and emergent vegetation should be installed on the fringes and within the surrounding areas; and
- It is likely that a combination of permanent and ephemeral freshwater habitats is important in supporting the species during both dry and wet periods. Both permanent and ephemeral freshwater wetlands should be present within the immediate vicinity of the compensatory habitat (i.e. if large areas of ephemeral habitat are already present then enhancement combined with the construction of permanent waterbodies should be undertaken, and vice versa);

- The establishment of emergent aquatic plants such as reeds to provide suitable basking, foraging and breeding opportunities;
- Ongoing maintenance of ephemeral wetlands to prevent emergent vegetation from completely covering wetlands may be required over time in response to declines in usage detected during monitoring; and
- A management strategy be implemented and funded that will ensure the ongoing management and monitoring of the offsets HRRP beyond the release stage of the emplacement project. The management strategy should include HRRP timeline, performance criteria for each HRRP component and a monitoring regime with feedback mechanisms.

The propagation and introduction of *Zannichellia palustris* into any constructed wetland would be considered in consultation with DECC.

9.8 Mitigation Measures

The proposed cell footprint of the emplacement cell has been reduced to minimise potential impacts on wetland habitats and a compensatory habitat offsets proposal has been committed to in consultation with RPS HSO ecologists, BHPB and DECC. A number of ameliorative measures are also recommended to be undertaken to further minimise the potential impacts on threatened species and EECs.

The following mitigation measures would be applied to the proposed works to minimise the potential impacts on threatened species and EECs:

- The commitment of BHPB to the DECC Framework for the management of the GGBF within KI through the enhancement, protection and provision of habitat for the species;
- Preparation of the following management plans prior to the commencement of works (note these management plans and/or their requirements may be incorporated within broader Environmental Management Plans prepared for the activity rather than being specific additional plans):
  - GGBF Construction Management Plan; and
  - Vegetation and Weed Management Plan;
- Where possible, initial clearing / construction works would try to avoid Spring / Summer to minimise disturbance to potential breeding of GGBF (*Litoria aurea*), Blue-billed Duck (*Oxyura australis*), and Freckled Duck (*Stictonetta naevosa*). Should these seasons be unable to be avoided within the works schedule, all efforts should be made to undertake works as early as possible within the season in order to minimise potential impacts;
- Lighting, noise and vibration should be kept to an absolute minimum during construction and in particular during nocturnal hours. Screens/shields/louvers or equivalent to minimise the potential for light spill onto adjacent wetland areas should be established, where safe and feasible to do so, to minimise potential lighting impacts on threatened fauna species. Operating equipment at the KIWEF site is to be maintained in a proper and efficient manner to minimise noise; and

- A pre-clearing inspection will be undertaken by an Ecologist prior to the commencement of works to ascertain which species are utilising the site around the time of works. This would be undertaken in the week prior to commencement of works. This site inspection would include searches for evidence of breeding or nests of threatened species.
    - Should the site inspection reveal breeding or likely breeding of any threatened species at the time of proposed commencement, activites will be immediately reviewed as appropriate and potential impacts on the species reduced to ensure that a significant impact is unlikely. If found, frogs in the path of activities will be appropriately dealt with in consultation with DECC;
- Frog exclusion fencing should be installed, monitored and maintained along relevant boundaries where habitat exists to minimise the potential for frog mortality during construction;
- Ensure appropriate erosion and sediment control measures are put in place prior to, during and subsequent to soil disturbance and construction;
- Where possible, vehicle and machinery movements on site should be limited to defined roads and tracks;
- Site briefings of all field staff should be undertaken to ensure that workers are aware of the sensitive nature of the site and the proposed mitigation measures;
- The DEC “Hygiene Protocol for the Control of Disease in Frogs” should be applied during all works in or near the site. Footwear, clothing, machinery, vehicles and instruments are to be cleaned of possible contaminants from other sites prior to entering the site;
- Monitoring of groundwater and surface water within the emplacement cell, in addition to upstream and downstream monitoring of the Hunter River, should be undertaken as required by DECC so that any contaminant movement would be able to be detected. A contamination contingency plan should be developed to cater for a worst case scenario; and
- Appropriate measures to prevent the suspension of sediments into the water column and reduce turbidity would be put in place during construction to minimise impacts on wetland habitats.

9.9 Conclusion

Whilst HRRP would result in the removal of known or potential habitat for some threatened species, including small areas of core and larger adjacent areas of foraging and shelter habitat for the GGBF, for most species such habitat is well represented in the immediate locality, including within existing conservation reserve areas.

The design of the emplacement facility has evolved over time via input from ecologists and DECC, such that direct impacts on core habitat areas for GGBF (and other species / communities) has been significantly reduced (by over 80% from the original emplacement design).

Further to this, BHPB has committed to strictly implementing a number of mitigation measures during construction, in addition to providing an offsets package in accordance with the principles outlined by the DECC, to ensure that an overall holistic balanced outcome is achieved for the ecology of the Lower Hunter estuary.

10.0 Odour

10.1 Background

BHPB is to undertake remediation of sediments from the South Arm of the Hunter River. Treatment of sediments will be conducted on BHPB's land at Mayfield, and a trial of the proposed method for sediment remediation, referred to as the SOS, will be completed in December 2008. The SOS will provide additional data and validate the proposed process for treatment during full-scale remediation works.

Main odour sources from the HRRP will be from the dredging and handling, temporary stockpiling and treatment of contaminated sediments.

The predicted odour impacts resulting from Stage 2 works are to be confirmed pending results from the SOS. To combat this uncertainty, a detailed methodology for odour assessment and an associated management framework for odour control during full-scale operations of Stage 2 have been prepared in support of this application. This work will build upon the previous investigations undertaken regarding odour emissions relating to the HRRP.

It should be recognised that the Odour Management Plan to be approved subsequent to this Stage 2 approval will incorporate the relevant results from the SOS in determining the specific management measures. This Odour Management Plan will be prepared in consultation with the DECC and approved by the DoP as part of the Dredging and Remediation Environmental Management Plans.

This section summarises the key findings of these previous assessments, introduces the odour sampling and monitoring regime to be undertaken during BHPB's SOS, and introduces the management framework for odour control during full scale operations associated with Stage 2 of the HRRP.

10.2 Sensitive Receptors

In the context of the Mayfield site, the most sensitive receptors would be the residences located approximately 680 m to the south of the former Steelworks site boundary. The area directly surrounding the Mayfield Site is characterised by a mixture of port-related activities and industrial uses. These non-residential areas would be considered significantly less sensitive.

The transport, delivery and emplacement of treated sediments to the emplacement cell also has the potential to generate odour emissions, however, once the sediments have undergone treatment, the odour impacts relating to the sediments are likely to be reduced. During transport from the Mayfield site to KIWEF, all truck loads will be covered which would further assist in reducing any residual odour risk during transport.

The closest residential areas to the KIWEF site are located at Warabrook and Mayfield West approximately 1.2 km to the south of the emplacement cell. All other receptors to the emplacement cell are industrial and would be considered significantly less sensitive.

10.3 Odour from KIWEF

Given the reduced odour emissions expected from the treated sediment and the significant distance to the closest residential receptors, odour impacts from the emplacement cell at KIWEF on sensitive residential receptors are not likely to be a significant issue and for this reason they have not been considered further in this assessment.

However, it should be noted that the odour emission rates from the KIWEF will be determined during the SOS and that these rates will then be included as an odour source in AUSPLUME dispersion modelling conducted for the full scale operations. The results of modelling will be used to establish the need for odour control during full scale operations.

If complaints are received in relation to odour emissions from KIWEF these will be investigated and if necessary appropriate monitoring and mitigation measures will be implemented to address the odour complaint.

10.4 Conditions of Consent

The statutory provisions relevant to the control of odour are outlined in the development consent. These provisions are identified in **Table 16.**

Table 16: Odour related Development Consent Conditions

Condition	Description
B2.7 and C2.1	The development shall be undertaken so as not to permit any offensive odour, as defined under section 129 of the POEO Act, to be emitted beyond the boundary of the site
B2.8 and C2.2	The total exposed area of treated and untreated contaminated materials from both remediation and dredging activities combined, shall not exceed 2,500 m^2 at any time, unless otherwise agreed to in writing by the DEC. *Note DECC has since approved in writing an increase in this exposed area to 7,000 m^2 for the current SOS activities.*
B2.9 and C2.3	Where the party undertaking dredging works is not the same party undertaking remediation works under this consent, the two parties shall develop and implement a protocol to coordinate works to achieve the requirements of condition B2.8 or C2.2 of this consent.
B3.3 and C3.3	Prior to the commencement of any dredging or remediation works an Odour Monitoring Program shall be developed and implemented, to monitor and assess the odour performance of the dredging works against the assumptions and predictions detailed in the documents referred to under condition A1.1 of this consent. The monitoring shall include specific provisions for the assessment of cumulative odour impacts with remediation activities, and shall provide sufficient information to support continuation of the trial remediation as Stage 2 of the development, as may be relevant.
B4.5 and C4.5	As part of the Dredging or Remediation Environmental Management Plans required under condition B4.4 and C4.4 of this consent, an Odour Management Plan shall be prepared to outline measures to minimise odour impacts associated with the dredging and excavation works.

Statutory provisions are also provided in EPL No 1708 with respect to the control of odour emissions. EPL No 1708 covers the dredging, handling and treatment of contaminated sediments at the Mayfield site.

10.5 DECC Odour Performance Criteria

The odour performance criteria to be met at the nearest sensitive receptors to the Mayfield site are outlined in the NSW DECC "Technical Framework – Assessment and Management of Odour from Stationary Sources in NSW", November 2006.

The nearest sensitive residential receptors are located in Mayfield to the south and south west of the site. The population of Mayfield is over 2000 people, and therefore the 2.0 odour unit (ou) criterion applies at the nearest sensitive receptors.

10.6 Odour Investigations to Date

Two previous investigations have been conducted into the odour impacts related to the remediation of sediments from the Hunter River:

- The Environmental Odour Laboratory at UNSW was commissioned to undertake the odour impact assessment for the EIS for extension of shipping channels in the Port of Newcastle (2003); and
- URS was commissioned in 2006 to perform an odour impact assessment of sediment dredging and treatment operations specifically a proposal to allow the volume and surface area of sediments being treated to be increased from the previously approved 2,500m^2/day to 47,200m^2/day.

DECC had raised concerns regarding the odour impact assessment undertaken by URS in 2006. Issues raised included, but were not confined to:

- Correlation between the emission rates calculated by UNSW and URS;
- Limitations of sampling;
- Odour emission rates used in modelling; and
- Effectiveness of some odour controls.

10.7 Stabilisation Optimisation Study

10.7.1 Scope of Work

The concerns raised by the DECC referred to above have informed the scope of works for the odour impact assessment to be undertaken by CH2M HILL on behalf of BHPB during the SOS and the management framework for the full scale sediment remediation works at Mayfield. The scope of work was prepared in consultation with and to the satisfaction of the DECC prior to commencing SOS works and includes:

- odour monitoring;
- odour sampling and speciation of VOCs and PAHs;
- odour modelling and impact assessment, and
- identifiying odour control requirements for full scale operations.

10.7.2 Odour Monitoring

During BHPB's SOS, CH2M HILL has been commissioned by BHP Billiton to undertake ambient odour monitoring. The monitoring will be conducted along and within the property boundary to determine the background ambient odour levels for one week prior to and one week after the SOS.

Monitoring will also be conducted at locations external to the site within the local area to determine whether off-site odours are detectable during this period. This will be done in order to assess any potential off-site odour impacts to the community, and will include three Mayfield locations. The locations will be selected based on initial dispersion modelling results.

Odour monitoring conducted before and after the SOS will establish ambient odour levels and identify potential odour sources in the area. Odour monitoring conducted during the SOS will provide an indication of the off-site odour impacts and be used for validation of AUSPLUME odour dispersion modelling results.

The odour monitoring requirements for full scale operations will be determined upon completion of the SOS in consultation with the DECC.

10.7.3 Air Quality Sampling

Discrete air quality samples will be collected and analysed by a NATA accredited laboratory during the SOS, with reference to protocols provided in the "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW" (DECC, 2007).

The results of sampling during the SOS will be used to derive odour emission rates for input into odour dispersion modelling using AUSPLUME. The modelling results will predict odour impacts from full-scale plant operation, and indicate where odour mitigation is required to meet singular requirements.

10.7.4 Odour Modelling and Odour Impact Assessment

Odour modelling will be conducted using AUSPLUME to quantify the odour impacts from the SOS and to determine whether the odour impacts from the full scale plant are within the DECC odour performance criteria.

The odour sampling data collected during the SOS will be used to derive odour emission rates from the various process areas on the Mayfield Site for input into modelling together with meteorological data.

An AUSPLUME model will be run to predict odour impacts during the SOS. The results will be compared with odour monitoring data collected during the SOS and odour emission rates revised to ensure that the model reflects reality.

The full scale operation will then be modelled to determine the extent of odour mitigation required to meet the DECC odour performance criterion. The performance parameters for any odour control facilities will also be determined from modelling results.

10.8 Odour Control Requirements during Full Scale Operations

The need for odour control during full scale operations will be based on the results of AUSPLUME modelling. It is proposed that the following odour control measures are trialled during the SOS:

- Odour covers, in the form of waterproof tarpaulins, over both untreated and treated sediment
- Ventilation and extraction of foul air from the grizzly, pug-mill and any associated conveyors, and
- Entrapment of odours from untreated and treated sediments using foam.

The need and extent of odour control and the requirements for odour sampling and monitoring during full scale operations will be determined based on the findings from the SOS.

Should AUSPLUME modelling indicate that odour control is necessary for full scale operations, the outcome of the trial of odour control measures and multi criteria analysis (MCA) will be used to determine the preferred odour control measures for implementation.

Some of the odour control options to be considered in the evaluation of SOS odour monitoring results for implementation during Stage 2 are summarised below in **Table 17.**

Table 17: Potential Odour Control Measures

Description	Process Description
Covers over untreated sediment stockpiles	Covers over sediment.
Covers over treated sediment stockpile	Covers over sediment.
Covers over trucks	Covers on trucks as they transport from river to treatment pad.
Enclosed storage facility	Shed used to house odorous sediment with, if closed, point source emission controls at exhaust points.
Extraction and treatment	Extract foul air with fan and treat in odour control system prior to venting to atmosphere.
Foam	Spray foams on the untreated sediment to trap the odour emissions.

Importantly, the proposal to operate Stage 2 remediation activities on a real-time basis, 24 hours per day, 7 days per week will contribute to a reduced odour risk from the Mayfield site due to the faster treatment and transfer to KIWEF of sediment after dredging. This will minimise the exposure time and rehandling of untreated sediments and the size of the sediment stockpile area that would otherwise be required to operate within the current approved hours. This real-time dredging and remediation process will also reduce the project duration and therefore reduce exposure to risk of amenity impacts related to odour.

The need for continued odour sampling and monitoring during full scale operations will depend upon the extent of odour control implemented and how comfortably the DECC's odour performance criteria is met.

Irrespective of the odour controls implemented during full scale operations, a standardised method for dealing with odour complaints will be developed as required by Condition C4.5 of the development consent (DA-134-3-2003-i). All complaints will be investigated.

10.9 Conclusion

Final understanding of the potential for odour emissions from the untreated sediments will be finalised during the SOS. It is envisaged that if the odour sampling and modelling undertaken during the SOS indicate that there could be odour impacts, a range of odour control measures (such as those identified in this **Section**) would be implemented as appropriate in consultation the DECC to manage odour to acceptable levels.

Once clearly understood, the potential for odour impacts and the methods of odour control (if required) will be detailed in the Odour Management Plan to be prepared in accordance with Condition C4.5 of the development consent. This Odour Management Plan will be prepared in consultation with the DECC and approved by the DoP as part of the Dredging and Remediation Environmental Management Plans prior to the start of Stage 2 works.

Any odour complaints received from the public will be managed in accordance with the Complaints Handling and Response Protocol to be approved by the DoP prior the commencement of Stage 2 works. This Protocol will deal with the effective receipt, investigation and follow-up to complaints or enquiries received.

11.0 Noise

11.1 Introduction

Spectrum Acoustics was engaged to undertake an acoustic assessment of the HRRP (refer **Appendix C**). The assessment relates only to the land based remediation activities at the Mayfield and KIWEF sites and the transport of material between the two sites.

All activities in the river such as dredging, blasting and sheet pile installation have been approved in the development consent as part of Stage 1A and have been considered here only in relation to potential cumulative noise impacts.

The acoustic assessment also considers the potential impacts of HRRP to operate 24 hours a day, 7 days a week.

The assessment has been carried out in accordance with:

- the NSW Industrial Noise Policy (INP, 2000)
- the Environmental Noise Control Manual (ENCM, 1992) and
- the Environmental Criteria for Traffic Noise (ECRTN, 1991).

11.2 Noise Criteria

11.2.1 Allowable Noise Contributions

Condition C2.17 of the development consent specifies the maximum allowable noise contributions for the remediation activities and associated works as shown in **Table 18** below.

Table 18: Maximum Allowable Noise Contributions from Remediation Activities and Associated Works

Location	Day	Evening	Night
NM1 – 21 Crebert St, Mayfield	62	58	53
NM2 – 52 Arthur St, Mayfield	56	55	48
NM3 – Arthur St, Mayfield	51	51	48
NM4 – Mayfield East Public School	52	50	47
NM5 – Cnr Wye & Avon Sts, Mayfield	50	50	47
NM6 – 45 Simpson Ct, Mayfield	51	54	51

The closest receivers to the Mayfield site are in the suburb of Mayfield East approximately 680m to the south of the site boundary (NM1 to NM5 inclusive). The closest receivers to the KIWEF site are in the suburb of Mayfield West approximately 1.2km to the south of the sediment emplacement cell (NM6). These locations are shown in **Figure 16.**

As per Condition C2.17 the noise limits specified in **Table 18** apply under the following meteorological conditions:

- Wind speeds up to 3m/s at 10 m above ground level, or
- Under temperature inversion conditions of up to +3 degrees C/100m and wind speeds up to 2m/s at 10m above ground level.

11.2.2 Sleep Disturbance

The DECC's ENCM states that the level of any specific noise source should not exceed the background noise level by more than 15dB(A) when measured outside the bedroom window. This criterion is applied to residential situations between the hours of 10pm and 7am when a receptor's sleep may be disturbed by noise.

Based on the background noise levels the applicable sleep disturbance criteria are shown in **Table 19** below.

Table 19: Sleep Disturbance Criteria

Location	Criterion
NM1 – 21 Crebert St, Mayfield	63
NM2 – 52 Arthur St, Mayfield	58
NM3 – Arthur St, Mayfield	58
NM4 – Mayfield East Public School	57
NM5 – Cnr Wye & Avon Sts, Mayfield	57
NM6 – 45 Simpson Ct, Mayfield	61

11.2.3 Road Traffic Noise

The proposed operations would generate additional heavy vehicle traffic along Selwyn Street, Industrial Drive, Tourle Street and Cormorant Road. However, the potentially affected residential receivers are located adjacent to the Industrial Drive section of the route.

The DECC's ECRTN recommends road traffic noise criteria for land use developments with potential to create additional traffic on arterial roads (such as Industrial Drive) as follows:

- 60dB(A) Leq(15hr) for 7am to 10pm, and
- 55dB(A) Leq(9hr) for 10pm to 7am.

The ECRTN also states that where the noise goals are currently exceeded, traffic arising from a development must not lead to an increase in existing noise levels of more than 2dB.

NM1 – 21 Crebert St, Mayfield is considered to be the worst case for road traffic noise because of its proximity to Industrial Drive (refer **Figure 16**). The measured existing noise levels at this location comfortably exceed both the day and night time criteria listed above. As such, in accordance with ECRTN, traffic arising from the development must not lead to an increase in existing noise levels of more than 2dB at these locations.

The resultant traffic noise goal for traffic arising from this development is 65.5dB(A) Leq (15hr) during daytime and 59.5dB(A) Leq (9hr) during night time for receivers with frontage to Industrial Drive.

As there are no residential receivers in the vicinity of Cormorant Road and Tourle Street, this part of the truck haulage route was not assessed.

11.3 Assessment Methodology

11.3.1 Meteorological Environment

The atmospheric conditions most relevant to noise assessments are temperature inversions, gentle winds and relative humidity. Weather patterns in the lower Hunter Valley are well documented and the conditions used in the noise modelling are detailed as follows:

- Extremes of relative humidity are rarely experienced. For modelling purposes a value of 70% RH was adopted
- Noise modelling was carried out under the prevailing wind conditions of 3m/s wind from the south east (typical in warmer months) and 3m/s wind from the north west (typical in cooler months)
- Temperature inversions are a known feature of the area during the nights in winter. A value of +3 degrees C/100m vertical temperature gradient has been adopted for modelling purposes, and
- The topography of the area is relatively flat with no receivers that are topographically lower than the HRRP. Therefore drainage winds associated with temperature inversions are not considered in this assessment.

11.3.2 Operational Noise

At the Mayfield Site the significant noise generating items or activities that may be occurring 24 hours per day were assumed to include: 3 stationary and 1 mobile cranes, 3 dewatering pumps, 6 dump trucks, 3 front end loaders (untreated sediment), 3 grizzlys, 3 screw conveyors, 3 pugmills and 3 batching plants, 3 stack conveyors, 3 front end loaders (treated sediment), 16 semi trailers or 12 truck and dog for haulage, 35 cement delivery trucks per day.

In addition there will be other plant and equipment that may be used on an as needs basis for maintaining the treatment trains or clean up of spilled material.

At the KIWEF site the significant noise generating items or activities that may be occurring 24 hours per day were assumed to include:- 3 D10 bulldozers, 1 hydraulic excavator, 2 vibratory drum compactors, 3 dump trucks, 1 water cart, 1 front end loader, 3 pumps at the truck washdown area, 6 diesel powered generators.

In the assessment it was assumed that stationary plant items were working at typical operating conditions. A number of assumptions were also made in respect to the operation of the various mobile plant equipment on the site. These are conservative assumptions as in reality not all plant equipment will be operating simultaneously and some of the works and equipment may themselves act as barriers to the passage of noise (eg. the bund walls of the emplacement cell).

Using the ENM model, modelling of these noise sources was carried out for the following scenarios:

- Scenario 1 +3 degrees C/100m vertical temperature gradient
- Scenario 2 3m/s north west wind
- Scenario 3 3m/s south east wind
- Scenario 4 Neutral atmospheric conditions (20 degrees C, calm conditions)

11.3.3 Sleep Disturbance

The major potential for sleep disturbance at the Mayfield site would come from noise during barge unloading, the treatment process and/or the maximum noise of trucks entering or leaving the site during the night.

The major potential for sleep disturbance at the KIWEF site would be from dozer tracks moving around the site during the night.

Using the ENM model, modelling of these noise sources was carried out for the following scenarios:

- Scenario 5 +3 degrees C/100m vertical temperature gradient
- Scenario 6 3m/s north west wind
- Scenario 7 3m/s south east wind

11.3.4 Road Traffic Noise

BHPB has provided a number of scenarios for the haulage of the treated sediment to the KIWEF site. The traffic study for the project has indicated that the preferred option for truck haulage to the KIWEF is using truck and dog vehicles with a 32 tonne capacity. The traffic study indicated that, under the preferred trucking scenario, on average there will be 13 trucks per hour (or 26 truck movements) between the Mayfield site and KIWEF. Under an alternative scenario using semi-trailers with a 24 tonne capacity, on average there will be 17 trucks per hour. For completeness, the potential impacts of this scenario have also been assessed.

In addition to this there will be 35 cement delivery trucks to Mayfield per day, or one extra truck every 40 minutes.

For this assessment, the rate of truck movements was considered constant throughout the day and night time periods.

11.4 Results and Discussion

11.4.1 Predicted Noise Levels

The noise contour results for each of the modelled operating scenarios (Scenarios 1, 2, 3 & 4) show that received noise as a result of emissions from the Mayfield and KIWEF sites will not exceed the allowable noise contribution at any receivers under the assessed worst case conditions.

The noise contour results for these modelled operating scenarios are shown in **Appendix C**. Generally, the results show that the noise as a result of emissions from the Mayfield and KIWEF site would not exceed the allowable noise contributions as outlined above in **Table 17**.

The noise contour results show that the received noise at the external façade of the Mayfield East Public School and the Hunter Christian School and internally within classrooms with windows open would be well below the criterion for a school playground and internal class rooms under the assessed north west wind conditions (worst case) for both schools.

11.4.2 Sleep Disturbance

The noise contour results for each of the modelled sleep disturbance scenarios (Scenarios 5, 6 & 7) show that received noise as a result of emissions from the operations at the Mayfield and KIWEF sites including on site trucking will not exceed the sleep disturbance criteria at any receivers under the assessed conditions.

The noise contour results for the various sleep disturbance scenarios are shown in **Appendix C**.

11.4.3 Road Traffic Noise

The assessment of road traffic noise was a conservative assessment based on worst case haulage operations occurring 24 hours a day and 7 days a week. In reality there will be periods of the day when the number of trucks are less than those assessed due to periods of poor weather, plant/machinery maintenance or breakdowns or truck driver rest periods.

The calculation of traffic noise levels show that the received noise at the centre of the school playground of the Mayfield East Public School and internally within classrooms with windows open would be below the ECRTN criterion for a school playground and internal class rooms under the worst case haulage scenario (maximum vehicle numbers).

The results show that the received noise at the centre of the school playground of the Hunter Christian School would be marginally above the ECRTN criterion for a school playground whilst the received noise internally within classrooms with windows open would be below the ECRTN criterion for internal class rooms under the assessed conditions (worst case).

It is important to note that existing road traffic noise at the school playground already exceeds this ECRTN criterion.

11.4.4 Cumulative Noise impacts

Given the relatively short term, limited duration and proposed timing of the current proposal it is unlikely that there will be any significant cumulative noise impacts as a result of the Stage 2 remediation works.

Cumulative noise impacts were considered in association with the construction of the NCIG coal loader, dredging works in the Hunter River and the proposed remediation works. It is assumed that construction work at the Intertrade Industrial Park will not commence until after the remediation works at Mayfield have been completed and therefore these noise impacts have not been included.

This assessment shows that the combined noise from all the approved projects in the area may result in an increase in the total noise level, however the increases are to be considered acceptable particularly allowing for the limited timeframe of the proposal.

11.5 Conclusion

The following recommendations were made in respect to environmental safeguards for the HRRP:

- A noise management framework will be developed to ensure that noise levels comply with adopted criteria as per Condition C2.17 of the development consent; and
- A noise monitoring program should be implemented that involves attended noise surveys at selected receiver locations throughout the day, evening and night time periods.

Any noise complaints received from the public will be managed in accordance with the Complaints Handling and Response Protocol to be approved by the DoP prior the commencement of Stage 2 works. This Protocol will deal with the effective receipt, investigation and follow-up to complaints or enquiries received.

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12.0 Traffic and Transportation

12.1 Introduction

As part of Stage 2 activities, BHPB is proposing to transport the treated sediment via Selwyn Street, the Industrial Highway and Tourle Street to KIWEF (immediately north west of the Tourle Street bridge) where it will be emplaced within an engineered landfill.

In accordance with conditions of this development consent, this application is seeking approval to proceed to Stage 2 and, in doing so, to treat and transport the sediment 24 hours a day, 7 days a week.

As part of the conditions of consent BHPB was required to prepare a Treated Material Transportation Strategy (Condition C2.19) for Stage 2 which is to be approved by the Road Traffic Authority (RTA).

Accordingly, Connell Wagner was engaged by BHPB to undertake various traffic investigations over the proposed haulage route, leading to the development a transportation strategy in accordance with the consent conditions. The Strategy is based on an assessment of the expected daily haulage requirements and its likely impact on the proposed haulage route (existing roads and intersections) between the Mayfield and KIWEF site.

The Transportation Strategy was originally prepared by Connell Wagner in 2006 and was accepted by the RTA at that time. This document has been revised to reflect the current haulage conditions described in **Section 12.3** below and is included as **Appendix D**.

12.2 Conditions of Consent

Clause C2.19 of the conditions of consent requires that:

> *Prior to the commencement of any treatment of contaminated materials, other than those works associated with Stage 1B (refer to condition A2.1b and C1.3), a **Treated Material Transport Strategy** shall be developed and submitted for the approval of the Roads and Traffic Authority. The Strategy shall be prepared in consultation with the Authority and the Newcastle City Council.*

12.3 Changes Made Since Stage 1A Approvals

Since the preparation of the original Transport Strategy by Connell Wagner for in 2006 the following material changes to the transport aspects of the HRRP have been made:

- Operation of haulage vehicles would occur 24 hours a day, 7 days a week;
- Haulage vehicles would be either semi-trailers (24 tonne capacity) or truck and dog configuration (32 tonne capacity);
- As a result of further investigations the volume of treated sediments to be emplaced at KIWEF increased to 930,000m^3 and the sediment density has increased to 1.6 tonnes/m^3;
- The haulage period has been extended to 40 weeks, and
- In calculating cycle times for haulage vehicles an allowance has been made of 10 minutes for loading and 10 minutes for unloading.

12.4 Road Network and Existing Traffic Volumes

The road network which would be utilised for the haulage route is well developed serving industrial and port facilities either side of the Hunter River. The major roads involved include Industrial Drive (MR 316) and Tourle Street/Cormorant Road (MR 108). Industrial Drive is an 80km/hr dual carriageway linking the Pacific Highway to the Newcastle CBD from the North. Tourle Street/Cormorant Road connects KI, Stockton and the Port Stephens area to Industrial Drive.

The proposed haulage route from the Mayfield Site to the KIWEF site and back has a total length of 18.6km and is shown on **Figure 1**. It follows the arrival and return routes as per below:

From Mayfield - Selwyn Street, right turn to Industrial Drive, right turn to Tourle Street and then left turn to the KIWEF site.

From KIWEF – left turn to Cormorant Road, U-turn at Teal Street roundabout, return along Cormorant Road and Tourle Street, left turn to Industrial Drive, left turn to Selwyn Street and then to Mayfield.

The Tourle Street Bridge is currently being replaced. The bridge has passed its useful life expectancy and it is not economically feasible to upgrade the bridge. Construction of the new bridge is substantially completed and it is understood that this new crossing is currently scheduled to be completed by mid 2009 at the latest.The new structure is located immediately east of the existing bridge and will provide wider lanes and an improved curve alignment to improve safety and traffic flow.

Based on 2004 RTA traffic volumes and 2006 surveys undertaken by Connell Wagner for the HRRP, Industrial Drive and Tourle Street/Cormorant Road are carrying the following two way volumes:

- Industrial Drive - in the order of 30,000 vehicles per day, approximately 2,630 vehicles during AM peak hour and approximately 2,450 vehicles during the PM peak hour, and
- Tourle Street/Cormorant Road - in the order of 24,000 vehicles per day, approximately 2,580 vehicles during the AM peak hour and 2,540 during PM peak hour.

2006 RTA data shows that traffic on Industrial Drive is approximately 8% heavy vehicles and traffic on Tourle Street/Cormorant Road is approximately 9% heavy vehicles.

Given the different standard of each road, these figures indicate that there is higher density traffic on Tourle Street/Cormorant Road.

Traffic counts were also undertaken at the Selwyn Street/Industrial Drive intersection and at the Industrial Drive/Tourle Street intersection. Both of these intersections are signalised and allow right and left turning movements.

No counts were undertaken at the KIWEF/Cormorant Road intersection or at the Teal Street roundabout.

12.5 Proposed Sediment Haulage and Road Transport Strategy

12.5.1 Estimated Haulage Traffic

The proposed haulage of sediment between Mayfield and the KIWEF site is expected to occur over an approximate 9 month period commencing from around mid to late 2009 once the treatment and emplacement facilities are constructed. Based on the volume of material to be transported (approximately 930,000m^3), a haulage period of 40 weeks is expected.

Two haulage scenarios have been examined:

- An average haulage scenario of 30,000m^3 (or 48,000 tonnes) of treated sediment per week. Average haulage conditions are based on 20 hours a day, 6 days a week allowing for breaks associated with poor weather, plant/machinery maintenance periods and rest periods for truck drivers. This scenario would occur for the majority of the time during the haulage period; and
- A maximum haulage scenario of 40,000m^3 or 64,000 tonnes of treated sediment per week. Maximum haulage conditions are based on 24 hours per day, 7 days a week. This scenario would only occur for very limited amounts of time during the haulage period.

There is also the option of using semi trailers which have a 24 tonne capacity or truck and dogs which have a 32 tonne capacity. Ultimately this would be determined by the truck type availability when contracting the work.

It is conservatively estimated that the 18.6km round trip between Mayfield and KIWEF site would take around 60 minutes allowing for truck loading/unloading and delays at the four sets of signalised intersections en route.

From this information it is estimated that haulage would generate the following traffic volumes:

- Between 250 and 334 trips per day or equivalent to between 13 and 17 trips per hour under average haulage conditions; and
- Between 286 and 381 trips per day or equivalent to between 12 and 16 trips per hour under maximum haulage conditions.

Note: One trip is defined as two vehicle movements (i.e. Mayfield to KIWEF and KIWEF to Mayfield).

The upper and lower range of trips per day reflects either a semi-trailer haulage option (24 tonne capacity per vehicle) or a truck and dog haulage option (32 tonne capacity per vehicle).

A truck and dog haulage option would be preferable as it would result in a maximum of 12-13 operating vehicles at any one time, as opposed to a semi-trailer haulage option which would result in a maximum of 16-17 operating vehicles at any one time.

12.5.2 Traffic Impacts on the Road Network

The above results indicate that estimated additional traffic volumes under average haulage conditions (between 250 and 334 trips per day) would not represent a major increase in traffic to the road network. This would represent approximately a 2.0–3.0% increase on existing total traffic flows or an increase of approximately 20-25% on existing heavy vehicle traffic flows.

This is considered acceptable having regard to the existing design capacity of the road network and the 40 week period of haulage that is proposed.

12.5.3 Traffic Impacts on Intersection Performance

The operating performance of existing intersections along the haulage route was assessed using the SIDRA intersection simulation programme. The analysis indicates that there would be:

- Minimal impact on the Selwyn Street/Industrial Drive intersection with only minor increases in delays for right turn movements, and
- Minimal impact on the Industrial Drive/Tourle Street intersection with delays for right turn movements virtually unchanged.

A new intersection at Cormorant Road/KIWEF is being constructed as part of the Tourle Street Bridge project. This intersection has been designed to accommodate expected traffic volumes from future industrial development of the KIWEF site and surrounding land. It is therefore considered adequate to accommodate the movement of haulage vehicles for the HRRP. As raised by RTA during the consultation phase to complete the traffic assessment, lighting at this intersection will be required for the project duration given the day/night operation proposed.

Haulage vehicles would only be allowed left in/left out movements at the Cormorant Road/KIWEF intersection and then they would travel east on Cormorant Road to undertake a U-turn at the Teal Street roundabout. As there is no southern leg to this roundabout, U-turn movements should be largely unopposed.

The estimated 13-17 haulage vehicle trips per hour would be relatively small compared to the total number of movements occurring at the Teal Street roundabout and therefore any impact on the level of service of this roundabout is considered minimal.

12.5.4 Construction Traffic

Construction traffic associated with the construction of the Mayfield site and KIWEF site would include traffic associated with staff movements to and from the site, vehicle movements associated with material deliveries and movements from construction plant and machinery.

Impacts associated with additional vehicle movements generated during the estimated 6-7 month construction period at Mayfield and KIWEF are expected to be less than the additional vehicle movements estimated during the haulage operation period. On this basis, traffic impacts on the road network and intersection performance during construction are considered to be acceptable.

12.5.5 Alternative Transport Strategies

In selecting the preferred sediment transport method of road haulage using trucks, other options were considered. These included the use of barges or pumps and pipelines to transport the treated material by river to the KIWEF site and constructing a dedicated conveyor system from the Mayfield site to the KIWEF. Use of George Bishop Drive (accessed from Tourle Street) on the return leg through the former Newcastle Steelworks site was also evaluated.

These options were not considered suitable for a number of reasons including significant safety and environmental risks.

12.5.6 Cumulative Traffic Impacts

In undertaking the traffic assessment the potential impact of other projects such as the construction of the NCIG coal export terminal and the Hunter River dredging project were considered. The dredging project will utilise a conveyor to transport material across Cormorant Road to the NCIG site and therefore will not add extra traffic to the road network.

Construction traffic associated with the NCIG project would utilise Industrial Drive and Tourle Street however the impacts are considered to be not significant and restricted to daylight hours.

The cumulative impacts are considered to be acceptable given the limited timeframe of this project and the planned improvements to the road network (upgrade of Tourle Street Bridge and new intersection at KIWEF/Cormorant Road).

12.6 Road Network and RTA Issues Management

BHPB and Connell Wagner have held a series of meeting with the RTA in developing the Treated Materials Transport Strategy. The most recent consultation with the RTA occurred in late November 2008.

The RTA initially identified a number of issues for consideration which reflect the matters set out in the relevant consent condition (C2.19).

More recently the RTA identified issues associated with road safety such as materials spilling from trucks, the design and lighting of the new KIWEF/Cormorant Road intersection and potential truck queuing from the site entry gates/weighbridge at KIWEF. These issues are to be addressed as follows:

- All trucks will be sealed (or lined) and covered to ensure there is no spillage of the treated sediment material during haulage;
- The intersection of the KIWEF/Cormorant Road will be illuminated either by permanent or temporary street lighting during the haulage period; and
- The entry gates and weighbridge at KIWEF will be located well within the site to avoid trucks queuing back onto Cormorant Road and interfering with through traffic.

These matters have been addressed in the Stage 2 Treated Materials Transport Strategy by Connell Wagner (refer to **Appendix D**).

Also BHPB and Connell Wagner have discussed the Stage 2 transport activities and traffic assessment results with the Newcastle City Council. Council's main concern related to potential noise impacts from late night truck movements on residential properties located along the haulage route. This issue has been discussed in some detail in the Consultation and Noise Sections of this report (refer **Sections 7 and 11** respectively).

During the preparation of the Treated Materials Transport Strategy there has also been consultation with the KI Cycling Club whose racetrack facility is located at the far eastern end of KI and operates on Saturday afternoons and public holidays.

It is recommended that a Road Haulage Management Plan be prepared and this Plan would include the installation and maintenance of signage at site access points and intersections and monitoring of cycle times and adjustment of truck numbers if necessary as a result of abnormal delays to haulage activities.

12.7 Summary and Conclusions

The following is a summary of the main points discussed in the traffic report:

- The impact on the road network of an additional 250 to 334 trips per day or between 13 and 17 trips per hour under average haulage conditions has been assessed as low with increased volumes being approximately 2.0–3.0% of existing total daily flows or 20-25% of discrete heavy vehicle flows;
- The detailed analysis of intersection performance for Selwyn Street/Industrial Drive and for Industrial Drive/Tourle Street intersections indicates little or no change in delays, queues or levels of service for the critical right turn movements on the outbound journey;
- A new intersection at Cormorant Road/KIWEF is being constructed as part of the Tourle Street Bridge replacement which is considered to adequately accommodate the movement of haulage vehicles for the HRRP. Haulage vehicles would only be allowed left in/left out movements at this intersection;
- Haulage vehicles would undertake a U-turn at the Teal Street roundabout but, given the configuration of the roundabout and the estimated number of haulage vehicles, these movements should not cause excessive delays to existing peak flows or to the proposed haulage fleet;
- The new Tourle Street Bridge is scheduled to open by mid-2009 which will most likely be prior to the scheduled commencement of haulage operations, although this cannot be guaranteed;
- Potential road safety impacts associated with material spilling from trucks, lighting of the KIWEF/Cormorant Road intersection and truck queuing at the KIWEF entry can all be comfortably managed;
- All of the above impacts would be restricted to the proposed approximate 40 week haulage period and would be regulated by a Road Haulage Management Plan; and
- This report has been prepared in consultation with the RTA and Newcastle City Council. Informal consultation has also been undertaken with the KI Cycling Club. The transport proposal and/or assessment results have also been discussed with project stakeholders, including community groups, other government authorities and local business and industry organisations.

13.0 Soils, Geology & Geotechnical

13.1 Introduction

This section presents a summary of the baseline soil and geotechnical assessments carried out for the proposed emplacement cell(s) at KIWEF by Douglas Partners from 2006 until 2008 and the proposed management regime for contaminated materials.

The assessments carried out are based on the design footprint and finished levels dated 14 October 2008. It is noted that a new footprint has since been issued, dated 6 November 2008. The new footprint has only minor modifications, predominantly in the north-western and south-eastern portion of the site. The information and recommendations summarised here, are not affected by this minor alteration to the footprint.

13.2 Background

Based on the available site history information, the site has not been filled using engineered landfill cells. The site comprises loosely dumped refuse and fill, largely comprising blast furnace slag and coal washery reject and an area of brecketts material and slag in the southern portion of the site. Based on this information, the site was considered likely to contain minimal gross chemical contaminants.

13.3 Soil Assessment

The Douglas Partners assessment was based on a review of available data and the collection of fill, soil, sediment, groundwater and surface water samples during field work.

13.3.1 Assessment Results

The following is a summary of the typical subsurface conditions encountered beneath the emplacement cell footprint:

UNIT 1 – FILLING - encountered to depths up to 11.6 m predominantly comprising intermixed sandy gravel/gravelly sand filling (slag and coal reject up to 300 mm diameter) with intermixed silt and clay components. Ash, cemented/granulated slag, rubbish/refuse (bricks, timber, metal, glass etc) were encountered within filling in some bores/pits.

UNIT 2 – UPPER SOFT SOILS – generally encountered at the base of fill at all test locations, generally comprising very soft to firm silty clay/clayey silt or sandy clay/clayey sand, ranging in thickness from 0.4 m to 4.5 m. Clay thickness is generally greater within the central areas of the site, and increasing in thickness to the south-east.

UNIT 3 – LOWER SAND – encountered below the upper soft clays from depths of 1.0 m /12.5 m in all bores, generally comprising loose to dense fine to medium grained sand with some shell.

UNIT 4 – DEEP CLAY – typically stiff to very stiff, from depths of about 20 m to 25 m, with interbedded sand and gravel layers. In some parts of the site there are further interbedded sand layers within the deep clay layer. The total thickness of deep clay is up to 25.6 m.

UNIT 5 – BEDROCK – encountered from depths of about 18.8 m to 47.9 m, and generally comprising extremely low to low strength dark grey / grey siltstone.

The two aquifers (described in detail in **Section 15)** are located within UNIT 1 (the fill aquifer) and UNIT 3 (the estuarine aquifer).

13.3.2 Contaminant Observations

Fill materials generally comprised coal reject and slag materials with no visual or olfactory evidence of gross contamination (i.e. no staining or odour), with the exception of the hydrocarbon, PAH and cement with slight sulphurous odours (as a result of potential acid sulphate soil).

The results of contaminant observations and screening of soil samples generally suggest the absence of gross volatile hydrocarbon contamination.

13.3.3 Assessment of Contamination

Existing fill materials at the site contain some contaminant concentrations which exceed the land use criteria (i.e. predominately manganese, TRH and PAH). These contaminants generally have a low propensity to leach from the soil, however, there is a potential for existing soils to impact on groundwater quality, as evidenced by leachability testing.

Based on total contaminant concentrations, fill materials would range in classification from “General Solid Waste” to “Hazardous Waste” (DECC Waste Classification Guidelines (April 2008)). The majority of samples are likely to be re-classified as “General Solid Waste” subject to additional leachability testing.

It is noted that existing site filling is proposed to be used to form the base of the proposed emplacement cell.

Due to the historical dumping of waste at the site, the presence of localised soil contamination (i.e. hotspots) cannot be precluded. This should be considered in the management of earthworks during construction of the emplacement cell.

13.4 Geotechnical Assessment

The geotechnical assessments were undertaken by Douglas Partners to determine if the geotechnical properties of the site were suitable for the proposed design of the emplacement cell and also if the geotechnical properties would support HDC’s final landform requirement.

13.4.1 Subsurface Conditions

The principal features of the subsurface conditions and their relevance to the HRRP are:

- Variable fill (Unit 1) at the surface and the high water table (fill aquifer) will affect subgrade preparation and compaction requirements of the base layer;
- Settlement over time under the load of the treated sediments would be variable across the emplacement cell based upon the depth and thickness of the compressible soft soils (Unit 2) in the upper soil profile and the less compressible but thick layers of firm to very stiff clays at depth (Unit 4);
- The sand layer (Unit 3) between the clay layers (Unit 2 and Unit 4) would act as a drainage path for water expelled from the clays and thereby increase the rate of consolidation of the clays, and
- Variable depths of bedrock (Unit 5) may indicate variable amounts of clay which could lead to variable settlements.

13.4.2 Geotechnical Issues

The principal geotechnical issues associated with the construction of the emplacement cell are:

- Settlement (sinking of the placed sediments) due to the imposed loads of the proposed emplacement cell
- Earthworks including preparation of the base of the placement area, excavatability, material quality and compaction
- Slope stability of existing batter slopes
- Geo-chemical conditions, and
- Seismic design parameters and risk of liquefaction.

Generally, the site is geotechnically suitable for the proposed emplacement cell, subject to design and construction in accordance with good engineering practice. The principal geotechnical findings are discussed in the following sections.

Settlement

The settlement analysis was based on two proposals for the finished ridge level of the emplacement cell: RL 13.5 and RL 15.0 Australian Height Datum (AHD) and the footprint of 14 October 2008. The following four load cases were analysed:

- Estimated Settlement after 10 Years, for a Ridgeline Elevation of 13.5 AHD
- Estimated Settlement after 100 Years, for a Ridgeline Elevation of 13.5 AHD
- Estimated Settlement after 10 Years, for a Ridgeline Elevation of 15.0 AHD, and
- Estimated Settlement after 100 Years, for a Ridgeline Elevation of 15.0 AHD.

The settlement varies across the footprint of the emplacement cell due to variations in fill height, soft soil layer thickness and soil strength. The estimated maximum loads, total settlements and differential settlements are summarised in **Table 20** below.

Table 20: Estimated Maximum Fill Loads and Settlements

Load Case	Maximum Fill Load (kPa)	Maximum Total Settlement (mm)	Maximum Differential Settlement (%)
Ridge 13.5 AHD - 10 Years	185	410	0.50
Ridge 13.5 AHD - 100 Years	185	455	0.59
Ridge 15.0 AHD - 10 Years	211	470	0.57
Ridge 15.0 AHD - 100 Years	211	520	0.68

The maximum total settlement varies between 410mm and 520mm across the four load cases. The maximum differential settlements are expected to occur along the north-eastern batter of the emplacement area, due to a combination of a change in load (batter slope) and thicker layers of soft soil.

The emplacement cell design has included an allowance for the expected maximum total and differential settlement described above.

Earthworks

Preparation of the base of the emplacement area is expected to comprise some cut and fill to bring the base of the cell to a reduced level of between 3.5 m and 7.0 m AHD. The main findings are:

- Material from the cut areas is expected to be suitable for use as base fill, provided that unsuitable inclusions (e.g. oversize and deleterious materials) are segregated;
- A low lying inundated area in the north-eastern part of the emplacement cell footprint has little or no fill cover over the natural silty clay and will therefore require an initial bridging layer of coarse granular fill, such as gravel selectively won from the cut areas;
- The majority of the cut area is expected to be readily excavatable using a large excavator, but some zones of cemented slag may prove difficult to excavate without the aid of a ripper attachment or pneumatic hammer;
- There will be some risk associated with trimming or filling over existing fill batter slopes (refer discussion below); and
- The placement of the base fill and treated sediment will be carried out under engineering control to achieve target compaction, moisture and permeability specifications.

Slope Stability

The existing site contains a number of steep slopes in fill batters within the current footprint area.

Care will be required during construction to prevent personnel and equipment being affected by slope instability where existing fill batters are present within the construction area. Once earthworks are completed the risks associated with these fill batter slopes will have been removed.

The completed emplacement cell design would have an external batter slope of 1 vertical to 3 horizontal, which is expected to be stable in the long term.

Geo-Chemical Conditions

The geo-chemical soil and water testing indicate generally non-aggressive to mild conditions with surface water, groundwater and soils and they should be considered in the design of future structures at the site.

The results of testing indicate the presence of potential acid sulphate soils (PASS) within the natural soils underlying the site. Natural soils exposed by excavation or dewatering activities, and water generated by these activities, should be managed in accordance with the acid sulphate soils details in the Excavated Material Management Plan (EMMP). However, it is noted that exposure of natural soils is likely to be minimal during cell construction and placement of the treated sediments within the site based on the current design.

Laboratory testing conducted to date on soils, surface waters and groundwater indicates that in-situ fill materials within the site are not currently acidic or currently leaching significant quantities of acid leachate into the groundwater or surface water bodies.

Seismic Design

An analysis of liquefaction risk indicated that the completed placement area would have a low risk of experiencing liquefaction during a magnitude 5.5 earthquake.

13.4.3 Acid Generation Potential of the Excavated Soils

The potential for acid generation from fill materials proposed to be excavated for construction of the emplacement cell (in particular coal washery reject) has not been directly assessed for this application. Laboratory testing conducted to date on soils, surface waters and groundwater indicates that in-situ fill materials within the site are not currently acidic nor currently leaching significant quantities of acid leachate into the groundwater or surface water bodies.

Further assessment of the potential acid generation potential of fill materials is currently underway. The additional assessment will include laboratory testing and an oxidation trial to assess pH changes and potential acidity of soils during oxidation. The recommended management options for acid generating soils, if present, will be confirmed but are likely to involve progressive excavation, screening/testing, segregation, treatment, testing to confirm neutralisation and re-use on site.

On-site staged neutralisation of potential acid generating soil/fill should be undertaken in a bunded area unlikely to be disturbed during construction activities. The lining should be a low permeability material (such as a clay layer or HDPE) and incorporate a leachate collection system to prevent the migration of acidic leachate.

Sampling and testing should be undertaken to confirm the neutralisation treatment. Depending on the results of testing, reapplication of lime may be necessary to gain adequate neutralisation.

13.5 Excavated Materials Management Plan

An Excavated Materials Management Plan (EMMP) is being prepared for the construction of the emplacement cell. The purpose of this EMMP is to assist in managing potentially contaminated materials, solid waste, water, or soil as they are encountered during the excavation and embankment construction portion of the emplacement cell. It is also intended to be used as a guidance document to manage suspected contaminated materials consistent with regulatory requirements.

The NSW DECC has produced a guide - Waste Classification Guidelines (April 2008) - for classifying wastes produced by waste generators. This classification system helps waste generators determine how to manage, treat, and dispose of wastes to ensure the associated environmental and human health risks are managed appropriately and in accordance with the POEO Act, and its associated regulations.

The EMMP will be consistent with the DECC Waste Classification Guidelines and the POEO Act. All excavated material shall be managed in accordance with the Waste Classification Guidelines developed by the DECC.

The content of the EMMP includes an analysis of all the expected and probable wastes that could be expected at the emplacement cell. These wastes are then classified using the DECC's Waste Classification Guidelines and then the handling procedures for the various range of wastes that may be encountered (including contaminated material) are outlined. The EMMP also outlines the requirements for field assessment, sampling, characterisation, management, transport and disposal of contaminated material.

The decision flow diagram for managing suspected contaminated materials at the emplacement cell is shown in **Figure 17**.

13.6 Future Development of KIWEF Site

The Newcastle LEP (2003) gives the current zoning of the site as 4(b) Port and Industry Zone, which has the objective “to accommodate port, industrial, maritime industrial and bulk storage activities which by their nature or scale of their operations require separation from residential areas and other sensitive land uses”.

The emplacement cell has been designed to accommodate future industrial development once the emplacement of treated sediment has been completed and the cell has been capped. The design must accommodate the broad criteria for future land use as put forward by the HDC including criteria relating to foundations, long term settlement and associated infrastructure (e.g. Roads and services).

A preliminary analysis has been carried out for various loading scenarios and further detailed analysis of these loading scenarios will be undertaken to define likely settlements, stresses and strains at various levels through the emplacement cell profile. This will allow site development guidelines to be prepared for the completed site.

13.7 Conclusion

The assessments undertaken by Douglas Partners to date have found that the geotechnical properties of the proposed KIWEF site are suitable for the proposed cell design and HDC’s final landform and land use requirement. Additional investigations will be undertaken to validate and confirm current understandings of the geotechnical properties of the site and the preparation of site development guidelines.

The EMMP will provide the framework to manage the impacts of soil contamination, PASS and the acid generation potential of the excavated soils. The EMMP, as described above, includes management actions and control requirements that will protect soil quality and integrity in the event that contaminated or acidic material is excavated during the construction of the emplacement cell.

14.0 Surface Water Management

14.1 Mayfield Site

14.1.1 Contaminated Water Management

There are a number of potential sources of contaminated water at the Mayfield site including free water decanted from the excavated sediment material on the barges, water that drains from the sediment receiving stockpile areas, and dump trucks, and truck wash water. This water would be pumped and stored in contaminated water holding ponds and then treated in a water treatment plant to meet DECC requirements before being discharged to the Hunter River.

The water holding ponds would be designed with an earth bund that is lined with two layers of waterproof membrane. The earth bund would be protected from erosion by a protective liner. The volume of stored contaminated stormwater was calculated for a 20 year, 24 hour duration storm event, with an additional allowance of 10% for rainwater falling directly on the ponds.

A water treatment pilot trial will be conducted during the SOS to assess the variability of contaminated water produced from the dredging of river sediments. The SOS will analyse the water chemistry and most appropriate treatment options.

The specific design of the water treatment plant would be performance based, determined by the quality of the contaminated water and the treated water quality crtieria agreed with DECC, and confirmed in EPL No 1708 for the Mayfield site, for discharge to the Hunter River.

On this basis, it is recommended that Condition C2.14 of the development consent be varied to state “or as otherwise agreed with DECC” at the end of the condition as the discharge criteria to be determined with DECC may differ from the objectives of the ANZECC guidelines which is specified as the criteria in this condition. This is also applicable to the proposed discharge and related criteria to be determined with DECC for the KIWEF site.

Typically the proposed water treatment plant would include the following processes:

- Buffering / balancing – this will essentially be achieved through allowing the mixing of inflow in a storage tank (for the SOS-WTP) and a series of sedimentation ponds (for the full-scale treatment);
- Coagulation – addition of a coagulant via a metered dosing pump and inline injection;
- Agitation – to bring the coagulant into contact with the particles to be coagulated;
- Passive separation of free oil and settling of solids;
- Flocculation – addition of a flocculant to cause fine particles to clump together;
- Separation of oil and settleable solids – via a coalescing plate separator;
- Media (sand) filtration – to remove the bulk of remaining oil and suspended solids; and
- Activated carbon polishing – to remove trace dissolved organics.

As part of the application to vary EPL No 1708, a licence will be sought from the DECC for the discharge of treated water from the Mayfield site to the Hunter River. The treated water would be discharged from a treated water storage tank into the PRZ within the area confined by the in-river sheet pile wall and/or silt curtains.

The storage tank provides a means of holding and testing the quality prior to discharge. Water that does not meet discharge specifications would be returned to the treatment plant or the contaminated water holding ponds. Discharge of treated water is estimated to be between 1,000 L/min and 1,500 L/min.

Two water treatment plants, each designed for continuous water treatment, would be included in the design to ensure that the sediment treatment process and associated water treatment could continue in the event of breakdowns, repairs or maintenance of equipment.

14.1.2 Stormwater Management

The Mayfield site has been predominantly capped with asphalt as part of the former remediation works at the site. The stormwater drainage network is already in place at the Mayfield site and includes stormwater pits, pipes and discharge structures into the Hunter River.

Uncontaminated stormwater (stormwater that does not come into contact with the contaminated sediment) originates from roofed areas and from sealed surfaces outside the bunded sediment stockpile areas and contaminated water storage ponds.

Stormwater that does not come into contact with the contaminated sediment that originates from roofed areas and sealed surfaces outside the bunded sediment stockpile areas will be allowed to flow overland to the existing grated stormwater drains for discharge to the Hunter River.

14.2 KIWEF Site

14.2.1 Stormwater Management

Stormwater management features at the emplacement cell are shown in **Figure 10** and, in summary, include the following:

- Open drains to the south and west of the cell;
- Construction of sediment ponds to the north and south of the cell (North and South Sediment Ponds);
- Erosion control blankets on the exterior slopes to minimise erosion and silt fencing along the north side of the cell to facilitate the interception of sediments from runoff emanating from the north embankment of the cell; and
- Use of a perimeter bund to contain the treated sediment (inside of bund) and to divert surface waters (outside of bund) around the cell to the North or South Sediment Pond.

Stormwater that comes into contact with the emplaced sediments before the cell is capped would be managed as leachate and conveyed to the leachate dam and treatment facility.

Construction

During construction of the cell, non-contaminated surface water would be collected from within the footprint of the cell and pumped to temporary sediment storage ponds for treatment. Temporary ponds are required because the two sediment ponds (North and South Sediment Ponds) are designed at an elevation to receive flows from the constructed perimeter bunds and the completed final cover system.

During construction of the perimeter bunds and grading of the bottom of the landfill, these two ponds would not be able to receive flows without pumping. Once the perimeter bund and the two permanent sediment ponds are completed, they can be used to receive surface water and the temporary ponds will be decommissioned.

If contaminated surface water is encountered or suspected (by sight or smell), the water would be diverted either to the leachate pond or to temporary surface water storage containers (drums, portable tanks) so that the water can be kept separate from non-contaminated surface water. This would include any surface water from the Contaminated Materials Storage Area to the west of the emplacement cell(s).

Surface waters draining from the Excavated or Imported Soil Storage Areas to the west of the cell (refer **Figure 4**) would be intercepted by silt fencing at the toe of this stockpile and then directed by open drain to either the North or South Sediment Ponds.

Operation

Two sediment ponds would be installed to intercept runoff and to facilitate the settling of sediments before discharging flow to receiving waters. The sediment ponds have been sized to contain the peak discharge from a 1 in 10 year ARI design storm. The drainage system outside of the bund walls would be for the most part directed to either the North or South Sediment Ponds.

The South Sediment Pond would discharge to the Hunter River. Under normal conditions, water would exit the pond via a drainage outlet and pipe to discharge to the River. A spillway has been incorporated into the design of the South Sediment Pond to allow for the controlled release of water during and immediately following a high rainfall event. These spillway flows would move across vegetated areas to the south of the emplacement cell and dissipate into the Hunter River.

The North Sediment Pond would discharge to a freshwater wetland (Pond H) to its immediate east. Under normal conditions, water would exit the sediment pond via a drainage outlet and pipe to discharge to the wetland area. A spillway has been incorporated into the design of the North Sediment Pond to allow for the controlled release of water during and immediately following a high rainfall event. Water from this wetland area would progress via a new culvert structure under the NCIG rail line embankment immediately to the north and then to a permanent and larger freshwater pond to the north (Deep Pond).

Along the north and north east bund wall of the emplacement cell surface water would drain directly to the adjoining freshwater wetland area (Ponds H and I). Erosion control matting would be placed on the exterior slopes to minimise erosion and a silt fence would be constructed at the foot of the north bund wall to dissipate sheet flows from the perimeter bund and to collect sediment prior to discharging into the freshwater wetland area.

14.2.2 Leachate Management

Leachate Collection, Treatment and Disposal

The features of the Leachate Collection System within the emplacement cell(s) would include:

- installation of a leachate drainage layer of at least 300 mm thickness and comprised of non-reactive, carbonate free, rounded drainage gravel (refer **Figure 6);**
- installation of a network of perforated HDPE pipes to capture leachate from the leachate drainage layer and installation of collector pipes to convey leachate to the leachate pond (refer **Figure 7**);
- the leachate management system would allow for the level of leachate within the cell to be maintained at no more than 300 mm above the base of the cell's liner;
- leachate collection pumps, leachate storage pond and leachate treatment area to the east of the cell;

- a small leachate storage tank to the north-east of the leachate pond; and
- a discharge point with energy dissipation structure on the northern bank of the Hunter River.

Any stormwater that comes into contact with the emplaced sediments before the cell is capped would be handled as leachate and conveyed to the leachate management facilities via drainage ditches on the interior of the perimeter bund walls.

Leachate Treatment during Treated Sediment Emplacement

It is proposed that treated leachate would be discharged to the Hunter River via a discharge licence sought from the DECC as part of a new EPL application for KIWEF activities.

The treatment of leachate collected during the emplacement of the treated sediment may consist of basic treatment including sedimentation in the leachate storage pond and pH adjustment. Dams will be constructed inside the landfill in order to capture stormwater that falls onto the treated sediment. The dams will be used as sediment controls which will remove any cement while the liquid will be transferred to the leachate pond for processing.

Leachate Treatment after Landfill Closure

The leachate pond would be decommissioned on completion of the final capping of the emplacement cell and at this point the amount of leachate being produced would be significantly reduced.

Subsequent leachate volumes after the final cover is in place would be handled by a dedicated tank storage facility, periodic removal, and disposal at a licensed industrial waste treatment facility.

14.2.3 Catchment Hydraulics

Hatch was engaged by BHPB to investigate the effect of the proposed cell on the existing and future KIWEF surface water flows and adjacent pond water levels. This included a consideration of water levels in the freshwater wetland immediately north of the cell (Pond H) and the permanent freshwater body beyond the rail embankment to the north of the KIWEF (Deep Pond).

The study correlated current and proposed future civil works at the KIWEF, the rail embankment being constructed by NCIG, and the concept plan of the proposed grading and capping of the site by HDC. The civil works included construction of a new drainage culvert beneath the new NCIG railway embankment to maintain the connection between the wetland areas to the south (Pond H) and north (Deep Pond).

Based on the simulation of a 1 in 100 year historical rainfall event, the study concluded that the proposed stormwater infrastructure would be sufficient to remove any overflows from within the whole catchment in the event of the 1 in 100 year Average Recurrence Interval (ARI) storm. Existing stormwater culverts in the broader area were found to be more then adequate in preventing the back-up of flows in pond levels.

The study also found that the water level in the pond immediately north of the emplacement cell (Deep Pond), known to be critical habitat for the GGBF (*Litoria aurea*), is unlikely to incur any backflow from downstream ponds, due largely to a 0.6m differential in standing water levels and the large surface area of this pond. This indicates that the pond levels would remain largely unaffected which is important in retaining ecological values at this site.

14.3 Flooding

The 1 in 100 annual exceedance probability AEP Flood map for the Newcastle and Port Stephens Councils (Public Works Department, 1994) indicates that both the Mayfield Site and KIWEF site are not subject to flooding under the simulated 1 in 100 year flood event.

It is also noted that the emplacement cell sediment and leachate ponds all have bund walls which are elevated well above the current river level and this would provide further protection in the event of flood event.

14.4 Environmental Safeguards

The following environmental safeguards have been recommended in relation to surface water management:

- preparation of a Stormwater management framework to manage the potential adverse impacts associated with the operation of remediation activities at the Mayfield site and the construction and operation of the emplacement cell at KIWEF;
- water quality monitoring of treated contaminated water at Mayfield and treated leachate at the KIWEF site to ensure appropriate water quality standards are achieved prior to discharge to the Hunter River;
- provision of a vehicle wash-down station at the Mayfield and KIWEF sites to prevent tracking of contaminated sediment within and outside of the sites;
- undertake refuelling of plant and vehicles only in designated areas and provision of spill kits to contain spills;
- development of a spill response plan to be implemented in the event of a oil, fuel or chemical spills;
- use of a licensed contractor(s) to manage and dispose of the sewage effluent generated at the Mayfield and KIWEF sites.

14.5 Conclusion

There are appropriate systems proposed for the collection of clean and contaminated stormwater run-off at the Mayfield and KIWEF sites, both during the construction and operational phases of the HRRP.

Contaminated stormwater run-off at Mayfield or leachate at the KIWEF site will be collected via a separate system and treated to achieve appropriate water quality standards before discharge to the Hunter River.

A range of environmental safeguards are proposed to ensure that any potential adverse impacts on surface water are appropriately managed.

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15.0 Groundwater Quality

15.1 Introduction

This section presents a summary of the baseline groundwater assessments carried out for the proposed emplacement cell by Douglas Partners during 2006, 2007 and 2008.

The assessments carried out are based on the design footprint and finished levels dated 14 October 2008. It is noted that a new footprint has since been issued, dated 6 November 2008. The new footprint has only minor modifications, predominantly in the north-western and south-eastern portions of the site. The information and recommendations summarised here, are not affected by this minor alteration to the footprint.

15.2 Background

Based on the available site history information, the site contains loosely dumped fill materials, largely comprising coal washery reject and blast furnace slag within the majority of the site, and an area of brecketts material and slag in the southern portion of the site. The site area has not been filled using landfill ponds, unlike site fill immediately to the north of the site. Based on this information, the site was therefore considered less likely to contain gross chemical contaminants due to historical placement of imported fill materials.

Groundwater is generally present at the site within two aquifers - the upper unconfined fill aquifer, and the underlying estuarine aquifer. The estuarine aquifer is sometimes further divided into shallow and deep estuarine, although tests have shown these waters to be chemically similar. The groundwater flow direction in the aquifers is to the south-west (i.e. towards the Hunter River).

15.3 Groundwater Assessment

15.3.1 Assessment Methodology

The Douglas Partners assessment was based on a review of available data and the collection of fill, soil, sediment, groundwater and surface water samples during field work.

Collection of samples was undertaken for identification and testing purposes during field work. The results of the identification and testing are provided below.

15.3.2 Assessment Results

Groundwater flow at the site primarily occurs within two aquifers (fill aquifer and estuarine aquifer), which are separated by a clay aquitard (Unit 2), which was confirmed by the difference in groundwater levels (piezometric head).

Groundwater levels within the fill aquifer over all gauging events varied between 0.3 m AHD and 2.7 m AHD within the site, however, higher levels up to about 6.3 m AHD were measured to the north of the site. Groundwater levels in the estuarine aquifer varied between approximately 0.2 m AHD and 1.5 m AHD.

Based on gauging events and subsequent contouring, the general groundwater flow direction in the vicinity of the site is to the south/south west (i.e. towards the South Arm of the Hunter River).

Groundwater levels observed in response to rainfall suggests that recharge is occurring in the upper fill aquifer, and increasing heads in the confined estuarine aquifer.

15.3.3 Groundwater Parameters

The groundwater parameters measured in the field and detailed laboratory testing indicated the following:

- Fill aquifer is typically neutral to basic, fresh to slightly brackish with both oxidising and reducing conditions;
- Shallow estuarine aquifer is typically slightly acidic to moderately basic, fresh to saline with both oxidising and reducing conditions;
- Deep estuarine aquifer is typically moderately acidic to slightly basic, brackish to saline with generally reducing conditions, and
- Surface waters are typically neutral to slightly basic, fresh to slightly basic with both oxidising and reducing conditions.

15.3.4 Assessment of Contamination

Contaminant Observations

Fill materials generally comprised coal reject and slag materials with no visual or olfactory evidence of gross contamination (i.e. no staining or odour), with the exceptions of the hydrocarbon/PAH, cement and slight sulphurous odours.

Generally there was no visual or olfactory evidence (i.e. staining or odours) to suggest the presence of gross contamination within seepage water/groundwater. Trace hydrocarbon odours and staining, however, were observed in seepage / groundwater in a few bores and pits during drilling/excavation.

Observations during well development and purging suggested the absence of gross contamination within groundwater. No floating product was detected with the oil/water interface meter, and there were generally no obvious hydrocarbon odours or staining during purging with the exception of slight PAH odours detected in some wells. A slight organic odour was also observed in some wells during gauging or development.

The headspace of groundwater collected from each well was screened for the presence of volatile organic compounds (VOCs) and this indicated the absence of gross volatile hydrocarbon contamination within groundwater. There was no visual or olfactory evidence to suggest the presence of gross contamination within surface waters across the site.

Chemical Analysis

Groundwater chemical analysis results from the 2006 and 2007 assessments were generally within the ANZECC 2000 trigger values for slightly to moderately disturbed systems (marine waters). Manganese, sulphide and pH were the main parameters found to exceed the guidelines in most samples. Other metals, ammonia NO_x, TRH (typically C_{10}-C_{36}), PAHs, and Total Cyanide were also found to exceed the guidelines in some of the samples.

It is noted that groundwater analysis has not been conducted within the western portion of the site, however, additional monitoring, which is to include all wells within the site was underway at the time of preparing this EA.

The results of the assessments undertaken suggest in general, the connectivity between the two aquifers is poor in the eastern portion of the site. However, anomalies (outliers) suggest that there may be localised mixing of upper and lower aquifers.

15.4 Long Term Groundwater Monitoring Program

A long term groundwater monitoring program has been proposed by Douglas Partners that will ensure that the effects of the emplacement cell on ground water quality are known, measured and recorded.

A total of 24 groundwater well locations are proposed for long term monitoring of groundwater at the site. Of the 24 wells it is proposed that there would be 14 up-gradient, 4 across-gradient, and 6 down-gradient of the landfill site.

The following have been considered to establish the analytical testing regime:

- Chemicals of concern associated with the treated sediments (i.e. TRH, PAH, Ammonia, Total Cyanide, Metals)
- Existing available groundwater data on KI (i.e. elevated chemical concentrations already present on-site)
- Groundwater monitoring requirements for the emplacement cell which incorporates the proposed site (i.e. analytes nominated in the DECC Environment Protection Licence 6437)
- Results of baseline groundwater testing by Douglas Partners for the site, and
- Known sources of contaminants up-gradient of the site.

It should be noted that the previous landfill operation on the site was not of engineering design or construction and therefore does not have the inherent safeguards that would be associated with the proposed emplacement cell(s). These include:

- An engineered cell with suitably designed liners to contain the treated sediment;
- A fully designed leachate management system to collect all contaminated run-off from within the cell prior to its treatment and disposal; and
- A 1.5 metre separation, or as otherwise agreed with DECC, between the bottom of the cell and the upper fill aquifer to allow for future settlement.

15.4.1 Proposed Groundwater Sampling & Analysis

A range of parameters are proposed to be analysed from the 24 proposed groundwater wells every six months for long term monitoring of groundwater quality at the KIWEF. Note that not all 24 wells may be sampled every monitoring run. A rotation program would be considered that is relevant and maintains appropriate representation to be considered.

In addition, the frequency of testing, number of analytes and locations will be reviewed during the course of monitoring and may be modified based on the results (i.e. subject to observed trends and results of testing).

Groundwater sampling would be conducted in accordance with relevant industry standards and regulatory requirements, using the same methodology as previous rounds of sampling for consistency. Quality control sampling and analysis would also be conducted.

The results of long term groundwater monitoring currently conducted in accordance with DECC Environment Protection Licence 6437 for the existing KI landfill facility will also be considered in the assessment of groundwater quality at the site. The proposed long term groundwater monitoring frequency (i.e. every 6 months) is commensurate with current frequency of groundwater monitoring for this licence.

15.5 Groundwater Quality Trigger Levels

Groundwater quality will be monitored at the perimeter of the site to confirm that treated sediments are not leaching or causing an adverse impact on surrounding groundwater. Groundwater trigger levels are required for given chemical parameters to ensure the protection of groundwater quality at the site.

Trigger levels are defined as the concentration recorded by monitoring which would trigger actions such as review, closer scrutiny or further investigation to assess the potential for migration of contaminants or adverse impact on groundwater quality from the site. The objective is to assess the potential for migration of contaminants or adverse impact on groundwater quality from the emplacement of the treated sediments.

A preliminary trigger level assessment was carried out following the 2006 groundwater assessments. These results and the proposed updating of the trigger level assessment are described in the Trigger Level Summary Report (Douglas Partners 2008b).

Typically the values given in ANZECC 2000 would be used as trigger levels for further investigation of possible impact on groundwater quality. However, many historical and current contaminant levels at the KIWEF site already exceed ANZECC 2000 values. In addition, significant ranges and variability of chemical concentrations have been observed within groundwater at the site.

Due to the variations in groundwater quality across the site (both spatially and between aquifers), statistical analysis is recommended to determine appropriate trigger levels based on estimating the existing mean and upper percentile values for each contaminant, within a 95% level of confidence.

Trigger values would be utilised during monitoring to identify trends, and prompt further investigation where trigger values are exceeded. Further investigation is anticipated to include additional rounds of monitoring, investigation of the integrity of the landfill cap and liner if migration of contaminants is suspected, and installation of additional groundwater monitoring locations. The additional investigation would be conducted to confirm the likely cause and possible implications of groundwater impact, and mitigation measures for the protection of groundwater quality. Groundwater trigger levels will subsequently be determined in consultation with DECC and subject to their approval as part of the EPL determination.

15.6 Groundwater at the Mayfield Site

The remediation activities at the Mayfield site are being located as much as possible to be within the boundary of the underground bentonite wall that confines an area of existing groundwater contamination at the site.

The ground surface in this area has been extensively capped by the landowner over recent years in accordance with the DECC and Site Auditor requirements. This bitumen cap provides an effective seal over the area for the proposed handling and treatment of contaminated sediments, effectively preventing the potential for spills or other incidents that may occur to contaminate the underlying aquifer system.

It should be noted that at the Mayfield site a separate system is proposed to isolate, capture and treat (via a water treatment plant) contaminated water from the dredging process, trucks and truck wash area, sediment stockpile areas and sediment treatment process. In addition a range of environmental safeguards are proposed to avoid or minimise the potential for escape of contaminated water.

In addition to this, BHPB is conforming to the strict requirements of the landowner and statutory authorities, including the DECC and DoP, to ensure the preservation of this bitumen cap during Stage 2 works including Site Auditor verification that this has occurred.

15.7 Environmental Safeguards

Condition C4.4 of the development consent requires the preparation of a Remediation Environmental Management Plan (REMP). The REMP would include requirements for the assessment of groundwater quality and the management of water generated during any dewatering activities at the site.

The REMP will also include requirements to minimise the risk of contamination of groundwater as a result of the construction activities including refuelling of equipment and handling of chemicals.

The REMP may also include a long term groundwater management plan and a mechanism that would identify potential adverse impacts to groundwater in a timely fashion.

The EMMP also includes management actions that would protect groundwater quality in the event that gross contaminated material is excavated during the construction of the landfill.

15.8 Conclusion

The Douglas Partners groundwater assessments and monitoring have identified significant variations and fluctuations in water quality at the KIWEF site in the past (with no discernable trends). While fluctuations did appear to stabilise in later rounds of sampling, the variability of water quality should be considered in the assessment of baseline conditions for the site.

Groundwater and surface water within the original KI investigation area contain some elevated contaminant levels with respect to ANZECC (2000) trigger levels.

The presence of PAH concentrations within the fill aquifer in all upgradient wells may indicate PAH levels are a result of upgradient sources.

Groundwater levels and subsequent hydraulic gradients are influenced by rainfall events. Groundwater levels within the fill aquifer are influenced by the water bodies on-site and the perched groundwater table to the north of the site. The observed groundwater level response to rainfall suggests that recharge is occurring in the upper fill aquifer, and increasing heads in the confined estuarine aquifer.

It is recommended that the trigger value assessment previously conducted for the 2006 and 2007 groundwater monitoring is updated following the planned monitoring in late 2008 to further assess baseline groundwater quality within the site compared to surrounding areas on KI.

The following additional assessments, with regard to groundwater, will be conducted to obtain the clearest picture of groundwater impacts as a result of the treated sediment emplacement:

- Additional periodic groundwater and surface water monitoring including sampling and analysis of wells installed and surface water bodies not previously assessed; and
- Additional slug tests to assess permeability of groundwater aquifers in the western portion of the site.

This additional information will be used to support applications to DECC for the EPL and relevant EMP approvals for KIWEF activities.

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16.0 Infrastructure and Resources

16.1 Introduction

The HRRP has the potential to impact on a range of existing infrastructure at and immediately surrounding the Mayfield and KIWEF sites including roads, rail, pipelines, power, water, drainage, sewer, telecommunications and easements.

In addition the HRRP will be using resources such as power, water and diesel fuel. All of these impacts need to be assessed and managed where appropriate.

16.2 Mayfield Site

16.2.1 Roads

The existing road network to be used for the transport of treated sediments from the Mayfield site is of a standard which will comfortably cater for the anticipated level of traffic movements and no upgrades to the road network are anticipated.

Selwyn Street and David Baker Road are both sealed roads which were originally designed to accommodate substantial numbers of overall traffic and heavy vehicle movements in association with the former BHP Steelworks. Traffic volumes on these roads are relatively minor at present.

Selwyn Street connects to Industrial Drive via a signalised intersection and Industrial Drive is a divided arterial road with multiple traffic lanes in each direction.

There are no requirements to upgrade these roads as a result of the HRRP.

16.2.2 Rail

Rail infrastructure exists to the south of the Mayfield site. The function of this rail line is to connect OneSteel to Morandoo Siding. Trucks conveying treated sediment from Mayfield to KIWEF will traverse the railway line and on occasions my need to stop to allow trains to pass. The safety of this intersection is being reviewed for the full-scale works with additional controls to be considered in consultation with NPC, as representative of the landowner, and users of the rail line.

The proposal is not intended to have an adverse impact on the utilisation of this existing rail infrastructure.

16.2.3 Electricity

A power line (possibly in excess of 11-kV) supplies the neighbouring OneSteel facility. It is likely that the contractor would seek to connect into this existing infrastructure to supply power to the Mayfield site. If this is not viable other options for connecting into the existing power supply grid surrounding the site would be investigated.

At the Mayfield Site power (up to 11kV) will be required to operate equipment such as the grizzly, mixing plant, conveyors, water treatment plant and lighting. This power will be sourced by the contractor from the relevant power supply authority (TransGrid or Energy Australia).

16.2.4 Water

Water supply in the area surrounding the Mayfield site is serviced by Hunter Water Corporation with trunk water mains buried underground. The contractor who would be undertaking the works at the Mayfield site would be responsible for the connection and supply of potable water.

A firewater supply pipeline traverses the Mayfield site. The Contractor may connect to this firewater pipeline to provide plant water for the remediation activities.

Operations on the Mayfield site would generate the following likely demand for water use during construction or operation. Water would be used to:

- Suppress dust during operations on the Mayfield site;
- Wash down contaminated sediment from equipment and trucks within the site;
- Supply amenities for staff working on site; and
- Supplement water to be used for the process of treating the sediment where required.

Supply of water could be augmented from the uncontaminated drainage run-off which is collected on site (e.g. from the roof of the sediment treatment areas).

All water related infrastructure to be provided on the site would be designed to applicable Hunter Water Corporation standards. If it was not possible to connect into existing water mains then the contractor would bring in potable water for all purposes that require it for the full duration of the HRRP's Stage 2 activities.

16.2.5 Fuel

Operations at the Mayfield site would require the use of diesel fuel to enable the operation of the following equipment:

- Dump trucks that would transport the untreated sediment around the Mayfield site
- Other plant equipment such as excavators, water trucks,
- Generators that power the portable lighting

Fuel to these vehicles and equipment would be supplied by regular tanker deliveries to the site. Refuelling of vehicles and plant equipment would only occur in nominated areas on the site which are appropriately designed (e.g. sealed and bunded) for this purpose with spill response facilities and trained personnel available.

16.2.6 Sewer

Although the area surrounding the Mayfield site is sewered, the existing sewer mains will not be used for the field activities on the Mayfield and KIWEF sites. The contractor staging and office administration areas on site would be served by portable toilet and washing facilities throughout the construction and operation period. Sewage would be collected and transported from the site by licensed contractors at regular intervals for disposal off site.

16.2.7 Koppers Pipeline

The Koppers Carbon Materials & Chemicals Pty Ltd pipeline traverses the Mayfield site running west to east parallel to and some 80 m south of the Hunter River. The pipeline elevation varies across the site from about 1m above ground to about 7m above ground level. The pipeline sits on a series of columns and carries pitch and tar for use in the aluminium industry. Koppers also have regular deliveries to their berth located at the eastern end of the Mayfield site proposed during the Stage 2 remediation works.

The pipeline structure will be retained and trucks and equipment on the Mayfield site will be required to carefully negotiate this structure in moving between the riverbank and the sediment treatment areas to the south.

An internal traffic management plan would be developed by the contractor to manage all traffic movements within the Mayfield site. This would include management of traffic movements in the vicinity of and beneath the pipeline structure so as to avoid any vehicle impacts and consideration of relevant activities at the Koppers berth.

Vehicle movements under the pipeline structure would only occur in designated locations where roadways would be constructed and prominent road markings, signage, barriers and lighting would be erected to direct vehicles to use the designated locations.

16.2.8 Capped Remediation Surface

In accordance with requirements of the development consent modification dated 8 July 2008 and EPL No 1708, the integrity of the existing capping layer (cap) over the remediated area at the Mayfield site will be maintained. In accordance with statutory requirements, a Site Auditor will confirm the integrity of the cap has been conserved or otherwise recommend suitable remedial works to be undertaken to restore the surface to its original condition.

16.3 KIWEF Site

16.3.1 Roads

The Tourle Street Bridge is currently being replaced with a new improved bridge structure which is due to be completed in early/mid 2009. The timeframe for opening of the new bridge is expected before mid 2009 which should align with the timing for start of transport as part of the Stage 2 activities.

The intersection of the KIWEF site access and Cormorant Road has recently been upgraded as part of the Tourle Street bridge project and this new intersection will form the permanent access to the KIWEF site. This new access will facilitate safe entry and exit to the site both during the construction and operation of the emplacement cell and ultimately when the site is developed for industrial purposes in the future.

During construction and operation of the emplacement cell, all traffic movements at this intersection will be restricted to left in/left out to avoid traffic flow and safety issues associated with right turn movements.

This new intersection will link with a new internal southern access road which will become the permanent access road within the site. This internal road will be 9 m wide and fully sealed and drained to facilitate two way truck movements.

No other changes to Cormorant Road/Tourle Street or to the Teal Street roundabout are considered necessary or proposed as part of the HRRP.

16.3.2 Rail

The NCIG coal export terminal development on KI requires the construction of a new rail spur line connecting the existing railway line to the west of emplacement cell to the proposed NCIG coal stockpile areas further to the east.

The new rail spur line will be elevated and will run from west to east immediately to the north of the emplacement cell. Construction and operation of the emplacement cell is intended to have no impact on this rail line.

16.3.3 Electricity

The electricity transmission and distribution infrastructure on KI is owned by TransGrid and Energy Australia. All KI's reticulation is owned and operated by Energy Australia with reticulation operating at 33kV. In addition, an overhead power line on the southern part of the KIWEF site is owned by Energy Australia.

At the KIWEF, electricity required to operate equipment (e.g. the leachate pumps, treatment plant, and lighting) would be sourced from the relevant power supply authority (TransGrid / Energy Australia). There is an existing overhead power line located adjacent to the southern boundary of the KIWEF site.

Power supply will be required to service permanent lighting infrastructure along the southern access road as well as the leachate pumps, water treatment plant, weighbridge and on-site facilities for staff (e.g. Office and amenities areas).

16.3.4 Water

It is understood there is a 100 mm diameter water main at the old truck fill station to the south east of the KIWEF. Water supply needed for the construction and operation of the emplacement cell is likely to be obtained from this source.

The construction and operation of the emplacement cell would not generate significant demand for water use during construction or operation. Water would be used to:

- Suppress dust during construction of the emplacement cell and related infrastructure;
- Wash trucks exiting the emplacement cell after they have delivered the treated sediment; and
- Supply office and amenities areas for staff working on site.

Supply of water could be augmented from the uncontaminated drainage run-off which enters the two sediment ponds.

All water-related infrastructure to be provided on the site would be designed to the applicable standards.

16.3.5 Diesel

The emplacement cell would require the use of diesel fuel to enable the operation of the following equipment:

- Plant equipment such as excavators, vibrating rollers and water trucks, and
- Generators that power the portable lighting at the site.

Fuel to these vehicles and equipment would be supplied by regular tanker truck deliveries to the site. Refuelling of vehicles and plant equipment would only occur in nominated areas on the site which are appropriately designed (e.g. sealed and bunded) for this purpose with spill response facilities and trained personnel available.

16.3.6 Sewer

Although the area surrounding the emplacement cell has access to sewer along it southern boundary, it is likely that the existing sewer mains will not used for the HRRP. The contractor staging and office administration areas on site would be served by portable toilet and washing facilities throughout the construction and operation period. Sewage would be collected and transported from the site by licensed contractors at regular intervals for disposal off site.

16.3.7 Energy Australia Easement

To the south of the emplacement cell there is an 80 metre wide Energy Australia easement. The easement runs parallel and to the north of the bank of the Hunter River.

The easement is largely unaffected by the design of the emplacement cell with the exception of the south sediment pond which will be sited within the easement. BHPB has discussed this proposal with Energy Australia and has been advised that Energy Australia has no issues with this proposed arrangement provided safe access for inspections, etc is maintained around the dam.

16.4 Conclusion

As the HRRP will occur over a limited timeframe (approximately 18 months to 2 years) the long-term impacts on infrastructure and resource availability will be limited in scope. The following summary is provided in relation to likely HRRP impacts:

- Existing infrastructure such as roads, rail lines, above ground pipeline structures or easements will not be significantly impacted by the HRRP and any potential impacts can be suitably managed;
- Where feasible connections to existing infrastructure (e.g. power, water, drainage) should be utilised to service Stage 2 activities;
- Where possible the HRRP should maximise the re-cycling of stormwater collected and/or treated on-site;
- Where refuelling of vehicles and plant equipment is proposed, ensure that this occurs in nominated locations that are properly designed for this purpose and with appropriate spill response facilities available; and
- Infrastructure created specifically for the HRRP should be utilised where possible to service future development of both sites (e.g. internal roads, intersections, lighting, drainage lines and sediment ponds).

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17.0 Aboriginal Heritage

17.1 Project Background

Specialists from ENSR were engaged to prepare an Aboriginal Heritage assessment of the proposed works associated with the construction and operation of the emplacement cell (refer **Appendix E**). This assessment discusses the potential impacts to Aboriginal cultural heritage values as a result of the development.

17.2 Study Area

The project land, hereafter referred to as the 'study area,' is located in the industrial area at the southern-central area of Kooragang Island (KI), near Newcastle, NSW. KI is located in the estuary of the Hunter River. Specifically, the study area is located immediately to the north west of Tourle Street Bridge. The northern boundary abuts the easement for the proposed NCIG railway spurs and sidings (refer **Figure 1**). The southern arm of the Hunter River is approximately 100 m south of the study area.

17.3 Aboriginal Community Consultation

Aboriginal community consultation was undertaken in accordance with the DEC (2004) *Interim Community Consultation Requirements for Applicants.*

The proponent wished to take a proactive approach to consultation with the Aboriginal community. Advertisements were run in the local newspapers and invitations to register were sent to known Aboriginal groups in the area.

In all, six Aboriginal community groups registered their interest in being involved (refer to **Table 21**).

Table 21: Registered Aboriginal Stakeholder Groups

Aboriginal Community Group	Representative
ALALC	Cheryl Kitchener
Nur-Run-Gee Pty Ltd	Leanne Anderson
Mur-Roo-Ma Inc	Anthony Anderson
Gidawaa Walang Cultural Heritage Consultancy (GWCHC)	Ann Hickey
ATOAC	Kerrie Brauer
ADTOAC	Shane Frost

A series of three meetings was held at the BHPB Newcastle Properties Group offices in Selwyn Street, Mayfield, on 3 November 2008 to discuss the proposed methodology for the Aboriginal heritage assessment. A presentation was given to the groups which included a detailed synopsis of the HRRP background, as well as a briefing on the proposed Aboriginal heritage assessment methodology.

Consultation with the Aboriginal community has been ongoing throughout this HRRP and all registered stakeholders were invited to comment upon the draft of the Aboriginal heritage assessment report prior to its finalisation.

17.4 Assessment Methodology

The most appropriate methodology for Aboriginal heritage assessment of the study area was deemed to be a detailed desktop assessment, given:

- the record of land use in the study area and the extent of disturbance and modification to the landscape
- a review of previous Aboriginal cultural heritage assessments in the vicinity of the study area indicating that there is little likelihood of compromising the cultural heritage values of the study area, and
- the predicted limited archaeological potential of the study area.

On that basis, an Aboriginal heritage survey of the study area was not conducted. This methodology was agreed to by the local Aboriginal community.

The methodology comprised:

- a search of the DECC Aboriginal Heritage Information Management System (AHIMS) database
- a review of relevant archaeological reports lodged in DECC's archaeological reports library at Hurstville, and
- consultation with Aboriginal community groups following DECC's interim guidelines with emphasis on the social cultural heritage values of the study area.

17.5 Environmental Context

The study area is entirely a modified landscape comprised of introduced industrial waste. No in-situ natural soils or landforms are present.

KI, as it is today, is the result of land reclamation efforts by Broken Hill Pty Ltd (BHP), commencing in 1951. It is a composite island formed by reclaiming of the channels separating the various mud flat islands (Hexham, Ash, Moscheto, Dempsey, Goat, Spectacle, Table, Pig and Walsh Islands). Dredge material from the river channel was dumped in the tidal inlets, and by 1966 the inlets had been filled, forming a single landmass. This means that the upper–level soils in the study area are largely imported dredge-fill.

The island covers an area of approximately 2,600 ha and large areas of the island have been designated for industrial development and port related activities. In 1972, BHP commenced operating an industrial landfill on KI. Industrial waste materials (e.g. coal washery rejects, steel manufacturing waste and construction waste) were used to reclaim land in addition to the deposition of dredged material from the Hunter River estuary and its tributaries.

This suggests that the soil profile of the study area has an A horizon that probably consists of soils introduced and deposited as part of the land reclamation process and industrial waste deposition. The landform is entirely comprised of introduced coal rejects and slag. No natural soil is evident on the study area.

17.6 Cultural Context

17.6.1 Registered Aboriginal Sites

A search of DECC's AHIMS database revealed that there are 123 registered Aboriginal sites within a 14 by 14 km area centred over the study area. The search also revealed that there were no registered Aboriginal sites within the study area. The majority of sites are associated with developments occurring in Newcastle city, along Stockton Beach and Fullerton Cove.

Only two Aboriginal sites have been recorded on KI itself a shell midden on what was formerly Moscheto Island (#38-4-0050) and a shell midden on the northern approach to the Tourle Street Bridge (#38-4-0041). Refer to **Figure 18** for details.

Site DECC No. 38-4-0041

This record is of a shell midden recorded as being south east of the study area, on the northern bank of the south arm of the Hunter River, just east of the Tourle Street Bridge. This record is the closest to the study area and is considered to be the most relevant. The site was originally recorded by David Moore of the Australian Museum in 1970. The site card describes the site as:

> *Midden by new bridge is almost completely bulldozed. In small undisturbed parts there are very marked lines of shells. Sample of shell types collected. No artefacts.*

This description indicates that it had been heavily disturbed when it was originally recorded, when the bridge was constructed in 1970. Subsequent archaeological surveys have failed to relocate the site. Furthermore, the original recording was made using a small-scale map and conversion to Map Grid of Australia (MGA) coordinates is problematic. Consequently there is some uncertainty as to whether the site is on the southern or northern banks of the South Arm of the Hunter River.

Site DECC No. 38-4-0050

This record is of a shell midden on the north eastern shores of KI, on what was formerly Moscheto Island, near the mouth of the north arm of the Hunter River. The site is located well away from the study area (approximately 4 km to the north east). The KIWEF site is too far away to have any impact on this shell midden.

17.7 Previous Assessment of the Study Area

Several Aboriginal heritage assessments have been conducted on KI, including areas immediately adjacent to the study site. The major assessments are presented in **Table 22**.

Table 22: Previous Aboriginal Heritage Assessments

Study/Project
PWCS, 1996. *Kooragang Coal Terminal Stage 3 Expansion*
Protech Steel, 2001. *Protech Proposed Cold Mill Facility*
Umwelt, 2003. *Proposed Extension of Shipping Channels, Port of Newcastle*
Insight Heritage, 2006. *Tourle Street Bridge Archaeological Assessment*
Umwelt, 2006. *Section 90 Consent Application, Tourle Street Bridge Replacement*
NCIG, 2007. *NCIG Coal Export Terminal Environmental Assessment*

Without exception, all previous assessments of lands in the vicinity of the study area have concluded that there is little likelihood for there to be any material (physical) evidence of Aboriginal occupation remaining, and that there is little likelihood that Aboriginal cultural heritage values will be compromised by the various proposed activities. All these assessments were conducted in full consultation with the Aboriginal community and with Aboriginal community agreement to the reports.

17.8 Archaeological Potential of the Study Area

The review of historical land use, together with the results of previous surveys and geotechnical investigations on lands in the near vicinity of the study area, indicate that the lands within the study area have been subject to extensive disturbance and modification for more than 50 years. The upper sequences of soils within the study area consist of dredge spoil and industrial waste material.

Consequently it is considered that any physical evidence (artefacts) that may occur in the study area are likely be the result of secondary deposition and would no longer contain any contextual information. On that basis, it is considered that the study area has little or no archaeological potential and that no further archaeological investigation of the study area is required.

17.9 Legislative Framework

17.9.1 Commonwealth Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The purpose of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Heritage Protection Act) is the preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters that are of particular significance to Aboriginal people in accordance with Aboriginal tradition.

There are no areas or objects in the study area declared under this Act.

17.9.2 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth Environment Protection and Biodiversity Conservation Act, 1999 (EPBC Act) provides for the establishment of two heritage lists:

- The National Heritage List, and
- The Commonwealth Heritage List.

There are no items in the study area listed on either of these lists.

17.9.3 NSW Environmental Planning and Assessment Act 1979

The EP&A Act requires that consideration be given to environmental impacts as part of the land use planning process. In NSW environmental impacts are interpreted as including cultural heritage impact.

17.9.4 NSW National Parks and Wildlife Act 1974

The NP&W Act, administered by DECC, is the primary legislation for the protection of Aboriginal cultural heritage in NSW.

Part 6 of the NPW Act provides specific protection for Aboriginal objects and places by making it an offence if impacts are not authorised. An Aboriginal Heritage Impact Permit (AHIP) should be obtained if impacts on Aboriginal objects and places are anticipated (either under section 86 or section 90.

17.9.5 Newcastle Local Environmental Plan

Under the Newcastle LEP the study area is Zoned 4b – Port and Industrial.

Heritage in general is protected under Part 4 (Regulations 27 to 34) of the LEP and individual heritage items are listed in Schedule 6.

There are no items of Aboriginal heritage significance in the study area listed in Schedule 6 of the NLEP.

17.10 Cultural Heritage Assessment

17.10.1 Scientific Value

The impacts of more than 50 years of land reclamation, industrial waste deposition and dredge spoil deposition have resulted in a highly modified landscape. There are no known existing Aboriginal sites in the study area that can be assessed and it is likely that all material evidence of Aboriginal occupation has been destroyed by previous land use practices, and all original land surfaces have been destroyed by industrial dumping of coal rejects and slag.

If artefacts were to be found in the study area, it is likely they would be the result of secondary deposition, probably due to dredge spoil deposition. On that basis it is considered that the study area holds no scientific value.

17.10.2 Educational Value

Educational value is often aligned to a site or area's scientific value. Usually it relies on tangible evidence of occupation. Since there are no known Aboriginal objects at the site and little prospect of encountering them, the educational value of the study area is considered to be negligible.

17.10.3 Cultural Value

During consultation there were several responses from Aboriginal stakeholders regarding their views on the cultural value of the study area. Correspondence from ATOAC and Nur-Run-Gee Pty Ltd indicate that KI (and by implication the study area) has cultural heritage value to Aboriginal stakeholders. Those cultural heritage values derive from the fact that the area, like all other parts of the landscape, was used by Aboriginal people.

17.10.4 Overall Assessment of Aboriginal Heritage Significance

Whilst Aboriginal stakeholders regard the study area as having social/cultural value, no specific cultural heritage values were identified for the study area. Based on the combined scientific, educational and social/cultural value assessments, no cultural heritage values were identified specifically for the study area.

This assessment does not imply that the site is devoid of all value; rather it suggests that the cultural heritage values are not significant when considered in the wider context of Aboriginal sites in the Lower Hunter region.

17.11 Impact Assessment

The method of construction of the emplacement cell will involve levelling the site and construction of the South Sediment Pond and the leachate pond, which will involve some excavation into the surface soils of the affected land. BHPB have advised that bore tests to a depth of 15 m indicate that all excavation activities will be retained in the upper soil strata which is composed of previously deposited waste material and dredge spoil.

To construct the emplacement cell excavation will occur to an average depth of 6m. The base of the cell will be located with clearance above the upper groundwater aquifer. As a result excavation will be contained within the existing waste material and dredge spoil layers.

The majority of the cell will be elevated above the ground surface by the construction of substantial bund walls encircling the cell. The height of the bund walls will vary across the site but will average approximately 8-9m.

Since all ground-breaking activities will be confined to the disturbed upper soil levels and the majority of the cell constructed above the current ground level, it is considered that there will be no adverse impacts on the Aboriginal cultural heritage values of the study area.

17.12 Conclusions

The findings of the Aboriginal heritage assessment can be summarised as:

- no previously recorded Aboriginal sites occur within the area affected by the development;
- Aboriginal people once lived in the area but physical evidence of their occupation is likely to have been destroyed by previous land management practices;
- there are no natural soils or landforms in the study area;
- there are no indications that the area is of Aboriginal heritage significance; and
- on the basis of this assessment, the HRRP is not likely to encounter Aboriginal objects.

Specific conclusions are as follows:

- the proposed excavation for the emplacement cell is not for the purpose of locating Aboriginal objects. Therefore an application for a AHIP (consent) under section 86 of the NP&W Act is not required;
- there are no known Aboriginal sites within the study area. Therefore an application for a AHIP (consent) under section 90 of the NP&W Act is not required;
- no further archaeological excavation, collection or monitoring is warranted for the construction project; and
- should any Aboriginal objects be located during the HRRP, work should cease and DECC and the local Aboriginal community informed prior to works continuing.

18.0 Visual

18.1 Assessment Methodology

This section of the EA describes the existing environment of the Mayfield and KIWEF sites and assesses the visual change likely to result from the HRRP in terms of visibility and visual prominence.

The visual assessment considers the following:

- existing site conditions – vegetation, slope, surrounding development
- the nature of proposed activities – height, scale, materials
- views that may be obscured as a result of the HRRP
- the impact on the visual amenity of the surrounding area, and
- any measures that could be undertaken to mitigate any adverse visual impacts.

18.2 Existing Environment

18.2.1 Mayfield site

Site Context

The Mayfield Site is positioned within the northern part of the former Newcastle Steelworks site and within a broader area home to port-associated industrial activities, chemical plants, and raw product shipping and storage. The nearest residential area is Mayfield 680 m to the south-west of the site (refer **Figure 1**). Beyond the Hunter River to the north is the KI industrial area and Kooragang Wetlands.

The overall character of the area surrounding the site is industrial.

Access

Ship berthing facilities are currently positioned on the northern periphery of the Mayfield site.

Vehicular access to the Mayfield Site is via David Baker Road, which connects with Selwyn Street and then Industrial Drive (refer **Figure 1**). The Mayfield Site is not currently accessible to the public, with security gates located on all road entrances into the former Newcastle Steelworks site.

Site Description

The former Newcastle Steelworks site has recently undergone site remediation (refer **Section 2**). Infrastructure has been removed to prepare the site for future industrial activities. The site is relatively flat and is largely void of vegetation. The site has been capped with asphalt. The only notable feature is the elevated Koppers pipeline that runs east to west through the site.

Land uses surrounding the Mayfield site include the South Arm of the Hunter River to the immediate north and east; existing and planned coal export facilities beyond the Hunter River to the north; fertiliser, grain and woodchip storage and dispatch facilities to the east; a coal export facility to the south; and a large steel mill to the west and residences of Mayfield to the south west.

An active railway line borders the southern boundary of the Mayfield site. Industrial office buildings are located in close proximity to the railway line on adjoining properties.

Visual Context

The industrial area is not readily accessible, physically or visually. The former Newcastle Steelworks site is on low-lying land that flanks the Hunter River.

The closest viewing locations to the site would be from existing industrial lots to the west and south-east of the site, and from industrial lots within KI's industrial area to the north. In the future, there are also likely to be industrial sites immediately east and south of the site within the former Newcastle Steelworks site which may also view the site. These neighbouring industrial lots are similarly low-lying as the Mayfield site.

Along Industrial Drive land is more elevated, however views of the site are largely obstructed by topography, buildings and vegetation in the foreground. At its closest point, Industrial Drive is approximately 650 m from the Mayfield site.

The other well-trafficked and publicly accessible road from which views to the site are possible is Cormorant Road, which serves the industrial area on KI. Cormorant Road is approximately 500 m from the Mayfield Site at it closest point. Currently views are relatively open from this direction.

There are few residential areas from which views to the site are possible. The closest area is Crebert Street, Mayfield. Views across the former Mayfield Steelworks industrial area are only possible from the eastern section of this street. Distant views of the Newcastle Steelworks site are also achieved from Merewether and The (Newcastle) Hill.

Passing views of the site would also be possible from the Hunter River, from commercial shipping, recreational users and tourists.

There are no other known publicly accessible sites (such as parks, playgrounds, schools) from which the site can be seen.

18.2.2 KIWEF Site

Site Context

KI was developed in 1951 as part of the Hunter River Islands Reclamation Scheme, which joined Islands within the Hunter River with dredged sand and fill material with the purpose of providing land for industrial development and port-related activities. Existing industrial developments on the Island include Port Waratah Coal Service, Orica Mining Services and Cargill.

The closest residential areas to the KIWEF are Warabrook and Mayfield West (each approximately 1.2 km to the south). The Hunter River is within approximately 100 m of the emplacement cell at its closest point.

Access

Vehicular access to the emplacement cell would be via Cormorant Road, an arterial road. The new access road is positioned approximately 150 m north of the Tourle Street Bridge which is undergoing replacement.

Site Description

The emplacement cell is to be located within an area previously disturbed by industrial activities, including land-filling activities. An artificially created ridge line occurs in the southern portion of the proposed cell.

The current condition of the KIWEF site is degraded. A mature stand of native planted trees occurs in the south-east corner of the site. These trees would be removed during construction of the emplacement cell. Mangroves and associated salt marsh vegetation fringes the Hunter River at lower elevation to the south of the emplacement cell.

Surrounding land uses to the emplacement cell include areas used for landfill purposes to the immediate north and east and west and the Hunter River to the south. The new rail spur for the NCIG coal export terminal is under construction and lies adjacent to the north of the cell. Directly across the River lies the Delta EMD facility and other industrial and warehousing facilities within the Steel River Eco Industrial Estate.

The overall character of the area is industrial and is busy with construction activity, industrial traffic (movement of raw materials and products) and harbour dredging. The proposed emplacement cell site falls within an area earmarked for future port and industrial development on KI.

Visual Context

The KIWEF has exposure to local passing traffic being located on the main vehicular route between Newcastle and Stockton. From the Tourle Street Bridge and Cormorant Road, the site is currently visible through gaps in the boundary vegetation. **Plate 4** shows the approach to the site on Tourle Street Bridge, northbound.

Beyond the immediate vicinity of Cormorant Road there are few vantage points of the site. The KIWEF can also be viewed from the Hunter River and from residential areas at Mayfield and Warabrook, although these are more distant views (refer **Plates 5, 6** and **7**).

18.3 Proposed Structures

18.3.1 Mayfield Site

The proposed layout of structures at the Mayfield site is graphically depicted in **Figure 2**. In summary, site infrastructure would generally include but not be confined to:

- three barge unloading areas and a concreted sediment receiving area on the bank of the Hunter River;
- three roofed sediment treatment areas including sediment pre-treatment and post-treatment storage areas;
- three silos for concrete storage;
- contaminated water holding ponds;
- a water treatment plant; and
- crib and ablution facilities.

The proposed facilities to be constructed at the Mayfield site would be disassembled and removed from the site on completion of the HRRP except where it was agreed with the landowners respesentative, NPC, to be retained. The site would be returned to its current condition after all remediation activities have been completed.

Temporary lighting would be installed and used for night works for the duration of the HRRP.

18.3.2 KIWEF Site

The proposed layout of the emplacement cell is shown in **Figure 4**. In summary, site infrastructure would generally include but not be confined to:

- a waste emplacement cell of approximate dimensions 800 m long and 180 to 300 m wide, with a final ridgeline height of approximately 14.5 m AHD;
- a leachate storage pond and treatment area to the south-east of the emplacement cell;
- two sediment ponds (north and south of emplacement cell);
- a temporary storage and stockpile area to the west of the emplacement cell; and
- a contractor staging area to the east of the emplacement cell.

Lighting would be installed and used for night works for the duration of the HRRP. Permanent lighting would be positioned at the entrance to the emplacement cell and along the internal access road.

18.4 Statutory Considerations

Newcastle Development Control Plan (DCP) 2005 contains provisions relating to visual amenity to be considered when assessing the visual impact of a proposal, namely Element 4.4 '*Landscaping*' and Element 7.1 '*Industrial Development*'.

Under Element 4.4 '*Landscaping:*

> *large scale development or development on prominent or ecologically sensitive sites with a high degree of visual significance and environmental impact is classified with a Landscape Category of '3'*, and
>
> *industrial development with a cost higher than $2 million is also classified with a Landscape Category of '3'*.

Developments within this category require a landscape plan for the site to be prepared in accordance with NCC's *Technical Manual*. It is expected that this requirement would form a condition of approval for the emplacement cell site in particular.

Objectives of Element 7.1 '*Industrial Development'* include to:

- Minimise the impact of industrial development, visual or otherwise through careful site planning, and
- Ensure that industrial development proposed in close proximity to residential areas does not have a materially detrimental effect on such areas.

The DCP indicates a requirement for the assessment manager (Council Officer) to consider, *inter alia*, the design and appearance of industrial development, the provision of landscaping and its effectiveness in screening the HRRP.

18.5 Potential Visual Impacts

18.5.1 Mayfield Site

As noted, the industrial area is not readily accessible, physically or visually. The potentially sensitive locations from which the site can be viewed are:

- Industrial Drive
- Mayfield residential area (Crebert Street)
- Cormorant Road, KI, and
- the Hunter River.

Industrial Drive

Existing Environment

Industrial Drive is elevated above the lower lying industrial area along the Hunter River. From the road, intermittent views into the riverside industrial area are possible. However, the former Newcastle Steelworks site is largely obstructed from view by existing stands of trees and shrubs which line the road and screen views to the north. A view looking north-east along the road (**Plate 1**) shows the dense screen of vegetation that obscures views down to the Hunter River.

Plate 1: View North-east toward the Mayfield Site from Industrial Drive near the Crebert Street intersection

It is unlikely that occupants of vehicles travelling along Industrial Drive would be able to clearly distinguish the Mayfield site in the momentary glimpses between trees and buildings that obscure views toward the area.

Pedestrians have greater opportunity to view the Mayfield site from Industrial Drive. Views toward the site are through a security fence surrounding the industrial area. Further, there are shrubs and mounds in view. Overall it is difficult to discern the Mayfield Site given its distance from the viewer.

Visual Impact

The proposal would add infrastructure (silos, roofed structures etc) to the Mayfield site. The silos, which are likely to be the highest structures at approximately 5 m high, would be below the level of existing infrastructure viewed from Industrial Drive. Over views of the HRRP would be consistent with the industrial nature of the area.

Mayfield Residential Area

Existing Environment

Residential areas are the most sensitive to visual changes. There are few residential areas from which views to the Mayfield site are possible. Only the eastern extent of Crebert Street, Mayfield, has close viewing access into the former Newcastle Steelworks area. Distant views can be gained from more elevated areas such as Merewether and The (Newcastle) Hill.

Plate 2: View toward Mayfield Site from Crebert Street

Plate 2 shows a view toward the industrial area from the nearest residential street - Crebert Street. Direct views into the Mayfield site are not possible. Trees and shrubs screen views north of Industrial Drive. As can be seen from **Plate 2**, where there are gaps in the vegetation, views to Port Waratah Coal Services (PWCS) are possible.

Visual Impact

The proposed new infrastructure at the Mayfield site is unlikely to be visible from homes in residential areas as a combination of topography, vegetation and built structures effectively screen views to the site. If views are available, the expected impact to residents is low given the existing industrial setting.

Cormorant Road

Existing Environment

The Mayfield site can be viewed from Cormorant Road on KI, some 500 m north of the site. The Hunter River separates KI from the site. A view from Cormorant Road is provided at **Plate 3**.

Plate 3: View toward Proposal Site from Cormorant Road

Vacant land separates Cormorant Road from the Hunter River. The Mayfield site is barely distinguishable from other industrial sites at this distance. Further, views from Cormorant Road to the site are transient (obtained from moving vehicles).

Visual Impact

The proposed infrastructure would be positioned relatively close to the southern bank of the Hunter River. The height of existing structures, such as the elevated Koppers pipeline, the OneSteel facility and other buildings in the background would help the Mayfield site integrate with surrounding industrial area.

Hunter River

Existing Environment

Passing views of the Mayfield site would be possible from the Hunter River. The river is used by recreational users and tourists for fishing and boating, and by those who work in the port and on ships. There are also tourist / entertainment boats that may cruise on the river which may travel near the Mayfield site.

People seeing the site from the Hunter River would have clear but transient views given that they are usually on moving craft. Their views may also be impeded by the in-river sheet pile wall, dredging activities and constructions located onshore that are related to the Stage 1A works as defined under the development consent. Views to the north and south are generally of heavy industry and port activity.

Currently there are navigation restrictions that apply to the navigable waters between the KI Coal Terminal and the KI Wind Generator due to dredging for the NCIG coal export terminal. The restrictions are currently in place until December 2008 (but are likely to be extended).

Visual Impact

The proposed structures would be in view of vessels navigating past the site on the South Arm of the Hunter River. Although river users may see some, or all of the HRRP, views are transitory. Further, the proposed views would be in keeping with the industrial context of the area.

18.5.2 KIWEF Site

The proposed emplacement cell would be more visually accessible than the Mayfield site and could be viewed from the following potentially sensitive locations:

- Tourle Street (north bound) and Cormorant Road (west bound)
- the Pacific Highway in the vicinity of Warabrook
- Mayfield and Warabrook residential areas, and
- the Hunter River.

The final ridgeline of the capped cell is expected to reach approximately 14.5 m AHD. This would be more visually prominent than the existing landfill area at the site. The most visible elements include bund walls of the cell, leachate and sediment ponds and night-time lighting.

Tourle Street / Cormorant Road

Existing Environment

Tourle Street transitions into Cormorant Road in the vicinity of the proposed access to the emplacement cell. The emplacement cell would be visible to passing north-bound traffic on the Tourle Street Bridge and passing west-bound traffic on Cormorant Road. Views of the emplacement cell would be most prominent from the existing Tourle Street Bridge (and new replacement bridge to the east which is under construction) (**Plate 4**).

Plate 4: View of the emplacement cell site looking North-west from the Tourle Street Bridge

A mature stand of planted trees (positioned centrally within **Plate 4**) are currently positioned in the south-eastern corner of the emplacement cell and assist in partly screening views of the site from the Tourle Street Bridge. This stand of trees would be removed to make way for the access road, leachate pond and the southern wall of the waste emplacement cell.

Visual Impacts

The proposal would involve significant changes to the landform of the site. The proposed removal of some of the mature stand of planted trees would open up views to the emplacement cell from the existing Tourle Street Bridge (and new Tourle Street bridge under construction) which are currently partly obscured.

The site will be viewed within the broader industrial context of KI and is unlikely to contrast significantly with surrounding land uses such as the elevated NCIG rail line to the west and north.

The Pacific Highway

Existing Environment

The Pacific Highway is Newcastle's main thoroughfare. Distant and intermittent views of the emplacement cell are achieved from the Pacific Highway in the vicinity of Warabrook (Plate 5).

Plate 5: View North-east toward the emplacement cell from the Pacific Highway at Warabrook

Occupants of vehicles travelling along the Pacific Highway may be able to distinguish the emplacement cell in the momentary glimpses between trees, houses and other buildings that obscure views towards the area. The emplacement cell is located approximately 1 km away from the Pacific Highway at its closest point and it is difficult to discern the site clearly given its distance from the viewer and the buildings in the foreground.

Visual Impact

The height of existing structures in the foreground, such as industrial sheds at the Steel River Eco Industrial Estate would help the facility integrate with surrounding industrial area.

Road users would not lose significant longer range views as a result of the emplacement cell(s).

Mayfield and Warabrook Residential Areas

Existing Environment

Residential areas are the most sensitive to visual changes. The site of the proposed emplacement cell can be viewed from elevated residential areas including Mayfield and Warabrook to the south.

Plate 6: View toward the emplacement cell from Woodstock Street, near its intersection with Bull Street, Mayfield

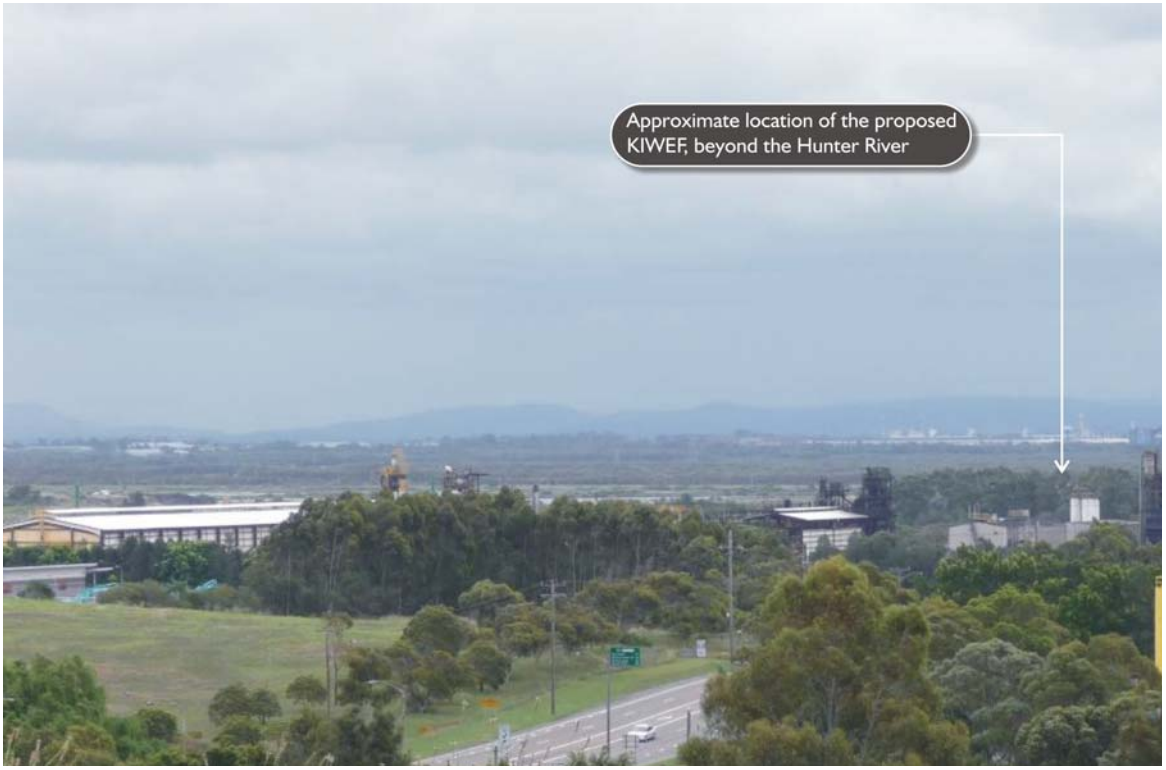

Plate 7: View toward the emplacement cell from the western end of Bull Street, Mayfield

Views from residential areas at Warabrook can be seen in **Plates 5, 6** and **7** show views toward the emplacement cell from residential areas at Mayfield.

Views of the emplacement cell from the Mayfield and Warabrook residential areas are obscured partly by infrastructure at Delta EMD's manufacturing plant, other industrial developments within the Steel River Eco Industrial Estate and vegetation screens. The Tomago Aluminium smelter can be seen in the background of **Plate 7**.

Visual Impact

Although visible from a number of residences within the areas of Mayfield and Warabrook, the proposed emplacement cell is positioned between industrial areas in the foreground and background, and integrates with the industrial nature of the broader area.

Residents would not lose significant longer range views as a result of HRRP.

Hunter River

Existing Environment

Passing views of the emplacement cell would be possible from the Hunter River. The river is used by recreational users and tourists for fishing and boating, and by those who work in the port and on ships. There are also tourist / entertainment boats cruising on the river which may travel near the emplacement cell.

Views north toward the site from the River would be of the mangrove areas that are not proposed to be impacted by HRRP. Some infrastructure such as bund walls may be seen beyond the mangroves. Views to the south side of the River would be of heavy industry associated with the Delta EMD facility.

Visual Impact

Vessels would be able to navigate close to the northern bank of the river and the proposed emplacement cell would be in view of such vessels.

Although people using the Hunter River can travel in close proximity to the proposed site, and may see some, or all of the HRRP, views are transitory. The HRRP site is part of an industrial area and in this part of the river the industrial landscape forms the visual backdrop to the river's boating and entertainment activities. The emplacement cell would be in keeping with the industrial context of the area.

A view from the south bank of the Hunter River is provided at **Plate 8**.

Plate 8: View toward the KIWEF from the south bank of the Hunter River

18.6 Environmental Safeguards

The following environmental safeguards are recommended for HRRP:

- Revegetation at the emplacement cell following final capping as appropriate; and
- Lights associated with the construction and operation of the emplacement cell should be positioned and directed so as to cause no glare or excessive light spillage onto external roads or other neighbouring land.

18.7 Conclusion

Stage 2 operations of the HRRP would be consistent with the character of the surrounding port and industrial areas.

Development of the Mayfield site would contribute additional temporary structures to this industrial environment. The height of existing structures, such as the existing elevated pipeline and industrial buildings in the broader area would help the facility integrate with the surrounding area.

The emplacement cell would result in considerable changes to the landform of the site and the necessary removal of some treed vegetation would expose the site to a greater visual audience from the south and east. However, the site is viewed within the industrial context of KI and is unlikely to contrast significantly with surrounding land uses.

No residents, road users or pedestrians are likely to lose views as a result of the activities proposed at both the Mayfield and KIWEF site.

19.0 Other Environmental Issues

19.1 Air Quality

19.1.1 Introduction

Dust generation from earthworks during the construction, and to a lesser extent the operation, of the emplacement cell are a potential source of air emissions.

Other air emissions would be limited to exhaust emissions from plant and equipment during construction and operational activities at Mayfield and KIWEF and exhaust emissions associated with the transport of treated sediments between these two sites.

A discussion of the potential issues associated with odour from the treatment and transport of contaminated sediments are summarised in **Section 10**.

19.1.2 Existing Air Environment

Air quality in Newcastle is dominated by motor vehicle emissions, but is also affected by the major industry located around the port area. Sources of air emissions include the nearby Orica and Incitec plants, the Delta EMD facility at Mayfield West, and the Tomago Aluminium smelter to the north. Additional pollutant sources include dust emissions from the coal and grain terminals, and odour from seed processing (Cargill). There are three fuel storage facilities in Newcastle: Caltex (Wickham), BP (Carrington) and Shell (Hamilton), which are located adjacent to or near to Newcastle residential areas.

The pollutants of prime concern in NSW are ozone and particulates, with levels of these pollutants approaching or exceeding the national standards prescribed in the National Environment Protection Measure for Ambient Air Quality (NEPM) on occasion. Pollutant levels in Newcastle, however, are generally acceptable, with few exceedences noted (NSW State of the Environment, 2006). The operations associated with Stage 2 operations are not expected to generate significant levels of ozone or particulates and as such have not been considered further.

Dust deposition data was analysed as part of the NCIG Coal Export Terminal – Environmental Assessment (EA) (Resource Strategies, 2006). The NCIG EA looked at dust collected at six dust collection sites at the Steel River Industrial Estate for the period from January 2003 to January 2006. The dust deposition rate over the period averaged across all sites was 1.6 g/m^2/month which was below the DECC goal of 4 g/m^2/month.

19.1.3 Sensitive Receptors

The nearest residential area is located at Mayfield with the closest residential receptors approximately 680 m from the Mayfield site boundary. The area surrounding the Mayfield Site is characterised by a mixture of port-related activities and industrial uses which are less sensitive by comparison.

The closest residential areas to the KIWEF site are located at Warabrook and Mayfield West approximately 1.2 km to the south across the South Arm of the Hunter River. The surrounding area includes old landfill activities which are nominated for industrial development in the future and the rail line to the west (existing) and north (proposed).

19.1.4 Dust Emissions

Sources

Air quality impacts related to dust generation from the HRRP would largely be result of dust generated during earthworks and other engineering activities associated with the development of the emplacement cell.

Dust emissions from the construction and operation of the Mayfield site are not expected to be significant because the Mayfield site is fully sealed and the sediments would be wet to moist and unlikely to generate dust emissions. The transport and delivery of treated sediments to the emplacement cell also have the potential to generate dust although the material will have an inherent moisture and truck loads will be covered.

Consent conditions

The control requirements to mitigate dust emissions are outlined in the development consent and EPL No 1708. These conditions are outlined in **Table 23** below.

Table 23: Development Consent and EPL Conditions Relating to Dust

Condition	Description
DA-134-3-2003-i	
B2.10 & C2.4	All activities shall be undertaken in a manner that minimises or prevents dust emissions from the site, including wind-blown and traffic-generated dust. All activities undertaken on the site shall be undertaken with the objective of preventing visible emissions of dust from the site. Should such visible dust emissions occur at any time, all practicable dust mitigation measures, including cessation of relevant works, as appropriate, shall be identified and implemented such that emissions of visible dust cease.
B2.11 & C2.5	All trafficable and vehicle manoeuvring areas shall be maintained at all times in a condition that minimises the generation and emission of dust.
B2.12 & C2.6	All vehicles entering, leaving or on the site and carrying a load, which has the potential to generate dust, must be covered or otherwise enclosed at all times to minimise the generation.
EPL No 1708	
O3.1	All operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.
O3.2	All trafficable areas and vehicle manoeuvring areas in or on the premises must be maintained, at all times, in a condition that will minimise the generation, or emission from the premises, of windblown or traffic generated dust.

Although these conditions were originally designed to address potential dust emissions from dredging and remediation activities at the Mayfield site they could equally be applied to proposed activities associated with the emplacement cell at KIWEF.

Potential Impacts

The main potential dust impacts are likely to arise from:

- Construction of the emplacement cell at KIWEF
- Vehicles travelling on unsealed access roads at KIWEF

Dust emissions at KIWEF could impact on site workers, local flora and fauna, motorists on nearby roads and surrounding industrial uses. The distance to the closest residential areas to the south means that these properties are unlikely to be affected.

The Mayfield site is sealed with a bitumen/asphalt surface and the excavated and treated sediment will contain a reasonable moisture content. These characteristics mean that the potential dust impacts associated with remediation activities at Mayfield are likely to be limited.

Environmental Safeguards

The management of dust emissions generated by the Stage 2 activities would be addressed as part of the Remediation Environmental Management Plan (refer Condition C4.4 of development consent). Management responses would be designed to minimise the potential for dust emissions arising from construction or remediation activities particularly in times of high wind and dry conditions and would include:

- Construction traffic would be restricted to defined and properly formed access roads wherever possible and speed limits would be controlled;
- Watering of exposed surfaces and stockpile areas as required in dry and windy conditions;
- Vehicle wheels would cleaned prior to trucks exiting the sites at Mayfield or KIWEF to minimise any impact on public roads;
- Vegetate, where feasible and appropriate, perimeter bund walls, cell capping, and other exposed areas resulting from new disturbance at KIWEF;
- All trucks carrying loads on either site or between the two sites will be sealed and/or lined and covered to prevent the potential escape of material; and
- Maintain internal site access roads to minimise deterioration and damage over time. It is noted that all internal access roads at Mayfield and the main internal access road at KIWEF will be sealed.

In the event of complaints related to any potential dust emissions, BHPB will coordinate an immediate investigation in accordance with the (to-be-approved) Complaint Handling and Response Protocol for Stage 2 activities.

19.1.5 Other Air Emissions

Sources

Air emissions resulting from the HRRP would be limited to exhaust emissions from plant and equipment during construction and operation at both Mayfield and KIWEF sites and transport of treated sediments between Mayfield and KIWEF.

Other Remediation Options

The EIS prepared for the Proposed Extension of Shipping Channels, Port of Newcastle (GHD, 2003) considered a number of potential options for the treatment of contaminated materials including cement stabilisation and thermal desorption.

One of the reasons for not preferring the thermal desorption option was the significant potential for air emissions associated with this process. Cement stabilisation offers improved outcomes with regard to air emissions by comparison to thermal desorption.

Environmental Safeguards

Exhaust emissions from construction and operation plant and equipment and the fleet of trucks that are to be used for the transportation of treated sediments can be managed by a schedule of regular maintenance to ensure the trucks and machinery are running at optimal performance.

19.1.6 Greenhouse Gas Emissions

The methods for calculating emissions are detailed in the *National Greenhouse and Energy Reporting (Measurement) Determination 2008* and the *National Greenhouse and Energy Reporting (Measurement) Technical Guidelines 2008.* The *Technical Guidelines* and have been designed to support reporting under the *National Greenhouse and Energy Reporting Act 2007*.

The greenhouse gases covered by these Guidelines are defined in the Regulations and include:

- carbon dioxide
- methane
- nitrous oxide
- specified hydrofluorocarbons
- specified perfluorocarbons, and
- sulphur hexafluoride.

Emissions are defined in the Regulations as the release of greenhouse gas into the atmosphere. Reportable emissions are defined as:

- Scope 1 emissions which are released from a facility as a direct result of the activities undertaken
- Scope 2 emissions are a form of indirect emission arising from the generation of electricity which may be used to power the facility.

Greenhouse gas emissions for Stage 2 the HRRP have not been calculated due to many unknown variables such as the construction methods chosen, the age type and numbers of construction equipment to be used and the success of remediation operation chosen. This information would not be available until such time as contractors have been appointed to the project. However, given the short-term nature of the activity, the emissions to air from equipment operation are not anticipated to be material.

Regardless, procedures would be implemented to ensure energy consuming plant, equipment and facilities are operating efficiently. Minimising the use of electricity and other utilities would also be encouraged.

Diesel and electricity consumption will be monitored and reported by BHPB in accordance with its own environmental reporting requirements and those of relevant legislation. In addition, greenhouse gas emissions will be continually assessed and reported as part of this process, on at least a six monthly basis.

19.1.7 Cumulative Impacts

The cumulative air quality impacts primarily relate to the construction activities associated with the NCIG coal export terminal and associated rail infrastructure. Information in relation to the NCIG air quality impacts have been considered as part of the NCIG EIA document (Resource Strategies, 2006).

Emissions associated with the operation of the NCIG coal export terminal would primarily be from coal dust emissions. Incremental increases in annual average dust deposition due to the NCIG Project were not predicted to be above the applicable DECC amenity criterion at any identified receiver. Annual average dust deposition due to the NCIG project plus background was not predicted to be above the applicable DECC amenity criterion at any identified receiver.

The air quality impacts during the NCIG construction were considered to be less significant than during operations. Water sprays and other standard dust control measures typically used at construction sites would be used to control dust emissions during construction.

Operation of the coal export terminal would be unlikely to occur until after the construction of the emplacement cell at KIWEF has been completed (August 2009). As a result the cumulative dust emissions would not be significant as the key dust generating activities of the two projects would not be occurring concurrently.

19.1.8 Conclusion

Potential dust impacts associated with Stage 2 of the HRRP are likely to be generated during earthworks and construction of the emplacement cell at KIWEF and to a lesser extent during the operation of the emplacement cell.

Given the sealed surface at Mayfield and the moisture content of the sediments dust emissions are unlikely to be a significant issue at Mayfield. Transport of sediment is also unlikely to be a significant generator of dust emissions given that the haulage route is sealed and all trucks will be covered.

Standard dust control measures would be implemented as required during Stage 2 works including regular watering of exposed areas, control of vehicle movements and vegetating exposed surfaces where appropriate. It is expected these standard control measures would effectively manage any adverse impacts.

Emissions from plant used for construction of the emplacement cell and operation of the remediation works including transport would not be significant. These emissions could be contained through a regime of regular maintenance.

Finally, it is considered that the cumulative air quality relating to the NCIG coal export terminal will be short term and not significant.

19.2 Lighting

19.2.1 Existing Environment

Numerous light emitting sources exist in the local and regional settings including fixed lighting associated with industrial developments, street lighting, lights associated with traffic on the road network and ship and rail movements in the area of the port.

At the Mayfield site permanent street lighting is provided on Selwyn Street and David Baker Road. Permanent lighting is also present at the contractors office with the remainder of the Site not currently lit. The area surrounding the Mayfield site is generally well lit as a consequence of the existing industrial facilities (e.g. OneSteel and the existing Carrington Coal Export Terminal) which operate 24 hours per day.

At KIWEF there is currently no lighting on site or for the surrounding streets and intersections such as on Cormorant Road.

19.2.2 Proposed Lighting

As the HRRP is proposed to operate on a 24 hour basis, seven days per week, night lighting would be required to ensure that the safety and security of operations is not compromised. All lighting would be powered from the existing electricity mains or by diesel generators and would comply with Australian Standards, WorkCover and legislative requirements.

Lighting sources used at both sites can be categorised as follows:

- flood lighting required to illuminate areas of each site to carry out the various remediation works and to enable traffic movement around the site;
- lighting for equipment such as conveyors, trucks, bulldozers and compactors; and
- lighting for security reasons.

At the Mayfield site, lighting would be constructed as part of the site preparation works to enable 24 hour operation. Lights would be provided at the office, weigh station, loading areas, sediment receiving, storage and treatment areas. Lights would also be provided along the Koppers pipeline and all internal roads and around the site perimeter. Temporary lighting would also be provided along the internal access roads within the Mayfield site as required.

The intersection of the KIWEF access road and Cormorant Road would require either permanent or temporary street lighting for vehicle safety. The proposed internal site access which will run to the south of the emplacement cell would also be provided with street lighting and lighting would also be extended to the contractors staging area (to the east) and the stockpile/storage area (to the west).

Mobile lighting towers would be used throughout both sites and particularly to illuminate the emplacement cell. These lights would be moveable temporary tilt top towers.

Vehicles and machinery would operate on both sites 24 hours per day, seven days per week and there would also be lighting associated with these vehicle movements.

19.2.3 Potential Lighting Impacts

The facilities at Mayfield and KIWEF will be operating 24 hours per day and as a result the potential lighting impacts could include:

- Potential lighting impacts from the Mayfield site operations on the nearest residential properties albeit that these properties are some 680 m to the south across Industrial Drive;
- Potential lighting impacts from the KIWEF site operations on the nearest residential properties albeit that these properties are some 1.2 km to the south across the South Arm of the Hunter River;
- Potential lighting impacts from trucks carrying out the haulage of sediment between the two sites on residential properties adjoining the Industrial Drive section of the haulage route; and
- Potential lighting impacts from the KIWEF site operations on fauna species, particularly the GGBF populations which inhabit the adjoining wetland areas.

In considering the potential lighting impacts it is important to have regard to the context of the surrounding port and industrial development and the 24 hour activity and lighting that is associated with these developments.

19.2.4 Environmental Safeguards

The following environmental safeguards are proposed to minimise the potential impacts from lighting associated with the Stage 2 works:

- A management framework to mitigate lighting impacts would be prepared for the construction and operational phases of the project. The objective of the Plan would be to ensure that obtrusive effects of lighting beyond the site are minimised while providing adequate lighting on site to maintain the operational safety of personnel;
- The potential impact of lighting on areas of fauna habitat adjoining the KIWEF site would be minimised by careful selection of lighting locations, ensuring lighting is directed away from such areas (eg. frog ponds), and the installation of screens, louvers, shields or equivalent controls where necessary to shield light and safe to do so; and
- Lighting would be placed only in areas where it is required and positioned or directed to shine within the site and to limit the spill of light external to the site.

19.2.5 Conclusion

Lighting at both the Mayfield and KIWEF sites is required in order to safely undertake remediation activities 24 hours per day, seven days per week. This would be a combination of permanent and temporary lighting of site areas, access roads, intersections etc.

The Mayfield and KIWEF sites are located in the context of surrounding port and industrial development and the 24 hour activity and lighting that is associated with these developments. The closest residential areas are some distance away from both sites.

The potential impacts associated with the HRRP would be addressed by the preparation of a management framework for the construction and operational phases of the project. Provided this framework and other recommended mitigation measures are adhered to, the impacts on local residents, passing motorists and nearby fauna species are expected to be minimal.

19.3 Climate Change

19.3.1 Introduction

Summers in the Hunter Region are relatively hot, with average maximum January temperatures of approximately 29–32°C. Winters are mild, with average maximum July temperatures of 17–18°C. Annual rainfall varies across the Hunter Region with about 650 mm/year. Peak precipitation occurs between January and March, however the variability in rainfall from one year to the next is high.

In a recent report (CSIRO, 2004) released on behalf of the NSW Government found that between 1950–2003, NSW became 0.9°C warmer, with more hot days/nights and fewer cold days/nights. Annual total rainfall reduced by an average of 14 mm per decade, with the largest declines in rainfall near the coast since the mid-1970s. Extreme daily rainfall intensity and frequency have also decreased throughout much of NSW.

19.3.2 Sea Level Rise

The area of Newcastle where the Mayfield Site is located is at an elevation of approximately 2 – 4 meters Australian Height Datum (AHD). The western area of KI is generally at an elevation of approximately 4 – 8 meters according to the Digital Elevation Model (DEM) of Newcastle LGA (NSW DoP, 2008).

Whilst the extent and rate of climate change occurring on the east coast of Australia is a matter of some debate, however there currently appears to be a technical consensus that the climate is now changing at an increasing rate. Consequently, the coastal zone will experience the most direct physical impacts of climate change and significant sea level rise (SLR) is anticipated along the east coast of Australia.

An authoritative and recent report on climate change (IPCC, 2007) predicts a global average SLR of between 0.2 and 0.8 m by 2100, compared with the 1980 levels. In addition to SLR, climate change is also likely to result in changes in wave heights and direction, coastal wind strengths and rainfall intensity. Mean relative SLR (including land movement) around Australia of about 1.2mm/year was recorded over the period 1920 to 2000. The frequency of extreme sea-level events, reaching 2.1 or 2.2 m, has more than doubled in Sydney since 1950 (CSIRO, 2004).

For Newcastle, climate change SLR and an increased frequency and intensity of storms has the potential to impact virtually all aspects of occupation of the low lying coastal areas (NSW DoP, 2008) including:

- Loss of sandy beaches, especially where they are backed by seawalls
- Increased flood levels in the tidal reaches of estuaries by approximately the amount of sea level rise, this will be especially significant around coastal lakes and lagoons
- Changed estuarine tidal regimes (flows and elevation)
- Problems with local drainage in the lower estuaries and adjacent to beaches where falls are currently small, potentially exacerbating nuisance storm flooding (increased frequency and water depths)
- Reduction in under bridge clearances, and
- Landward migration of mangroves and salt marshes in areas of no development and, where development restricts migration, potential loss of threatened and endangered species.

The potential for the HRRP to be affected by direct wave action is low considering the Mayfield and KIWEF sites are located approximately 4.5 km and 8 km respectively from where the Hunter River meets the sea. Nevertheless, storm surge in association with the anticipated SLR may potentially impact the Mayfield and KIWEF sites. If such an event were to occur, many developments along the Hunter River, including the KIWEF and more particularly the Mayfield site could be impacted.

19.3.3 Temperature Increase

Since 1950, the Hunter Region has experienced warming of around 1.3ºC. It is likely that this increase is partly due to human activities. The CSIRO (2007) has indicated that average Hunter Region temperatures are set to increase by 0.2 to 1.6°C by 2030 and by 0.7 to 4.8°C by 2070. The report stated that the number of extremely hot days (above 35°C could almost double by 2030 and there could be approximately 4½ more days on average above 35°C by 2070 (up to 78). The report also suggested that the number of days below zero could significantly drop from current levels.

19.3.4 Water Availability

Rainfall along the Hunter coast has declined by around 50 mm per decade since the 1950's. The contribution of human activities to the rainfall decline is hard to distinguish from natural variability. Although projected changes in average rainfall are currently not clear, given projected increases in evaporation, the Region is likely to be drier. Despite this trend toward drier conditions, there is also potential for seasonal increases in extreme rainfall events.

Changes in rainfall and higher evaporation rates are likely to lead to less water for streams and rivers in the Hunter-Central Rivers Catchment, which would have downstream consequences for water storages and would place strain on the available water resources. For example, due to recent trends toward reduced rainfall, as of August 2006, the Glenbawn Dam on the Hunter River and the Glennies Creek Dam were at only 38% of capacity. However, the Lostock Dam on the Paterson River was 90% full (CSIRO, 2007).

The CSIRO (2007) have indicated that the projected rain fall for the Hunter Region on average may possibly change by -7% to +7% by 2030 and by -20% to +20% by 2070. However, evaporation rates are expected to increase as the expected average temperatures increase with maximum evaporation rates as high a +40% on current levels are possible by 2070.

19.3.5 Potential Impacts

The current likelihood of any of the above events occurring is quite low, particularly having regard to the limited timeframe of the Stage 2 works which is scheduled for completion in 2010/11.

Sediment storage and treatment areas and contaminated water holding ponds on the Mayfield site will all be bunded. On the KIWEF site the bunds of the emplacement cell, sediment and leachate ponds will also be well setback from and elevated above the river level. The cell(s) will also be lined on all sides and stood above the highest aquifer. On this basis, no adverse impacts are anticipated.

19.4 Waste Management

19.4.1 Introduction

This section identifies the various waste sources that would be generated by the HRRP, and recommends environmental safeguards that would minimise the potential impacts related to waste management. Waste generated throughout the HRRP would primarily consist of general construction wastes, potentially contaminated waste water, and waste materials generated during the decommissioning phases of both the Mayfield and KIWEF sites.

19.4.2 Potential Waste Management Impacts

Sources of waste that may be generated during construction and operation of the HRRP include:

- Cleared vegetation waste;
- Surplus construction waste such as scrap metal, concrete, timber, soil;
- Basic plant and equipment maintenance wastes, including waste oil, used batteries, etc;
- Domestic waste from construction and operation staff; and
- Packaging wastes, including plastics, timber pallets, and metal wires.

There is potential for contaminated waste water to be generated throughout the HRRP from a variety of sources, including free water decanted from the material barges, contaminated water that drains from stockpiles, truck wash water, and stormwater that falls within the sediment receiving areas. Contaminated water holding ponds and a water treatment plant would be provided at the Mayfield site to manage this issue.

Potentially contaminated water on the KIWEF site would be diverted into the leachate collection system, where (if necessary) it would undergo treatment to enable discharge into the Hunter River (refer **Section 14**).

Waste material would also be generated during the decommissioning process at both the Mayfield and KIWEF sites. Temporary structures would be removed, and wherever possible materials would be decontaminated and recycled or appropriately disposed of off-site.

Mayfield Site

All the proposed facilities for the Mayfield site would be designed to be disassembled and removed from the site at the completion of the remediation activities unless otherwise agreed with the landowner. The waste material would be decontaminated and inspected before leaving the site. Where practicable, materials would be recycled or reused. Contaminated materials would either be decontaminated or disposed of at an appropriately licensed waste facility.

KIWEF Site

Temporary structures would be dismantled and removed after the emplacement cell has been capped unless otherwise agreed with the landowner. These include all the facilities associated with the contractor staging area, the leachate pond (being replaced by a contained tank system) and the western contractor's storage area. The landfill facility containing the treated sediments would remain in place in perpetuity.

19.4.3 Environmental Safeguards

A management approach to deal responsibly with the different types of waste to be generated would be prepared and implemented as part of the CEMP for the HRRP. This Plan would be developed in accordance with the principles of the *Waste Avoidance and Resource Recovery Act 2001*, which encourages efficient use of resources, avoidance of unnecessary resource consumption, and resource recovery (reuse or recycling).

Waste classification of potentially contaminated waste materials would be undertaken as required, in accordance with the DECC's *Waste Classification Guidelines (2008)*.

All earthworks and handling of excavated materials, including potentially contaminated materials, would be managed in accordance with the EMMP to be prepared.

19.4.4 Conclusion

A management approach would be implemented to minimise the potential impacts to the community and environment as a result of waste generated from Stage 2 activities. Where possible, waste materials would be reused or recycled. Contaminated waste material would be transported and disposed off-site by licensed contractors.

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20.0 Cumulative Impact

Cumulative impacts on the environment can result from a combination of a number of different elements within a project as well as from other projects operating within the same general locality.

20.1 Cumulative Impacts from Stage 2 of HRRP

As part of the completion of Stage 2 activities, there are examples where a number of discrete environmental impacts, when combined and not managed, have the potential to generate a greater level of impact. For example, noise, lighting, water quality and habitat disturbance impacts have the potential when combined to cause more significant impacts on the threatened species ecology at KIWEF than in isolation, particularly if not carefully managed.

The proposed cumulative impacts from the Stage 2 works have been discussed in each of the Sections of this report which relate to individual environmental issues. The potential cumulative impacts associated with the various elements of the Stage 2 works are considered to be acceptable and manageable based upon the control measures described within this document and/or to be determined in the preparation of subsequent Environmental Management Plans required by the development consent. The timeframe of the project will confine any impacts to the temporary duration of works.

20.2 Cumulative Impacts with Other Projects

Cumulative impacts must also take into account other major projects planned in the local area. Given the limited timeframe of the Stage 2 works the other major projects that were considered were limited to projects already operating or in construction, and projects approved and expected to start construction or operation within a similar timeframe.

The other major projects that were considered include:

- the current dredging of the shipping channel in the South Arm by NCIG. Main potential cumulative environmental impacts include noise, odour, river water quality; and
- the new NCIG coal export facility including the new rail spur adjoining the north boundary of the KIWEF site (currently under construction). Main potential cumulative environmental impacts include noise, traffic, ecological, surface water, soil and groundwater contamination and visual.

A number of projects were excluded from the cumulative impact assessment primarily because they will not proceed within the same timeframe as the proposed Stage 2 works. These projects include:

- The Intertrade Industrial Park which is a 150 hectare intermodal gateway site offering opportunities for port, logistics, distribution services and general industrial and commercial development. The project is identified to occur on the former BHP Steelworks site, however, it is currently understood that substantial works will not proceed until such time as the river and Stage 2 land based remediation activities at Mayfield are completed and the site has been vacated; and
- The KIWEF site is identified to accommodate future industrial development consistent with its nominated zoning under the Newcastle LEP. However, this development will not occur until such time as the emplacement operations have been completed, the cell has been capped and other site infrastructure decommissioned.

The detailed technical assessments contained in this EA report discuss the potential cumulative impacts associated with these projects. In summary the cumulative impacts are considered to be acceptable and manageable based on:

- The current mitigation measures proposed for Stage 2 activities reducing contribution from the HRRP and those understood as mandatory for neighbouring operations, including NCIG;
- The limited overlapping timeframes of each project will result in any potential cumulative impacts being of a limited duration;
- Protocols BHPB has in place with neighbouring operations, including NCIG, in the event of public enquiries or complaints, regarding an amenity or other environmental issue that may be attributed to cumulative impacts; and
- The significant net environmental and economic benefits which will flow from these projects to the local Newcastle community and the broader region.

21.0 Environmental Management and Monitoring

21.1 Existing Development Consent

The development consent contains a number of specific conditions which provide a management framework for mitigation, monitoring and reporting of potential environmental impacts associated with the Stage 2 remediation activities. These conditions are detailed in Part A and more particularly Part C of the development consent.

These development conditions will be satisfied in the implementation of the State 2 remediation activities.

21.2 Proposed Environmental Safeguards

Table 24 below includes a summary of the main environmental safeguards identified within this document that are to be implemented during the construction and operation of the Stage 2 remediation activities.

Note that some environmental safeguards identified relate only to a particular activity (e.g. road haulage or treatment) or location (e.g. KIWEF or Mayfield), while in other cases the mitigation measures may apply to all works.

Table 24: Summary of Environmental Safeguards

Issue	Safeguard
Ecology (KIWEF)	• Commitment to the DECC Framework for the Management of the GGBF at Kooragang Island; • GGBF management plan will be prepared prior to the commencement of works; • Where feasible, the clearing works would attempt to avoid the spring and summer seasons to minimise the disturbance to the potential breeding habitat of the GGBF and other relevant species; • A pre-clearing inspection will be undertaken by a suitably qualified ecologist in the week prior to the commencement of construction works, including searches for evidence of breeding or nests of threatened species; • Frog exclusion fencing will be installed, monitored and maintained to minimise the potential for frog mortality during construction; • Appropriate erosion and sediment control measures are to be established and maintained prior to, during and subsequent to construction works to minimise the potential for impacts on water quality within the adjoining ponds/wetland areas; • Where practically feasible, all vehicle and machinery movements on site should be restricted to defined roads, tracks and working areas; • The DEC Hygiene Protocol for the Control of Disease in Frogs will be applied during all works on and near the site; • Training will be held for all relevant personnel to ensure they are aware of the sensitive nature of the site and proposed GGBF mitigation measures;

Issue	Safeguard
	• Lighting, noise and vibration will be kept to a minimum during nocturnal hours and screens or equivalent controls used to contain potential light spill onto adjacent wetland areas and equipment will be maintained in a proper and efficient manner; and • Regular monitoring of surface water and groundwater at and immediately adjacent to the emplacement cell should be undertaken so that any significant fluctuation in contamination can be detected, investigated and actioned if required.
Odour	• The treat and haul approach and the 24/7 operation which is proposed will ensure that the sediment is dredged, treated, transported and emplaced at KIWEF in the most efficient timeframe possible thereby minimising the area required for stockpiling of sediment and the associated potential odour emissions at the Mayfield site; • Odour sampling and modelling will be undertaken during the SOS to determine whether there are likely to be odour impacts during the remediation activities and whether odour control measures are required; • An Odour Management Plan will be prepared which outlines measures to minimise odour impacts associated with the Stage 2 remediation activities; and • If necessary, a range of potential odour control measures are available including enclosures and/or covers for stockpile areas, covers for transport trucks, use of foam on stockpile areas and ventilation/extraction of foul air from plant/equipment associated with the sediment treatment process.
Noise	• A noise monitoring program will be undertaken to ensure that remediation activities and associated works comply with the maximum noise limits specified in the development consent (Condition C2.17). • Haul trucks and operating plant and equipment at the KIWEF and Mayfield sites will be maintained in a proper and efficient manner; and • Noise complaints will be managed in accordance with the Complaints Handling and Response Protocol for the Stage 2 works.
Traffic and Transportation	• Transport trucks will be sealed (or lined) and covered to ensure treated sediments are well contained during transit; • All drivers will undergo appropriate training in spill and emergency response procedures prior to the commencement of haulage operations; • A truck and dog transport option (32 tonne) will be preferred so that the overall number of truck movements are minimised; • Where necessary for safety, appropriate lighting will be installed, including at the new intersection off Cormorant Road for access to KIWEF; and

Issue	Safeguard
	• In accordance with Conditions C2.19 of the development consent, a Treated Material Transport Strategy will be prepared in consultation with Newcastle City Council and to the satisfaction of RTA identifying the controls to be applied during the transport of treated sediment between Mayfield and KIWEF (and/or transport to other alternate disposal sites lawfully able to accept the treated waste).
Soils, Geology and Geotechnical (KIWEF)	• An Excavated Materials Management Plan (EMMP) will be prepared to manage the excavation of potentially gross contaminated material during construction of the emplacement cell(s); and • The emplacement cell has been designed to accommodate future industrial development at the site in accordance with the requirements of the landowner.
Surface Water	• Preparation of a stormwater management plan for each of the Mayfield and KIWEF sites to demonstrate how clean and contaminated water will be managed during the construction and operation phases at each site including management of erosion and sedimentation; • Stormwater management at Mayfield will be via the existing drainage network comprising pits, pipes and outlet structures before discharging to the Hunter River; • Contaminated water at Mayfield would be pumped to contaminated water ponds before being treated at a water treatment plant to meet agreed DECC standards before discharge to the Hunter River and/or licensed disposal off-site; • Temporary storage of untreated or treated sediments at Mayfield will occur in areas that consist of concrete pads with side walls and a watertight HDPE liner designed to hold wet sediment and contain run-off; • Stormwater management at KIWEF would include bund walls, open drains, sediment ponds (north and south), erosion control blankets and silt fencing along the north and north east side of the cell, and discharge points to the Hunter River; • Leachate management at KIWEF would include a drainage layer and network of pipes, collection pumps, storage pond/tank storage, treatment area and discharge point to the Hunter River; • A vehicle wheel wash area will be provided at Mayfield and KIWEF to prevent tracking of potentially contaminated material outside of each site; • The treat and haul approach and the 24/7 operation which is proposed will ensure that the sediment is dredged, treated, transported and emplaced at KIWEF in the most efficient timeframe possible thereby minimising the area required for stockpiling of sediment and the associated volume of supernatant and run-off water at the Mayfield site that require treatment and management;

Issue	Safeguard
	• Regular monitoring will be undertaken of water quality in the sediment ponds, adjoining pond system, leachate/contaminated water ponds and prior to discharge from both Mayfield and KIWEF sites; • Refuelling and maintenance of plant and vehicles will be undertaken in designated areas which are sealed and bunded and spill kits are available.
Groundwater (KIWEF)	• The base of the emplacement cell will be no less than 1.5 metres above the highest recorded groundwater level at the site as per DECC requirements to allow for settlement. • The leachate collection system will collect leachate from the base of the emplacement cell and pump it to a leachate pond or storage tank for treatment and disposal. • An Excavated Materials Management Plan (EMMP) will be prepared to manage the excavation of potentially gross contaminated material during construction of the emplacement cell. • Periodic groundwater monitoring will be undertaken at the KIWEF site to gauge any potential impacts to groundwater as a result of the construction and operation of the emplacement cell.
Infrastructure and Resources	• Appropriate measures will be undertaken to protect and avoid adverse impacts on critical infrastructure within and immediately adjacent to both sites; • The existing remediation cap at the Mayfield site will be suitably protected in the design and construction of any new works with the surface restored to its original condition where any unintentional impacts are caused; and • Where possible infrastructure constructed for Stage 2 should be retained to service the future development at both sites where landowner consent is provided (e.g. internal roads, intersections, lighting, drainage and sediment ponds).
Aboriginal Heritage (KIWEF)	• In the event that any Aboriginal objects are located at KIWEF during construction of the emplacement cell and associated infrastructure then work should cease and DECC and the local Aboriginal community should be informed immediately prior to works at that location proceeding. • Relevant personnel will be suitably trained in this protocol.
Visual and Lighting (KIWEF)	• Lights associated with the construction and operation of the emplacement cell will be positioned and directed to minimise excessive light spillage onto external roads, neighbouring lands or adjacent wetland habitat.
Air Quality (dust)	• A range of dust management (suppression) measures will be implemented at the Mayfield and KIWEF sites during construction and operation, including watering roads as required to minimise visible dust levels and confining vehicle movements to established roads as much as practically possible.

Issue	Safeguard
Waste Management	• Wastes will be suitable classified in accordance with DECC's Waste Classification Guidelines (2008); • Wastes will be segregated where feasible to maximise recycling and re-use opportunities; • Training will be undertaken to encourage proper waste disposal behaviours.

21.3 General Environmental Management

Environmental management practices will be an integral component of the construction and operation of Stage 2 works. A suite of Environmental Management Plans are either required by the development consent or are proposed as additional to incorporate the safeguards that are listed in **Section 21** and more broadly within this document.

It is proposed that environmental management during the completion of Stage 2 works will be based around the following structure:

- An overarching Environmental Management Plan which will apply to both the Mayfield and KIWEF sites and to both the construction and operational phases of the project. In the development consent (refer Condition C4.4), this plan is referred to as the Remediation Environmental Management Plan (REMP); and
- A series of sub-plans describing the management of specific issues such as odour, ecology, excavated materials, stormwater and treated material transportation.

21.4 Environmental Monitoring

Regular monitoring of issues such as odour, noise, surface water and groundwater quality is proposed during the completion of Stage 2 works to ensure that agreed benchmarks are complied with and that any non-compliances are identified, investigated and actioned as necessary.

The frequency of monitoring, the monitoring parameters and appropriate benchmarks or trigger levels to be adopted will be detailed in the relevant Environmental Management Plans and, where appropriate, would be determined in consultation with regulatory authorities such as DECC.

The proposed monitoring regime is summarised in **Table 25** below.

Table 25: Environmental Monitoring

Issue	Requirement	Site
Surface Water	Surface water quality would be regularly monitored in the following areas: • Contaminated water holding ponds (Mayfield) • Water treatment plant prior to discharge (Mayfield) • within the Hunter River at or near discharge locations as required by DECC (both sites) • Sediment ponds and leachate pond (KIWEF) • Leachate treatment area prior to discharge (KIWEF) • Existing ponds/wetland areas adjacent to emplacement cell (KIWEF)	Mayfield and KIWEF
Groundwater	Groundwater quality would be regularly monitored on a rotational basis from the groundwater wells located up-gradient, across-gradient, and down-gradient of the emplacement cell.	KIWEF
Odour	The odour monitoring requirements for full scale operations will be determined upon completion of the SOS odour monitoring trials and documented in the Odour Management Plan to be approved by the DoP (as part of the REMP); Odour monitoring would largely focus on the Mayfield site as odour issues are more likely to occur in relation to dredged and untreated sediment and the closest residential receivers are within 680 metres of the site boundary.	Mayfield and KIWEF
Dust	Regular monitoring of visible dust levels would occur during periods of hot and/or windy weather conditions. Monitoring would largely focus on the KIWEF site during construction and operation of the emplacement cell as the majority of the Mayfield site is a fully sealed surface. Monitoring would occur in response to specific complaints regarding dust emissions.	Mayfield and KIWEF
Noise	Regular noise monitoring would be undertaken to ensure that noise emissions from remediation activities meet the maximum allowable noise contributions detailed in Condition C2.17 of the development consent.	Mayfield and KIWEF

22.0 Residual Risk Analysis

22.1 Approach

The Residual Environmental Risk Analysis for the proposed Project is based on a process adapted from Australian Standard AS 4369:1999 Risk Management, as well as environmental risk tools developed by other organisations. The process is qualitative and is based on the Residual Risk Matrix shown in **Table 25**.

Residual Environmental Risk is assessed on the basis of the significance of environmental effects of the proposed project and the ability to confidently manage those effects to minimise harm to the environment.

The significance of environmental effects is given a numerical value between 1 and 5 based on the receiving environment, the level of understanding of the type and extent of impacts and community response to the environmental consequences of the project. This enables both the actual and perceived impacts to be considered. The manageability of environmental effects is similarly given a numerical value between 1 and 5 based on the complexity of mitigation measures, the known level of performance of the safeguards proposed and the opportunity for adaptive management. The numerical value allocated for each issue is based upon the following considerations:

Significance of Effects

5. *Extreme*

   Undisturbed receiving environment; type or extent of impacts unknown; substantial community concern.

4. *High*

   Sensitive receiving environment; type or extent of impacts not well understood; high level of community concern.

3. *Moderate*

   Residual receiving environment; type and extent of impacts understood; community interest.

2. *Minor*

   Disturbed receiving environment; type and extent of impacts well understood; some local community interest.

1. *Low*

   Degraded receiving environment; type and extent of impacts fully understood; uncontroversial project.

Manageability of Effects

5. *Complex*

   Complicated array of mitigation measures required; safeguards or technology are unproven; adaptive management inappropriate.

4. *Substantial*

   Significant mix of mitigation measures required; limited evidence of effectiveness of safeguards; adaptive management feasible.

3. *Straightforward*

   Straightforward range of mitigation measures required; past performance of safeguards is understood; adaptive management easily applied.

2. *Standard*

   Simple suite of mitigation measures required; substantial track record of effectiveness of safeguards; adaptive management unlikely to be required.

1. *Minimal*

   Little or no mitigation measures required; safeguards are standard practice; adaptive management not required,

The numbers are added together to provide a result which provides a ranking of potential residual effects of the project when the safeguards identified in this EA are implemented.

Table 26: Residual Risk Matrix

Significance of Effects	Manageability of Effects				
	5 Complex	4 Substantial	3 Straightforward	2 Standard	1 Minimal
1 Low	6 (Medium)	5 (Low/Medium)	4 (Low/Medium)	3 (Low)	2 (Low)
2 Minor	7 (High/Medium)	6 (Medium)	5 (Low/Medium)	4 (Low/Medium)	3 (Low)
3 Moderate	8 (High/Medium)	7 (High/Medium)	6 (Medium)	5 (Low/Medium)	4 (Low/Medium)
4 High	9 (High)	8 (High/Medium)	7 (High/Medium)	6 (Medium)	5 (Low/Medium)
5 Extreme	10 (High)	9 (High)	8 (High/Medium)	7 (High/Medium)	6 (Medium)

22.2 Analysis

The analysis of residual environmental risk for issues related to the proposed Project is shown in **Table 27.** This analysis indicates the environmental risk profile for the proposed Project based on the assessment of environmental effects, the identification of appropriate safeguards, and the SoC included in this EA.

Table 27: Residual Risk Profile for Project

Issue	Significance	Manageability	Residual Risk
Ecology at KIWEF	2	4	**6 (Medium)**
Odour	2	3	**5 (Low/Medium)**
Noise	3	2	**5 (Low/Medium)**
Traffic and Transportation	2	2	**4 (Low/Medium)**
Soils, Geology and Geotechnical	1	2	**3 (Low)**
Surface Water	2	2	**4 (Low/Medium)**
Groundwater at KIWEF	2	2	**4 (Low/Medium)**
Infrastructure and Resources	1	2	**3 (Low)**
Aboriginal Heritage at KIWEF	1	1	**2 (Low)**
Visual	2	1	**3 (Low)**
Dust	2	1	**3 (Low)**
Lighting	1	2	**3 (Low)**
Climate Change	2	1	**3 (Low)**
Waste Management	1	2	**3 (Low)**

The above residual risk analysis indicates that Stage 2 of the HRRP presents an overall low/medium risk in relation to each of the identified environmental issues provided that the recommended mitigation measures identified in this document are implemented.

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23.0 Conclusion

The HRRP involves the removal, treatment and disposal of sediments from the South Arm of the Hunter River. The river sediments have been contaminated from the operations on adjacent lands of the former BHP owned Newcastle Steel Works that closed in 1999.

BHPB is seeking approval to proceed to Stage 2 works (full scale remediation) under the original development consent (DA-134-3-2003-i). BHPB is also seeking approval to undertake the proposed Stage 2 operations on a 24 hours per day 7 days per week basis.

The HRRP will provide a number of significant benefits, but primarily it will:

- Remove the potential Significant Risk of Harm (SRoH) to the environment that the contaminated sediments represent in the river, thereby providing a cleaner river environment;
- Meet BHPB's statutory obligation to address the SRoH that the contaminated river sediments represent in accordance with a Voluntary Remediation Agreement (VRA) between BHPB and NSW Department of Environment and Climate Change (DECC); and
- Allow for the extension of shipping channels in the South Arm of the Hunter River thereby supporting the on-going expansion of port and industrial facilities within the Port of Newcastle.

The HRRP is consistent with the NSW Government strategic direction for Ports in NSW which seeks to improve deep water access to the Port thereby attracting additional heavy and Port related industries which are significant employment generators. The existing port facilities at the Port of Newcastle have been identified as lacking capacity to accommodate forecast growth.

BHPB is currently completing a SOS or second trial remediation project to refine the optimal operating conditions and key environmental management measures, such as odour and water management, for the full scale dredging and remediation process.

It is considered that the results from the SOS are not material nor required in order to proceed to Stage 2 works. BHPB is confident that it can proceed to Stage 2 works in advance of obtaining the SOS results based on the extensive body of work (bench scale testing, trial remediation project and further investigations) that has been undertaken since the original development consent was issued in August 2005.

This work demonstrates that the proposed cement stabilisation technology is appropriate and preferred to effectively treat the sediments. Importantly, the DECC has issued a specific Immobilisation Approval (No.2008-S-03) which endorses the proposed treatment methodology.

Throughout the development of HRRP a number of alternatives were considered in respect to treatment of contaminated sediments, location of the emplacement cell on KI, the footprint and design of the emplacement cell, the transport of treated sediments and operating hours.

The option that is being pursued as part of this application has been selected after careful consideration of all associated environmental and operational issues and after extensive consultation by BHPB with stakeholders including the local community and government agencies.

The preferred option reflects the results of this extensive consultation. It has also been subject to a series of design modifications at considerable additional cost and time delays for BHPB.

The HRRP is centred around a treat and haul approach whereby sediments are excavated, treated, transported and placed within the emplacement cell at KI within 48 hours while still achieving the necessary engineering and environmental outcomes. To do this effectively it is necessary to operate the remediation activities on a 24 hours, 7 per week basis. This enables the remediation works to:

- Align themselves with the approved hours of operation for dredging thereby enabling real time dredging, treatment, transport and emplacement.
- Deliver the treated sediments to KIWEF in a timely fashion prior to the setting of the slag cement.
- Minimise the duration of potential amenity and traffic impacts on the local community.
- Provide flexibility and contingency in the event of unforseen operational interruptions.
- Reduce the potential for delays to the dredging of the shipping channels in the Port of Newcastle and the re-development of the former Newcastle Steelworks site.

The emplacement cell at KI has been designed with a revised footprint that enables more than 80% of the existing wetland habitat to be conserved. This wetland habitat has been identified as important breeding and foraging habitat for the GGBF and a small number of other threatened fauna species.

BHPB has committed to a number of mitigation measures to protect these threatened species during the construction and operational phases of the project, in addition to providing an offsets package in accordance with principles outlined by DECC to achieve a holistic and balanced outcome for the ecology of the Lower Hunter estuary.

The KIWEF site is already degraded by land filling activities which have been conducted on site since the early 1970's. These landfill operations do not incorporate many of the formal engineering design features proposed as part of the emplacement cell such as a HDPE liner, leachate collection system, surface water management system, gas collection and venting system and an engineered cell capping on completion.

All potential environmental issues have been assessed in this EA Report. Issues which were considered to represent a medium to high level risk (prior to mitigation and environmental management) included:

- flora and fauna
- noise,
- odour,
- surface water, and
- groundwater.

These, and other low risk environmental issues, have all been carefully assessed as part of this EA report and in some cases more detailed technical assessments have been carried out where appropriate.

A range of environmental safeguards are contained in the existing development consent and these will be supplemented where required to provide a robust environmental management framework for the project. The environmental safeguards and management plan framework proposed for the Stage 2 works are discussed in **Section 21** of this report.

Provided that the recommended environmental safeguards and management plan framework are appropriately implemented, all of the environmental issues associated withy the Stage 2 works can be managed to an overall low/medium level of risk.

Regular monitoring of issues such as odour, dust, noise, surfacewater and groundwater is also proposed before and during the Stage 2 works to ensure that agreed benchmarks are complied with and that any non compliances are identified, investigated and actioned as necessary.

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24.0 References

ANZECC (2000), “Australian Water Quality Guidelines for Fresh and Marine Waters”, November

CH2M Hill (2008) Mayfield Sediment Remediation Odour Summary

Connell Wagner, Stage 2 Treated Material Transport Strategy, Hunter River Sediment Removal, BHP Billiton Limited

CSIRO (2007) Climate Change in the Hunter-Central Rivers Catchment http://www.environment.nsw.gov.au/climatechange/nswreports.htm (accessed 25/9/08)

CSIRO (2004) Climate Change in New South Wales: Part 1: Past climate variability and projected changes in average climate, http://www.environment.nsw.gov.au/climatechange/nswreports.htm (accessed 25/9/08)

Douglas Partners Pty Ltd (2006) “Report on Investigation of “Area C” Placement of Treated Hunter River Sediments, Kooragang Island Site, Newcastle”, [Draft Report] Project 39342, December

Douglas Partners Pty Ltd (2007) “Report on Investigation of “Area C’, Placement of Treated Hunter River Sediments, RLMC Kooragang Island Site, Newcastle”, Project 39342, March

Douglas Partners Pty Ltd (2007a) “Report on Baseline Assessment – “Area C”, Placement of Treated Hunter River Sediments, RLMC Kooragang Island Site, Newcastle”, Project 39342, June

Douglas Partners Pty Ltd (2008) “Report on Baseline Assessment - “Area C’– Proposed Treated Sediment Emplacement Facility, HDC Kooragang Island Site, Newcastle”, Project 39342.05, November

Douglas Partners Pty Ltd (2008d) “Summary Report – Acid Generation Potential of Excavated Soils, Treated Sediments Project, Kooragang Island Waste Emplacement Facility”, Project 39342.08 November

Douglas Partners Pty Ltd (2008f) “Summary Report – Baseline Assessment, Treated Sediments Project, Kooragang Island Waste Emplacement Facility”, Project 39342.08 November

Douglas Partners Pty Ltd (2008a) “Summary Report – Future Development, Treated Sediments Project, Kooragang Island Waste Emplacement Facility”, Project 39342.05, November

Douglas Partners Pty Ltd (2008c) “Summary Report – Geotechnical Assessment, Treated Sediments Project, Kooragang Island Waste Emplacement Facility”, Project 39342.08 November

Douglas Partners Pty Ltd (2008e) “Summary Report – Long Term Groundwater Monitoring Program, Treated Sediments Project, Kooragang Island Waste Emplacement Facility”, Project 39342.08 November

Douglas Partners Pty Ltd (2008b) “Summary Report – Trigger Levels, Treated Sediments Project, Kooragang Island Waste Emplacement Facility”, Project 39342.08, November

ENSR (2008) Aboriginal Heritage Assessment: Stage 2 Approval, Hunter River Remediation Project, Kooragang Island, Newcastle, NSW

GHD (2004) Extension of shipping channels within the Port of Newcastle including dredging, excavation, treatment and disposal of sediments from the South Arm of the Hunter River

Harper Somers O'Sullivan (2008) Flora and Fauna Assessment, for a proposed Waste Emplacement Site, HDC Land, Kooragang Island

IPCC (2007) *Climate Change 2007*: *The Physical Science Basis.* Summary for Policy Makers. Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).

Newcastle Port Corporation (2008) http://www.newportcorp.com/, Accessed 3 November 2008

NSW Department of Planning (2008) *High resolution terrain mapping of the New South Wales Central and Hunter coasts for assessments of potential climate change impacts*. Department of Planning Climate Change Impacts and Adaptation Research Project

Resource Strategies (2006) Newcastle Coal Infrastructure Group (NCIG) Coal Export Terminal – Environmental Assessment

Spectrum Acoustics (2008) Noise Impact Assessment, Hunter River Remediation Project, Mayfield and Kooragang Island, NSW

Figures

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Appendix A

Hours of Operation Assessment

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Hours of Operation Assessment

A.1 Background

ENSR was engaged by BHPB to prepare this EA for the proposed Stage 2 works associated with the Hunter River Remediation Project (HRRP).

The Stage 2 works essentially involve:

- The full scale remediation of contaminated sediments dredged from the South Arm of the Hunter River on land that was previously occupied by the BHP Steelworks (referred to as the Mayfield site);
- The construction of an emplacement cell for the treated sediments on a former landfill site on KI to the north west of the Tourle Street Bridge (referred to as the Kooragang Island Waste Emplacement Facility or KIWEF site); and
- The transport and placement of treated sediment from Mayfield to KIWEF.

BHPB is seeking approval to proceed to Stage 2 works under the development consent (DA-134-3-2003-i) for the extension of shipping channels within the Port of Newcastle issued by the Minister for Planning on 9 August, 2005.

BHPB is also seeking approval to undertake the proposed Stage 2 operations on a 24 hour per day, 7 days per week basis under Condition C2.16 of the development consent.

This Section is intended to assist the DoP's review of the matter specific to obtaining approval to operate remediation activities on a 24 hour per day, 7 days per week basis. This was a specific request of the DoP (*per comms Scott Jeffries, Director, Major Infrastructure Assessments)* during BHPB's consultation with the Department during the preparation of this application. Whilst the proposal to vary the operating hours and their benefits and impact mitigation measures are referred throughout this document, this Section is intended to bring together and summarise the main elements that are relevant to this variation request.

A.2 Existing Site Conditions

The Mayfield site is located on the south bank of the South Arm of the Hunter River and immediately adjoins the OneSteel site which is to the west. The site has an area of approximately 25 hectares and is accessed from Selwyn Street. The Mayfield site was formerly occupied by the BHP Steelworks which operated from 1915 until 1999.

The KIWEF site is located on the western part of KI immediately to the north west of the Tourle Street Bridge. The site has an area of approximately 36 hectares and is accessed from Cormorant Road some 150 m north of the Tourle Street Bridge. The site has operated as a landfill since the early 1970's.

The closest residential areas to the Mayfield site are located in Mayfield some 680 metres to the south across Industrial Drive. The closest residential areas to the KIWEF are located in Mayfield West and Warrabrook some 1.2km to the south across the Hunter River and Industrial Drive.

A.3 Proposal

It is proposed that all construction works and remediation activities at the Mayfield site, all construction works and the emplacement of treated sediment at the KIWEF and the transport of treated sediment between Mayfield and KIWEF would occur 24 hours per day, 7 days per week.

As a result both the Mayfield and KIWEF sites would require lighting to allow for 24 hour operation in a safe workplace environment.

Operating on a 24 hour, 7 days per week basis will help ensure the HRRP is undertaken in the shortest possible timeframe whilst still achieving the necessary engineering, environmental and wider outcomes. It will:

- Align with the approved hours of operation for dredging and related activities (defined as Stage 1A in the development consent);
- Ensure treated sediments are delivered to KIWEF in a timely fashion prior to the setting of the slag cement;
- Minimise the duration of potential amenity and traffic impacts on the local community;
- Provide necessary flexibility and contingency in the event of unforeseen operational interruptions (e.g. prolonged periods of adverse weather, equipment failures, traffic delays, etc); and
- Significantly reduce the potential for delays to the dredging of the shipping channels in the Port of Newcastle for other activities and the redevelopment of the former Newcastle Steelworks site.

Operating 24 hours, 7 days per week also supports the ‘treat and haul approach’ that is proposed and will allow contaminated river sediments to be dredged, treated, transported and deposited at the KIWEF within in a real-time manner without the need for extensive stockpiling of material that can exacerbate issues related to odour and water quality.

In reality, given periods of downtime for poor weather, maintenance of plant/equipment and rest periods for truck drivers, it is likely that operations would occur on average 6 days per week and an average of 20 hours per day. However, there will be periods during which it is necessary to operate 24 hours per day, 7 days a week to achieve production goals and other objectives that have been hampered, for example, by prolonged periods of adverse weather or extended shutdowns due to equipment or other failures.

It is expected that the remediation project will have an overall timeframe of approximately 18 months to 2 years, starting with construction in February 2009, subject to all relevant approvals being obtained, and finishing operations in 2010/11.

A.4 Conditions of Development Approval

Condition C2.15 of the existing development consent limits all activities associated with the remediation works to between 7.00am and 6.00pm Monday to Friday, between 8am and 1pm on Saturdays and no work on Sundays and public holidays.

Condition C2.16 allows these time restrictions to be varied with the Director General's agreement after considering the results of any community consultation that may require to be undertaken and after considering any information necessary to determine that activities undertaken during the varied hours will not adversely impact on the acoustic amenity of receptors in the vicinity of the site.

Extensive community consultation has been conducted by BHPB in relation to the various aspects of the HRRP including the proposed 24 hour operation (refer **Section 7**).

In addition, an acoustic report has been prepared by Spectrum Acoustics to assess the impact of the additional operating hours on the amenity of receptors in the vicinity of the site (refer **Section 11**.)

A.5 Impact Assessment

In considering the potential impacts of the proposal to operate 24 hours a day, 7 days per week, the following issues have been considered:

- Consultation undertaken with the local community;
- Impacts of noise on the surrounding residential areas;
- Impacts of traffic;
- Impacts of lighting; and
- Impacts on the local ecology of KIWEF from nigh-time activities.

Each of these issues and their management are further discussed below.

A.5.1 Community Consultation

BHPB has implemented a comprehensive, inclusive and proactive approach to community engagement on the HRRP as detailed in **Section 7**.

A range of engagement techniques were established and applied to engage the local community regarding the HRRP, including Community Newsletters, HRRP website (www.bhpbilliton/com/hrrp), stakeholder meetings, free-call 24 hour community hotline, email enquiries line, fact sheets, community survey, display ads, letter and email communications.

BHPB has identified over 100 stakeholders that it has sought to engage in relation to the project. These stakeholders include a broad range of groups such as residents and resident groups, community groups, environmental groups, local business and industry groups, State and Federal government agencies, local government, local Aboriginal stakeholders, politicians and others.

Many issues were discussed as part of the active consultation process undertaken with community groups and other stakeholders over the last six months including, but not confined to, the remediation and sediment treatment process, general environmental impacts, odour impacts, truck movements, river water quality, river access, selection of emplacement cell location, local employment, footprint and design of emplacement cell, visual amenity, re-use of the sites upon completion of works and flora/fauna impacts.

The proposal to operate 24 hours, 7 days per week has been raised by BHPB during the consultation process where relevant to the stakeholders interests. In these situations, BHPB has discussed the rationale for seeking 24 hour operation, the advantages of such an arrangement and the management measures proposed to minimise any potential impacts. In many cases, the need to still obtain approval to vary the hours has been discussed and as being a matter which is currently being assessed, with no major issues raised.

To date, there has not been overwhelming community interest in this issue and there has been general acceptance of why 24 hour operation is such an important element in the successful execution of this project.

A.5.2 Traffic Impacts

A traffic assessment for this project has been prepared by Connell Wagner and is attached as **Appendix D** to this EA report. The relevant findings of this assessment in respect of the proposed 24 hour per day, 7 day a week operations are summarised below.

The impact on the road network of an additional 250 to 334 trips per day or between 13 and 17 trips per hour under average haulage conditions has been assessed as low with increased volumes being approximately 2.0-3.0% of existing total daily flows or 20-25% of discrete heavy vehicle flows.

The proposal to treat and haul sediment 24 hours a day, 7 days a week would allow the overall timeframe of the Stage 2 remediation works to be minimised. It also allows truck movements to be spread across a longer period each day thereby reducing the intensity of movements during the critical peak periods.

The existing road network and key intersections along the haulage route have adequate capacity to accommodate the expected number of truck trips with negligible impact to existing traffic flows.

Noise from trucks using the haulage route late at night could be a potential issue for residential properties located adjacent to Industrial Drive. This issue is specifically addressed in the noise assessment (refer **Section 11**).

The new Tourle Street Bridge is scheduled to open by mid 2009 which is likely to be prior to the scheduled commencement of haulage operations. A new intersection at Cormorant Road/KIWEF is being constructed by RTA as a related activity to the bridge construction and it is understood this will also be completed prior to the start of HRRP haulage. Haulage vehicles would only be allowed left in/left out movements at this intersection. This will be done for safety reasons to avoid crossing double lanes along this busy section of road.

Potential road safety impacts associated with material spilling from trucks, lighting of the KIWEF/Cormorant Road intersection and truck queuing at the KIWEF entry can all be comfortably managed (refer discussion in **Section 12**).

Given the proposed 24 hour operations it will be important to ensure that both the Mayfield and KIWEF sites are well illuminated and that internal traffic movements conform to a traffic management plan for each site.

All of the above impacts would be restricted to the proposed (approximate) 40 week haulage period with the duration ultimately dependant on a number of external factors (e.g. weather) and would be regulated by a Road Haulage Management Plan, as included in the Treated Material Transport Strategy (refer **Appendix C**).

A.5.3 Noise Impacts

A noise assessment for this project has been prepared by Spectrum Acoustics and is attached as **Appendix C** to this EA report. The relevant findings of this assessment in respect of the proposed 24 hour per day, 7 day a week operations are summarised below.

The noise contour results for each of the modelled operating scenarios show that received noise as a result of operations from the Mayfield and KIWEF sites will not exceed the allowable noise contribution (as outlined in Condition C2.17 of the existing development consent) at any receivers under the assessed worst case conditions.

They will also comply with the relevant criterion for a school playground and internal class rooms under the assessed worst case conditions for both the Mayfield East Public School and Hunter Christian School.

The noise contour results for each of the modelled sleep disturbance scenarios show that received noise as a result of operations from the Mayfield and KIWEF sites including on site trucking will not exceed the sleep disturbance criteria (DECC ENCM) at any receivers under the assessed conditions.

The calculation of traffic noise levels show that the received noise at the worst case residential receiver (21 Crebert Street) and at the Mayfield East Public Schools will not exceed the relevant criterion (DECC ECRTN) even under the worst case haulage scenario.

The results show that the received noise at the centre of the school playground of the Hunter Christian School would be marginally above the relevant criterion (DECC ECRTN) for a school playground whilst the received noise internally within classrooms with windows open would be below the relevant criterion for internal class rooms under the assessed conditions (worst case). However, it is important to note that existing road traffic noise at the school playground already exceeds this criterion.

The assessment of road traffic noise was a conservative assessment based on worst case haulage operations occurring 24 hours a day and 7 days a week. In reality there will be periods of the day when the number of trucks are less than those assessed due to periods of poor weather, plant/machinery maintenance or breakdowns or truck driver rest periods.

Given the relatively short term, limited duration and proposed timing of the Stage 2 works it is unlikely that there will be any significant cumulative noise impacts as a result of the remediation works.

The following recommendations were made in respect to environmental safeguards for the HRRP:

- As part of the Remediation Environmental Management Plan, measures should be developed to monitor and control noise emissions during operations in accordance with Condition C4.4(d) of the development consent; and
- A noise monitoring program should be implemented at selected receiver locations to determine whether the allowable noise contributions (as specified by condition C2.17 of the development consent) are being met.

A.5.4 Lighting Impacts

As the HRRP is proposed to operate on a 24 hour basis, seven days per week, night lighting would be required to ensure that the safety and security of operations is not compromised.

At the Mayfield and KIWEF sites, there would be a range of permanent and temporary lighting of treatment areas, loading areas, internal access roads, stockpile/storage areas, contractor staging areas and emplacement cell(s) required There would also be lighting associated with plant and equipment and the truck haulage fleet.

Mobile lighting towers would be used throughout both sites and particularly to illuminate the emplacement cell. These lights would typically be be relocatable temporary tilt top towers or equivalent.

The facilities at Mayfield and KIWEF will be operating 24 hours per day and as a result the potential lighting impacts could include:

- Potential lighting impacts from the Mayfield site operations on the nearest residential properties albeit that these properties are some 680 m to the south across Industrial Drive;
- Potential lighting impacts from the KIWEF site operations on the nearest residential properties albeit that these properties are some 1.2 km to the south across the South Arm of the Hunter River;
- Potential lighting impacts from trucks carrying out the haulage of sediment between the two sites on residential properties adjoining the Industrial Drive section of the haulage route; and
- Potential lighting impacts from the KIWEF site operations on fauna species, particularly the Green and Golden Bell Frog (GGBF), which inhabit the adjoining wetland areas.

In considering the potential lighting impacts it is important to have regard to the context of the surrounding port and industrial development and the 24 hour activity and lighting that is associated with these developments.

The following environmental safeguards are proposed to minimise the potential impacts from lighting associated with the Stage 2 works:

- A management framework to mitigate lighting impacts would be prepared for the construction and operational phases of the project. The objective of the Plan would be to ensure that obtrusive effects of lighting beyond the site are minimised while providing adequate lighting on site to maintain the operational safety of personnel;
- The potential impact of lighting on areas of fauna habitat adjoining the KIWEF site would be minimised by careful selection of lighting locations, ensuring lighting is directed away from such areas (eg. frog ponds), and the installation of screens, louvres, shields or equivalent controls where necessary to shield light and safe to do so; and
- Lighting would be placed only in areas where it is required and positioned to limit the spill of light external to the site.

A.5.5 Ecological Impacts

A flora and fauna assessment for this project has been prepared by Harper Somers O'Sullivan and is attached as **Appendix B** to this EA report. The relevant findings of this assessment in respect of the proposed 24 hour per day, 7 day a week operations are summarised below.

The assessment demonstrates that the proposed 24 hour operations have the potential to impact on the GGBF and other fauna species primarily as a result of disturbance from night lighting, noise and general activity associated with the construction and operation of the emplacement cell.

A number of mitigation measures are proposed to address these potential impacts including:

- Pre-clearing surveys, frog exclusion fencing and frog relocation is proposed to minimise the potential for frog mortality during construction and operation;
- Lighting, noise and vibration should be kept to an absolute minimum during construction and in particular during nocturnal hours. Screens/shields/louvers or equivalent to minimise the potential for light spill onto adjacent wetland areas should be established, where safe and feasible to do so, to minimise potential lighting impacts on threatened fauna species. Operating equipment at the KIWEF site is to be maintained in a proper and efficient manner to minimise noise; and
- Wherever possible vehicle and machinery movements on site should be limited to defined roads and tracks.

In addition, BHPB is committed to contributing to and actively supporting the DECC framework for GGBF management within KI, including the provision of compensatory habitat.

A.6 Conclusion

On the basis of above and the additional information provided within this document, it is considered that a variation to the current approved hours to operate Stage 2 remediation activities 24 hours per day, 7 days per week will provide significant project engineering, environmental and schedule benefits whilst not causing unacceptable impacts on public amenity in the local area.

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