



Our reference: DOC14/178073, EF13/8279
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25 AUG 2014

Ms Kate Wedgwood
Planning Assessment Commission
Level 13, 301 George Street
SYDNEY NSW 2001

Email: kate.wedgwood@planning.nsw.gov.au

Dear Ms Wedgewood

PROPOSED TERMINAL 4 ('T4') PROJECT

I refer to the meeting between the Planning Assessment Commission (PAC) and the NSW Environment Protection Authority (EPA) on 14 August 2014, regarding the proposed Terminal 4 ('T4') project. A number of issues were discussed regarding contamination, air quality, noise, water and rail issues. The following requested information is provided for consideration by the Planning Assessment Commission in determining the project.

Draft Conditions of Approval

The EPA has reviewed the draft conditions of approval available on the Department of Planning and Environment's website as drafted on 14 August 2014. The EPA reviewed a previous version and provided comments to the Department of Planning and Environment on 27 February 2014.

The current draft conditions of approval address a majority of the EPA's issues and would enable drafting of an Environment Protection Licence should approval be granted. There are some issues raised by the EPA that we believe are still not adequately addressed.

i. Contaminated Sites

Reducing infiltration will reduce the risk of mobilisation of contaminants in the groundwater from past industrial activities on Kooragang Island. To this end, draft condition B38 requires stormwater and surface water management infrastructure on the site to be lined with low-permeability material. The EPA recommends that condition B38 be expanded to require that all surfaces that may be used to store wet sediment and dredge waters also be lined with low-permeability material.

ii. Stormwater and Surface Water Management

Draft condition B32 has been modified since the EPA provided comments in February 2014. The current draft condition refers to designing a surface water management system to capture a 1-in-3 month average recurrence interval (ARI) discharge event.

The previous wording of this condition required the surface water management system be designed to capture a 1 in 100 year ARI even with no surface water discharge to occur from the site unless provided for in an environment protection licence.

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The EPA recommends the previous wording, referencing a 1 in 100 year ARI event be adopted as this is consistent with the design presented in the Preferred Project Report and original Environmental Assessment.

iii. Rail

The draft conditions of consent appear to be silent on the issue of cleaning empty wagons following coal unloading activities. The EPA recommends the following condition be considered for inclusion, should approval be granted.

“The proponent must design and construct the rail unloading facility to enable the installation and operation of equipment to remove any and all residual coal from empty wagons prior to the locomotive leaving the premises.”

iv. Noise

Draft Condition B13 identifies maximum allowable noise contributions from the project at Fern Bay, Stockton and Mayfield. The proposed noise levels are higher than those recommended by the EPA in November 2013. The $L_{Aeq(15min)}$ is 1dBA higher at all locations and the $L_{A1(1\text{ minute})}$ is 2dBA and 10dBA higher at Stockton and Mayfield respectively. Table 1 provides the noise limits recommended by the EPA.

The EPA considers that the limits recommended in November 2013 are more appropriate for the proposed development because they deal with the noise contribution from the T4 project without assuming any noise reduction from existing neighbouring developments.

Table 1 – EPA Recommended Noise Limits and Localities

Locality	NOISE LIMITS dB(A)				
	Day	Evening	Night		
	$L_{Aeq(15\text{ minute})}$	$L_{Aeq(15\text{ minute})}$	$L_{Aeq(15\text{ minute})}$	$L_{Aeq(9\text{ hour})}$	$L_{A1(1\text{ minute})}$
<i>Fern Bay and Stockton</i>	49	49	49	46	55
<i>Mayfield West</i>	43	43	41	38	47
<i>Mayfield and Mayfield East</i>	43	43	42	38	48
<i>Carrington</i>	41	41	39	35	45
<i>Sandgate</i>	37	37	36	35	45
<i>Warabrook</i>	37	37	35	35	45

Noise Complaints

Table 2 summarises noise complaints received by the EPA's Environment Line for the Newcastle local government area over the last two years.

Table 2: Noise Complaints Newcastle LGA – August 2012 to August 2014

Suburb of Complainant	Industrial Noise	Coal Loader	Rail Noise	Construction Noise	Other
Carrington	29	16	1		
Stockton	59				
Tighes Hill		1	63		
Mayfield	11			10**	
Newcastle	1				2
Hexham / Sandgate	1		4		
Wallsend / Shortland					2
Lambton					1
Hamilton					2
Adamstown	9*				

*One complainant ** One incident

Stacker-Reclaimer Shut Down Conditions

Both Newcastle Coal Infrastructure Group and Port Waratah Coal Services cease coal stacking and reclaiming under extreme wind conditions when infrastructure may be at risk. Under condition 2.4 of the Kooragang Coal Loader consent, I understand that Port Waratah Coal Services are also obliged to cease operations if weather conditions are likely to lead to the emission of visible dust from the site.

Kooragang Island Waste Emplacement Facility – Capping Costs

As discussed, Hunter Development Corporation is responsible for installing a temporary cap over the footprint of the T4 proposal, through the provisions of Surrender Notice 1111840. Hunter Development Corporation has provided an estimate of capping costs to the EPA, however this has been provided to the EPA on a Commercial-In-Confidence basis. I suggest that you contact Mr Mike Bardsley, Hunter Development Corporation Environment Manager on 02 4904 2773 or 0432 685 798 regarding this matter.

Newcastle Air Quality Monitoring Report

On the advice of the Newcastle Community Consultative Committee on the Environment, the EPA commissioned a series of reports analysing existing air quality data. A report summarising available data up until 2012 is available at <http://www.epa.nsw.gov.au/resources/NCCCE/120523LHunterAirMonitoring.pdf> Regular reports since that date are available at <http://www.epa.nsw.gov.au/NewcastleCttee/index.htm> under the heading "Lower Hunter Air Quality Monitoring Monthly Reports". These reports indicate that Newcastle's air quality generally complies with all current standards and goals.

If you wish to discuss any of the above further, please contact Rebecca Scrivener on 4908 6830.

Yours sincerely

A handwritten signature in black ink, appearing to read 'MB', with a long horizontal flourish extending to the right.

MITCHELL BENNETT
Head Regional Operations Unit - Hunter
Environment Protection Authority



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Dear Ms Wedgwood

PROPOSED TERMINAL 4 (T4) PROJECT – ADDITIONAL ISSUES RAISED DURING PUBLIC HEARINGS

I refer to discussions on 15 September 2014 between the Planning Assessment Commission (PAC) and the NSW Environment Protection Authority (EPA) regarding additional issues raised during the public hearings held in Newcastle for the proposed Terminal 4 (T4) project. The following information is provided for consideration by the PAC in determining the project.

Air Quality

The EPA understands the Coal Terminal Action Group (CTAG) presented a submission at the public hearing held in Newcastle on 26/27 August 2014. As part of its submission, the Group provided the PAC with a copy of the following documents:

1. *'Coal Dust in Our Suburbs: A Community-led Study of Particle Pollution in Newcastle and the Lower Hunter Coal Train Corridor,'* March 2013 prepared by CTAG; and
2. *'Assessment of Measures Planned for T4 for Fugitive Dust Mitigation against Current Best Practice,'* working document prepared by the Hunter Community Environment Centre, dated November 2013.

The PAC sought EPA comment on both these documents.

- **Coal Dust in Our Suburbs: A Community-Led Study of Particle Pollution in Newcastle and the Lower Hunter Coal Train Corridor**

The EPA carried out a brief review of the Coal Dust In Our Suburbs report and notes the report summarises the results of a 'snapshot' monitoring campaign designed to identify the impact of coal trains on residential areas adjacent or in close proximity to the rail line. The report presents results that are higher than the national standards for PM₁₀ and advisory reporting standards for PM_{2.5}. The report also identifies these results are higher than those recorded by monitoring stations operated by the Office of Environment and Heritage (OEH) at Wallsend, Beresfield and Newcastle.

The CTAG monitoring program employed monitors known as Osiris particulate monitors which provide useful indicative information on particle levels and is commonly used for short-term, comparative monitoring campaigns rather than assessing long term ambient air quality. These monitors have been used by the NSW Health Expert Panel to characterise particle distributions in the Upper Hunter region.

The results obtained by CTAG were generally consistent with the report prepared by the OEH in 2012 titled, '*Lower Hunter Ambient Air Quality Review of Available Data*'. The report prepared by OEH was carried out as part of the investigation into the establishment of an ambient air monitoring network in the Lower Hunter/Newcastle local government area and was reviewed by the Health Air Pollution Expert Advisory Committee. This committee concluded the monitoring data demonstrates that the Lower Hunter has good air quality. A copy of this report is available on the EPA's website at: <http://www.environment.nsw.gov.au/resources/nccce/120281lhunterairmonitoring.pdf>

Should the PAC require any further information on the relationship between air quality and coal trains (and other trains) in the Hunter, I refer you to the review by Prof Louise Ryan of data collected by the Australian Rail and Track Corporation (ARTC). The study, titled "Re-analysis of ARTC Data on Particulate Emissions from Coal Trains" and dated 25 February 2014, is available on the EPA website.

The review concluded that while particulate levels were elevated when trains passed the monitoring station, there was no evidence that loaded coal trains produce more dust than empty coal trains or freight trains.

- **Assessment of Measures Planned for T4 for Fugitive Dust Mitigation Against Current Best Practice**

The best practice measures identified in the Assessment of Measures document are generally sourced from the benchmarking study carried out by Katestone Environmental Pty Ltd in 2010. However, it is noted other sources, including the US Centres for Disease Control and Prevention and industry references, are also used. The focus of the benchmarking study was on coal mine operations rather than export coal terminals. Nonetheless, it is acknowledged the principles and intent of the management actions are similar.

The EPA also notes the table provided by CTAG focusses on the operational phase of the project.

The table provided by CTAG indicates that the T4 proposal does not commit to full enclosure of the transfer towers and installation of belt cleaning and spillage minimisation from the conveyors. The EPA understands these mitigation measures are proposed by Port Waratah Coal Services and are identified in the Statement of Commitments of the Preferred Project Report and discussed in *Appendices – Volume 5 - Appendix O – Assessment of Modified Design – Air Quality*, submitted as part of the Response to Submissions and Preferred Project Report.

The EPA understands that Port Waratah Coal Services intend to fully enclose conveyors where possible as is the current practice at the Kooragang Coal Terminal. However, the company is clear that conveyors can only be partially enclosed where machinery is required to travel along the conveyor for operational, maintenance or similar purposes. In this situation, the conveyors cannot be fully enclosed due to operational restrictions. All other conveyors are fully enclosed.

The table also identifies the mining activity, 'Stage loader/crusher – the mechanical compression of material to reduce the size'. The EPA understands that crushing or resizing of coal is not proposed for the T4 project, rather only the physical handling of coal through delivery, stockpiling and loading of coal to ship.

The EPA reviewed the air quality impact assessment provided in the original Environmental Assessment and Preferred Project Report and concluded that implementation of proactive, real time best practice management measures are critical to minimise the risk of dust impacts from the proposed project. The EPA expects the emission control measures identified in the Statement of Commitments of the Preferred Project Report to be implemented should approval for the project be granted.

Contamination

The EPA has reviewed proposed approval conditions relating to contaminated land management at the project site. Attachment 1 provides revised wording and additional conditions for your consideration. The conditions relate to the Remedial Action Plan (RAP) and surface water management at the project site.

NSW EPA – Recommended Amendments relating to Contaminated Land - Draft Project Approval – MP10_0215 – October 2014

Condition	Suggested amendment	Reason
B43.	Prior to the commencement of construction, the Remedial Action Plan must be finalised in accordance with the requirements of the <i>Guidelines for Consultants reporting on Contaminated Sites, NSW EPA 1997</i> , submitted to the consent authority and approved by the consent authority. The RAP must clearly identify the remedial options that will be implemented at the site.	<ul style="list-style-type: none"> • The existing condition B43 indicates a RAP must be submitted for approval but is not definitive as to whether the RAP will be approved prior to the commencement of construction. • The concept stage RAP prepared to date does not provide sufficient certainty that the preferred remedial options will be implemented. An interim opinion by the site auditor identifies a number of additional studies, trials and monitoring programs that must be carried out prior to finalisation of the RAP.
B43 (a)	The proponent must engage an auditor accredited under the Contaminated Land Management Act <i>to determine the appropriateness of the Remedial Action Plan</i> . The auditor must prepare a Site Audit Report and Site Audit Statement and submit it to the EPA at least one month prior to the commencement of the construction work.	The existing condition B43(a) is not definitive on the nature of the site audit required.
B38.	All stormwater and surface water management infrastructure on the site intended to manage actual or potentially contaminated or saline waters during operations shall be lined with a low-permeability material to minimise potential leakage and groundwater recharge through infiltration. Collected stormwater shall be reused on site for beneficial purposes such as the wetting of coal to reduce dust emissions from the site.	Contaminated soils are known to occur within the site. Any groundwater recharge as a result of infiltration of waters would be anticipated to generate leachate and contaminated groundwater. [Note the salinity of the waters is not relevant but the volume of waters passing through the (contaminated) soil at the site is relevant].
NOT IN EXISTING CONDITIONS	Handling and deposition of wet sediment and dredge waters only be undertaken in areas of the site which have an impermeable land surface barrier (such as concrete or HDPE liner) and appropriate drainage such that the risk of waters entering the groundwater table is minimised as far as practicable.	
NOT IN EXISTING CONDITIONS	Final capping works must be implemented and completed prior to any dredge material emplacement, preloading and/or construction at the site.	
NOT IN EXISTING CONDITIONS	The long term maintenance requirements of permeable passive reactive barriers proposed in the concept stage Remedial Action Plan should be identified and agreed by the landowners.	Necessary to ensure that the landowners agree to the long term maintenance requirements.
B43.	The proposed location and design of any containment cell/s be identified and approved prior to the construction of any containment cell.	The existing condition mentions that the plan will be submitted but is not definitive as to whether the containment cell design will be approved prior to construction.

The EPA has recommended that, should approval be granted, final capping works must be implemented and completed prior to any dredge material emplacement, preloading or construction at the project site. This will ensure that should a staged approach be undertaken by the proponent, and dredging preloading or construction is delayed, existing groundwater contamination is effectively managed by limiting surface water infiltration.

If you wish to discuss any of the above further, please contact Rebecca Scrivener on 02 4908 6830.

Yours sincerely

A handwritten signature in black ink that reads "Gary Davey". The signature is written in a cursive style with a large, looping "G" and "D". A long horizontal line extends from the end of the signature to the right.

GARY DAVEY
Director North Branch
Environment Protection Authority

10 October 2014

Table provided by Commonwealth Department of Environment

Issues raised regarding Environmental Assessment	Response to Department's Assessment Report
Green and Golden Bell Frog	
<p>The magnitude of the proposed impact on the Green and Golden Bell Frog (GGBF) is highly significant. The GGBF is listed as a vulnerable species under the EPBC Act. The Kooragang Island population is the largest population remaining in the Hunter region and one of the largest known populations of the species. Impacts to the GGBF would include permanent removal of the most important known area of breeding habitat for this population, from which frogs disperse to ephemeral wetlands across Kooragang/Ash Island. Other connected breeding and foraging habitat would also be permanently removed. Impacts from the T 4 Project are likely to substantially reduce the size and ongoing viability of the GGBF population on Kooragang Island.</p>	<p>During the earlier stages of the assessment process, there was a lack of complete information about the different frog habitats on site, the extent of impact and proposed avoidance and mitigation measures. This meant that a highly precautionary approach was warranted.</p> <p>The proponent has since provided more complete and better quality information. As a result the area of impact has been revised down and the effectiveness of particular mitigation strategies has been realised (for example, wetland habitat creation, movement corridors and the creation of potential new breeding areas).</p> <p>Refer comments on offsets below.</p>
Requested further reduction to impacts on GGBF	Refer above
<p>The GGBF is a critical ecosystem component of the Hunter Estuary Wetlands Ramsar site. The likely reduction in the size, extent, connectivity and breeding and dispersal capability of the GGBF population could threaten its continued occurrence in the Ramsar site, which could result in a breach of the Limits of Acceptable Change for the wetland. It is noted that the proponent has argued that the GGBF does not occur in the Ramsar site; however, they have not provided any evidence to support this.</p>	<p>Further survey information and discussions with NSW assessment officers have resolved that there are no significant population elements in the area of the Ramsar site that is directly adjacent to the action. While it is possible that frogs may or could move into the Ramsar site from the T4 area, it is not considered a critical aspect (although connectivity to the Ramsar site will be maintained).</p> <p>It is not currently considered that impacts to the frog will breach the Limits of Acceptable Change.</p>
<p>The proposed GGBF habitat corridor appears to have the potential to partly mitigate the loss of GGBF habitat from other parts of the T4 site and provide connectivity between known GGBF habitat which would otherwise be fragmented by the project. The design of the corridor should be further refined using the best available information in GGBF habitat creation to ensure that it provides the maximum possible benefit to a residual GGBF population. It is noted that this measure is proposed as a dispersal corridor only and not to provide breeding habitat</p>	<p>Corridor design has been refined. It is one of a suite of avoidance, mitigation and offset measures that would be involved.</p> <p>The proponent has demonstrated the development of some artificial habitats that have produced breeding frogs ("tubs"). This will be further monitored and refined in the context of the overall project.</p> <p>This point is now not considered a critical issue.</p>

Table provided by Commonwealth Department of Environment

<p>The proposed Brundee offset for the GGBF does not adequately offset the impacts of the proposal on the GGBF when assessed using the Department's Offsets Assessment Guide.</p> <p>The primary reasons for this are the high quality of the GGBF habitat at the impact site and the relatively low risk of loss of the GGBF habitat at the offset site. A reduction in impacts and/or additional offsets would be required to reach consistency with the Department's Environmental Offsets Policy.</p>	<p>During the earlier stages of the assessment process, there was a lack of complete information about the different frog habitats on site, the extent of impact and proposed avoidance, mitigation and offset measures. This meant that a more conservative view of the value of the proposed offsets was warranted.</p> <p>The proponent has since provided more complete and better quality information about the Brundee offset area. In particular, their engagement of, and our discussions with, a local expert, Gary Daly (GAIA Research) has added completeness and value to the information set (and thus improved the inputs into our offsets guide calculator). The Department is now satisfied that the proposed offsets meet the requirements of the EPBC Act.</p>
Migratory Shorebirds	
<p>The currently proposed project will result in highly significant impacts on migratory shorebirds by removing habitat and having indirect impacts on two significant wetlands - Deep Pond and Swan Pond. It is noted that the preferred project proposes a greater impact on shorebird habitat than that originally proposed in the Environmental Assessment (EA) - due to the construction of the dredge return water channel within Swan Pond.</p>	<p>During the earlier stages of the assessment process, there was a lack of complete information about the different migratory bird habitats on site and the extent of impact. This meant that a more precautionary approach was warranted, particularly with regard to the dredge return channel..</p> <p>The proponent has since provided more complete and better quality information about the presence and behaviours of the shorebirds on site.. As a result the impacts on shorebirds are considered to be of lesser significance – although residual impacts will still require mitigation and an offset.</p>
<p>Migratory shorebirds are a critical ecosystem component of the Hunter Estuary Wetlands Ramsar site. The proposal has the potential to contribute both to the decline in numbers of migratory shorebirds and the number of shorebird species that occur in the Ramsar wetland.</p>	<p>The creation of an appropriate offset site will balance out this potential impact.</p>
<p>The proposed wetland habitat creation at Tomago appears to have the potential to adequately compensate for the loss of shorebird habitat from the impact site. However, the habitat will need to be created and demonstrated to adequately offset the impacts of the proposal prior to the impact occurring to be acceptable as an offset.</p>	<p>It is considered that the creation of the Tomago offset, if successful, will achieve this. It is acknowledged that any conditions of approval will need to include a set of practical, operational requirements which relate to being able to monitor and evaluate success. It is considered that a single season that shows successful use of the site by shorebirds (including the full range of species abundance and effective foraging and breeding habitats) will be acceptable in terms of proving the offset. It is acknowledged that several seasons of monitoring may be necessary prior to reaching this point.</p> <p>The offset must be proven prior to the impact occurring.</p>

Table provided by Commonwealth Department of Environment

Australasian Bittern	
The EA states that the proposal would have a significant impact on a "geographically distinct regional population" of the Australasian Bittern, which is listed as an endangered species under the EPBC Act.	The impacts to the Australasian Bittern will need to be mitigated and/or offset.
The proposed offsets do not adequately compensate for the loss of habitat for the Australasian Bittern when assessed using the Department's Offsets Assessment Guide. A reduction in impacts or additional offsets will be required to adequately offset the stated impacts of the proposal on this species.	Refer above comments regarding the Brundee offset site. The creation of an offset at Tomago is also relevant to this species.
Given that the population being impacted is geographically distinct, it would be most appropriate if any additional offsets were located within the area occupied by the population.	The Tomago offset site accounts for a small proportion of the offsets required for the bittern. Most of the offset will be provided at the Brundee site. This is considered acceptable.
In addition, the Australasian Bittern is a critical ecosystem component of the Hunter Estuary Wetlands Ramsar site and is integral to the values of the wetland, since its nationally endangered status assisted the estuary in meeting the criteria for Ramsar listing.	The provision of a successful offset at Tomago would result in this concern being less relevant.
Hunter Estuary Wetlands Ramsar site	
As noted above, the GGBF, Australasian Bittern and migratory shorebirds are all critical ecosystem components of the Hunter Estuary Wetlands Ramsar site, as described in the Ecological Character Description (ECO) for the wetland. The ECO of the Ramsar site identifies Limits of Acceptable Change (LAC) which, if exceeded, indicate unacceptable change to the ecological character of the wetland.	Consistent with the species specific comments above, it is currently considered that impacts (including potential impacts) to such species are within the Limits of Acceptable Change.
Based on the information provided in the assessment documents, the proposal has the potential to exceed or contribute to an existing breach of the LAC for the GGBF and migratory shorebirds for the reasons detailed above.	Refer above comment.
Impacts to a Ramsar wetland can only be offset by measures which provide compensatory benefits directly to the Ramsar wetland.	Given the above, it is not considered that such an offset would be required.
The proposed Tomago offset for migratory species could be an acceptable offset for impacts on the ecological character of the Ramsar wetland due to its location in the Hunter	No comment here (until the offset is proven).

Table provided by Commonwealth Department of Environment

<p>estuary, if it was shown to compensate for the loss of migratory shorebird habitat prior to the impact occurring.</p>	
<p>The proposed GGBF offset at Brundee would not be an acceptable offset for any breach of the LAC for this species. The retention of a viable GGBF population on Kooragang Island, with connectivity to the breeding habitat in the Ramsar site, would be needed to ensure the LAC for this species was not permanently exceeded.</p>	<p>Refer above comments.</p>

VERSION 3 – 16 July 2014**Terminal 4 Coal Export Terminal Project (EPBC 2011/6509) offset calculations**

These calculations relied on information provided by the proponent.

1. Summary of offset calculations

Table 1. Summary of offset calculations.

Matter	Area impacted (ha)	Area offset (ha)	Percentage of impact on matter offset
Green and Golden Bell Frog	48.9 ha (51.7 ha impact area – (4.7 ha x 0.6) mitigation area (60% confidence in success))	199.7	92.3%
Australasian Bittern	24.2 ha 27 ha impact area – (4.7 ha x 0.6) mitigation area (60% confidence in success)	11 ha (Tomago) 159.3 ha (Brundee)	6.72% (Tomago) + 147.17% (Brundee) = 153.89%

2. Impact and Offsets Analysis

Green and Golden Bell Frog

Table 2. Green and Golden Bell Frog impact site calculations – T4 Project site.

Attribute	Weighting	Reasoning	Score
Quality			
Condition	2	The impact site contains 5.8 ha of breeding habitat; it is stated that the water quality in ponds at the site appears to reduce the prevalence of chytrid fungus in this population; pond fringing vegetation, foraging habitat and shelter sites are present. Condition has been weighted low to reduce subjective bias in score, and since information for other quality attributes is reasonably good.	2
Context	4	Kooragang Island population is the largest, most significant site remaining in the Hunter region, one of the most important sites for the species as a whole; saline influence in pond water may be significant in abating effects of chytrid fungus; site is connected to broader island population through contiguous habitat, and movement of frogs between ponds on the island is well documented; site contains a highly significant area of the breeding and refuge habitat for the broader population on the island, particularly since it contains many large, permanent ponds; site is located near the centre of the spatial extent of the Island population.	3.5
Species stocking rate	4	The impact site supports part of one of the largest known populations of the Green and Golden Bell Frog (GGBF: around 900 individuals) and based on the information provided, it appears to directly represent at least 50% of the population (>450 individuals), within an area of habitat of approximately 51.8 ha. It is reported to support a similar sized population as the offset site, which contains an area of habitat 3.5-times larger than that at the impact site, indicating the impact site supports a much higher density of frogs. The component of the population within the impact site is likely to be very important to the viability of the greater Kooragang Island population, given its location, the area and permanence of breeding habitat and the likely proportion of the population present.	3.5
Total			9

Table 3. Green and Golden Bell frog offset site calculations – Brundee offset site.

Attribute	Weighting	Reasoning	Score
Quality			
Condition	2	Reported to contain relatively natural freshwater wetlands, including forested wetlands, and also vegetated drainage ditches. Area of breeding habitat not reported. Foraging and shelter sites are evidently present, but detail is not provided on type/abundance of shelter sites. Presence of species and other information provided indicates habitat is in good condition relative to the ecological requirements of the species.	2
Context	4	Site is located within the Shoalhaven region, which the NSW draft recovery plan refers to as the stronghold for the species, with 11 Key Populations. Site is part of Crookhaven Floodplain Key Population (NSW draft Recovery Plan), which has 4 sub-populations, including Brundee Swamp. Site is reportedly used for breeding and dispersal into surrounding areas and is located fairly centrally to the spatial extent of local records. Chytrid influence on site is not known, but may be significant. Site is one of many populations in Shoalhaven region, and is relatively less important to the species' regional survival compared to the Kooragang population in the Hunter region. Nonetheless, it is significant because it is part of a stronghold which is likely to be important for the long-term survival of the species.	3
Species stocking rate	4	Reports are varied, with Umwelt's 2012 and 2013 surveys finding up to 81 individuals (including adults, juveniles and metamorphs) over five 1-4-day survey periods. Anecdotal reports of a population boom in the 2009-10 breeding season suggest "thousands of individuals" were present – presumably most of these were juveniles or metamorphs but this is not stated. The population is reported to be of a similar size as the impact site, meaning density is much lower. However, no detailed population estimates have been attempted. The population is likely to be important to the viability of the wider Brundee population, based on its location adjacent to other GGBF habitat, presence of breeding habitat and that the species is reported to disperse from the site.	3
Total		<i>NOTE: The department's Environmental Offsets Policy states that any direct offset must meet, as a minimum, the quality of the habitat at the impact site. Where a proposed offset site has a lower habitat quality than that of the impact site, the offset must be managed and resourced over a defined period of time so that its habitat quality is improved to meet the quality of the habitat originally impacted.</i>	8

Time until ecological benefit		Based on the type of management proposed and the habitats present, it seems reasonable that the ecological benefit could be achieved within 10 years.	10
Future Quality			
Without offset		The proponent engaged GGBF expert, Gary Daly (Gaia Research), to describe the existing and likely ongoing impacts of current land uses on the site, particularly cattle grazing and agricultural activities, and their impacts on the GGBF. Existing land uses do have a negative impact on GGBF habitat, and these impacts would be likely to degrade the quality of GGBF habitat over the next 10 years. These include grazing and trampling of emergent aquatic vegetation, soil compaction, burning and slashing. In particular, grazing of the swamp during droughts has the potential to impact on GGBFs at times when the population is most vulnerable.	7
With offset		Existing land use practices have been demonstrated to be having a detrimental impact on the quality of GGBF habitat at the site. Due to the nature of the impacts and the types of habitat present on the site, the removal of those impacts would be expected to allow the regeneration of native vegetation in the swamp, and result in an improvement in the quality (condition and possibly carrying capacity) of the site in relation to the GGBF.	9
Risk of Loss within 20 yr			
Without offset		<p>The majority of the Brundee offset site is zoned as E3 – Environmental Management, with the remainder zoned RU2 Rural Landscape (Shoalhaven LEP 2014).</p> <p>Despite the current zoning and the flood liability of the land, the proximity of the site to areas experiencing high population growth and residential development warrants consideration in determining the risk of loss. There is the possibility that the zoning of the site could change again in the future and the site be subjected to a higher risk of development and this is reflected in the risk of loss score.</p> <p>However, based on the landscape position and current zoning of the land, the risk of loss is expected to be</p>	10%

		relatively low.	
With offset		<p>The proponent states that they are expecting the site to be included in the National Parks estate. This would afford a high level of protection to the offset, and seems reasonably likely since the site adjoins an existing nature reserve. In the event that the site is not put under National Parks ownership and management, it is expected that the proponent would propose an appropriate long-term secure tenure arrangement for the site, such as a Biobanking agreement, however these details are yet to be finalised.</p> <p>The risk of loss with offset is considered to be very low, but this score is based on the premise that the site is put into a secure long-term land tenure, such as Nature Reserve or Biobanking Agreement.</p>	1%
Confidence in result			
Risk of loss		The Department is confident in the accuracy of the values calculated for risk of loss with and without offset, based on the reasoning given above.	80%
Habitat quality change		The proponent has presented sufficient evidence to support the assertion that the quality of the GGBF habitat would improve if the site was used as an offset and that it would decline if the site was not used as an offset. The Department is confident that the scores for habitat quality change are likely to be accurate.	80%

Australasian Bittern

Table 4. Australasian Bittern impact site calculations – T4 Project site.

Attribute	Weighting	Reasoning	Score
Quality			
Condition	3	The impact site contains 27 ha of wetlands suitable for the Australasian Bittern (AB). Permanent and ephemeral wetlands are present. The presence of a pair of birds indicates possible breeding on site and high habitat quality. Although wetlands are situated in highly disturbed landscape, the habitats used by the AB are evidently in good condition in relation to the ecological requirements of the species, based on the number of records and pair of birds recorded.	2
Context	4	The impact site is part of geographically distinct regional population (in the Lower Hunter: Umwelt 2012). It is situated within a complex of wetland habitat within the Hunter Estuary and Lower Hunter region, which the AB is able to move around freely (Umwelt 2012). The site probably represents around half of the home range area requirements of a pair of ABs (which is thought to be 40-50 ha: Marchant and Higgins 1990 cited by Umwelt 2012). The habitat of the AB in this region has been subject to incremental historic losses and these are expected to continue. The area of habitat available and the size of this regional population are not known.	3
Species stocking rate	3	Considering the size of the site, the number of records of this species using the site (four by Umwelt during T4 Project surveys) is significant, more so given that a pair of birds has been recorded on the site by Umwelt. The species stocking rate could not be expected to be higher.	3
Total	10		8

Table 5. Australasian Bittern offset site calculations – Brundee offset site.

Attribute	Weighting	Reasoning	Score
Quality			
Condition	3	The Brundee offset site contains suitable permanent wetland habitat, and possibly ephemeral wetlands, for the AB. Umwelt has made three recent records of the species, including a pair flushed on the site. Juveniles are reportedly known from the site (Umwelt 2013). These factors all indicate good condition of habitat. However, information provided by the proponent also indicates current land uses are causing ongoing degradation to the site and that condition of habitat could be improved with changed management.	2
Context	4	The occurrence of the AB at the Brundee offset site is probably part of continuous coastal population occupying lowland swamps along the coastal plain between Wollongong and Nowra. Occurs adjacent to wetland habitat in Brundee Swamp Nature Reserve, although this reserve has a problem with Swamp Oak incursion into wetland habitats which reduces habitat quality for this species. Site could be near southern limit of regional occurrence of species between Wollongong and Nowra.	3
Species stocking rate	3	With a pair recorded, three recent records from limited survey effort and previous records of juvenile birds on the site, species stocking rate is likely to warrant maximum value.	3
Total			8
Time until ecological benefit		Based on the type of management proposed and the habitats present, it seems reasonable that the ecological benefit could be achieved within 10 years.	10
Future Quality			
Without offset		Information provided by the proponent demonstrates that existing land use practices (e.g. grazing, burning and slashing) are having an ongoing negative impact on the AB habitat on the site. Within 10 years, it is likely that this	7

		would lead to a decrease in the quality of the habitat by one point.	
With offset		As described for the GGBF above, removing current management practices that are having a negative impact on AB habitat would be likely to result in the regeneration and improvement in quality (condition) of the freshwater wetland systems on the site that provide habitat for the AB. Ongoing management of the site to explicitly provide habitat for the AB (and GGBF) increases the likelihood of the quality of AB habitat improving with 10 years.	9
Risk of Loss within 20 yr			
Without offset		<p>The majority of the Brundee offset site is zoned as E3 – Environmental Management, with the remainder zoned RU2 Rural Landscape (Shoalhaven LEP 2014).</p> <p>Despite the current zoning and the flood liability of the land, the proximity of the site to areas experiencing high population growth and residential development warrant consideration in determining the risk of loss. There is the possibility that the zoning of the site could change again in the future and the site subjected to a higher risk of development and this is reflected in the risk of loss score.</p> <p>However, based on the landscape position and current zoning of the land, the risk of loss is expected to be relatively low.</p>	10%
With offset		<p>The proponent states that they are expecting the site to be included in the National Parks estate. This would afford a high level of protection to the offset, and seems reasonably likely since the site adjoins an existing nature reserve. In the event that the site is not put under National Parks ownership and management, it is expected that the proponent would propose an appropriate long-term secure tenure arrangement for the site, such as a Biobanking agreement, however these details are yet to be finalised.</p> <p>The risk of loss with offset is considered to be very low, but this score is based on the premise that the site is put into a secure long-term land tenure, such as Nature Reserve or Biobanking Agreement.</p>	1%
Confidence			

in result			
Risk of loss		The department has a relatively high level of confidence in the accuracy of the values calculated for risk of loss with and without offset, based on the reasoning given above.	80%
Habitat quality change		The proponent has presented sufficient evidence to support the assertion that the quality of the GGBF habitat would improve if the site was used as an offset and that it would decline if the site was not used as an offset. The Department is confident that the scores for habitat quality change are likely to be accurate.	80%

Table 6. Australasian Bittern offset site calculations – Tomago offset site.

Attribute	Weighting	Reasoning	Score
Quality			
Condition	3	Site contains suitable wetland habitats; the AB has been recorded in and around the site during surveys reported; wetland is described as “ <i>may be ephemeral</i> ”, and therefore may not provide year-round habitat.	2
Context	4	The site is situated in the Hunter Estuary, as part of a mosaic of wetland habitats used by this species, and provides habitat for the same geographically distinct regional population as the impact site. However, the site is relatively small and the year-round availability of the habitat is uncertain.	2
Species stocking rate	3	Surveys for the AB have been undertaken by the proponent as part of the assessment for the project, including targeted surveys on seven occasions on the site. The Hunter Bird Observers Club has also undertaken some survey work in this area but their survey methods and effort is unknown. One AB is reported to have been recorded in habitat adjacent to the site and a pair of birds was recorded on the site in January and July 2012, respectively. Given the relatively small size of the site and the moderate amount of effort put into surveys for this species, the two separate AB records, including a pair of birds, suggests that the species occurs at the site at fairly high density.	2
Total		NOTE: <i>The department’s Environmental Offsets Policy states that any direct offset must meet, as a minimum, the quality of the habitat at the impact site. Where a proposed offset site has a lower habitat quality than that of the impact site, the offset must be managed and resourced over a defined period of time so that its habitat quality is improved to meet the quality of the habitat originally impacted.</i>	6
Time until ecological benefit		Based on the information provided, it is considered possible that the predicted degradation of AB habitat quality at the offset site could take place within 10 years.	10
Future Quality			

Table provided by Commonwealth Department of Environment

Without offset		<p>The proponent states that two factors are operating against the quality of the AB habitat on the site:</p> <ul style="list-style-type: none"> deterioration of floodgates controlling tidal flows into the site, causing saline water to enter freshwater wetlands on the site and encroachment of Swamp Oak forest into AB habitat. <p>Sufficient information has not been provided for the department to make a confident assessment as to the likely effects of these processes on the quality of the AB habitat on the site over the next 10 years. However, based on the information provided, the department has accepted the proponent's conclusion that the habitat quality score could be reduced by the equivalent of two points over the period.</p>	4
With offset		<p>The proponent has stated that they will retain the freshwater wetland characteristics of the rice paddy site and prevent degradation of AB habitat through saline water intrusion by repair of flood gates that allow saline water into the site. There has been no information provided to indicate that the quality of the AB habitat at this site would be improved beyond its current state.</p>	6
Risk of Loss within 20 yr			
Without offset		<p>The PPR states that the Tomago offset site is part of a State Significant site listed under NSW <i>State Environmental Planning Policy (Major Development) 2005</i>, which zones the site E2 Environmental Conservation. The objectives of this zone include: to protect, manage and restore areas of high ecological values and to prevent development that could destroy or damage those values.</p> <p>On this basis, the risk of loss of the AB habitat from the "rice paddy" wetland without the offset is low.</p>	5%
With offset		<p>The proposal does not include a mechanism for the ongoing legal protection of the offset site, but states that the proponent's intention is to hand over the site to the NSW national Parks and Wildlife Service, who manage the adjacent national park. It is expected that a suitable arrangement could be made to reduce the risk of loss under this management to a negligible level and this is reflected in the score given, however these details are yet to be</p>	1%

		finalised.	
Confidence in result			
Risk of loss		Based on the information provided and available on NSW State Government website (zoning maps and descriptions), the Department is very confident in the risk of loss score for this site.	90%
Habitat quality change		Based on the lack of detailed information provided on the current state of the habitat and how the site would be managed, the Department is only moderately confident in the accuracy of the scores provided for habitat quality change.	60%



Planning Assessment Commission
GPO Box 3415
Sydney NSW 2001

Dear Commissioners

NSW Health appreciates the opportunity to provide comments to the Planning Assessment Commission on potential health issues associated with air pollution from the proposed PWCS Coal Terminal 4.

Health effects of Particulate Matter (PM)

As discussed, there is a substantial body of evidence from which to conclude that short-term and long-term exposure to fine particulate matter (PM_{2.5}) causes cardiopulmonary disease. Short-term exposure is thought to exacerbate pre-existing illness (such as asthma, ischaemic heart disease and COPD) and may also cause upper respiratory tract irritation. Long-term exposure is thought to induce chronic cardiopulmonary disease and accelerate its progression. It should be noted that, based on current evidence, long-term exposure to PM_{2.5} is responsible for the majority of the air-pollution-related burden of disease.

There is also evidence that suggests short-term exposure to coarse particles (PM_{10-2.5}) may causes cardiopulmonary effects. There is much less evidence of associations between long-term exposure to PM_{10-2.5} and health effects. This should not be interpreted to mean these particles do not have a health effect. The current lack of evidence could be related to difficulties in measuring a population's exposure to air pollutants that exhibit substantial spatial variation in concentration.

The World Health Organization's most up-to-date summary of the evidence is available here: http://www.euro.who.int/_data/assets/pdf_file/0004/193108/REVIHAAP-Final-technical-report-final-version.pdf. Question A2 on page 10 considers the evidence of coarse particles.

There is little evidence of a threshold below which exposure to PM is not associated with health effects. Therefore, any increase in exposure should be assumed to have a negative impact, even at levels below current assessment criteria. This is the reason for NSW Health's view that, even when modelled PM impacts comply with assessment criteria, a proponent should be required to take all reasonable and feasible measures to minimise any increase in exposure.

As you requested, NSW Health has undertaken a simple calculation to estimate the risk associated project-related PM_{2.5} emissions. This calculation is based on the T4-related increases in annual average PM_{2.5} levels at the various locations documented in table 12.7 of the air quality assessment. It indicates an increase in annual risk of mortality for people residing at these locations in the range 3×10^{-5} to 6×10^{-6} . People residing further from the proposed project would be at lower risk. There are a large number of assumptions and simplifications in this calculation (for example, it is assumed that those exposed have the average mortality rate of any NSW person aged over 30). However, the results provide some indication of the magnitude of risk for those exposed to the highest levels of project-related pollution.

If a suitable decision making framework exists, estimates of mortality risk could be used to inform management. An international example of such a framework is the approach taken by the UK Health and Safety Executive. The HSE framework uses defined threshold levels of risk to determine the necessary level of mitigation. An increase in annual risk of mortality of less than 1×10^{-6} is defined as so small as to be "broadly acceptable". Risks in the range 1×10^{-4} to 1×10^{-6} are

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considered "tolerable" so long as they are minimised insofar as is reasonably practicable. A risk of greater than 1×10^{-4} for any member of the public is considered "unacceptable" under any circumstance.

In Australia, similar risk-based concepts have been applied. For example, the Australian Drinking Water Guidelines criteria for carcinogenic chemicals are generally set to ensure that the lifetime risk of cancer associated with consumption of water is less than 1 in a million.

The Secretary's Preliminary Environment Assessment Report

NSW Health has reviewed the Secretary of the Department of Planning and Environment's Preliminary Environment Assessment Report. The report takes into account the issues raised in NSW Health submissions. It emphasises that the conditions of approval should include the requirement to mitigate the impacts of particulate matter, even though assessment criteria are not expected to be breached.

Health Risk Assessment

In general terms, NSW Health believes that a health risk assessment (HRA) can provide valuable information in any development where significant health risks will need to be managed or where there is significant public concern about potential or perceived health risk. An important part of the HRA is consultation with relevant stakeholders (including the affected community) to identify the issues to be addressed and so it is important that it is commenced at the beginning of the assessment process. In this instance, predicted changes in $PM_{2.5}$ levels are relatively small and, arguably, it may be too late for the proponent to engage the community effectively on these matters. NSW Health would support and provide a critical appraisal on a HRA if the PAC believes it would assist its decision making. However, while an HRA would have saved NSW Health considerable time in assessing the potential health risks and provided relevant stakeholders feedback on their concerns, we have already invested heavily in interpreting and analysing the information already provided in the EIS from a health risk perspective, and as noted above consider that the community engagement phase has now been overtaken in the process.

Future standards

As discussed, air quality standards change over time as knowledge of the effects air pollution improves. For example, since the Ambient Air Quality NEPM was introduced in the late 1990s, it has been changed to include an advisory reporting standard for annual and 24hr average $PM_{2.5}$ concentration. Currently, the National Environment Protection Council is consulting on proposed changes to the NEPM particle standards and the possibility of introducing an "exposure reduction framework". Therefore, it is not unlikely that future standards will be different to today's, which could have implications for the conditions placed on projects in the future. This is mainly an issue when developments may be significantly delayed.

Should you require any further information, please contact Dr Richard Broome, Deputy Director of Environmental Health on 9424 5918.

Yours sincerely



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Health Protection NSW