Wallarah 2
COAL PROJECT

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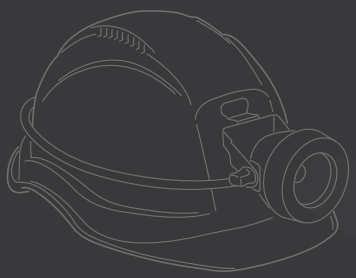
Residual Matters Report

October 2013



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WALLARAH 2 COAL PROJECT

RESIDUAL MATTERS REPORT

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October 2013

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for

Wyong Areas Coal Joint Venture

1 INTRODUCTION

On 13 October 2011, Wyong Areas Coal Joint Venture (WACJV) made an application to the Department of Planning and Infrastructure (DP&I) for Director-General's Requirements (DGRs) under Part 2 of Schedule 2 of the *Environmental Planning & Assessment Regulation 2000* (EP&A Regulation). This request was supported by the 'Wallarah 2 Coal Project Background Document' (Hansen Bailey, 2011). The DGRs were subsequently issued by DP&I on 12 January 2012.

Following the issuance of DGRs, the 'Development Consent Application' and supporting 'Wallarah 2 Coal Project Environmental Impact Statement' (EIS) (Hansen Bailey, 2013) was prepared and ultimately placed on public exhibition for eight weeks from 26 April 2013 to 21 June 2013.

A total of 748 submissions (including 20 regulatory agencies) were received by DP&I during and following the eight week public exhibition of the EIS. The 'Wallarah 2 Coal Project Response to Submissions' (Hansen Bailey, 16 September 2013) (RTS) was prepared on behalf of WACJV to support SSD-4974 under section 78A(8A) of the EP&A Act. The RTS document responds to the submissions raised by stakeholders during the public exhibition period.

DP&I provided this document on 17 September 2013 to various regulatory authorities who provided a submission to the public exhibition of the EIS and requested responses within 10 working days (i.e. 1 October 2013).

Table 1 indicates regulators to which the RTS was provided, the date each responded, whether there are residual (outstanding issues) and if so, where each is responded to this in document. Regulatory submissions are reproduced in **Appendix A**.

Table 1
Regulatory Review Summary of RTS

Ref	Regulator	Date of Response	Response Required	Where Addressed
1.	Australian Rail Track Corporation (ARTC)	1 October 2013	No	**2.2**
2.	Transgrid	1 October 2013	No	**2.3**
3.	NSW Heritage	2 October 2013	No	**2.9**
4.	Department of the Environment (DoE) *	4 October 2013	No	**2.10**
5.	Hunter-Central Rivers Catchment Management Authority (HCRCMA)	1 October 2013	Yes	**2.11**
6.	Transport for NSW (TfNSW)	1 October 2013	Yes	**2.12**
7.	Transport Roads & Maritime Services (RMS)	25 September 2013	No	**2.1**
8.	Railcorp	15 October 2013	No	**2.8**
9.	Central Coast Water Corporation	2 October 2013	Yes	**2.13**
10.	NSW Office of Water (NOW)	4 October 2013	Yes	**2.14**
11.	Fisheries NSW	4 October 2013	Yes	**2.6**
12.	Crown Lands	4 October 2013	Yes	**2.7**
13.	Office of Agricultural Sustainability & Food Security (OAS&FS)	3 October 2013	Yes	**2.4**
14.	Forestry Corporation NSW	14 October 2013	No	**2.5**
15.	Central Coast Public Health Unit (NSW Health)	9 October 2013	Yes	**2.15**
16.	Environment Protection Authority (EPA)	9 October 2013	Yes	**2.16**
17.	Office of Environment & Heritage (OEH)	3 October 2013	Yes	**2.18**
18.	Lake Macquarie City Council (LMCC)	Received 17 October 2013	Yes	**2.17**
19.	Mine Subsidence Board	Not Received	N/A	NR
20.	Wyong Council	Not Received	N/A	NR

N/A = Not received. NR = Response not required.

**Formerly the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC).*

2 ENVIRONMENTAL AND SOCIO-ECONOMIC ISSUES

This section provides residual regulatory issues indented and in italics; with WACJV's response in normal type. The regulatory submissions are reproduced in full in ***Appendix A****.*

2.1 ROADS AND MARITIME SERVICES

The response from RMS dated 25 September 2013 advised that the RTS has addressed all issues raised in RMS's submission and there are no additional issues.

No further response from WACJV is required.

2.2 AUSTRALIAN RAIL TRACK CORPORATION

The response from ARTC dated 1 October 2013 notes that 'there are no outstanding issues related to the Wallarah 2 Coal Project submission'.

No further response from WACJV is required.

2.3 TRANSGRID

The response from Transgrid dated 1 October 2013 advised that WACJV had consulted with Transgrid regarding the issues previously raised by Transgrid's.
Transgrid also noted it will continue to co-operate with WACJV in determining the feasibility of different options in relation to the network safety and reliability of Transgrid's high voltage electricity network in the vicinity of the Project.

No further response from WACJV is required.

2.4 OFFICE OF AGRICULTURAL SUSTAINABILITY & FOOD SECURITY

The response from OAS&FS states that the RTS 'adequately covered the agricultural production issues'.

It further states that a condition should be included to require the proponents for develop a Property Subsidence Management Plan (PSMP) negotiated with potentially affected property owners that addresses remediation of any damage to agricultural infrastructure such as buildings water bores, fencing, dams and turf growing and horse establishments.

OAS&FS *also recommends that the Proponent should commit to covering the cost of any agreed management response to restore groundwater supplies to agricultural enterprises, if affected by subsidence.*

Consistent with References 1 and 7 in Table 11 Project Management & Monitoring Measures of the RTS, WACJV will prepare a Subsidence Management Plan (SMP) (and associated individual PSMPs) in accordance with conditions of Development Consent and any mining Lease issued for the Project to the approval of relevant regulators.

The PSMPs will be progressively completed for all landholders (including all agricultural enterprises) within the Subsidence Impact Limit (SIL) as shown Figure 7 and 14, respectively in the EIS.

Section 7.2.4 of the EIS (Groundwater) states "there is the potential for subsidence to cause damage to private groundwater bores and wells. Where necessary, WACJV will repair or replace damaged bores".

2.5 FORESTRY CORPORATION OF NSW

The response from the Forestry Corporation of NSW dated 14 October 2013 advised that it did not have any further comments in relation to the RTS.

No further response from WACJV is required.

2.6 FISHERIES NSW

The response from Fisheries NSW on 4 October 2013 requested:
"(i) Prior to mining commencing, the applicant must include details of stream remediation as part of the Surface Water Monitoring Plan in the event that subsidence, vertical leakage, fracturing, change in slope or increased erosion of creek lines occur.
(ii) Fisheries NSW are to be consulted on the development of the Biodiversity Management Plan and Surface Water Monitoring Plan to address monitoring of subsidence impacts on aquatic ecosystems."

WACJV agrees with Fisheries NSW comments and looks forward to consulting with the department should Development Consent be granted.

2.7 CROWN LANDS

Crown Lands advised its earlier comment apply. These are that the surface construction for the project at Tooheys Road appear to affect Crown public road at the Tooheys Road/F3 intersections. Should this be the case then acquisition of the affected Crown land will be required."

Further consultation with Crown Lands occurred with a response provided on 17 October 2013 confirming that Crown Lands is satisfied with the response "The construction of the Tooheys Road Site and rail spur will occur on Crown Land. WACJV will consult with NSW Crown Land regarding the necessary acquisition of Crown Land."

2.8 RAILCORP

The response from RailCorp dated 15 October 2013 advised that it did not have any further comments in relation to the Wallarah RTS.

No further response from WACJV is required.

2.9 NSW HERITAGE

The response from NSW Heritage dated 2 October 2013 did not raise any additional issues, however provided the following comments:

- "*The preparation of a* [Historic Heritage Management Plan] *HHMP is considered an appropriate step and this should be conditioned as a part of the consent.*
- *The HHMP must include stop-works procedures should any unexpected archaeological relics or objects be located. These need to include assessment by an appropriately qualified person and notification to the Heritage Division.*
- *The map and list in the HHMP needs to include the 13 known and 19 potential heritage items.*
- *A procedure for the mitigation of impacts on any of these items need to be included in the HHMP to cover any unexpected impacts or works near to these items.*"

As noted in the EIS and RTS, these issues will be included in the HHMP to be developed in consultation with NSW Heritage.

2.10 DEPARTMENT OF THE ENVIRONMENT

The response from the DoE (formerly SEWPaC) dated 4 October 2013 advised that it did not have any further comments in relation to the RTS.

DoE did note that on page 74 of Attachment B "Consolidated Submission Issues" comment 733 incorrectly lists the Glossy Black Cockatoo, Yellow Bellied Glider and NSW population of the Masked Owl as being EPBC listed threatened species, which they are not.

Comment 733 is a submission from SIG1 and not an error of the EIS or RTS.

2.11 HUNTER CENTRAL RIVERS CATCHMENT MANAGEMENT AUTHORITY

The response for the HCRCMA dated 1 October 2013 identified two issues that requested further clarification.

2.11.1 Stream Erosion

HCRCMA suggests there is a potential for mine subsidence to result in accelerated erosion of the fluvial system. The HCRCMA's response asserts that the impact of subsidence on stream bed gradient has been misstated as follows:

The response states (page 67) " ... this 1% change in gradient is the maximum tilt that is predicted to occur at a specific point along Jilliby Jilliby Creek as opposed to the change in the average gradient along the entire length of the creek"

The response says '1% change in gradient'. This is incorrect. The change in gradient is from 0.13% to 1%; hence the 'change in gradient' is 760%, not 1%.

The HCRCMA's response also asserts that changes in gradient due to subsidence will result in head-cuts.

Section 3.3.5 of the RTS states "this 1% change in gradient is the maximum tilt that is predicted to occur at a specific point along Jilliby Jilliby Creek". The intended meaning of the statement is that the actual gradient at any point along the creek may increase by up to an additional 1% (or 10 mm/m). The '1% change in gradient' does not refer to the orders of magnitude that the gradient will increase by relative to existing slope. That is, the statement did not intend to mean that the slope may increase by 1% of the existing slope.

The conclusions in Section 3.3.5 are not affected by any potential misinterpretation of this statement. The assessment of potential impacts on stream erosion identified locations where erosion potential is increased. However, the increased velocities and stream powers at these locations are within the range of values currently experienced along Jilliby Jilliby Creek, and therefore the increase in erosion potential is less than the increase in channel slope.

An adaptive management approach is proposed for the Project, which is based on monitoring to identify initiation of increased erosion (if it occurs) and undertake structural intervention tailored to the nature and scale of impact. This is a common approach to the management of mine subsidence. Under an adaptive management approach, there is a risk that some erosion damage may occur before mitigation measures can be constructed. However, the alternative of pre-emptively constructing bed stabilisation structures also presents some risks.

Pre-emptive bed stabilisation at locations of increased erosion potential will involve disturbance of riparian vegetation, which plays a key role in the stability of the existing channel bank. Pre-emptive construction of bed stabilisation structures is not warranted as the predicted post-subsidence erosion potential is comparable to existing erosion potential in reaches along the creek that are stable. Due to the high natural variability of hydraulic conditions along a natural creek system, combined with potential differences between actual and predicted subsidence, it is possible that erosion impacts may be greater or less than predicted and may not occur at the predicted location. Hence, it is possible that pre-emptively constructed bed stabilisation works could be redundant or ineffective. For these reasons, the adaptive management approach is preferred and has been preferred.

2.11.2 Biodiversity Offset Package

The HCRCMA notes that the RTS page 110 states " ... there will be no net loss of biodiversity, which is consistent with the required 'Maintain and Improve' principles of the Native Vegetation Act 2003" and believes that this statement is incorrect.

*The HCRMCA further states that the "… Biodiversity Offset Package (BOP) and Biodiversity Management Plan (BMP) are **not** consistent with the 'improve or maintain' principle of the Native Vegetation Act 2003:*

- *Offset ratios are inadequate; at less than 3.4:1 these offset ratios do not meet the 'improve or maintain' principle of the NV Act.*

- *The proposal involves the clearing of 12.2 ha of Endangered Ecological Communities (EECs).*
- *The clearing of EECs are not permitted under the NV Act unless in low condition, hence the proposal does not meet the 'improve or maintain' principle of the NV Act.*
- *The rehabilitation of areas of derived native grassland and exotic grassland to Woodland does not meet the 'improve or maintain' principle of the NV Act."*

We recognise that the offset package proposed for the Project may not meet the principle of 'improve or maintain' under the NV Act specifically however, Section 25 of the *Native Vegetation Act 2003* (NV Act) provides that the provisions of the Act do not apply in certain circumstances. Pursuant to section 25(l), the NV Act does not apply to vegetation clearing authorised under the *Mining Act 1992*.

Therefore, the objects of the NV Act (section 3), including the 'improve or maintain' principle do not apply to the Project should Development Consent and a subsequent mining lease be granted.

By virtue of Section 89J of the *Environmental Planning & Assessment Act 1979*, an authorisation under Section 12 of the NV Act is not required to clear vegetation if a Development Consent is issued under Division 4.1 of Part 4 for the Project.

Despite the above, a robust BOP has been developed for the Project in consultation with and to the satisfaction of OEH and DoE (formerly SEWPaC) (see **Section 2.18** and **2.10** respectively). The BOP has been developed in consideration of the requirements under the *Threatened Species Conservation Act 1997* and *Environment Protection Biodiversity Conservation Act 1999*.

2.12 TRANSPORT FOR NSW

The response from TfNSW dated 1 October 2013 stated that 'most issues previously raised by TfNSW appear to be adequately addressed'. However the response raises one new issue.

"The 200 m radius curves cited for the loading facilitate are below what is considered optimum for mitigating wheel squeal. Other mitigation measures may be required."

Section 7.8.4 of the EIS and Section 3.8.2 of the RTS commits to a design with curve radii of at least 200 m. The configuration of the conceptual rail loop is shown in (at least) Figure 19 of the EIS with further conceptual design detail in Figure 21 of the RTS. The conceptual rail loop consists of four curved sections; with radii of R500 left, R500 right, R200 right and R800 right. The conceptual configuration of the rail loop is consistent with the RailCorp Engineering Standard (Railcorp, 2013) which prescribes a minimum curve radius of 160 m.

The Noise and Vibration Impact Assessment (NIA) in Appendix N of the EIS states that 'curves within the rail loop and spur line designed with radii not less than 200 m.

Investigations and observations at similar coal handling facilitates (Kooragang Island Coal Loader (200 m), Wallsend Colliery (200 m), Tahmoor Colliery (200 m), Baalbone Colliery (200 m), Charbon Colliery (200 m)) have shown for rail curves greater than 200 m rail/wheel interface noise (rail squeal) was not identified …".

WACJV will consult with TfNSW in relation to the final design of the loop, including consideration of appropriate mitigation measures, as required.

2.13 CENTRAL COAST WATER CORPORATION

2.13.1 Table 12 Guidance for Further Assessment

"The submissions report does not appear to adequately recognise or consider Table 12 Guidance for further assessment/validation and monitoring contained in the report by PMS which was a key and emphasised element of our submission."

To assist the Central Coast Water Corporation in locating where each of its matters is addressed, Table 12 of its submission is reproduced below with an additional column which indicates where each is addressed in the EIS and/or the RTS.

Table 2
Table 12 from Central Coast Water Corporation EIS Submission

Item of Uncertainty	Importance	Measures	Response
Subsidence	High	Accurate measurement of surface subsidence is expected to be undertaken by the mine if and when mining occurs. This must be calibrated against an accurate map of conditions prior to mining. The record must also include detailed survey of all properties, infrastructure and structures that may be affected by subsidence along with comprehensive dilapidation assessments. Agreement with all stakeholders and landowners must be gained as to the extent and infrastructure to be assessed for impact due to subsidence.	EIS Section 7.1.4 and 3.1.7 of the RTS
Subsidence Model	High	A hold point after an agreed number (possibly 5) of longwalls have been extracted and the SCT and MSEC models validated and recalibrated as necessary.	3.1.7 of the RTS
Subsidence - potential variability in modelling results.	Medium	The influence of UCS -Sonic correlation UCS -modulus correlation and stress regime on the prediction of subsidence must be validated -as is proposed by the EIS.	EIS Section 7.1.4
Subsidence -impact of pillar yielding on subsidence and the ability to validate predictions	Medium	A comparison of impacts with and without the influence of pillar yielding. A program of pillar performance measurement including convergence measurements and extensometer readings.	Section 3.1.2 of RTS

Item of Uncertainty	Importance	Measures	Response
Mine Plan	Medium	It Is likely, or even inevitable that the Mine Plan and layout of longwall panels will change during the life of the mine. This is particularly so after the process of validation of the subsidence modelling has been completed following initial mining of the first longwall panels (minimum of 4). Modification to the Mine Plan and longwall panel layout will alter the extent and location of subsidence and the location of impacts on flooding, access routes and stream flows. A clear process must be set out for the assessment and approval of revised mine plans and must include Council. Assessments of the Impacts of Mine Plan change include subsidence magnitude and extent, potential impact on groundwater modelling, Impact on flooding and stream flows/ponding.	Section 3.4.12 of RTS
Sampling of rock mass -impacts on groundwater modelling	High	In order to confirm the EIS assumption and reduce uncertainty on the extent and connectivity (tortuous) of the defect system within the "aquatard" which is relied upon in the modelling factual data should be provided. If this data is not available then within the existing mine database, or other sources additional exploration cored boreholes drilled at an angle to the horizontal plane of say 60' should be implemented. Drilling would need to be undertaken in the Dooralong Valley and in the lower reaches of the Yarramalong Valley to target rocks below the alluvial soils. Drill holes to extend to at least the base of the "constrained zone" from subsidence modelling. The location and number of such holes is not recommended here, but should be of sufficient number to provide confidence in the result when used in conjunction with other available data. These angled holes could also be used to undertake further in-situ permeability testing by means such as Packer or Constant Head testing.	Section 3.2.2 of RTS
Permeability of Patonga Claystone-impacts on groundwater modelling	High	Specific testing of the permeability of the rock mass below the alluvial soils in the valleys be undertaken to confirm EIS assumptions, or otherwise. The assumptions, and hence impacts of the EIS groundwater modelling must be confirmed prior to mining below any alluvial areas. Testing to be in inclined, cored boreholes. Holes must be logged to allow permeability testing to be carefully targeted to allow assessment of vertical and horizontal defects. Possible methods to test the rock mass permeability comprise; • Packer testing. • In-situ Constant Head testing. • Full scale in-situ pump testing targeting the impacts of dewatering below the Patonga Claystone formation. We acknowledged that these tests are expensive and time consuming and alternate methods may be appropriate. We recommend the former two methods be employed as a first phase of testing. Testing should comprise a suitable number of locations and successful tests to be meaningful. The final number is likely to be subject to the results of the works at the time. A minimum of 6 test holes is suggested.	Section 3.2.2 of RTS
Impact on Groundwater Levels	High	Should the mine be approved a comprehensive system and regime of groundwater level monitoring must be implemented. This will require a robust system of new and existing monitoring wells and/or piezometers that are able to survive the predicted subsidence impacts. Monitoring points must be read on a frequent basis and compiled into a central database which is not only open for access by Council, but the data must be reviewed and assessed for its 'meaning' on a regular basis.	Section 3.2.16 of RTS and Section 7.2 of EIS

Item of Uncertainty	Importance	Measures	Response
		This system should be augmented by measurement of levels and yields from water bores in the valleys.	
Impact on Stream Flows	High	Monitoring of streamflow and inputs that influence alluvial lands water table recharge must be ascertained to allow assessment of the impact of groundwater leakage/loss. Aspects that must be monitored include: • Rainfall and runoff across the catchment area for Wyong River and Jilliby Jilliby Creek, • Stream Flows -measured at multiple points along the various streams. As a minimum this must comprise Jilliby Jilliby Creek upstream of the mine area, upstream and downstream of the confluence with Little Jilliby Jilliby Creek and just upstream of the confluence with Wyong River. Wyong River upstream of the mine area -say at Duffy's Point, just upstream and downstream of the volcanic intrusion along the southern edge of the mine -say about 500 m upstream of Chandlers Creek and about 700/800m upstream of Kidmans Lane, just upstream and downstream of the confluence with Jilliby Jilliby Ck. Little Jilliby Jilliby Creek just upstream of the confluence with Jilliby Jilliby Creek and say just as the creek enters the upper forested area. These points could also be used to monitor water quality as necessary.	Section 3.2.4 and 3.3.3 of RTS
Flood Remediation to Access Roads	Medium	The impact of potential remedial works to access roadways must be understood prior to undertaking such works with regard to the impacts on future flood levels. Models for the 1%AEP and 20% AEP must be developed, assessed and agreed. Further, the method and design of remedial works and the maintenance implications for the future must be understood and agreed with Council.	Section 3.4.7 of RTS
Stream Stability (and ecology)	Medium	Specific and measurable/quantifiable targets must be agreed and established concerning stream stability and the impacts on erosion (as well as flora and fauna) so all parties understand where they stand if the mine Is approved. This is particularly so given the very difficult nature of assessment of what is adverse and what is not as a result of the mine.	Section 3.3.5 of RTS
Risk Assessment	High	A detailed and comprehensive risk assessment must be undertaken to provide a framework against which reasonable adaptive management programmes can be developed, and assessed.	Section 3.26 of RTS
Adaptive Management	High	Specific, measurable and agreed targets or levels from monitoring must be established prior to any underground works to allow all stakeholders certainty about what the aims of any adaptive management programme are. These should be based on the results of a comprehensive quantitative risk assessment and possibly cost benefit assessment. Targets may include loss of stream flows, lowering of water levels/pressures in monitoring bores and levels of subsidence. Further, the targets must be accompanied by agreed responses otherwise the management system would be reduced to an impotent and disingenuous process. Agreed responses may be as minor as "continue to monitor / watch" to as strong as "cease mining" or to quarantine sensitive areas from mining. It may be considered that it Is not possible to sufficiently confirm through monitoring the level of streamflow loss. In that case It may be that a proportion of the mine inflow water is deemed to be from streams and an agreed method and distribution of this proportion of mine water is treated and repatriated to streams, users/residents and areas of significant flora.	EIS Section 7.1.4 and 3.1.7 of the RTS

Item of Uncertainty	Importance	Measures	Response
Independent Impact Monitoring Authority	Medium	An independent body be established)to install, monitor and maintain all me groundwater, surface water and surface level impacts of the mine both during and after operation - this is particularly so given the EIS stated length of impact on groundwater and uncertainty on the speed with which pillar yield may impact subsidence. This body must be guaranteed funding to not only establish the monitoring system, but to maintain it as the impacts of subsidence and the long mine life will require significant repairs and timely replacement of equipment and monitoring points/ instruments. Indeed, replacement of instrument/monitoring points should not take longer than say 2 months to maintain continuity of measurements. It is also recommend the monitoring authority be given either a direct, or at the least oversight role in the assessment of impacts and on the assessment of compensation for damage/loss or the development of remedial works/measures to control/limit the impacts of the mine -judged against the specific targets of the Adaptive Management Plan -and as such must be able to undertake, or direct the mine to undertake additional investigations and/or assessments with regard to subsidence, groundwater and surface water. The records and recommendations of the authority should be available on the public record.	See response below table

Monitoring will be conducted as indicated in the EIS as well as any additional requirements determined as part of the development of the relevant Management Plans for the Project.

WACJV does not consider it necessary for an independent body to be established to install and monitor the groundwater system; or impose additional 'bonds' for an individual Project, consistent with current practice for all other mining projects in NSW.

Rigorous independent review and annual reporting will be required should the Project be approved, which will be further reviewed by NSW regulators and made publicly available for any third party review. This already well-established open and transparent process should negate the need for the establishment of further 'independent bodies'.

2.13.2 Impacts on the Central Coast Water Resource

"If the proposal was to proceed, we consider that the associated approval conditions would need to include a rigorous monitoring and evaluation process to identify impacts together with agreed and secured compensation measures established prior to the proposal commencing. ...

Specific, measurable and agreed targets / triggers for monitoring need to be established prior to any underground works proceeding in order to allow all stakeholders certainty about what the aims of any adaptive management programme are." ... "These targets / triggers should be passed on the results of a comprehensive quantitative risk assessment and possibly cost / benefit assessment."

Consistent with References 1 and 7 in Table 11 'Project Management & Monitoring Measures' of the RTS, WACJV will prepare a SMP in accordance with conditions of Development Consent and any mining lease issued for the Project to the approval of relevant regulators. This SMP will include rigorous monitoring, evaluation and identification of management and mitigation impacts and will need to be prepared in consultation with all relevant regulators. It will also include the development of triggers and measurable targets derived from a risk based analysis, and include adaptive management learnings developed during the mining process. The SMP will be required to be approved by DRE prior to mining occurring. The SMP will also refer to the detailed management plans to be prepared for the Project in accordance with Table 11 of the RTS and any additional relevant conditions of Development Consent.

2.14 NSW OFFICE OF WATER

This section has been provided by Mackie Environmental Research (MER) and WRM Water & Environment in response to the NOW submission's comments (on the RTS) dated 4 October 2013, subsequent meeting on 11 October 2013 and further discussions between MER and NOW representatives.

2.14.1 Responses to Impact Mitigation Strategies

NOW requested clarification of impact mitigation measures that would be invoked if potential leakage losses from the alluvial lands aquifer systems were greater than predicted.

Leakage losses from the alluvial lands will be governed largely by the vertical hydraulic conductivity of the constrained zone that evolves during subsidence (see Figure E5 of MER2013). Once subsided, there is no practical means of mitigating the effects of cracking and permeability enhancement. For this reason, it is important to be able to accurately predict the effects of subsidence on the rock strata and the groundwater systems. This is normally achieved by measuring land subsidence, installing extensometers and pore pressure monitoring systems, and measuring the groundwater flows reporting to the mine.

Extensive monitoring is proposed by WACJV from the commencement of mining to ensure that the impacts are comprehensively understood. Five longwall panels will be extracted before any mining is undertaken beneath the alluvial lands. If adverse impacts are observed, the normal course of action would involve changing the mine plan (seam extraction height and panel width).

Mitigative measures for any identified negative impacts on groundwater systems (beyond those already predicted), may include accounting for leakage losses by procurement and relinquishment of licensed groundwater or surface water allocations.

2.14.2 Assessment Against Minimal Impacts for Deep Hardrock Strata

Minimal impacts with respect to the Aquifer Interference Policy (AIP) have been previously addressed for the alluvial lands which are considered to be a less productive alluvial aquifer, and for the Terrigal Formation which is considered to be a less productive fractured or porous rock aquifer system. NOW has noted that the deeper hard rock system underlying the alluvial lands has not been addressed.

The hard rock groundwater system underlying the alluvial lands has hitherto been regarded as a non-productive system due to the very low hydraulic conductivities of the rock strata which would not support a useful water supply. The AIP does not provide minimal impact criteria for non-productive aquifer systems. Instead the AIP assumes that all subsurface saturated rocks fall within the two prescribed definitions of 'highly productive' and 'less productive' aquifers where the underlying definition of an aquifer is '*a groundwater system that is sufficiently permeable to allow water to move within it, and which can yield productive volumes of groundwater*'[1]. It is noted that the deep hard rock system generally comprises a layered assemblage of claystones, siltstones, sandstones and conglomerates with a high presence of claystones and siltstones in the Patonga Claystone and the Tuggerah Formation. It is highly improbable that a sustainable productive volume of groundwater can be obtained from these formations.

However, in order to assess the deeper strata with respect to the AIP as required by NOW, it is assumed that the less productive fractured and porous rock definition applies. An assessment in respect of minimal harm criteria prescribed in Table 1 of the AIP follows:

- ***Water table (1)*** *– Impacts to be less than or equal to 10% cumulative variation in the water table and 40 m from any high priority groundwater dependent ecosystem or high priority culturally significant site.* There are no high priority groundwater dependent ecosystems or high priority culturally significant sites identified in the WSP for Jilliby Jilliby Creek or the WSP for the Central Coast Water Supply.
- ***Water table (1)*** *– A maximum of 2 m decline at any water supply work is allowed unless make good provisions apply.* There are no water supply works within the predicted zone of drawdown in the deep hard rock system.
- ***Water pressure (1)*** *– A cumulative pressure head decline of not more 2 m at any water supply work.* There are no water supply works within the predicted zone of drawdown in the deep hard rock system.
- ***Water quality (1a)*** *- Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity*.

[1] Aquifer Interference Policy (AIP) Section 1.2

As described in Section 6.5.1 of MER, 2013, storage of residual salt and brine is proposed within the mine workings. This storage was further assessed in the Response to Submissions wherein it was noted that during recovery of the groundwater system, the coal seam groundwater quality could decrease from an average of 7,500 mg/l to 9,500 mg/l (27% increase in salinity). The degraded coal seam groundwater is likely to migrate eastward over a long period of time. The predicted migration pathways exceed the stated distance criteria of 40 m. However, the coal seam waters are considered to have no beneficial use due to the depth of the seam, the low permeability of the seam, and the pre-mining salinity of seam groundwater.

Post mining, the velocity of migration is predicted to be lower than 1E-03 m/day beyond the area disturbed by mining, resulting in a travel time of more than 8,000 years before any increase in salinity might be observed near surface. However at this low velocity, it is improbable that any increase in salinity would be observed since shallow unconsolidated deposits are subjected to high rates of rainfall recharge.

2.14.3 Responses to NOW request for Leakage Loss Impacts on Baseflows

NOW has requested clarification of leakage losses from the alluvial lands and the impacts of such losses on baseflows in Jilliby Jilliby Creek and the Wyong River.

Figure 1 in MER 2013 shows the alluvial aquifer extents, the proposed mine footprint and the location of stream flow gauging stations. The following response considers leakage losses within the identified mine footprint.

Impact of Leakage Losses on Stored Groundwater

Leakage losses from the alluvial lands at the completion of mining have been assessed by groundwater flow modelling. These losses are sustained in time and are predicted to be about
2 millilitres/day per square metre of land surface over subsided panels at the completion of mining. This equates to about 7.3 ML/annum.

The losses are uniformly distributed and are balanced by rainfall recharge across the region. The impact on groundwater storage in the alluvium is negligible since the stored groundwater is estimated to be about 2.4 kL per square metre based on an average 20 m high saturated column and 0.12% drainable porosity. The predicted leakage rate of 2 millilitres/day per square metre of land surface represents 0.000083% of the stored water per square metre. The column of water would deplete at the rate of 0.73 mm/annum without recharge. The predicted leakage rate is based upon conservative groundwater model parameters that include inter alia:

- A matrix conductivity for claystone strata which is based on siltstone conductivities (claystone samples could not be assessed due to failure of the core during sample preparation). Adopting a lower and more representative value for claystone would reduce downwards leakage;

- Variably saturated flow modelling without invoking unsaturated flow which would otherwise reduce the conductivity of unsaturated strata and inhibit downwards leakage; and
- No reduction of insitu vertical conductivity in the constrained zone – a reduction is normally attributed to increased horizontal stresses which tend to reduce the transmission capacities of joints (and inhibit downwards leakage).

A more conservative assessment assumes that the vertical conductivity that governs the rate of leakage is an order of magnitude (10 times) higher than the value adopted in groundwater assessments in MER 2013. While considered to be highly unlikely, an increase of this scale would yield a similar increase in the leakage rate from 2 to 20 millilitres/day per square metre or 73 ML/annum. This would result in depletion of the stored water column at a rate of 7.3 mm/annum without recharge – a rate that is still considered to be very small.

Impact of Leakage Losses on Baseflows

The impact on baseflows in Jilliby Jilliby Creek and Wyong River has also been considered. A worst case assumes that no rainfall recharge occurs to the alluvial lands and that leakage losses ultimately reduce baseflow contributions to Jilliby Jilliby Creek and Wyong River. For assessment purposes, 2006 has been adopted as a representative dry/drought year.

Table 3 shows the estimated baseflow component of the 2006 flow record as gauged at the Jilliby Jilliby Creek gauge upstream of the Wyong River (211010) and the Wyong River gauge at Gracemere (211009 - upstream of Jilliby Jilliby Creek). 2006 had the lowest annual streamflow on record for both of the gauges. The gauge locations are shown in the figure below (Figure 2.18 of the SWIA report). For the Jilliby Jilliby Creek catchment (including Little Jilliby Jilliby Creek) the downwards leakage is approximately 1.5% of the estimated 2006 baseflow component. For the Wyong River catchment (upstream of Jilliby Jilliby Creek), the downwards leakage is approximately 0.005% of the estimated 2006 baseflow component. If the downwards leakage were increased by a factor of 10, it would be 15% and 0.05% of the Jilliby Jilliby Creek and Wyong River (upstream of Jilliby Jilliby Creek) estimate baseflow components, respectively.

Table 3
Estimated Baseflow Jilliby Jilliby Creek and Wyong River Stations (2006)

Watercourse	Total Catchment Area (km^2)	Stream Gauge	Catchment Area to Gauge (km^2)	2006 Recorded Runoff (to Gauge) (ML)	2006 Estimated Baseflow Component (ML/a)*[1]	Leakage Downwards (ML/a)*[2]
Jilliby Jilliby Creek	100	#211010 – Jilliby Jilliby U/S Wyong River	92	2,126	446	6.67
Wyong River	439	#211009 – Wyong River at Gracemere	236	4,106	862	0.05

*Notes: *[1] Estimated from AWBM parameter calibration as described in Section 4.6.1 of SWIA (21% of total runoff)*
**[2] Bloomfield Road catchment leakage of 0.81 ML/a is not included as it joins Wyong River downstream of the gauge.*

Leakage Losses – Implications for Water Sharing Plans

Section 17(a)(ii)(A) of the Central Coast Unregulated Water Sharing Plan outlines the Very Low Flow Class for the Wyong River Water Source for all local access water utility access licences as being "*when the combined flows at gauging stations 211009 and 211010 are equal to or less than 4 ML/day*". Each of these gauging stations has 40 years of historical record (since 1972). **Figure 1** shows the flow duration relationship at each gauging station for the last 40 years, as well as the flow duration curve for the combined flows.

Over the 40 years of historical record, the average annual stream flow at the Jilliby Jilliby Creek and Wyong River gauges was 5,009 ML/a and 16,565 ML/a respectively. The baseflow component of Jilliby Jilliby Creek has been estimated at 21% of the total runoff (by WRM as part of the SWIA), and of the Wyong River at 33% of the total runoff (Boughton W & Chiew, F, *Calibration of the AWBM for Use on Ungauged Catchments,* Cooperative Research Centre for Catchment Hydrology, December 2003). The impacts to the combined flow duration relationship of a loss of baseflow of 6.67 ML/a and 0.05 ML/a from Jilliby Jilliby Creek and the Wyong River catchments respectively is shown in **Figure 1**. The results show the impacts of the baseflow losses to be an increase of 2.2 hours/year of the period in which discharges are in the 'Very Low Flow' Class for the Wyong River Water Source.

To test the sensitivity of the losses, the same analysis was undertaken assuming the losses were increased by a factor of ten. The results are also presented in **Figure 1**. The results indicate that if the losses were out by a factor of ten, the period in which discharges are in the 'Very Low Flow' Class of the Wyong River would increase by 14 hours/year.

A similar assessment was undertaken for 2006 (the lowest annual streamflow on record) to assess the impacts during drought conditions. Results are shown in **Figure 2**. Results indicate an increase of 5.1 hours/year of discharges in the 'Very Low Flow' Class under drought conditions.

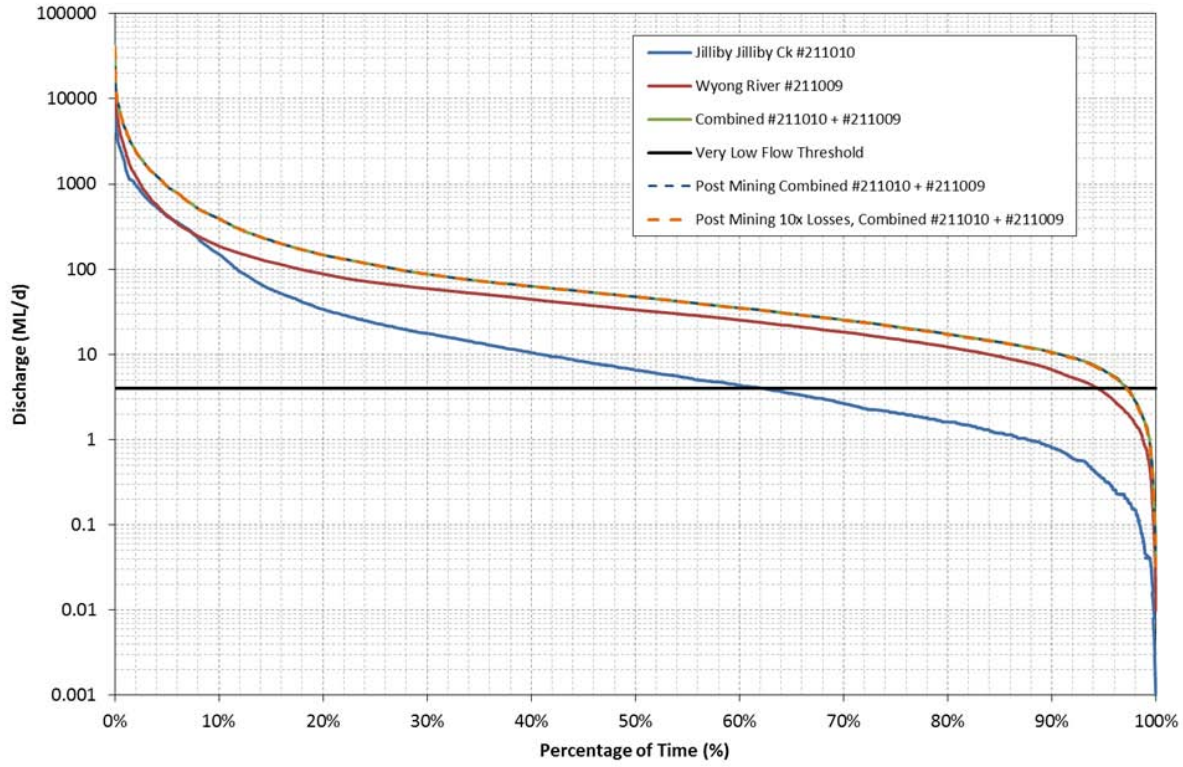


Figure 1
Post mining impacts on Wyong River Weir Low Flow Threshold Flow Duration Relationship (1972-2013)

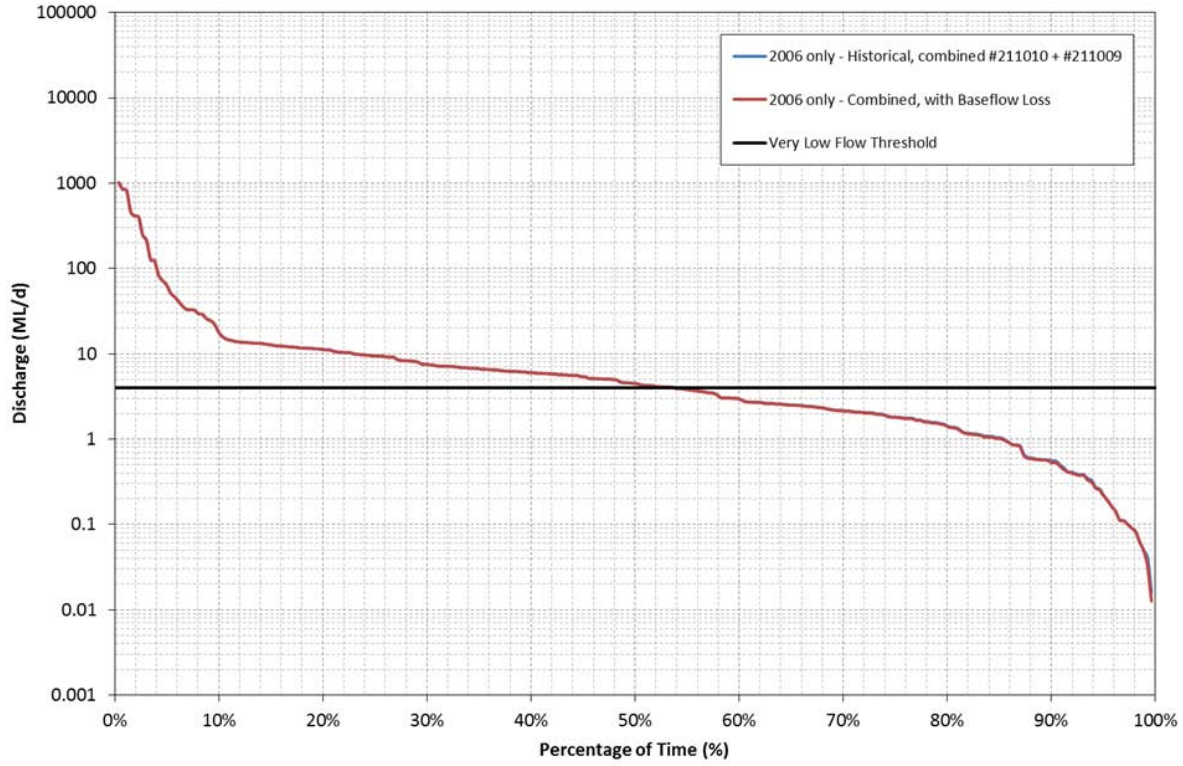


Figure 2
Post mining impacts on Wyong River Weir Low Flow Threshold Flow Duration Relationship (2006)

2.15 CENTRAL COAST PUBLIC HEALTH UNIT

2.15.1 Water

NSW Health comments that "We note the comments of agencies such as NSW Department of Primary Industries (NSW Office of Water), NSW Office of Environment and Heritage and Wyong Shire Council in relation to potential impacts on the drinking water supply. Should the project proceed, it is imperative that appropriate conditions are applied to ensure that the requirements of these agencies are met and to minimise any risk to the drinking water supply.

The proponent will need to obtain all relevant approvals for the water treatment plant and reuse of wastewater, and undertake consultation with the Central Coast Local Health District Public Health Unit on water reuse options.

WACJV commits to obtaining all appropriate licences required for the Project in consultation with relevant regulators. See **Sections 2.14**, **2.18** and **2.9** for additional responses to comments received from NOW, OEH and Heritage.

"In our earlier submission, we expressed concern regarding potential impacts on groundwater bores, in particular those used for drinking water supplies. We note the proponent's commitment on this issue, but encourage realistic means of identifying where the project is impacting bores. Should the project proceed, effective protocols are required to identify where bores are affected by the project, and remedy impacts on groundwater bores.

The proponent's response does not address our concern regarding public health risks associated with flooding of onsite waste management systems (for example septic tanks). The proponent should develop and implement effective protocols to identify and mitigate this risk."

All private bores and their use, along with septic tanks will be identified through the PSMP process in consultation with individual landholders. Any required risk mitigation strategies will also be identified at that time in consultation with landholders and relevant regulators.

2.15.2 Air Quality

"*Epidemiological studies have been unable to identify a threshold below which exposure to particulate matter air pollution (PM) is not associated with health effects. Therefore, any increase in exposure must be assumed to have an adverse impact, even at levels below the assessment criteria. If the project is approved, the proponent should be required to employ best practice measures to minimise PM emissions (both $PM_{2.5}$ and the coarse particle fraction of PM_{10}) from all sources to ensure that any risk from PM is as low as reasonably practicable.*

The predicted increase in PM concentration at the nearest receptors is small and so the associated health risk is also likely to be small. However, the information provided by the proponent in section 3.7.2 of the response to submissions is not sufficient for an objective assessment to be made of the validity of the results presented in table 3.

To facilitate objective assessment, the proponent would need to provide clear and detailed information about the inputs to their calculations including:

- *The size and age-distribution of the potentially affected population;*
- *The underlying health status (e.g. mortality and hospitalisation rates) of that population;*
- *The predicted change in exposure for that population;*
- *Each concentration-response function; and*
- *The assumptions used to simplify the analysis."*

Further information in relation to each dot point is provided below as requested.

The Size and Age-distribution of the Potentially Affected Population

The air quality assessment has investigated the potential impact of the proposed mining operations on $PM_{2.5}$ and PM_{10} levels at residences closest to the Project, as well as populated areas including:

- Blue Haven;
- Lake Haven;
- Gorokan;
- Wyong;
- Hamlyn Terrace;
- Watanobbi;
- Warnervale;
- Jilliby; and
- Woongarrah.

The Warnervale Town Centre is currently under construction and is a major development in this part of the Central Coast. It is predicted to house an additional 6,000 residents and will have an associated employment zone which is planned to be close to the mine operations (NSW Department of Planning and Infrastructure, 2012). Given that the plans for the development of the Town Centre have been approved and construction has commenced, this area has also been included in this Health Risk Assessment (HRA).

Population statistics have been obtained from ABS for the each of the towns considered in the health risk assessment. The current population in the study area is 36,688 (42,688 including the proposed population of the Warnervale Town Centre). Of this, 7% are less than 5 years of age and 17% are 65 years or older. The median age of the population is 38 years. It has been reasonably assumed that the population profile for the Warnervale Town Centre would not differ from that of the whole area.

The Underlying Health Status of that Population

Health statistics for each of the outcomes included in the HRA were obtained from ABS. Where data was available for the identified health outcomes and age groups, the Central Coast statistics were used. For many of the outcomes, including all-cause mortality, the rates per 100,000 population were slightly higher than those observed for Sydney.

For some of the outcomes being considered, only data for NSW as a whole was available from the NSW Health Statistics website. Where data for the Central Coast was not available for particular age groups, ABS data for the Lower Hunter region has been used. A comparison of available statistics in the NSW Health Statistics database for the Hunter region and the Central Coast region shows that the incidence rates for the Hunter are slightly higher than the Central Coast. Using this data in the HRA is a conservative approach, and may lead to a slight overestimate of the cases attributable to $PM_{2.5}$ exposure.

The health incidence rates per 100,000 used in the HRA are summarised in **Table 4**.

Table 4
Health Incidence Rates

Health Outcome	Age Group (years)	Type of Outcome	Incidence/ 100,000	Data source
All-cause mortality	30+	Annual	1,863	ABS Lower Hunter
Cardiopulmonary deaths	30+	Annual	734	ABS Lower Hunter
Ischemic Heart Disease deaths	30+	Annual	298	ABS Lower Hunter
Lung Cancer deaths	30+	Annual	108	ABS Lower Hunter
All-cause mortality	All ages	Daily	3.1	ABS Lower Hunter
Cardiovascular deaths	All ages	Daily	1	ABS Lower Hunter
Hospital admissions Respiratory Disease	65+	Daily	13.6	ABS Lower Hunter
Hospital Admissions Cardiac Disease	65+	Daily	24.2	ABS Lower Hunter
Hospital Admissions Cardiovascular Disease	65+	Daily	34.8	ABS Lower Hunter
Hospital Admissions Pneumonia and Bronchitis	65+	Daily	4.2	ABS Lower Hunter
Hospital Admissions COPD	65+	Daily	4.5	ABS Lower Hunter
Hospital admissions Respiratory Disease	15-64	Daily	2.6	ABS Lower Hunter
Emergency Department Attendances Asthma	1-14	Daily	4.2	ABS Lower Hunter

The Predicted Change in Exposure for that Population

$PM_{2.5}$ concentrations for the Project have been predicted for each of the receptors shown in **Figure 3** for each day of the year. The contribution from the Project alone does not cause an exceedance of the air quality standards at any time, however due to higher existing background levels, one exceedance has conservatively been predicted. **Figure 4** shows the predicted $PM_{2.5}$ concentration for the worst affected receptor which is also located directly adjacent to the mine site near the proposed Tooheys Road operations. No exceedances of the annual average goal were predicted at any receptor.

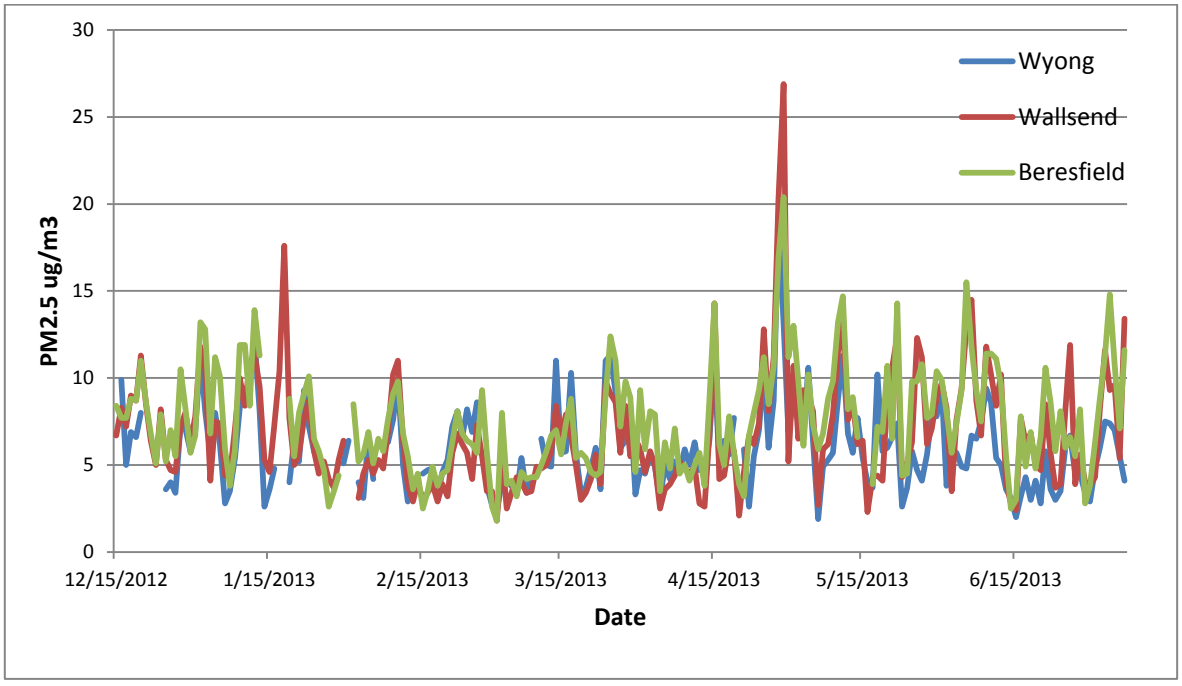


Figure 3
Comparison of Wyong, Wallsend and Beresfield PM2.5 Data (2012-13)

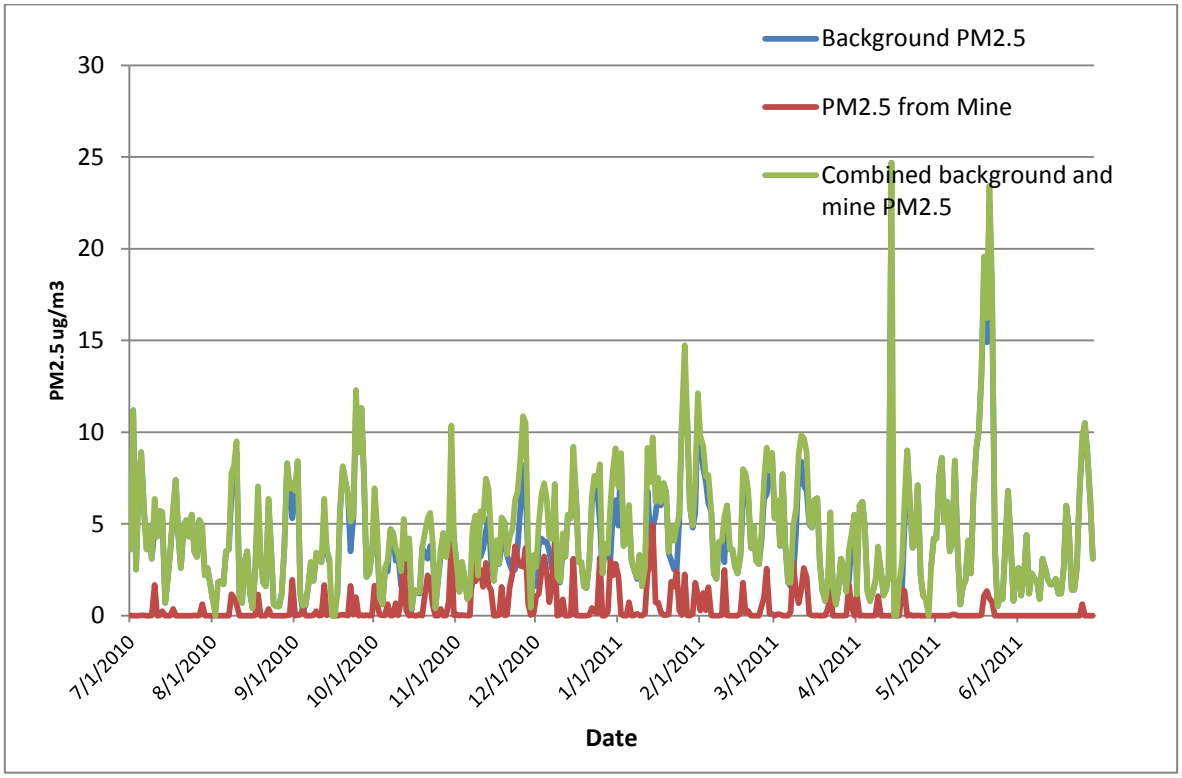


Figure 4
24 Hour Average PM2.5 for the Worst Affected Receiver

To assess the health risks associated with the Project, background data was obtained. The EPA established a monitoring site for PM_{10} and $PM_{2.5}$ in Wyong in late 2012. For the EIS, there was insufficient data to be used in the HRA. $PM_{2.5}$ is monitored at two sites in Newcastle (Beresfield and Wallsend) as well as at Richmond. This data was compared with the available data from Wyong to evaluate whether any of these data sets would be suitable for use for the Project. The Richmond data was significantly higher than either the Newcastle or Wyong sites and was considered unsuitable.

As can be seen from **Figure 3**, the $PM_{2.5}$ data at the two Newcastle sites is similar to the data collected at Wyong for the same period with the data from the Beresfield site being more similar. On this basis, in the absence of data being available for Wyong, the Beresfield data was used as background data in the HRA.

The predicted $PM_{2.5}$ concentration for all receptors was combined with the population data and baseline health incidence to calculate the number of attributable cases for each location. This was done to account for the variability in the predicted $PM_{2.5}$ concentrations across the population. The numbers of cases for each location were then summed to give the total number of cases for the whole study area.

There are a number of individual residences close to the mine site. As well as being assessed individually against the NEPM goals, this population was included in the population of Jilliby for the purpose of the population-based health risk assessment. The background for each day, although variable, was treated as being constant across all receptors for any given day.

For the assessment of long-term mortality, the annual average concentrations were used in the calculations. The number of cases for each receptor location was then summed to give the total for the exposed population. Again, background was considered as constant across the whole population.

Each Concentration-Response Function

The NHMRC (2006) and NEPC (2010) have provided guidance on the selection of exposure response functions for air pollution risk assessments. The preference is to use the results of Australian meta-analyses where possible. To support the review of the National Environment Protection Measure (NEPM) (Ambient Air Quality), the Environment Protection and Heritage Council (EPHC) initiated a large multicity mortality and morbidity study for Australia (EPHC, 2010). The results of this study have been peer reviewed and published in the international literature (Barnett et al., 2005a; 2005b).

Where possible the exposure-response functions from that study have been used in this risk assessment as they have been derived for the Australian population. For long-term effects the results of the re-analysis of the ACS study Krewski et al., (2009) have been used. This study has been adopted by the USEPA and WHO as a basis for assessing long-term risks from PM. No long-term Australian studies on mortality have been conducted.

The exposure-response functions used in the HRA are summarised in **Table 5** and **Table 6**.

Table 5
Exposure Response Function for Long Term Outcomes

Outcome	Averaging Period	Exposure Response Function per 1 µg/m^3 increase in $PM_{2.5}$	Reference
Annual all-cause mortality (non-accidental) 30+ years	Annual Average	0.006	Krewski, D., Jerret , M., et al., 2009
Annual cardiopulmonary mortality 30+	Annual average	0.014	Krewski, D., Jerret , M., et al., 2009
Annual mortality ischemic heart disease 30+ years	Annual average	0.024	Krewski, D., Jerret , M., et al., 2009
Annual mortality lung cancer 30+ years	Annual average	0.014	Krewski, D., Jerret , M., et al., 2009

Table 6
Exposure Response Function for Short Term Outcomes

Outcome	Averaging Period	Exposure Response Function per 1 µg/m^3 increase in $PM_{2.5}$	Reference
Daily all-cause mortality (non-accidental) all ages	24 hours	0.0023	Barnett et al., (2005); EPHC, (2010)
Daily mortality cardiovascular disease - all ages	24 hours	0.0013	Barnett et al., (2005); EPHC, (2010)
Hospital Admissions respiratory disease 65+ years	24 hours	0.004	Barnett et al., (2005); EPHC, (2010)
Hospital Admissions cardiac disease 65+ years	24 hours	0.005	Barnett et al., (2005); EPHC, (2010)
Hospital Admissions cardiovascular disease 65+ years	24 hours	0.003	Barnett et al., (2005); EPHC, (2010)
Hospital Admissions ischemic heart disease 65+ years	24 hours	0.004	Barnett et al., (2005); EPHC, (2010)
Hospital Admissions COPD 65+ years	24 hours	0.004	Barnett et al., (2005); EPHC, (2010)
Hospital Admissions pneumonia and bronchitis 65+ years	24 hours	0.005	Barnett et al., (2005); EPHC, (2010)
Hospital Admissions respiratory disease 15-64 years	24 hours	0.003	Barnett et al., (2005); EPHC, (2010)
Emergency Department Visits Asthma 1-14 years	24 hours	0.0015	Jalaludin B., Khalaj et al., (2008)

The Assumptions Used to Simplify the Analysis

Two scenarios were assessed to evaluate the relative impact of the proposed mine on the potentially exposed population and included:

1. Existing $PM_{2.5}$ levels in the surrounding area, and
2. $PM_{2.5}$ arising from the proposed mine.

The first part of characterising the risk from the $PM_{2.5}$ emissions is to obtain baseline health statistics that are representative of the local community. These are described above.

The number of attributable cases has been calculated using equation 1 as follows:

No attributable cases =

exposure response function/µg/m^3 $PM_{2.5}$ x $PM_{2.5}$ concentration x baseline incidence rate/ 100,000 x population **(equation 1)**

The number of cases for each outcome was calculated for the population represented by each receptor point. The number of cases for each day of the year were calculated and then summed to obtain the annual total. These values were then summed to obtain the total number of cases across the entire study population. For the assessment of long-term mortality, the annual average concentrations were used in the calculations. The number of cases for each receptor location was then summed to give the total for the exposed population.

The results shown in **Table 5** are the annual increases in the identified health outcomes due to $PM_{2.5}$. As can be seen from these results, the increase in the health outcomes due to $PM_{2.5}$ emissions from the Project are very small.

2.15.3 Issue 2 – Noise

> *"It is noted that the NSW Environment Protection Authority has proposed conditions to be included in any approval to be granted. The noise impact assessment, project specific noise goals and eventual Noise Management Plan must be satisfactory to the NSW Environment Protection Authority."*

No response is required.

2.16 ENVIRONMENT PROTECTION AUTHORITY

2.16.1 Connection to the Sewer System

> *"On 26 June 2013 EPA submitted recommended conditions of approval. The only outstanding matter at that time involved the establishment of suitable discharge limits from the water treatment plant to Wallarah Creek.*
>
> *EPA notes however at 3.27.5 of the response to submissions by the proponent, it only mentions connection of the Tooheys Road complex to the Wyong Shire Council Sewerage System (the system). EPA understands both the Tooheys Rd and Buttonderry Rd complexes are to be connected to the system and the response to submissions is to clarify that Tooheys Rd complex is definitely to be connected to the system. Part 3.5 of the EIS clearly sets out Buttonderry Road complex is to be connected to the system.*"

WACJV confirms that both sites will be connected to the sewer system. No further response is required.

2.16.2 Discharge limits from RO Plant

> *"In relation to the discharge limits from the RO Plant into Wallarah Creek the proponent provided directly to the EPA a series of proposed End of Pipe Discharge Limits. EPA has considered that proposal and notes a number of issues set out in Annexure A. Annexure A also includes EPA's revised maximum allowable discharge limits from the RO plant including four further elements.*"

In addition to EPA's previously recommended conditions of approval EPA requests the full table of pollutants to be monitored and the discharge limits attached in Annexure A be included in any conditions of approval.

The table in Annexure A is reproduced as **Table 7**. Suggested amendments to Annexure A are highlighted yellow in **Table 7** with further discussion provided below.

> *Wallarah Creek Data. The proponent needs to clarify the percentile level of the data quoted under the column heading "80th Percentile Value" in the preliminary discharge limits table. Same values have been tabulated as 90th percentile in Appendix J, Table 2.11".*

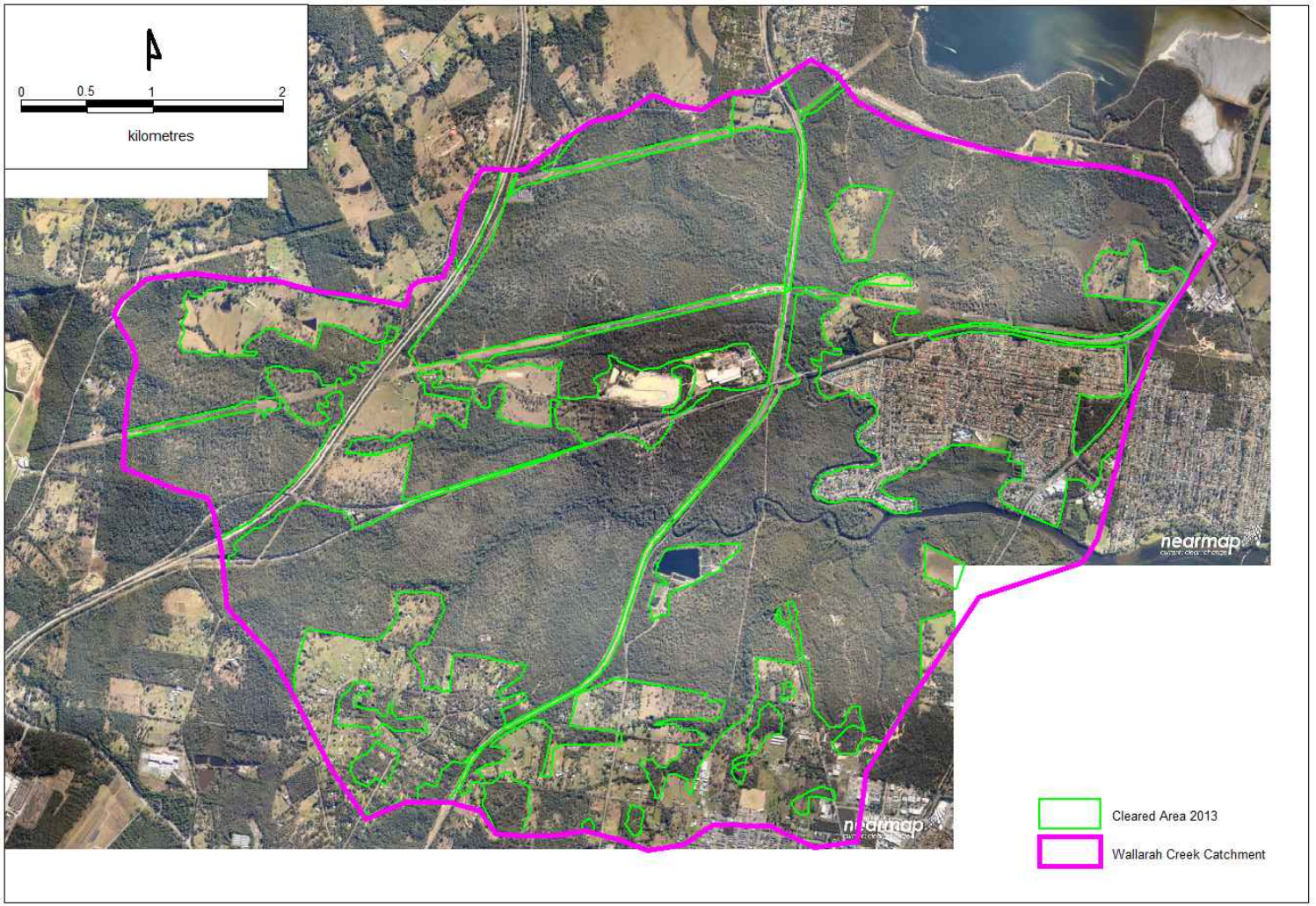
Section 3.3.2 of the RTS 2.11 states: "of the SWIA contains a typographical error: values identified as 10th percentile and 90th percentile values are actually 20th percentile and 80th percentile values (for all parameters at all monitoring sites)." The 80th percentile value of the reference data has been used as specified in the ANZECC guidelines, Section 3.3.2.4.

> *Species protection level. The 99% species protection ANZECC guidelines level has been adopted for a few important toxicants and these have been highlighted in Table 1 in Red.*

A 99% level of protection should be applied to a "pristine or outstanding ecosystem", "effectively unmodified or other highly-valued ecosystems …" (Section 3.1.3.1 of ANZECC guidelines). As of 2013, approximately 33% of the Wallarah Creek catchment has been cleared (based on aerial photography as shown on **Figure 5**). Hence, Wallarah Creek is a moderately disturbed ecosystem and we would suggest that a 95% level of protection would be more appropriate .

> *The discharge limit cannot exceed ANZECC trigger value for toxicants listed in the preliminary table provided.*

The approach to the selection of discharge limits was as described in the ANZECC guidelines, Section 3.1.1.2 regarding determination of appropriate guideline trigger values: "For physical and chemical stressors and toxicants in water and sediment, the preferred approach to deriving trigger values follows the order: use of biological effects data, then local reference data (mainly physical and chemical stressors), and finally (least preferred) the tables of default values provided in the Guidelines." This approach was reiterated to us in a teleconference with David Bell (Regional Operations Officer, NSW Environment Protection Authority) on 6 August 2013.



HB 1163 F01 Wallarah RTS - Wallarah Ck Disturbed Catchment.dwg

WALLARAH 2 COAL PROJECT

Wallarah 2 COAL PROJECT

Hansen Bailey ENVIRONMENTAL CONSULTANTS

Wallarah Creek Disturbed Catchment

FIGURE 5

As no biological effects data is available, local reference data has been used as a basis for the selection of the trigger values. Section 3.3.2.4 of the ANZECC Guidelines states "data collected after two years of monthly sampling are regarded as sufficient to indicate ecosystem variability and can be used to derive trigger values". The background data used for the trigger value selection is well in excess of this requirement, spanning a six year period of monthly sampling.

> **Trigger values quoted by the proponent appears to be erroneous. (See Table 3.3.2, Table 3.4.1, and page 8.3-123 of ANZECC 2000 guidelines).*

As stated in the notes to **Table 7**, the "lowest of irrigation, livestock, eco-system and recreational trigger values" have been used as follows:

- For Manganese, 0.1mg/L is specified for recreational values.
- For Iron, 0.2mg/L is the long term trigger value.
- For Total Phosphorus, as specified in the notes of Table 3.3.2 of the ANZECC Guidelines, a value of 0.025mg/L is relevant for Lowland Rivers for NSW and Vic. east flowing rivers.
- Nitrate + Nitrite – Unsure as to where EPA has sourced the suggested trigger value of 0.3mg/L. Table 3.4.1 of ANZECC Guidelines states a value of 0.7mg/L for Nitrate (equivalent to 0.15mg/L Nitrate-N). No ecosystem value of Nitrite is suggested, however a livestock drinking value of 30mg/L is recommended (equivalent to 9.1mg/L Nitrite-N). Note that the background Wallarah Creek water quality data value is reported on the basis of its respective nitrogen content (nitrate + nitrite as N). The heading has been adjusted for correctness.
- The value of Nickel suggested by the EPA is correct (0.011 mg/L), however the Wallarah Creek background water quality has been adopted and is lower (0.002mg/L) than the ANZECC guidelines. Note that as per the table notes, some of the "Analytes analysed in a concentration below the detection limit were replaced for the calculation of the 80th percentile with half of the detection limit".
- In some cases this has resulted in an apparent 80th percentile value of less than the detection limit. A column has been added to the table of the detection limits (where these are unknown at present they have been left blank). The proposed end of pipe discharge limits have been adjusted accordingly so that they are not below the detection limit.

Table 7
Suggested Revised Discharge EPL Limits for WTP

Parameter	Unit	Detection Limit (mg/L)	Wallarah Creek (W6) 80th Percentile Value[1]	ANZECC Guidelines Default Trigger Value[2]	EPA Revised Maximum Allowable Discharge Limit	WACJV Proposed End-of-Pipe Discharge Limit[3]	WACJV Comment
Electrical Conductivity	µS/cm	1	516	300	300	500	Suggest to use local reference data in preference to ANZECC guideline.
pH	pH units	0.01	5.9 – 6.8	6.5 – 8.5	6.5-8.5	6.0 – 7.5	Suggest to use local reference data in preference to ANZECC guideline.
TSS	Mg/L	5	24	-	24	25	Agree.
Dissolved Oxygen	% saturation	0.1	67.8	85	68	70	Agree.
Calcium	mg/L	1	13.6	1,000	14	15	Agree.
Sodium	mg/L	1	81.4	115	80	80	Agree.
Magnesium	mg/L	1	9.8	2,000	10	10	Agree.
Potassium	mg/L	1	3	-	3	3	Agree.
Sulphate	mg/L	0.25	19.9	400	20	20	Agree.
Chloride	mg/L	1	141.8	175	140	140	Agree.
Arsenic	mg/L	0.001	0.0005	0.013	0.0005	0.001	Suggest TV is below detection limit.
Barium	mg/L	0.001	0.15	1	0.15	0.15	Agree.
Cadmium	mg/L	0.0001	0.0001	0.0002 – 95% 0.00006 – 99%	0.00006	0.0001	Suggest TV is below detection limit.
Chromium	mg/L	0.001	0.001	0.001	0.001	0.001	Agree.
Copper	mg/L	0.001	0.003	0.0014	0.0014	0.003	Suggested to use local reference data in preference to ANZECC guideline.

Parameter	Unit	Detection Limit (mg/L)	Wallarah Creek (W6) 80th Percentile Value[1]	ANZECC Guidelines Default Trigger Value[2]	EPA Revised Maximum Allowable Discharge Limit	WACJV Proposed End-of-Pipe Discharge Limit[3]	WACJV Comment
Lead	mg/L	0.001	0.0008	0.0034	0.0008	0.001	Suggest TV is below detection limit.
Manganese	mg/L	0.001	0.105	0.1	0.1	0.1	Agree.
Nickel	mg/L	0.001	0.002	0.011	0.002	0.002	Agree.
Zinc	mg/L	0.005	0.097	0.008	0.008	0.097	Suggest use local reference data in preference to ANZECC guideline.
Iron	mg/L	0.05	1.764	0.2	0.3	1.5	Suggest use local reference data in preference to ANZECC guideline.
Mercury	mg/L	0.0001	0.00005	0.0006 – 95% 0.00006 – 99%	0.00005	0.0001	Suggest TV is below detection limit (for method used).
Ammonia	mg/L	0.01	0.06	0.02		0.06	No EPA comment..
Nitrate and Nitrite as N	mg/L	0.01	0.052	0.15 (Nitrate-N)	0.05	0.05	Agree.
Total Phosphorus	mg/L	0.01	0.1	0.025	0.05	0.1	Suggest use local reference data in preference to ANZECC guideline.
Oil/grease	mg/L	5	2.5	300	2.5	5	Suggested TV is below detection limit.
Aluminium	mg/L	0.01	Not available.	0.055	0.055 or Wallarah Creek W6 90th%ile sampling results whichever is less	Wallarah Creek W6 80th %ile sampling result	Suggest to use local reference data in preference to ANZECC guideline.

Parameter	Unit	Detection Limit (mg/L)	Wallarah Creek (W6) 80th Percentile Value[1]	ANZECC Guidelines Default Trigger Value[2]	EPA Revised Maximum Allowable Discharge Limit	WACJV Proposed End-of-Pipe Discharge Limit[3]	WACJV Comment
Selenium	mg/L	0.01	Not available.	0.011 – 95% 0.005 – 99%	0.005 or Wallarah Creek W6 90th%ile sampling results whichever is less	Wallarah Creek W6 80th %ile sampling result	Suggest to use local reference data in preference to ANZECC guideline.
Carbonate	mg/L	1	Not available.		Wallarah Creek W6 90th %ile sampling result	Wallarah Creek W6 80th %ile sampling result	Suggest to use 80th%ile sampling result (lower).
Bicarbonate	mg/L	1	Not available.		Wallarah Creek W6 90th %ile sampling result	Wallarah Creek W6 80th %ile sampling result	Suggest to use 80th%ile sampling result (lower).

Notes: *1. Monthly monitoring data from May 2006 to March 2012. Analytes analysed in a concentration below the detection limit were replaced for the calculation of the 80th percentile with half of the detection limit.*

2. 95% of species protected. Lowest of irrigation, livestock, ecosystem and recreational trigger values.

3. 100 percentile limit.

* *Provided by Carbon Based Consulting or WACJV (18 October 2013).*

2.17 LAKE MACQUARIE CITY COUNCIL

2.17.1 Air Quality

Council is satisfied with the response.

No response required.

2.17.2 Awaba Rail Loop

The RTS report states that:

"the Rail System Capacity Assessment determined that the construction of passing loops at Awaba would ensure sufficient capacity for the train cycles generated by the Project. The design and construction of the passing loops will be undertaken by the rail authority. The necessary planning approval for this work will also be sought by the rail authority. The Project's contribution to the funding of these upgrades will be determined through ongoing consultation with TfNSW".

Council does not consider this assessment adequate.

The development application should fully explore the environment impacts of the proposed development inclusive of a planned rail loop at Awaba. The application has not undertaken an environmental assessment of the proposed impacts of rail improvements including the proposed Awaba Rail Loop. This is considered to be a significant shortcoming of the proposal, given the operation of the mine is predicated on this piece of infrastructure being undertaken.

The Awaba Rail loops do not form part of the Wallarah 2 Coal Project application as they are part of the wider rail network which is the responsibility of TfNSW.

This issue was most recently discussed with TfNSW at a meeting on 16 July 2013 where representatives confirmed that they are the appropriate body to design, seek approval for (including environmental assessment) and construct the Awaba Rail Loops as required. Ongoing discussions will occur between WACJV (and other potential users of the proposed Awaba Rail Loop) and TfNSW and appropriate contributions made as required.

2.17.3 Energy Supply and Demand

The RTS refers to the emission trading scheme and carbon tax. There is currently no emission trading scheme in Australia and there is no plan for one while the carbon tax will be dismantled before this project is approved.

Without an emission trading scheme, the project will not contribute to the revenue of the scheme. Therefore, the RTS conclusions in this regard are no longer relevant and should be re-addressed to ensure there is no increase in greenhouse gasses from this project.

In the absent of such a market price on carbon the "global social damage cost of carbon of $23/t CO2-e" as estimated by the respondent then the BCA will not accurately reflect the impact of the project. The project should re-exam the proposed mechanism to capture the cost (as estimated ($23/t CO2-e) and redirect them into community funds and projects.

The coal product is proposed to be hauled through the City of Lake Macquarie in fossil fuel powered transport. Therefore, this process will impact on the greenhouse gas footprint of the city. In this regard, it is recommended that the project address how it complies with the Greenhouse Gas Emission Reduction Targets Policy (2008) which sets targets to reduce the City's emissions by 3% per year. The application does not address Council's policy.

The development of an Energy and Greenhouse Strategy within 2 years is not sufficient and would not allow the strategy to be integrated into the design phase of the project. A carbon neutral target should be set. An Energy and Greenhouse Strategy and Action Plan should be developed before approval is given, which is common for other GHG emitting sites such as landfills.

The current carbon tax set by the Australian government aims to reflect the global social damage cost of carbon emissions. This is the value that was included in the Benefit Cost Analysis (BCA) as an economic cost of the Project. Cessation of the carbon tax will not change the estimated net social benefits of the Project. However, when the carbon tax is abolished, this cost will no longer be internalised into the operating costs of the Project.

The Australian Government is proposing a broad range of measures to meet its proposed carbon emissions targets. From an economic perspective, any greenhouse gas emission actions to meet these targets should be based on the principle of least cost. It is unlikely that constraints on coal mining and truck movements would represent a least cost approach to reducing Australia's greenhouse gas emissions. Greenhouse gas emissions targets on a city by city basis is also unlikely to provide a least cost way of meeting Australia greenhouse gas targets.

An Energy and Greenhouse Strategy will consider greenhouse management initiatives during design, operation and decommissioning phases and will be developed in accordance with any conditions of Development Consent issued for the Project.

2.17.4 Social Impacts

There are no objections to the proposed development subject to the following measures being incorporated into conditions of consent:

1. *ensuring that the local community is kept informed of the project, along with the opportunity to raise concerns and have these addressed - the additional information identified that in order to address people's loss of their attachment or sense of belonging to places and to increase their sense of pride it is important to ensure that they have a sense of control of change occurring;*

2. *commitments that the project will undertake in contributing to the community (that is, building social capital and social cohesiveness);*
3. *ensuring that there isn't an impact on housing affordability in the local area due to the influx of additional workers;*
4. *contributing to improved health and support services to ensure that the proposal does not place increased demand on these services; and*
5. *how the workforce will be supported and encouraged to actively participate in the local community.*

WACJV has committed to ongoing stakeholder consultation throughout the Project life (see Section 5.5. of the EIS). The measures listed above are consistent with the social objectives of WACJV in relation to the Project.

2.17.5 Water Quality

The current plan to monitor and then mitigate surface water impacts, with regard to mine subsidence is considered to be unachievable. Ideally, the applicant should consider this factor in the subsidence risk assessment. If site topography prevents any future mitigation, then this should be factored into the level of risk afforded to that area. Ultimately, a more conservative subsidence limit should be applied to areas of the development where mitigation is not possible, should impacts occur.

A comprehensive monitoring and response program will be required to be implemented for the Project as part of the Extraction Plan/SMP process and associated PSMP process (to be developed in consultation with relevant regulators and land and utility owners) as detailed in Section 7.1.4 of the EIS. Responses to residual water related issues raised by NOW (the key department responsible for the management of water issues in NSW) are described in **Section 2.14**.

2.18 OFFICE OF ENVIRONMENT AND HERITAGE

2.18.1 Risk Assessment for Jilliby SCA

"In relation to Jilliby SCA risk assessment (s 3.26 of the RtS) and potential for impacts upon GDEs and threatened species, OEH is of the opinion that this analysis is poor. …

This is supported by the location of these groundwater dependent ecosystems in close proximity to the main drainage lines within the Jilliby SCA. Therefore, the predicted impacts of the Project on the regional groundwater system are unlikely to result in impacts to the values of the Jilliby SCA." (p. 191). … OEH does not support the analysis provided in Table 10 (p. 193). OEH is aware that the proponent did not have access to the more recent modelling that OEH has provided to Planning. More detailed GDE mapping will be available soon."

Further discussion on subsidence impacts is provided in detail in **Section 2.18.3**.

WACJV looks forward to contributing to the revised GDE mapping to utilise during the development of the site Biodiversity Management Plan in consultation with OEH.

Groundwater Dependent Ecosystems (GDE)

It is acknowledged that there is baseflow in Little Jilliby Jilliby Creek. The existence of baseflow suggests that the water table is relatively shallow in the alluvial lands. The shallow water table in the alluvium is due to the relatively low elevation along the lower reaches of Little Jilliby Jilliby Creek. These areas undoubtedly contribute to baseflow in the creek. In the elevated areas within the Jilliby SCA, the permanent water table resides in the Terrigal Formation. It is much deeper but could also contribute to baseflow. This deeper water table is unlikely to be accessed by vegetation.

The only potential GDE located within the Jilliby SCA is Coachwood – Crabapple warm temperate rainforest. As stated in Section 5.3.2 of the Ecological Impact Assessment (Appendix O of the EIS), Coachwood – Crabapple warm temperate rainforest is likely to be dependent on groundwater only during periods of drought. Areas of this vegetation community within the Jilliby SCA are predominantly located in hard rock areas. Due to the depth of the water table in the Terrigal formation, potential GDEs in hard rock areas are likely to be dependent on soil moisture within the unsaturated zone rather than the permanent water table. Conditions in the unsaturated zone are not predicted to be impacted by the Project.

There are some occurrences of Coachwood – Crabapple warm temperate rainforest located within the alluvium of Little Jilliby Jilliby Creek. These areas of this community may be dependent on the alluvial water table. Mining induced subsidence has the potential to alter water levels in alluvial lands. However, appropriate groundwater flow modelling (Appendix F of the Groundwater Impact Assessment) has indicated that the impact on the water table is minimal due to the relatively low permeability of the alluvial materials. Therefore, the Project is not predicted to have a significant impact on potential GDEs located within the alluvium of Little Jilliby Jilliby Creek.

Threatened Frogs

Although no threatened frog species were recorded in the Jilliby SCA in the course of the ecological surveys for the EIA, six threatened species have the potential to occur in this area:

- Giant Barred Frog (*Mixophyes iterates*);
- Green and Golden Bell Frog (*Litoria aurea*);
- Green-thighed Frog (*Litoria brevipalmata*);
- Giant Burrowing Frog (*Heleioporus australiacus*);
- Littlejohn's Tree Frog (*Litoria littlejohni*); and
- Stuttering Frog (*Mixophyes balbus*).

Potential impacts on these frog species could occur through loss of habitat. The presence of frog habitat within the Jilliby SCA is expected to be confined to the creeks. The Project will not remove any vegetation within the Jilliby SCA that may provide habitat to these species.

Potential frog habitat within the Jilliby SCA may be impacted through subsidence. Although subsidence has the potential to alter alluvial water levels, the impact is predicted to be minor due to the relatively low permeability of the alluvial materials present within the Jilliby SCA. Consequently, the alluvial water table will remain accessible to vegetation that depends on groundwater. Therefore, subsidence is not predicted to impact the vegetation communities that may provide habitat for threatened frog species. The likelihood of impacts to threatened frog species is therefore considered "unlikely".

Even if an unanticipated loss of frog habitat occurs within the Jilliby SCA, the Project is unlikely to place populations of these species at risk. There are large areas of potential frog habitat located in the vicinity, including the reaches of the Jilliby SCA beyond the Project Boundary), Munmorah SCA, Olney State Forest and Ourimbah State Forest.

Additional proposed ecology monitoring is detailed in Section 3.10.10 of the RTS which (amongst other things) commits to a TARP approach to inform the monitoring and modelling program throughout the project life to ensure a negligible and manageable risk to aquatic ecology ecosystems.

2.18.2 Threatened Frogs

> *"OEH is also aware that the proponent has not had time to update requested baseline frog data in Jilliby SCA. However, the SCA has been subject to a long-term study of both the Mixophyes frog species by the University of Newcastle (Prof. Michael Mahony, UoN, pers. comm.). This was part of PhD study commenced in the early 2000s though was discontinued following the student's departure. OEH has examined the data and it demonstrates that these 3rd and 2nd order streams, particularly Little Jilliby Jilliby Creek, contain significant and stable populations of both species. This study can provide a viable baseline data set for future monitoring for these species and OEH will request that the University of Newcastle be facilitated to continue this valuable work as part of the Wallarah 2 project monitoring programme".*

The University of Newcastle study will be used to inform the frog monitoring program for the Project. Similarly, the result of the monitoring program will be made available to the University of Newcastle study, as required.

Consistent with Section 3.9.6 'Impacts on the Giant Barred Frog' of the RTS, WACJV has committed to $60,000 to DoE for relevant research in relation to the Giant Barred Frog, the details of which shall be included in the Biodiversity Mangement.

WACJV looks forward to further consultation with DP&I, OEH and DoE during the development of the Biodiversity Management Plan in relation to further appropriate frog monitoring, should Development Consent be granted.

2.18.3 Subsidence Assessment

"OEH is having difficulty accepting some of the reasoning behind the subsidence assessment is the EIS and RtS as there seems to be certain ambiguities and assumptions of no impact on surface ecosystems and GDEs. The EIS and RTS proposed that the risk to GDEs is low/unlikely because 1) assumptions made about vertical hydraulic impacts from cracking and responses of the alluvium; 2) drop in water table is said to be "minimal" yet may still affect water access for GDEs; 3) permeability of alluvials, which is variously stated as being low to moderate; 4) assumes rapid recharge and recovery of water tables under low-average rainfall conditions but drought is not considered nor is peripheral drainage of water tables from unsubsided areas.

With respect to issues of the proponent undertaking avoidance or staged consent options for the project, OEH understands that these are still on the table for discussion.

OEH is working on an appropriate set of monitoring targets, thresholds, responses and conditions for this project that cover key threatened ecological communities and species both within and outside the SCA. Following further meetings with the proponent ,these will be finalised.

WACJV looks forward to further consultation with OEH in relation to appropriate monitoring targets, thresholds and conditions and during the development of the Biodiversity Management Plan for the Project.

Background

The potential impacts of the Project on GDE vegetation are discussed in Section 6.6 of the Groundwater Impact Assessment (Appendix I of the EIS).

The majority of GDE vegetation present within the forested areas is located in bedrock areas. In elevated bedrock areas, the permanent water table is generally predicted to be deeper than the water table in the Dooralong Valley. Consequently, vegetation in bedrock areas is unlikely to be dependent on the permanent watertable due to the significant depth of the water table.

In contrast, the water table is relatively shallow in the alluvium. GDE vegetation located in alluvial areas may be dependent on the water table. Changes to alluvial water levels could therefore impact GDE vegetation within alluvial areas. However, the Project is unlikely to significantly alter water levels in the long term due to the following:

- The rate of leakage from alluvial lands is minimal due to the very low hydraulic conductivity of the underlying strata; and
- Temporary changes in the water table due to subsidence are mitigated by the low permeability of alluvial materials.

On this basis, the EIS concluded that the risk of significant impacts to GDEs was low.

These conclusions are based on findings with respect to geological properties and cracking of the bedrock. This information was derived from testing of geological samples and numerical modelling of rock fracture mechanics, as explained below.

Hydraulic Conductivity of Bedrock

The groundwater modelling determined that drawdown of the surficial aquifers was minimal due to the very low hydraulic conductivities of the hard rock strata. The hydraulic conductivities used in the modelling were determined using field and laboratory tests of exploration bores and core materials. The analyses of hydraulic properties are explained in Appendix D of the Groundwater Impact Assessment.

CPI (1998) carried out 170 packer tests at 31 exploration bore locations in order to establish estimates of hydraulic conductivity for different strata. Testing was conducted using a single packer assembly with test intervals varying from 3 m to 200 m (average of approximately 30 m). The procedure comprised sealing off the lower portion of an exploration hole and measurement of the rate of clean water injection to the isolated test zone at 3 or 4 injection pressures ranging from 200 kPa to 800 kPa. Numerous tests exhibited potential packer leakage or difficulties in achieving injection equilibration (non constant injection rates) due to equipment limitations.

Hydraulic conductivity estimates are provided in Appendix D of the Groundwater Impact Assessment. For many tests, a negligible injection rate was observed at all test pressures due to the low conductivity of the strata. For these tests, a likely maximum hydraulic conductivity has been calculated assuming a minimum injection rate of 0.01 litres per minute (10 ml/min) at 600 kPa, with this being identified as the probable lower limit of the flow measurement apparatus. Under these conditions, the calculated conductivity for a median test section length of approximately 23 m was about 5.5E-06 m/day.

The results of the 170 packer tests were collated to generate bulk hydraulic conductivities based on stratigraphic formations and statistical parameters. The hydraulic conductivities determined by packer testing are presented in **Table 8**. A histogram of packer testing results indicates that 85% of the tests returned a hydraulic conductivity of less than 1E-3 m/day and 72% of the tests returned a conductivity of less than 1E-04 m/day.

Table 8
Packer Test Hydraulic Conductivity Estimates

Strata	Number of tests	A-mean (m/day)	St-Dev	Median (m/day)	LN-Mean (m/day)
Patonga Claystone	6	2.76E-03	3.67E-03	1.77E-03	2.11E-04
Tuggerah Formation	40	7.74E-04	2.09E-03	3.21E-05	4.61E-05
Munmorah Conglomerate	55	6.40E-04	2.02E-03	1.18E-05	3.05E-05
Dooralong Shale	20	2.11E-04	4.95E-04	1.13E-05	2.59E-05
Wallarah/Great Northern Seam	23	2.85E-04	7.28E-04	2.24E-05	4.56E-05
Awaba Tuff	9	8.01E-04	1.87E-03	1.47E-05	6.19E-05
Teralba Conglomerate	6	3.85E-04	6.69E-04	1.46E-05	5.15E-05
Bolton Point Conglomerate	1	9.12E-06			9.12E-06
Fassifern Seam	1	2.71E-03			2.71E-03
Karingal Conglomerate	8	1.44E-04	3.30E-04	1.46E-05	3.04E-05

In addition to the packer testing undertaken by CPI (1998), laboratory core tests were conducted on 59 formation samples extracted at five borehole locations. All core samples were tested by Core Laboratories Australia.

Primary HQ size cores were inspected in archived core trays and representative samples for testing were taken from sections displaying relatively uniform properties over a reasonable depth section. Mudstones and claystones were not selected because these rock types tend to fail during cutting of smaller test slugs from the primary core. Consequently, there was a sampling bias towards conglomerates, sandstones and siltstones. This bias is considered acceptable for analytical purposes since mudstones and claystones are likely to exhibit matrix hydraulic conductivities at least an order of magnitude lower than siltstones or sandstones.

The matrix hydraulic conductivities determined for the Patonga Claystone are therefore based on the siltstone component of the formation. The hydraulic conductivity of the claystone component of the Patonga Claystone is expected to be significantly lower than the adopted hydraulic conductivity value for the unit.

The hydraulic conductivities determined by core testing are presented in **Table 9**. A histogram of the results indicates that 92% of the tests returned a conductivity of less than 1E-03 m/day and 85% of the tests returned a conductivity of less than 1E-04 m/day. The conductivity values determined by core testing exhibited a slightly lower range of values than the conductivities determined by packer testing.

Table 9
Core Test Hydraulic Conductivity Estimates

Strata	Kxy LN-mean (m/day)	Kz LN-mean (m/day)
Terrigal Formation (2 samples)	3.31E-03	3.74E-04
Patonga Claystone (sandstones)	1.47E-03	9.19E-06
Tuggerah Formation	3.31E-05	2.11E-05
Munmorah Conglomerate	4.13E-06	9.07E-06
Dooralong Shale	1.07E-05	2.68E-06
Awaba Tuff (1 sample)	4.51E-06	2.72E-04

LN mean = log normal mean

Extent of Cracking

The minimal drawdown of shallow aquifers is also attributed to the lack of connective cracking from the surface to the mine workings. The rock fracture modelling undertaken for the Subsidence Modelling Study (Appendix G of the EIS) has predicted that there will be a "constrained zone". The strata within the constrained zone will retain their low hydraulic conductivities, resulting in very low leakage rates.

Subsidence induced cracking of hard rock strata has been simulated using the FLAC numerical model. FLAC is a two-dimension explicit finite difference program developed specifically for solving mining and geotechnical engineering problems.

The rock fracturing regimes predicted by the FLAC model are presented in Sections 2.4, 2.5 and 2.6 of the Subsidence Modelling Study (Appendix G of the EIS). The modelling shows that there is a zone of highly connected cracking above the longwalls. This zone initiates a rapid rate of depressurisation and would be essentially free draining downwards to the WGN seam. However, this free draining zone does not extend to the surface. The FLAC model predicts that the zone of highly connected cracking will extend up to 190 m above the longwalls beneath the alluvial valleys. The groundwater model has conservatively adopted a free draining zone of 220 m above the longwalls.

The free draining zone extends upwards from the coal seam but ends within the Tuggerah Formation. The Patonga Claystone overlies the Tuggerah Formation and is therefore predicted to be free of enhanced vertical cracking and enhanced connectivity of cracking. There is predicted to be a relatively thin zone (10 m to 20 m) of tensile vertical cracking immediately beneath the alluvium. However, this cracking does not connect to the highly connected cracking zone. The claystone component of the Patonga Claystone has the lowest permeability of any material within the Narrabeen Group. As such, claystone plays a significant role in minimising downward leakage from the alluvium.

Hydraulic Conductivity of Alluvium

A temporary displacement of the water table will occur as each longwall is extracted. The resultant hydraulic gradient causes water to flow from unsubsided areas towards subsided areas. The movement of water is inhibited to an extent by the low conductivity of the alluvium.

Unconsolidated and variably saturated alluvial sediments occur at the surface within the Dooralong and Yarramalong valleys. The extent of distribution of alluvium is shown in Figure 30 of the EIS. These alluvial sediments are up to 30 m thick and comprise variably mixed sequences of sands, silts and clays.

Hydraulic conductivities for the alluvial sediments were determined using falling head tests. CPI (1998) undertook these tests in 16 piezometers installed at 12 locations, including four dual piezometer installations. Analysis was based upon the Hvorslev method. Additional analyses have been conducted by MER using the KGS method (Butler, 1997) which is considered to be more suited to the unconfined alluvial sediments.

The results of the falling head tests are presented in Appendix D of the Groundwater Impact Assessment. The average horizontal conductivity value assuming log normality is approximately 1.8E-01 m/day. The median horizontal conductivity was determined to be 2.0E-01 m/day using the Hvorslev method and 2.4E-01 m/day using the KGS method.

In 2010, WACJV installed piezometers at five locations (HP1 to HP5) near the confluence of Jilliby Jilliby Creek and Little Jilliby Creek. These piezometers were subjected to rising head tests (L. Cook and Associates) and generated estimates of conductivities in the range 5.8E-03 to 6.4E-01 m/day. An overview of all results indicates a generally low hydraulic conductivity consistent with the observed alluvial materials – silty and clayey sands and gravels. The average conductivity value assuming a log normal distribution is approximately 1.8E-01 m/day and the median value is approximately 2.2E-01 m/day.

Hydraulic properties of the unconsolidated alluvial deposits generally reflect a silty, clayey alluvium with low hydraulic conductivities.

Rainfall Recharge

The groundwater model predicted a vertical leakage rate of approximately 2 ml/day per square metre of alluvial land. During the dry period from 2002 to 2007, the short term minimum rainfall recharge rate was assessed to average approximately 130 ml/m^2/day (0.13 mm/day). The maximum leakage rate is therefore predicted to be easily balanced by recharge from rainfall.

Peripheral Drainage of Water Tables

The impact of subsidence on alluvial water levels has been considered in Section 6.3 of the Groundwater Impact Assessment.

Subsided alluvial areas will exhibit a temporary increase in groundwater storage as each panel is displaced downwards and groundwater migrates from the unsubsided area to the subsided area. This will potentially result in local decline in the water table in unsubsided areas and a corresponding rise in the water table in subsided areas. This effect is mitigated to an extent by the low hydraulic conductivity of the alluvial material. The rate of recovery in the unsubsided area will depend largely upon climatic conditions. Under drought conditions, calculations indicate that 55% to 75% recovery could be expected within about 6 months of subsidence occurring. Measured water table responses suggest rapid recovery is likely to occur during normal and above average rainfall periods.

The groundwater storage will increase in subsided areas, which may have some beneficial impact on GDEs. In unsubsided areas, there will be a temporary lowering of the water table. GDEs may be impacted whilst the water table recovers to pre-mining levels. Due to the expected rapid recovery of the water table, impacts to GDEs are considered not likely to be significant.

* * *

for
HANSEN BAILEY

Dianne Munro
Principal

James Bailey
Director

3 REFERENCES

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Appendix A

REGULATORY SUBMISSIONS

From:	Les Conrad
To:	Dianne Munro
Cc:	Gary Wood
Subject:	RE: Wallarah 2 Coal Project - Crown Lands Comments
Date:	Thursday, October 17, 2013 2:16:19 PM

Hi Dianne,

I have discussed this with Gary Wood, Project Manager, Regional Projects.

In general, Crown Lands is satisfied with the submission response comment highlighted by yellow colour below.

Les Conrad | Acting Group Leader Property Management
Crown Lands Division of NSW Trade & Investment | Hunter Office
141 Newcastle Road | East Maitland NSW 2323
PO Box 2215 | Dangar NSW 2309
Direct: T: 02 49379340 | F: 02 49348417 | M: | E: les.conrad@lands.nsw.gov.au
Generic T: 1300 886 235 | F: 02 4925 3517 |
E: maitlandcrownlands@lands.nsw.gov.au | W: www.lands.nsw.gov.au

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From: Dianne Munro [mailto:DMunro@hansenbailey.com.au]
Sent: Thursday, 17 October 2013 12:36 PM
To: Les Conrad
Subject: RE: Wallarah 2 Coal Project - Crown Lands Comments

Sorry, here are the two figures I refer to below.

Regards,
Dianne.

From: Les Conrad [mailto:Les.Conrad@lands.nsw.gov.au]
Sent: Thursday, October 17, 2013 12:34 PM
To: Dianne Munro
Subject: RE: Wallarah 2 Coal Project - Crown Lands Comments

Hi Dianne,

There was no attachment (figure 19) to your email.

Les Conrad | Acting Group Leader Property Management
Crown Lands Division of NSW Trade & Investment | Hunter Office
141 Newcastle Road | East Maitland NSW 2323
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From: Dianne Munro [mailto:DMunro@hansenbailey.com.au]
Sent: Thursday, 17 October 2013 12:15 PM
To: Les Conrad

Subject: Wallarah 2 Coal Project - Crown Lands Comments

Hi Les, thanks for your time today.

Please find following comments from Crown Lands (via Greg Paine at Trade's larger email dated 4 October 2013) provided to us via the Department of Planning & Infrastructure:

"Crown Lands advise its earlier comments made in response to exhibition of the environmental assessment still apply. These are that the surface constructions for the project at Tooheys Road appear to affect Crown public road at the Tooheys Road/F3 intersection. Should this be the case then acquisition of the affected Crown land will be required. For further information please contact Melanie Osborne, Acting Senior Manager Hunter Area (Maitland office) on 4937 9332, or at: melanie.osborne@lands.nsw.gov.au."

In our 'Wallarah 2 Coal Project Response to Submissions' document dated September 2013 (RTS) (to which this comment refers) Wallarah Coal (WACJV) provided a response in Section 3.28.5 as follows *"The construction of the Tooheys Road Site and rail spur will occur on Crown Land. WACJV will consult with NSW Crown Land regarding the necessary acquisitions of Crown Land."*

Please find attached Figure 19 – Conceptual Layout Tooheys Road Site from the EIS (which can be viewed in full here http://majorprojects.planning.nsw.gov.au/page/project-sectors/mining--petroleum---extractive-industries/mining/?action=view_job&job_id=4974) and an additional detailed figure showing landownership in the vicinity of existing underpass at the F3/Tooheys Road.

In consideration of the above, can you please confirm that the commitment as reproduced above from the RTS is adequate to address Crown Lands comments. We look forward to meeting with yourself and Melanie in the future to discuss any required interactions and acquisitions.

We look forward to your reply and please don't hesitate to call to discuss further if needed.

Kind Regards,
Dianne.

Dianne Munro
Principal

HANSEN BAILEY
Tel: (02) 6575 2003
Fax: (02) 6575 2001
Mobile: 0428 772 566
Email: dmunro@hansenbailey.com.au

Belinda Hale

From: Dianne Munro
Sent: Tuesday, 15 October 2013 2:49 PM
To: Belinda Hale
Subject: FW: Wallarah 2 Coal Project

Save as railcorp submission pls.

From: Clay Preshaw [mailto:Clay.Preshaw@planning.nsw.gov.au]
Sent: Tuesday, October 15, 2013 1:49 PM
To: Dianne Munro
Subject: Fwd: Wallarah 2 Coal Project

Hi Dianne,

No issues with RailCorp - see below email.

Clay

>>> "Rutledge, Robert" <Robert.Rutledge@transport.nsw.gov.au> 10/15/2013 1:47 pm >>>
Hi Clay,
Per our recent conversation, RailCorp did not have any comments on the Wallarah 2 Coal Project. Sorry for any confusion this may have caused you.

Thank you for your consideration in this matter, and if you should have any questions or need additional information, please do not hesitate to contact me.

Kind Regards,

Robert Rutledge
Principal Land Use and Transport Planner
Land Use Planning & Development
Planning and Programs Division

phone: 02 8202 2203
email: robert.rutledge@transport.nsw.gov.au

Clay Preshaw - RE: Wallarah 2 Coal Project - Response to Submissions

From: Jude Parr <Jude.Parr@fcnsw.com.au>
To: Clay Preshaw <Clay.Preshaw@planning.nsw.gov.au>
Date: 10/14/2013 10:57 AM
Subject: RE: Wallarah 2 Coal Project - Response to Submissions

No further comments from Forestry.

Jude Parr | Land Administration Officer
Forestry Corporation of NSW | Central Region

Maher Street | PO Box 168 | Wauchope NSW 2447
T: 02 65869718 | F: 02 65852422| M: 0409882922
E: jude.parr@fcnsw.com.au | W: www.forestrycorporation.com.au

Note change of email address

From: Clay Preshaw [mailto:Clay.Preshaw@planning.nsw.gov.au]
Sent: Monday, 14 October 2013 10:42 AM
To: Jude Parr
Subject: Wallarah 2 Coal Project - Response to Submissions

Hi Jude,

As discussed, can you let me know (via email) whether Forestry has any further comments in relation to the Response to Submissions?

FYI - I've attached your original submission.

Regards

Clay Preshaw
Team Leader
NSW Department of Planning and Infrastructure
GPO Box 39 | Sydney NSW 2001 | T 02 9228 6305 | E clay.preshaw@planning.nsw.gov.au

>>> Clay Preshaw 9/17/2013 12:38 pm >>>
Dear all,

Please be advised that the applicant has submitted a formal Response to Submissions document in relation to the Wallarah 2 Coal Project (SSD 4974). The document is available to download via the following link: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=4974

PCU048587

Your reference:	SSD4974 Wallarah 2 Coal Project
Our reference:	DOC13/70209, EF13/8250
Contact:	David Bell (02) 49086817
Electronic correspondence to:	hunter.region@epa.nsw.gov.au

NSW Department of Planning and Infrastructure
Mining and Industry Projects
GPO Box 39
SYDNEY NSW 2001
Attention: Mr Clay Preshaw

Dear Mr Preshaw,

Wallarah 2 Coal Project (SSD4974) - Comments re Response to Submissions

Reference is made to your email to the Environment Protection Authority (EPA) dated 17 September 2013 regarding the response by the proponent to submissions following public exhibition of the Environmental Impact Statement (EIS) in respect of the above proposal and inviting the EPA to submit any further comments and recommended conditions of approval.

On 26 June 2013 EPA submitted recommended conditions of approval. The only outstanding matter at that time involved the establishment of suitable discharge limits from the water treatment plant to Wallarah Creek.

EPA notes however at 3.27.5 of the response to submissions by the proponent, it only mentions connection of the Tooheys Road complex to the Wyong Shire Council Sewerage System (the system). EPA understands both the Tooheys Rd and Buttonderry Rd complexes are to be connected to the system and the response to submissions is to clarify that Tooheys Rd complex is definitely to be connected to the system. Part 3.5 of the EIS clearly sets out Buttonderry Road complex is to be connected to the system.

In relation to the discharge limits from the RO Plant into Wallarah Creek the proponent provided directly to the EPA a series of proposed End of Pipe Discharge Limits. EPA has considered that proposal and notes a number of issues set out in annexure A. Annexure A also includes EPA's revised maximum allowable discharge limits from the RO plant including four further elements.

In addition to EPA's previously recommended conditions of approval EPA requests the full table of pollutants to be monitored and the discharge limits attached in Annexure A be included in any conditions of approval.

If you require any further information or wish to discuss the matter please contact David Bell on (02)49086817.

Yours sincerely

9 OCT 2013

MARK HARTWELL
Head Regional Operations Unit – Hunter
Environment Protection Authority

PO Box 488G Newcastle NSW 2300
Email: hunter.region@epa.nsw.gov.au
117 Bull Street, Newcastle West NSW 2302
Tel: (02) 4908 6800 Fax: (02) 4908 6810
ABN 43 692 285 758
www.epa.nsw.gov.au

Annexure A

The submitted discharge limits Table, together with appropriate sections of the EIS including appendix J on surface water impact assessment, were reviewed to assess the proposed discharge limits. Table 1 is a modified version of the submitted discharge limits Table, shows recommended discharge limits, appropriate ANZECC 2000 guideline trigger values and additional elements for monitoring. The following sub-sections provide further descriptions:

Wallarah Creek Data

- The proponent needs to clarify the percentile level of the data quoted under the column heading "80th Percentile Value" in the preliminary discharge limits table. Same values have been tabulated as 90th percentile in Appendix J, Table 2.11.

Species protection level

- The 99% species protection ANZECC guideline level has been adopted for a few important toxicants and these have been highlighted in Table 1 in Red.

Discharge Limit

The discharge limits have been set to comply with the following two considerations:

1. The discharge limit for any of the toxicants or parameters cannot be worse than the current water quality of the Wallarah Creek.
    - The EIS has clearly stated that the waters discharged would be "…at a similar quality to the existing water quality of the creek." (page 46 of EIS). Also refer to section 4.5.5 and Table 4.3 of appendix J. Since, during the EIS process, it was stated that the discharge water quality will be same or better than water quality of Wallarah Creek, the impact of releasing higher amounts of toxicants has not been assessed.
    - The Wallarah Creek is ephemeral, and may not have visible water flow especially during dry periods. It has been stated on page 57 of appendix J, section 4.5.4 that …"Wallarah Creek is an ephemeral watercourse, and hence, it is likely that treated water discharge may occur at times when there is no natural flow…" Under such circumstances, the discharged water will not experience any mixing or dilution, and downstream water quality would tend to equal discharge water quality.

2. The discharge limit cannot exceed ANZECC trigger value for toxicants listed in the preliminary discharge table provided.

Based on the above two points, for any toxicant the discharge limit can be equal to or lower than the 90th percentile (as per Table 2.11, appendix J) values for Wallarah Creek or the relevant ANZECC trigger value, whichever is the lower value.

Additional elements and toxicants.

The addition of elements/compounds such as aluminium, selenium, carbonate and bicarbonate is required. The discharge limits for these should not exceed concentrations in Wallarah Creek or the ANZECC trigger values, which ever is lower. If data on these species are not currently available for Wallarah Creek, then additional testing may be required.

Table 1 - Discharge Limits RO Plant Wallarah Creek

Parameter	Unit	Wallarah Creek W6 90th%ile	ANZECC Guidelines Default Trigger Value (99% sp. Protection)	Proposed End-of-Pipe Discharge Limit	Revised Maximum Allowable Discharge Limit
Electrical conductivity	uS/cm	516	300	500	300
pH	pH units	5.9 – 6.8	6.5 – 8.5	6.0 – 8.5	6.5-8.5
TSS	mg/L	24	-	25	24
Dissolved Oxygen	% saturation	67.8	85	70	68
Calcium	mg/L	13.6	1,000	40	14
Sodium	mg/L	81.4	115	80	80
Magnesium	mg/l	9.8	2,000	70	10
Potassium	mg/L	3	-	3	3
Sulphate	mg/L	19.9	400	70	20
Chloride	mg/L	141.8	175	140	140
Arsenic	mg/L	0.0005	0.013 (0.0008)	0.0005	0.0005
Barium	mg/L	0.15	1	0.15	0.15
Cadmium	mg/L	0.0001	0.0002 (0.00006)	0.0002	0.00006
Chromium	mg/L	0.001	0.001	0.001	0.001
Copper	mg/L	0.003	0.0014	0.003	0.0014
Lead	mg/L	0.0008	0.0034 (0.001)	0.001	0.0008
Manganese	mg/L	0.105	0.1 (1.9)*	0.1	0.1
Nickel	mg/L	0.002	0.1 (0.011)*	0.002	0.002
Zinc	mg/L	0.097	0.008	0.097	0.008
Iron	mg/L	1.764	0.2 (0.3)*	1.5	0.3
Mercury	mg/L	0.00005	0.0006 (0.00006)	0.0006	0.00005
Ammonia	mg/L	0.06	0.02	0.06	
Nitrate and Nitrite	mg/L	0.052	0.7 (0.3)*	0.05	0.05
Total Phosphorus	mg/L	0.1	0.025 (0.05)*	0.1	0.05
Oil/grease	mg/L	2.5	-	2.5	2.5
Aluminium	mg/L	Data required	0.055		0.055 or **Wallarah Creek W6 90th%ile sampling results which ever is less**
Selenium	mg/L	Data required	0.005		0.005 or **Wallarah Creek W6 90th%ile sampling results which ever is less**
Carbonate	mg/L	Data required	No TV		**Wallarah Creek W6 90th% Sampling result**
Bicarbonate	mg/L	Data required	No TV		**Wallarah Creek W6 90th%ile Sampling result**

*Trigger values quoted by the proponent appears to be erroneous (See Table 3.3.2, Table 3.4.1 and page 8.3-123 of ANZECC 2000 guidelines).

Clay Preshaw - Re: Wallarah 2 Coal Project - Response to Submissions

From: <julie.moloney@industry.nsw.gov.au>
To: <Clay.Preshaw@planning.nsw.gov.au>
Date: 10/3/2013 3:53 PM
Subject: Re: Wallarah 2 Coal Project - Response to Submissions

Hi Clay

DRE has no additional comments.

Regards

Julie

Julie Moloney | Principal Adviser | Industry Coordination
Division of Resources and Energy
Trade & Investment NSW | 516 High St | Maitland NSW 2320 | PO Box 344 | Hunter Region Mail Centre NSW 2310
T: 02 4931 6549 | F: 02 4931 6776 | M: 0407 921 462 | E: julie.moloney@industry.nsw.gov.au
W: www.industry.nsw.gov.au

From: "Clay Preshaw" <Clay.Preshaw@planning.nsw.gov.au>
To: Ash Tamhane <ashish.tamhane@rms.nsw.gov.au>, Darren Clarke <Darren.Clarke@transgrid.com.au>, David Green <david.green@cma.nsw.gov.au>, David Lovell <dlovell@lakemac.nsw.gov.au>, Greg Cashin <greg.cashin@wyong.nsw.gov.au>, "Greg Cole-Clark" <g.cole-clark@minesub.nsw.gov.au>, landuse.enquiries@industry.nsw.gov.au, Lin Armstrong <LJArmstrong@wyong.nsw.gov.au>, "Lucy Moore" <Lucy.Moore@heritage.nsw.gov.au>, "Mark Jenkins" <Mark.Jenkins@environment.gov.au>, Mark Ozinga <Mark.Ozinga@transport.nsw.gov.au>, Paul Purcell <ppurcell@artc.com.au>, "Peter Lewis" <Peter.Lewis1@health.nsw.gov.au>, planning.matters@environment.nsw.gov.au
Cc: Bill Talbot <bill.talbot@dpi.nsw.gov.au>, Carolyn McNally <Carolyn.McNally@transport.nsw.gov.au>, Denise Lo <Denise.Lo@transgrid.com.au>, "Emily Goodworth" <EKGoodworth@wyong.nsw.gov.au>, Greg Paine <greg.paine@industry.nsw.gov.au>, Jude Parr <jude.parr@fcnsw.com.au>, Julie Moloney <julie.moloney@industry.nsw.gov.au>, Kylie Spratt <kspratt@nsccahs.health.nsw.gov.au>, Liz Rogers <liz.rogers@dpi.nsw.gov.au>, Mahani Taylor <mahani.taylor@environment.gov.au>, "Mitchell Isaacs" <Mitchell.Isaacs@water.nsw.gov.au>, "Peter Jamieson" <Peter.Jamieson@epa.nsw.gov.au>, Regina Fogarty <regina.fogarty@dpi.nsw.gov.au>, "Richard Bath" <Richard.Bath@environment.nsw.gov.au>, "Vincent Sicari" <Vincent.Sicari@heritage.nsw.gov.au>, Wayne Jones <wayne.jones@industry.nsw.gov.au>
Date: 17/09/2013 12:42 PM
Subject: Wallarah 2 Coal Project - Response to Submissions

Dear all,

Please be advised that the applicant has submitted a formal Response to Submissions document in relation to the Wallarah 2 Coal Project (SSD 4974). The document is available to download via the following link:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=4974

The Department is now finalising its assessment of the proposal.

If you wish to provide any comments on the Response to Submissions, including comments about whether it has addressed the issues raised in your agency's submission, please do so by **COB Tuesday 1 October 2013.**

If you have any questions, please feel free to call me.

Regards

Clay Preshaw
Team Leader
NSW Department of Planning and Infrastructure
GPO Box 39 | Sydney NSW 2001 | T 02 9228 6305 | E clay.preshaw@planning.nsw.gov.au

NSW GOVERNMENT | Department of Primary Industries

- 3 OCT 2013

OUT13/28387

Clay Preshaw
Team Leader
NSW Department of Planning and Infrastructure
GPO Box 39, Sydney NSW 2001

clay.preshaw@planning.nsw.gov.au

Dear Mr Preshaw

Thank you for your letter of 17 September 2013 concerning the response to submissions regarding the proposed Wallarah 2 Coal Project.

The Office of Agricultural Sustainability & Food Security (O AS&FS) has reviewed the response to submissions provided by Hansen Bailey (16 September 2013). Specific issues are included in Attachment 1. A brief summary follows:

The responses have adequately covered the agricultural production issues. A condition should be included to require the proponents to develop a Property Management Subsidence Plan negotiated with potentially affected property owners that addresses remediation of any damage to agricultural infrastructure such as buildings, water bores, fencing, dams and turf growing and horse establishments.

This advice from the O AS&FS is forwarded directly to the Department of Planning & Infrastructure in accordance with agreed arrangements for mining applications that affect agricultural land.

Additional advice from the other divisions within the Department of Primary Industries may be forwarded by separate letter.

If you wish to discuss the issue further please call Rob Williamson on telephone 02 6391 3642 or by email robert.williamson@dpi.nsw.gov.au

Yours sincerely

Dr Regina Fogarty
Director Office of Agricultural Sustainability & Food Security

Encl

Attachment 1: Specific Agricultural Issues

Socio-economic assessment of the Wallarah 2 Coal Project
The Response to Submissions adequately addresses most of the socio-economic concerns previously raised in our submission, including the issues relating to the possible conditions of consent that were identified. Further clarification regarding the following issues is required to inform the final approval process.

Issues below are in relation to the DGR's Key Issue - Social and Economic

Management of potential subsidence impacts on agricultural enterprises
The proponent has committed to consultation with the turf farmer and five horse training establishments that may be impacted by subsidence due to the Project (pp.171-174, Section 3.19.2). However, in Table 11 (Ref 10, pp.204-205, Section 4) only consultation with the turf farm operator is indicated, "at least" during the preparation of the Property Subsidence Management Plan (PSMP).

Recommendation in response to this issue:
The proponent should commit to consultation with all agricultural enterprises potentially impacted by subsidence due to the Project. Consultation should be undertaken prior to the preparation of PSMPs and during or following any subsidence event to ensure that affected agricultural enterprises can continue to operate with minimal disruption. Table 11 should be updated to reflect this.

Management of potential subsidence impacts on water resources
The proponent has acknowledged that subsidence due to the Project could impact on 12 registered groundwater bores used for agriculture (p.174, Section 3.19.2). The proponent has committed to consultative management responses with the agricultural enterprises should their bores be impacted by subsidence.

Recommendation in response to this issue:
The proponent should commit to covering the cost of any agreed management responses to restore groundwater supplies to the agricultural enterprises. Section 3.19.2 should be updated to reflect this.

Clay Preshaw - Wallarah 2 Coal Project - Response to Submissions

From: Richard Bath <Richard.Bath@environment.nsw.gov.au>
To: Clay Preshaw <Clay.Preshaw@planning.nsw.gov.au>
Date: 10/3/2013 3:23 PM
Subject: Wallarah 2 Coal Project - Response to Submissions
CC: David Paull <David.Paull@environment.nsw.gov.au>

Clay

OEH preliminary review of the Response to Submissions Report

OEH has reviewed the Response to Submissions Report (RtS) and the additional information contained therein, in particular: the revised the Ecology section (including the Risk Assessment for Jilliby SCA) and Aquatic Ecology section (including Appendix E by Marine Pollution Research). As discussed, this preliminary review is to provide feedback prior to the next meeting between OEH, DP&I and the proponent, which is tentatively scheduled for the week commencing 14 October. Please note that before finalising this date I will need to check the availability of Monica Collins. Following this meeting, OEH will provide a formal response to the submissions report.

OEH acknowledges that some progress has been made in relation to:

1. Settling issues in relation to offsets for direct impacts. The BioBanking Methodology has been used to confirm adequacy of the offset to the satisfaction of OEH. Conservation mechanism should be confirmed as condition of approval. Planning should note that Conservation Agreements are no longer accepted by OEH as a way to establish in perpetuity offsets, except under exceptional circumstances.

2. Aquatic ecology baseline data. Proponent did additional surveys in August which clarified location of monitoring sites in and outside the SCA and have established a good set of baseline data. For any monitoring programme, OEH will ask that some additional indicators be included such as water table levels and specific vegetation indicators.

3. Water quality. OEH acknowledges that some baseline data has been collected, though will let the EPA take the lead role on this issue.

There are some outstanding issues:

1. In relation to Jilliby SCA risk assessment (s 3.26 of the RtS) and potential for impacts upon GDEs and threatened species, OEH is of the opinion that this analysis is poor. For example:

"Cumberland Ecology has identified a number of groundwater dependent ecosystems within the vicinity of the major and minor drainage systems within the Project Boundary, including areas of the Jilliby SCA. In these areas, the water table within the hard rock strata is predicted to be deep. The trees and plants within the Jilliby SCA are unlikely to draw moisture from the deeper hard rock groundwater systems that are predicted to be affected by the Project. Instead, they are expected to rely upon soil moisture within the unsaturated zone, which is presently sustained by rainfall and runoff and will continue to do so with the Project. This is supported by the location of these groundwater dependent ecosystems in close proximity to the main drainage lines within the Jilliby SCA. Therefore, the predicted impacts of the Project on the regional groundwater system are unlikely to result in impacts to the values of the Jilliby SCA." (p. 191).

This analysis does not sit with the information as presented in the Aquatic Ecology section and data in Appendix E which acknowledges baseline river flows. There also seems to be a reluctance to admit that GDEs are found in the Dooralong Valley. Aside from the level and type of groundwater dependency being in error in the analysis, no mention is made of the key issues for OEH such as the threatened frogs in this risk assessment. OEH does not support the analysis provided in Table 10 (p. 193). OEH is aware that the proponent did not have access to the more recent modelling that OEH has provided to Planning. More detailed GDE mapping will be available soon.

2. Threatened frogs. OEH is also aware that the proponent has not had time to update requested baseline frog data in Jilliby SCA. However, the SCA has been subject to a long-term study of both the *Mixophyes* frog species by the University of Newcastle (Prof. Michael Mahony, UoN, pers. comm.). This was part of PhD study commenced in the early 2000s though was discontinued following the student's departure. OEH

has examined the data and it demonstrates that these 3rd and 2nd order streams, particularly Little Jilliby Jilliby Creek, contain significant and stable populations of both species. This study can provide a viable baseline data set for future monitoring for these species and OEH will request that the University of Newcastle be facilitated to continue this valuable work as part of the Wallarah 2 project monitoring programme.

3. OEH is having difficulty accepting some of the reasoning behind the subsidence assessments in the EIS and RtS as there seems to be certain ambiguities and assumptions of no impact on surface ecosystems and GDEs. The EIS and RtS proposes that the risk to GDEs is low/unlikely because 1) assumptions made about vertical hydraulic impacts from cracking and responses of the alluvium; 2) drop in watertable is said to be "minimal" yet may still affect water access for GDEs; 3) permeability of alluvials, which is variously stated as being low to moderate; 4) assumes rapid recharge and recovery of watertables under low-average rainfall conditions but drought is not considered nor is peripheral drainage of water tables from unsubsided areas.

With respect to issues of the proponent undertaking avoidance or staged consent options for the project, OEH understands that these are still on the table for discussion.

OEH is working on an appropriate set of monitoring targets, thresholds, responses and conditions for this project that cover key threatened ecological communities and species both within and outside the SCA. Following further meetings with the proponent, these will be finalised.

Regards

Richard Bath
Senior Team Leader - Planning
Regional Operations Group
Office of Environment and Heritage
NSW Department of Premier and Cabinet
PO Box 488G Newcastle NSW 2300
T: 4908 6805
W: www.environment.nsw.gov.au

From: Clay Preshaw [mailto:Clay.Preshaw@planning.nsw.gov.au]
Sent: Tuesday, 17 September 2013 12:39 PM
To: Ash Tamhane; Darren Clarke; David Green; David Lovell; Greg Cashin; Greg Cole-Clark; landuse.enquiries@industry.nsw.gov.au; Lin Armstrong; Moore Lucy; Mark Jenkins; Mark Ozinga; Paul Purcell; Peter Lewis; CaRD Mailbox
Cc: Bill Talbot; Carolyn McNally; Denise Lo; Emily Goodworth; Greg Paine; Jude Parr; Julie Moloney; Kylie Spratt; Liz Rogers; Mahani Taylor; Mitchell Isaacs; Jamieson Peter; Regina Fogarty; Bath Richard; Sicari Vincent; Wayne Jones
Subject: Wallarah 2 Coal Project - Response to Submissions

Dear all,

Please be advised that the applicant has submitted a formal Response to Submissions document in relation to the Wallarah 2 Coal Project (SSD 4974). The document is available to download via the following link: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=4974

The Department is now finalising its assessment of the proposal.

If you wish to provide any comments on the Response to Submissions, including comments about whether it has addressed the issues raised in your agency's submission, please do so by **COB Tuesday 1 October 2013.**

If you have any questions, please feel free to call me.

Regards

Clay Preshaw
Team Leader
NSW Department of Planning and Infrastructure
GPO Box 39 | Sydney NSW 2001 | T 02 9228 6305 | E clay.preshaw@planning.nsw.gov.au

Clay Preshaw - RE: Wallarah 2 Coal Project - Response to Submissions [SEC=UNCLASSIFIED]

From: "Jenkins, Mark" <Mark.Jenkins@environment.gov.au>
To: 'Clay Preshaw' <Clay.Preshaw@planning.nsw.gov.au>
Date: 10/4/2013 11:19 AM
Subject: RE: Wallarah 2 Coal Project - Response to Submissions [SEC=UNCLASSIFIED]

Clay

The department does not have any comments to make regarding the Wallarah 2 Coal Project - Response to Submissions Report other than that on page 74 of Attachment B "Consolidated Submission Issues" comment 733 incorrectly lists the Glossy Black Cockatoo, Yellow Bellied Glider and NSW population of the Masked Owl as being EPBC listed threatened species, which they are not.

regards

Mark

From: Clay Preshaw [mailto:Clay.Preshaw@planning.nsw.gov.au]
Sent: Tuesday, 17 September 2013 12:39 PM
To: Ash Tamhane; Darren Clarke; David Green; David Lovell; Greg Cashin; Greg Cole-Clark; landuse.enquiries@industry.nsw.gov.au; Lin Armstrong; Lucy Moore; Jenkins, Mark; Mark Ozinga; Paul Purcell; Peter Lewis; planning.matters@environment.nsw.gov.au
Cc: Bill Talbot; Carolyn McNally; Denise Lo; Emily Goodworth; Greg Paine; Jude Parr; Julie Moloney; Kylie Spratt; Liz Rogers; Taylor, Mahani; Mitchell Isaacs; Peter Jamieson; Regina Fogarty; Richard Bath; Vincent Sicari; Wayne Jones
Subject: Wallarah 2 Coal Project - Response to Submissions

Dear all,

Please be advised that the applicant has submitted a formal Response to Submissions document in relation to the Wallarah 2 Coal Project (SSD 4974). The document is available to download via the following link: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=4974

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If you wish to provide any comments on the Response to Submissions, including comments about whether it has addressed the issues raised in your agency's submission, please do so by **COB Tuesday 1 October 2013.**

If you have any questions, please feel free to call me.

Regards

Clay Preshaw
Team Leader
NSW Department of Planning and Infrastructure
GPO Box 39 | Sydney NSW 2001 | T 02 9228 6305 | E clay.preshaw@planning.nsw.gov.au

Clay Preshaw - Wallarah 2 coal mine RtS

From: Greg Paine <greg.paine@trade.nsw.gov.au>
To: <clay.preshaw@planning.nsw.gov.au>
Date: 10/4/2013 10:37 AM
Subject: Wallarah 2 coal mine RtS

Clay.
Advices of Department of Primary Industries below.
Will follow under formal DPI letterhead shortly.
Greg Paine
Business Services
Tel: 9338 6778

Comment by NSW Office of Water

The NSW Office of Water advises:

(i) Comment by the Office of Water in relation to exhibition of the environmental assessment included requests that the proponent:

1. undertake a detailed risk analysis that examines the potential impact to the Gosford-Wyong Water Authority, and
2. develop a response and mitigation strategy in the event that vertical leakage, hence the impact on surface water and shallow groundwater, is found to be greater than predicted.

The proponent has not provided details in respect to these two items in the response to submissions.

(ii) The response provided to the Office of Water□s submission on groundwater resources is inadequate. Only limited further information has been provided in that:

? assessment against the minimum impact considerations, and some additional information specific to the requirements of the Aquifer Interference Policy (section 3.2 in the main report) is incomplete;

? an examination of technical issues relating to the variability and uncertainty of estimating vertical hydraulic conductivity and its impact on shallow aquifers has been provided. This assessment concluded that leakage from □alluvial lands□ would be □low□. However, volumes are not given against water sources, and the link between conclusion and the evidence given is difficult to follow (Appendix D of the response report).

Given the depth of the proposed activity, and the likely low vertical hydraulic conductivity of the strata between, it is conceivable that water impacts closer to the surface will be minimal. However insufficient detail is provided to give confidence in that assessment. A monitoring, response and mitigation strategy will be required in the event that vertical leakage is greater than predicted.

(iii) In summary, the Office of Water reiterates its earlier comments, and requests that the proponent address our earlier submission in a complete and consolidated report.

For further information please contact Hemantha Desilva, Senior Water Regulation Officer (Newcastle office) on 4904 2525, or at: hemantha.desilva@water.nsw.gov.au.

Comment by Fisheries NSW

Fisheries NSW reiterates its earlier comments made in response to exhibition of the environmental assessment:

(i) Prior to mining commencing, the applicant must include details of stream remediation as part of the Surface Water Monitoring Plan in the event that subsidence, vertical leakage, fracturing, change in slope or increased erosion of creek lines occur.

(ii) Fisheries NSW are to be consulted on the development of the Biodiversity Management Plan and Surface Water Monitoring Plan to address monitoring of subsidence impacts on aquatic ecosystems.

For further information please contact Scott Carter, Senior Conservation Manager Port

Stephens office) on 4916 3931, or at: scott.carter@dpi.nsw.gov.au.

Comment by Crown Lands

Crown Lands advise its earlier comments made in response to exhibition of the environmental assessment still apply. These are that the surface constructions for the project at Tooheys Road appear to affect Crown public road at the Tooheys Road/F3 intersection. Should this be the case then acquisition of the affected Crown land will be required.

For further information please contact Melanie Osborne, Acting Senior Manager Hunter Area (Maitland office) on 4937 9332, or at: melanie.osborne@lands.nsw.gov.au.

Comment by Office of Agricultural Sustainability & Food Security

In accordance with procedures for mining applications that affect agricultural land, the Office of Agricultural Sustainability & Food Security will respond direct to your Department.

For further information please contact Liz Rogers (Orange office) on 6391 3642, or at: liz.rogers@dpi.nsw.gov.au.

Comment by Forestry Corporation NSW

As advised in this Department□s letter of 8 July 2013 Forestry Corporation of NSW is now a separate agency and contact should be made direct.

For further information please contact Jude Parr, Land Administration Officer (Wauchope office) on 6586 9718, or at: jude.parr@fcnsw.com.au.

Clay Preshaw - Wallarah 2 Project SSD4974

From: Gary Estcourt
To: Clay Preshaw
Date: 10/2/2013 9:10 AM
Subject: Wallarah 2 Project SSD4974

Clay,

I have been off the last couple of days and this snuck up on me.

I have looked through the PPR and have the following comments if not too late:

- The preparation of a HHMP is considered an appropriate step and this should be conditioned as a part of the consent.
- The HHMP must include stop-works procedures should any unexpected archaeological relics or objects be located. These need to include assessment by an appropriately qualified person and notification to the Heritage Division.
- The map and list in the HHMP needs to include the 13 known and 19 potential heritage items.
- A procedure for the mitigation of impacts on any of these items need to be included in the HHMP to cover any unexpected impacts or works near to these items.

Sorry for delay and happy to discuss.

Thanks

Gary

Gary Estcourt
Heritage Division
Regional Operations and Heritage
Office of Environment and Heritage
NSW Department of Premier and Cabinet
Locked Bag 5020 Parramatta NSW 2124
3 Marist Place Parramatta NSW 2150
T: (02) 9873 8562
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W: www.heritage.nsw.gov.au

F2006/01080
October 2 2013

NSW Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

Attention: Mr Clay Preshaw

Dear Sir

COMMENTS RE WALLARAH 2 COAL PROJECT RESPONSE TO SUBMISSIONS REPORT

In response to your email of 17 September to Greg Cashin seeking comments on the proponents formal Response to Submissions document in relation to the Wallarah 2 Coal Project (SSD 4974), the following is provided.

The Central Coast region has a significant population currently in excess of 320,000 and likely to increase to over 400,000, however has limited local water resources. As such, any activity that threatens or places at risk either the water quantity or quality available for town water supply is of great concern to the region.

The EIS and subsequent response submission by the proponent presents arguments that the proposal will have limited impacts on the water resources of the Central Coast. Whilst these may be the findings of the EIS, there is the potential that the assessments could be incorrect and the proposal could have impacts on the local water resources. There appears to be limited recognition of this possibility with minimal mitigation measures and compensatory proposals presented in the event impacts do occur.

The submissions report does not appear to adequately recognise or consider *Table 12 Guidance for further assessment / validation and monitoring* contained in the report by PMS which was a key and emphasised element of our submission (a copy of Table 12 is attached for reference).

From a water supply perspective we are keen to ensure that the water resources are protected and in the event that they are affected that appropriate monitoring, mitigation and compensatory procedures are in place to protect the interests of the Central Coast community (water supply customers).

If the proposal was to proceed, we consider that the associated approval conditions would need to include a rigorous monitoring and evaluation process to identify impacts together with agreed and secured compensation measures established prior to the proposal commencing.

It is considered essential that the risk of the impacts associated with the mining proposal are borne by the proponent and not shifted to third parties. To this point it is considered appropriate that the risk burden is held by the proponent with the principle that the benefit of doubt falls in favour of those adversely impacted by the proposal.

Specific, measurable and agreed targets/ triggers for monitoring need to be established prior to any underground works proceeding in order to allow all stakeholders certainty about what the aims of any adaptive management programme are.

These targets/ triggers should be based on the results of a comprehensive quantitative risk assessment and possibly cost/benefit assessment. Targets/ triggers may include loss of stream flows, lowering of water levels/pressures in monitoring bores and levels of subsidence.

The monitoring and response process must be credible, independent and subject to legal sanctions.

Further, the targets/triggers must be accompanied by agreed responses otherwise the management system could be reduced to an impotent or frustrating process. Agreed responses may be as minor as "continue to monitor / watch" to as strong as "cease mining" or to quarantine sensitive areas from mining.

It may be considered that it may not be possible to sufficiently confirm through monitoring the level of streamflow loss. In that case it may be that a proportion of the mine inflow water is deemed to be from streams and an agreed method and distribution of this proportion of mine water is treated and repatriated to streams, users/residents

Should further information or clarifications be required my contact details are Garry Casement, Manager Headworks, 16 Hely Street, Wyong, NSW, 2259 and can be contact by phone 4350 5158 or by email Garry.Casement@wyong.nsw.gov.au.

Yours faithfully

Garry Casement

Manager Headworks
Central Coast Water Supply

TABLE 12
GUIDANCE FOR FURTHER ASSESSMENT / VALIDATION AND MONITORING

ITEM / AREA OF UNCERTAINTY	IMPORTANCE (Low, Medium and High)	MEASURES
Subsidence	High	Accurate measurement of surface subsidence is expected to be undertaken by the mine if and when mining occurs. This must be calibrated against an accurate map of conditions prior to mining. The record must also include detailed survey of all properties, infrastructure and structures that may be affected by subsidence along with comprehensive dilapidation assessments. Agreement with all stakeholders and landowners must be gained as to the extent and infrastructure to be assessed for impact due to subsidence.
Subsidence Model	High	A hold point after an agreed number (possibly 5) of longwalls have been extracted and the SCT and MSEC models validated and recalibrated as necessary.
Subsidence – potential variability in modelling results.	Medium	The influence of UCS – Sonic correlation UCS – modulus correlation and stress regime on the prediction of subsidence must be validated – as is proposed by the EIS.
Subsidence – impact of pillar yielding on subsidence and the ability to validate predictions	Medium	A comparison of impacts with and without the influence of pillar yielding. A program of pillar performance measurement including convergence measurements and extensometer readings.
Mine Plan	Medium	It is likely, or even inevitable that the Mine Plan and layout of longwall panels will change during the life of the mine. This is particularly so after the process of validation of the subsidence modelling has been completed following initial mining of the first longwall panels (minimum of 4). Modification to the Mine Plan and longwall panel layout will alter the extent and location of subsidence and the location of impacts on flooding, access routes and stream flows. A clear process must be setout for the assessment and approval of revised mine plans and must include Council. Assessments of the impacts of Mine Plan change include subsidence magnitude and extent, potential impact on groundwater modelling, impact on flooding and stream flows/ponding.

TABLE 12
GUIDANCE FOR FURTHER ASSESSMENT / VALIDATION AND MONITORING (Cntd)

ITEM / AREA OF UNCERTAINTY	IMPORTANCE (Low, Medium and High)	MEASURES
Sampling of rock mass – impacts on groundwater modelling	High	In order to confirm the EIS assumption and reduce uncertainty on the extent and connectivity (tortuous) of the defect system within the "aquatard" which is relied upon in the modelling factual data should be provided. If this data is not available then within the existing mine database, or other sources additional exploration cored boreholes drilled at an angle to the horizontal plane of say 60° should be implemented. Drilling would need to be undertaken in the Dooralong Valley and in the lower reaches of the Yarramalong Valley to target rocks below the alluvial soils. Drill holes to extend to at least the base of the "constrained zone" from subsidence modelling. The location and number of such holes is not recommended here, but should be of sufficient number to provide confidence in the result when used in conjunction with other available data. These angled holes could also be used to undertake further in-situ permeability testing by means such as Packer or Constant Head testing.
Permeability of Patonga Claystone – impacts on groundwater modelling	High	Specific testing of the permeability of the rock mass below the alluvial soils in the valleys be undertaken to confirm EIS assumptions, or otherwise. The assumptions, and hence impacts of the EIS groundwater modelling must be confirmed prior to mining below any alluvial areas. Testing to be in inclined, cored boreholes. Holes must be logged to allow permeability testing to be carefully targeted to allow assessment of vertical and horizontal defects. Possible methods to test the rock mass permeability comprise; • Packer testing. • In-situ Constant Head testing. • Full scale in-situ pump testing targeting the impacts of dewatering below the Patonga Claystone formation. We acknowledged that these tests are expensive and time consuming and alternate methods may be appropriate. We recommend the former two methods be employed as a first phase of testing. Testing should comprise a suitable number of locations and successful tests to be meaningful. The final number is likely to be subject to the results of the works at the time. A minimum of 6 test holes is suggested.

TABLE 12
GUIDANCE FOR FURTHER ASSESSMENT / VALIDATION AND MONITORING (Cntd)

ITEM / AREA OF UNCERTAINTY	IMPORTANCE (Low, Medium and High)	MEASURES
Impact on Groundwater Levels	High	Should the mine be approved a comprehensive system and regime of groundwater level monitoring must be implemented. This will require a robust system of new and existing monitoring wells and/or piezometers that are able to survive the predicted subsidence impacts. Monitoring points must be read on a frequent basis and compiled into a central database which is not only open for access by Council, but the data must be reviewed and assessed for its 'meaning' on a regular basis. This system should be augmented by measurement of levels and yields from water bores in the valleys.
Impact on Stream Flows	High	Monitoring of streamflow and inputs that influence alluvial lands water table recharge must be ascertained to allow assessment of the impact of groundwater leakage/loss. Aspects that must be monitored include: • Rainfall and runoff across the catchment area for Wyong River and Jilliby Jilliby Creek, • Stream Flows – measured at multiple points along the various streams. As a minimum this must comprise ○ Jilliby Jilliby Creek upstream of the mine area, upstream and downstream of the confluence with Little Jilliby Jilliby Creek and just upstream of the confluence with Wyong River. ○ Wyong River upstream of the mine area - say at Duffy's Point, just upstream and downstream of the volcanic intrusion along the southern edge of the mine – say about 500m upstream of Chandlers Creek and about 700/800m upstream of Kidmans Lane, just upstream and downstream of the confluence with Jilliby Jilliby Ck. ○ Little Jilliby Jilliby Creek just upstream of the confluence with Jilliby Jilliby Creek and say just as the creek enters the upper forested area. These points could also be used to monitor water quality as necessary.

TABLE 12
GUIDANCE FOR FURTHER ASSESSMENT / VALIDATION AND MONITORING (Cntd)

ITEM / AREA OF UNCERTAINTY	IMPORTANCE (Low, Medium and High)	MEASURES
Flood Remediation to Access Roads	Medium	The impact of potential remedial works to access roadways must be understood prior to undertaking such works with regard to the impacts on future flood levels. Models for the 1%AEP and 20% AEP must be developed, assessed and agreed. Further, the method and design of remedial works and the maintenance implications for the future must be understood and agreed with Council.
Stream Stability (and ecology)	Medium	Specific and measurable/quantifiable targets must be agreed and established concerning stream stability and the impacts on erosion (as well as flora and fauna) so all parties understand where they stand if the mine is approved. This is particularly so given the very difficult nature of assessment of what is adverse and what is not as a result of the mine.
Risk Assessment	High	A detailed and comprehensive risk assessment must be undertaken to provide a framework against which reasonable adaptive management programmes can be developed, and assessed.
Adaptive Management	High	Specific, measurable and agreed targets or levels from monitoring MUST be established prior to any underground works to allow all stakeholders certainty about what the aims of any adaptive management programme are. These should be based on the results of a comprehensive quantitative risk assessment and possibly cost/benefit assessment. Targets may include loss of stream flows, lowering of water levels/pressures in monitoring bores and levels of subsidence. Further, the targets must be accompanied by agreed responses otherwise the management system would be reduced to an impotent and disingenuous process. Agreed responses may be as minor as "continue to monitor / watch" to as strong as "cease mining" or to quarantine sensitive areas from mining. It may be considered that it is not possible to sufficiently confirm through monitoring the level of streamflow loss. In that case it may be that a proportion of the mine inflow water is deemed to be from streams and an agreed method and distribution of this proportion of mine water is treated and repatriated to streams, users/residents and areas of significant flora.

TABLE 12
GUIDANCE FOR FURTHER ASSESSMENT / VALIDATION AND MONITORING (Cntd)

ITEM / AREA OF UNCERTAINTY	IMPORTANCE (Low, Medium and High)	MEASURES
Independent Impact Monitoring Authority	Medium	An independent body be established to install, monitor and maintain all the groundwater, surface water and surface level impacts of the mine both during and after operation – this is particularly so given the EIS stated length of impact on groundwater and uncertainty on the speed with which pillar yield may impact subsidence. This body must be guaranteed funding to not only establish the monitoring system, but to maintain it as the impacts of subsidence and the long mine life will require significant repairs and timely replacement of equipment and monitoring points/instruments. Indeed, replacement of instrument/monitoring points should not take longer than say 2 months to maintain continuity of measurements. It is also recommend the monitoring authority be given either a direct, or at the least oversight role in the assessment of impacts and on the assessment of compensation for damage/loss or the development of remedial works/measures to control/limit the impacts of the mine – judged against the specific targets of the Adaptive Management Plan – and as such must be able to undertake, or direct the mine to undertake additional investigations and/or assessments with regard to subsidence, groundwater and surface water. The records and recommendations of the authority should be available on the public record.

Transport for NSW

Director, Mining and Industry Projects
Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

Attention: Clay Preshaw

Wallarah 2 Coal Project (SSD 4974)
Response to Submissions

Dear Mr Preshaw

I refer to your email dated 17 September 2013 requesting Transport for NSW (TfNSW) to review the formal Response to Submissions for the Wallarah 2 Coal Project.

Most issues previously raised by TfNSW appear to be adequately addressed. One additional issue regarding noise (Section 3.8) needs additional consideration:

- **3.8.2 Noise Control Measures:** The 200m radius curves cited for the loading facilities are below what is considered optimum for mitigating wheel squeal. Other mitigation measures may be required.

Please note that the Roads & Maritime Services and RailCorp will be submitting separate responses.

Should you have any questions regarding this matter, please contact Robert Rutledge on 8202 2203 or Robert.Rutledge@transport.nsw.gov.au.

Yours sincerely

1/10/13

Mark Ozinga
Manager, Land Use and Transport Planning
Planning and Programs

Objective Ref: CD13/18366

18 Lee Street Chippendale NSW 2008
PO Box K659 Haymarket NSW 1240
T 8202 2200 F 8202 2209
www.transport.nsw.gov.au
ABN 18 804 239 602

Clay Preshaw - RE: Wallarah 2 Coal Project - Response to Submissions

From: Clarke Darren <Darren.Clarke@transgrid.com.au>
To: Clay Preshaw <Clay.Preshaw@planning.nsw.gov.au>
Date: 10/1/2013 3:22 PM
Subject: RE: Wallarah 2 Coal Project - Response to Submissions
CC: Lo Denise <Denise.Lo@transgrid.com.au>
Attachments: Wallarah 2 Coal Project - Response to Submissions

Hi Clay,

I received your voicemail this afternoon in regards to obtaining further comments relating to the Wallarah 2 Coal Project.

TransGrid advise that we are satisfied with the response provided by Wallarah 2 Coal (in the attached email). We confirm that Wallarah 2 Coal has consulted with TransGrid to address comments previously provided. Whilst all issues have not been addressed at this stage, TransGrid will continue to co-operate with the proponent in determining the feasibility of different options to ensure TransGrid's high voltage electricity network in the vicinity of the project, should it obtain Project Approval, can continue to operate with risk to network safely or reliability.

Regards,

Darren

Darren Clarke
Senior Environmental Officer
Environment, Property and Development Compliance | Capital Program Delivery

TransGrid | 70 - 72 Commonwealth St, Sydney, NSW 2000
T: (02) 8204 6314 **F:** (02) 8204 6370
E: darren.clarke@transgrid.com.au

From: Clay Preshaw [mailto:Clay.Preshaw@planning.nsw.gov.au]
Sent: Tuesday, 17 September 2013 12:39 PM
To: Ash Tamhane; Clarke Darren; David Green; David Lovell; Greg Cashin; Greg Cole-Clark; landuse.enquiries@industry.nsw.gov.au; Lin Armstrong; Lucy Moore; Mark Jenkins; Mark Ozinga; Paul Purcell; Peter Lewis; planning.matters@environment.nsw.gov.au
Cc: Bill Talbot; Carolyn McNally; Lo Denise; Emily Goodworth; Greg Paine; Jude Parr; Julie Moloney; Kylie Spratt; Liz Rogers; Mahani Taylor; Mitchell Isaacs; Peter Jamieson; Regina Fogarty; Richard Bath; Vincent Sicari; Wayne Jones
Subject: Wallarah 2 Coal Project - Response to Submissions

Transport
Roads & Maritime
Services

25 September 2013

SF 2012/045917
CR 2013/006912
MJ

Director, Mining & Industry Projects
Department of Planning
GPO Box 39
SYDNEY NSW 2001

Attention: Clay Preshaw

STATE SIGNIFICANT DEVELOPMENT – WALLARAH 2 COAL PROJECT (SSD 4974) - RESPONSE TO SUBMISSIONS REPORT

Dear Mr Preshaw

I refer to your email dated 17 September 2013 regarding the subject Response to Submissions Report forwarded to Roads and Maritime Services (RMS) for comment. I also refer to my letter dated 16 May 2013.

RMS Responsibilities and Obligations

Transport for NSW and Roads and Maritime's primary interests are in the road network, traffic and broader transport issues, particularly in relation to the efficiency and safety of the classified road system, the security of property assets and the integration of land use and transport. With regard to the subject proposal, Roads and Maritime's main concerns are safety, access and traffic generating impacts on the classified road network and its intersections.

In accordance with the Roads Act 1993, RMS has powers in relation to road works, traffic control facilities, connections to roads and other works on the classified road network. Roads and Maritime concurrence is required for works, structures, and disturbances to, in, on, under or over classified roads, under section 138 of the Act, with Council consent. Council is the roads authority for all roads in the area with the exception of the Pacific Motorway (M1).

Additionally, Roads and Maritime has powers under Section 104 of the Roads Act 1993 to direct the removal of any works deemed by to be a traffic hazard.

RMS Response and Requirements

Roads and Maritime has reviewed the subject Response to Submissions Report prepared by Hansen Bailey Environmental Consultants (September 2013). Roads and Maritime advises that the matters raised in my letter dated 16 May 2013 have been addressed in the subject report and it

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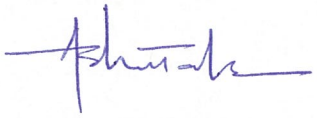
T 02 4924 0688 | **F** 02 4924 0342 | **E Ashish.Tamhane@rms.nsw.gov.au** **www.rmservices.nsw.gov.au | 13 22 13**

has no additional requirements for the project. The matters raised in my letter dated 16 May 2013 still apply.

On the Minister's determination of this matter, it would be appreciated if a copy of the Project Approval is forwarded to Roads and Maritime for record and / or action purposes.

Please contact me on 4924 0688 if you require further advice.

Yours sincerely



Ash Tamhane
A/Manager Land Use
Hunter Region

Cc Mr Robert Rutledge
Transport for NSW

Cc General Manager
Wyong Council

Catchment Management Authority
Hunter-Central Rivers

Mr Clay Preshaw
A/Team Leader
Director, Mining Projects,
Development Assessment Systems & Approvals
Department of Planning and Infrastructure
GPO Box 39,
SYDNEY NSW 2001

Our Ref: Gos395 A1681154
Your Ref: 11/18834

Re: State Significant Development Wallarah 2 Coal Project (SSD 4974)

Response to Submissions

Dear Mr Preshaw,

Thank you for the opportunity to comment on the Response to Submissions for Wallarah 2 Coal Project. The response to the CMA's submission fails to adequately address the CMA's concerns with regards to the clearing of native vegetation and risk of accelerated erosion of the fluvial system as a result of mine subsidence. Detailed comments are provided below.

3.3.5 Subsidence Impacts

The response states (page 67) *"...this 1% change in gradient is the maximum tilt that is predicted to occur at a specific point along Jilliby Jilliby Creek as opposed to the change in the average gradient along the entire length of the creek"*

The response says '1% change in gradient'. This is incorrect. The change in gradient is from 0.13% to 1%; hence the 'change in gradient' is 760%, not 1%.

The 'average' change in stream gradient bears little relationship to the capacity for head-cut propagation and its potential impacts. Head-cuts are most likely to initiate where the most significant changes in bed gradient will occur. The increase in bed gradient causes an increase in erosivity due to increases in flow velocities and stream power.

Irrespective of an 'average' change in channel slope, as clearly indicated in Figure 5.1 (Subsidence Predictions and Impact Assessments), the land-surface (and stream channel) is predicted to subside by up to 1.5 m over distances ranging from 65 m to several hundred metres in association with the extraction of each long wall. For example, 0.8 m of subsidence is predicted to occur between long walls 1S and 2S, representative of around 65 m of channel length (measured from MSEC515-01), imposing a post subsidence channel gradient of 1.2%. The current stream gradient along the channel of Jilliby Jilliby Creek in the vicinity of long walls 1S and 2S (calculated between XS17 and XS24) is

0.07%. As a consequence of mine subsidence, the bed gradient between long walls 1S and 2S will increase by 1763%, or 17.6 times.

Long wall 6N will be the first to be excavated under Jilliby Jilliby Creek. This will induce 1.2 m of subsidence over 220 m of channel length (0.54% gradient), or a 415% increase in bed gradient given an average channel gradient of 0.13%.

The steep channel gradients imposed due to mine subsidence as illustrated from the examples presented will occur from the extraction of all long-walls under Jilliby Jilliby Creek. The increased flow velocities, stream power, and stream erosivity can be expected to induce bed incision and head-cut retreat. Due to the lack of natural bed controls head-cut retreat has the capacity to erode large quantities of sediment within, and upstream, of the mine footprint, including the tributary network.

No quantification of sediment at risk of erosion or bank and bed stability analysis has been undertaken (in the EIS), nor has it been proposed in the response to the CMA's comments to the EIS. Basic calculation demonstrates bed incision along Jilliby Jilliby Creek has the capacity to erode at least 24,000m^3 of sediment within the mine footprint (assuming 1.2 m depth and 2 m average bed width). Actual sediment releases would likely be many times the calculated amount due to additional inputs from bed and bank erosion of side tributaries.

Although the EIS considers riverbank and bed instability due to subsidence a likely occurrence, the measures proposed to mitigate damage are inadequate; a response is triggered only after erosion is observed. Jilliby Jilliby Creek within the mine footprint (and for kilometres upstream) is a laterally unconfined sand-bed stream; there are few (if any) bed controls sufficient to arrest a regrading head-cut. As a consequence, there is the capacity for significant erosion to occur to the bed and banks of Jilliby Jilliby Creek and its tributaries, within and upstream of the mine footprint prior to it being identified or ameliorated.

The CMA is concerned as the issue of bed erosion through head-cut migration was not addressed in the current EIS, despite the CMA identifying the issue in comments submitted on June 2, 2010 relating to the previous Environmental Assessment for Wallarah 2 (attached); and it has not been addressed in the response to the CMA's comments on the current EIS, despite the CMA raising this as a key issue in comments submitted on June 24, 2013.

In summary, subsidence due to mining beneath Jilliby Jilliby Creek has the potential to create a rapidly migrating head-cut, with up to 1.5 m of incision due to a maximum subsidence induced tilt of 1% (or greater), representing a 760% (or greater) increase to the current stream-bed gradient. This has the potential to rapidly erode the bed and banks of Jilliby Jilliby Creek (and tributaries) both within, and upstream of the mine footprint. The measures proposed to mitigate this risk are inadequate.

3.9.5 Clearing of Vegetation and Removal of Habitat for Native Species

The response states (page 110) "...there will be no net loss of biodiversity, which is consistent with the required 'Maintain and Improve' principles of the *Native Vegetation Act* 2003.

The above statement is incorrect. The Biodiversity Offset Package (BOP) and Biodiversity Management Plan (BMP) are ***not*** consistent with the 'improve or maintain' principle of the Native Vegetation Act 2003:

- Offset ratios are inadequate; at less than 3.4:1 these offset ratios do not meet the 'improve or maintain' principle of the NV Act.
- The proposal involves the clearing of 12.2 ha of Endangered Ecological Communities (EECs). The clearing of EECs are not permitted under the NV Act unless in low condition, hence the proposal does not meet the 'improve or maintain' principle of the NV Act.
- The rehabilitation of areas of derived native grassland and exotic grassland to woodland does not meet the 'improve or maintain' principle of the NV Act.

Assessment of this proposal under the NV Act would demonstrate a net loss of biodiversity and failure to meet the 'improve or maintain' principle of the NV Act. As a consequence, the CMA objects to the response claiming to be consistent with the 'improve or maintain' principle of the NV Act.

If you require any further information or to discuss these issues further, please don't hesitate to contact David Green, Team Leader Central Coast on 4352 5114 or by email on david.green@cma.nsw.gov.au

David Green

Team Leader for

Fiona Marshall

General Manager

1st October 2013

Clay Preshaw - RE: Wallarah 2 Coal Project - Response to Submissions

From: John Brown <JBrown@artc.com.au>
To: "Clay.Preshaw@planning.nsw.gov.au" <Clay.Preshaw@planning.nsw.gov.au>
Date: 10/1/2013 3:58 PM
Subject: RE: Wallarah 2 Coal Project - Response to Submissions
CC: Paul Purcell <PPurcell@ARTC.com.au>, Teena Renes <TRenes@ARTC.com.au>

Hi Clay,

ARTC are satisfied there are no outstanding issues relating to Wallarah 2 Coal Project submission.

Please do not hesitate to contact me if you wish to discuss further.

Regards,

John Brown
Third Party Works Officer

P – 02 4978 9880
F – 02 4978 9995
M – 0467 800 363
E – jbrown2@artc.com.au

Australian Rail Track Corporation Ltd.
Locked Bag 1, Broadmeadow NSW 2292

From: Clay Preshaw [mailto:Clay.Preshaw@planning.nsw.gov.au]
Sent: Tuesday, 17 September 2013 12:39 PM
To: Ash Tamhane; Darren Clarke; David Green; David Lovell; Greg Cashin; Greg Cole-Clark; landuse.enquiries@industry.nsw.gov.au; Lin Armstrong; Lucy Moore; Mark Jenkins; Mark Ozinga; Paul Purcell; Peter Lewis; planning.matters@environment.nsw.gov.au
Cc: Bill Talbot; Carolyn McNally; Denise Lo; Emily Goodworth; Greg Paine; Jude Parr; Julie Moloney; Kylie Spratt; Liz Rogers; Mahani Taylor; Mitchell Isaacs; Peter Jamieson; Regina Fogarty; Richard Bath; Vincent Sicari; Wayne Jones
Subject: Wallarah 2 Coal Project - Response to Submissions

Dear all,

Please be advised that the applicant has submitted a formal Response to Submissions document in relation to the Wallarah 2 Coal Project (SSD 4974). The document is available to download via the following link: