



Department of Primary Industries

OUT13/17681

- 8 JUL 2013

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

Clay.Preshaw@planning.nsw.gov.au

Dear Mr Preshaw,

Wallarrah 2 Coal Project (SSD 4974) Response to exhibition of Environmental Assessment

I refer to your email dated 24 April 2013 requesting advice from the Department of Primary Industries (DPI) in respect to the above matter.

Comment by Fisheries NSW

Fisheries NSW advises the following key points, with details at Attachment A:

- (i) there is concern that subsidence under Jilliby and Little Jilliby Creeks may destabilise the alluvial based creek and cause increased erosion and sedimentation.
- (ii) generally the proposal is acceptable as the impact areas are proposed to be monitored, however the monitoring period proposed is "quarterly". As mining moves past the sensitive areas, this timing is far too short and needs to be much more frequent to effectively monitor any subsidence impacts.
- (iii) the proponent will be developing a management plan for remediation, but Fisheries NSW advises that it should be completed before mining commences.
- (iv) mining next to the Wyong River is recommended to be restricted so the river bank is not inside the 20mm subsidence contour.

For further information please contact Bill Talbot, Director Aquaculture, Conservation and Marine Parks (Port Stephens office) on 4916 3854, or at: bill.talbot@dpi.nsw.gov.au.

Comment by Crown Lands

Crown Lands advise 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 Stewart Veitch, Senior Manager Hunter Area (East Maitland office) on 4937 9366, or at: stewart.veitch@lands.nsw.gov.au.

Comment by Forestry Corporation NSW

Forests NSW became Forestry Corporation of NSW (FCNSW) in January 2013 following implementation of the *Forestry Act 2012*. Future correspondence should be made direct to FCNSW. In the meantime in relation to this referral, FCNSW advises:

- (i) the then Forests NSW was consulted in the preparation of the GHD review and FCNSW is satisfied with the Forestry Assessment undertaken.
- (ii) FCNSW would require that subsidence monitoring be undertaken over the life of the mine to ascertain the effects on the Wyong State Forest, similar to requirements placed on other mining ventures underlying State forest (refer Appendix A-Subsidence).
- (iii) the following corrections to the submitted documentation should be noted:
 - (a) change in reference to Forestry NSW to Forestry Corporation of NSW. References to the Minister for Forests remain the same.
 - (b) the western ventilation shaft is proposed for location within Wyong State forest. The text asserts it is already there. The land is owned by the State of NSW. Forestry Corporation NSW is the land manager under the provisions of the *Forestry Act 2012* (refer section 2.5).
 - (c) Wyong State forest is located in the Central Forest Management Region (refer section 3.2 Appendix Z).
 - (d) reference to an Occupation Permit should be to a Forest Permit as granted under section 60 of the *Forestry Act 2012* (refer Appendix Z section 4.3 last line, section 5.4, and section 7, last line).

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

Comment by NSW Office of Water

The NSW Office of Water advises the following key issues:

- (i) continuous and uncontrolled reduction of base flow in the Wyong River during low flow periods is likely to reduce extraction opportunities available to the Gosford-Wyong Water Authority. Reduction in the number of opportunities to extract water during low river flow periods will impact on the public water supply system. The same scenario will apply to all other downstream water users and the environment. The Office of Water requests that the proponent undertake a detailed risk analysis that examines the potential impact to the Gosford-Wyong Water Authority.
- (ii) the proponent should also 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.
- (iii) subsidence of creek beds and alluvial systems is likely to modify the geomorphic features of the streams and the hydrogeological regime of the area. The Office of Water recommends the proponent undertake a full fluvial geomorphic assessment which specifically details the risk of bed and bank erosion, change in slope or plan form for individual longwall panels and the cumulative risk as a result of subsidence over the life of the mine.
- (iv) in order to better understand the impact to the hard rock aquifers, the Office of Water requests the proponent undertake an assessment against the minimal

impact considerations of the NSW Aquifer Interference Policy. It is recommended that the proponent present this information in the same table format as in Appendix B, below.

- (v) it is not clear if the proponent has estimated the maximum annual water take from each water source. The proponent should undertake this assessment, and should be required to obtain licensed entitlement sufficient to account for the predicted maximum annual take of water, prior to commencing activities.

In addition, Attachment B includes:

- detailed comments on the groundwater assessment,
- an assessment of potential impacts on surface water systems and water users,
- a summary of licences and approvals required under the *Water Management Act 2000* and the *Water Act 1912*, and
- recommended conditions should the application be approved.

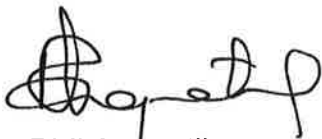
For further information please contact Hemantha Desilva, Senior Water Regulation Officer (Newcastle office) on 4904 2525, or: hemantha.desilva@water.nsw.gov.au.

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 has responded direct to your Department by letter dated 11 June 2013.

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

Yours sincerely



Phil Anquetil

Executive Director Business Services

Attachment A

Wallarrah 2 Coal Project (SSD 4974) Response to exhibition of EIS

Comment by Fisheries NSW

Fisheries NSW is responsible for ensuring that fish stocks are conserved and that there is no net loss of key fish habitats upon which they depend. To achieve this, Fisheries NSW ensures that developments comply with the requirements of the *Fisheries Management Act 1994* (namely the aquatic habitat protection and threatened species provisions in Parts 7 and 7A of the Act, respectively), and the associated *Policy and Guidelines for Fish Habitat and Conservation Management (2013)*. In addition, Fisheries NSW is responsible for ensuring the sustainable management of commercial and recreational fishing and aquaculture in NSW.

Fisheries NSW has significant concerns about the potential impact on Jilliby and Little Jilliby Creeks due to subsidence.

It is the view of Fisheries NSW that the levels of subsidence, combined with the instability of the sandy alluvium, has the potential to create significant erosion and sedimentation issues. A 1-metre subsidence change in the catchment is relatively large in such a flat catchment.

As such Fisheries NSW would expect the development of a suitable stream modelling and impact mitigation program, as part of the Surface Water Monitoring Plan, before mining commences. This program should also include:

- regular (weekly) resurveys of the potentially impacted areas as the longwall approaches and passes the creek lines identified as being at risk.
- wider walkover assessments to determine areas of water ponding and active bed and bank erosion. These wider walkovers can be carried out quarterly as proposed by the proponent.

Fisheries NSW supports the proponent's proposed remediation approach of using soft engineering techniques. Examples of the types of works proposed should be included in the Surface Water Monitoring Plan.

Fisheries NSW is also concerned about the potential impacts on the Wyong River. Due to the importance of the River as habitat as well as its social value, mining should be restricted to ensure that the riverbank is not inside the 20mm subsidence contour.

End Attachment A

Attachment B

Wallarah 2 Coal Project (SSD 4974) Response to exhibition of EIS

Comment by NSW Office of Water (NOW)

PART A: Potential Groundwater Related Environmental Impacts

A1. Geology/Hydrogeology

Main stratigraphical units of interest include in a top-down progression, the Hawkesbury Sandstone, the Terrigal Formation, the Patonga Claystone, the Tuggerah Formation, the Munmorah Conglomerate and the Dooralong Shale. The Wallarah/Great North seam underlies the Dooralong Shale.

Rates of groundwater flow through the subsurface strata are governed by the prevailing piezometric surface and the hydraulic properties of strata. The velocities of flow within the hard rock system are calculated to be very low and in the range from 1.0E-7 to 1.0E-4 m/day (0.036 to 36 mm/year) based on the hydraulic conductivities used in numerical modelling of these groundwater systems. The reduction in leakage induced by depressurisation after 38 years of mining is calculated to be less than 2 millilitres/day/per square metre of land surface. This rate is very low compared to a potential steady state rate of rainfall recharge calculated to be as high as 130 millilitres/day per square metre (assuming 4% infiltration).

Groundwater quality within the hard rock strata is brackish to saline (limited measurement) with an indicative total dissolved solids (TDS) range of 1800 to 7500mg/L while pH values range from 6.3 to 7.6.

A2. Surface Water Bodies

The project is located within the Tuggerah Lakes Basin, which has a catchment area of approximately 700km². Surface drainage comprises of creeks which ultimately drain into the Wyong River. Most of the Project extraction area lies within the Jilliby Jilliby Creek catchment. The Tooheys Road site (the projects coal loading facilities) is located within the Wallarah Creek catchment.

The Jilliby Jilliby Creek Water Source (2003) and the Central Coast Unregulated Water Sources (2009) apply to the project. No groundwater sharing plan is applicable to the project.

A3. Groundwater Dependant Ecosystems (GDE's)

GDE's have been identified along surface drainage channels within project boundary. The GDE's that have been identified include Paperbark, Coachwood, Blackbutt and other species that rely on shallow water table. The possibility of subsidence does have the potential to alter the level of the water. Predicted high rainfall recharge events will counter the alteration of the water table, and may result in only minimal impact on the GDE's.

A4. Groundwater Users

There are 12 registered bores and wells located within the extraction area. There are an additional 49 bores registered within 5km of the extraction area.

A5. Geotechnical and Mining Effects

The predicted impacts include:

- Depressurisation in the subsurface strata, leading to reduced baseflow and surface water reliability (of significant importance due to water supply requirements from the Wyong River catchment for use by the Central Coast population).

- Cracking of hard rock strata in elevated areas may initiate localised redirection of surface flows in some drainages leading to water-rock interactions and possibilities of iron staining downstream.
- Potential for hydraulic connections to exist or be induced by mining in the substrata.
- Subsidence and depressurisation effects on local groundwater users.

A6. Groundwater Modelling:

(i) Predicated Groundwater Volumes:

"On completion of the 38 year simulation period, specific zone budgets were extracted from the groundwater model in order to provide estimates of mine water influx... A total water make of about 26,500 ML is predicted over the mine life."

(ii) Water Balance

A water balance model has been presented for the project area and reflects changes in the water management system over the life of the project. Groundwater inflows used in the calculation of the water balance were sourced by the model creators.

(iii) Conceptual Model, Parameters, Model Calibration and Performance

The model comprises 14 model layers representing the various rock strata layers and sub-division of some of the geological layers with associated anisotropic permeability, representing a total area of about 575 sq. km. There are 105,768 cells per layer with and are a minimum 50 x 50 metre, with a 50 metre thickness except within the Wallarah/Great North coal seam. The model confidence level classification is of a class 2 model with aspect of class 3. The table below lists the layers used and their associated hydraulic conductivities.

Parameters used in the model included hydraulic conductivity, compressive (elastic) storage and specific yield. Hydraulic conductivity was assigned from 3 boreholes, from which an adopted matrix of known hydraulic conductivity values was associated with bore stratigraphy.

The calibration of the model was dependant on the measurements and assignment of formation hydraulic properties as determined by packer and core tests, and upon the steady state hydrostatic piezometric surfaces.

Steady state calibration was conducted using head level elevations derived from a majority of alluvial monitoring wells.

Transient calibration involved groundwater system reaction simulation using water table response in response to rainfall recharge based on measurements from the Wyee rainfall gauge and five piezometers at Honeysuckle Park which have been data logged since 2010. It has only been possible to calibrate the alluvial water table variability using the rainfall information.

Sensitivity analyses on the vertical conductivity of the constrained zone indicate that horizontal conductivity can be increased without affecting the vertical conductivity. *"Basically the horizontal conductivity is relatively insensitive when compared to the vertical conductivity in controlling vertical leakage through the constrained zone".*

(iv) Issues identified

Conceptualization of Vertical Hydraulic Conductivity

The earlier review of the Wallarah 2 Coal from NOW stated that "The conceptual model on which the numeric groundwater model has been based assumes there is limited vertical hydraulic connection through the Patonga Claystone and the overlying surface water resources both prior and post mining... In summary, there is the potential for this hydraulic connection to exist, or be induced by mining, and the impacts of the scenario should be assessed... There has not been a sensitivity analysis undertaken on the predictions of the numeric groundwater model, in particular a leaky aquitard scenario to consider potential impacts of hydraulic connection..."

In response, the applicant has conducted a vertical hydraulic conductivity sensitivity analysis, for the constrained zone, which was considered as a suitable alternative. Kalf and Associates (KA) agree that *"The results indicate that the bulk vertical permeability is derived of the same order of magnitude as that adopted for the regional model."*

As reported by NOW, vertical connectivity is important given the reliance of surface water by the Gosford-Wyong Water Authority as a source of water supply. Further, the model indicates a potential risk to the local water supplies.

- *Leakage from alluvial sources has been associated within the model in terms of loss of baseflow from the alluvial and hard rock groundwater systems to the local creek catchments".*
- *"The rate of leakage from the alluvial lands will be governed almost entirely by the hydraulic conductivity of constrained zone which is comprised of Patonga Claystone and Tuggerah Formation"*

Regarding the geological evidence in the area, the applicant has suggested reported lineaments through the project area are hypothetical and were unsupported by evidence as to the location and the extent in which faulting occurs around the project area. Faulting reports conducted by the applicant were reliant on drill core evidence and a geological survey.

- *"The Wyong Areas Coal Joint Venture (WACJV) geology team found, with almost 20 years of underground experience in the South Newcastle Coalfield, that water make from these features (i.e.: local faulting), was manageable and that traditional bord and pillar operations commonly negotiated 4-5m faults at depths of 150m beneath Lake Macquarie without experiencing significant inflows. This was also the case where the Boomerang Creek Tunnel intersected two major faults. While inflows were initially exposed, this rate dropped to only several litres per minute within a few hours.*
- *Despite the intensity of the WACJV exploration program, no evidence supporting these features (i.e.: the major lineaments), has emerged.*
- *Results suggest that the 'Coastal Lineament' may have been misinterpreted from remote sensing data as a structure, when in fact it approximately corresponds with the west side of the massive conglomerate channel..."*

The above evidence notwithstanding, the potential impacts on surface water requires ongoing monitoring and assessment with mitigation option developed by the proponent.

Water Monitoring and Management Plan

A water management plan is yet to be developed to address monitoring and trigger levels. A current issue with gathering groundwater data involves gaining land access for monitoring use by council and landholders. Access is currently being sought and as such the monitoring program cannot be modified until access is granted. There remains a concentration of monitoring data to areas of limited spatial coverage due to land access issues.

For consistency with the NSW Aquifer Interference Policy, the proponent needs to demonstrate that the background monitoring for evaluating before and after impact can be achieved. The current concentration of monitoring data to areas of limited spatial coverage, with no groundwater monitoring information west of honeysuckle Park, and in the catchments of the Little Jilliby Jilliby Creek, Myrtle Creek, and within the Jilliby SCA and the Wyong State Forest.

Model Uncertainty

In assessing the proponent's groundwater model, Kalf and Associates have reviewed the model in conjunction with the 2012 *Australian Groundwater Modelling Guidelines*, as required by the NSW Aquifer Interference Policy. The review shows that an uncertainty analysis has not taken place. This is particularly important in relation to the possible risks to surface water impacts. Permeability values used in the model are based on packer tests and the examination of drill core logs. Whilst no evidence of significant faulting can be found, similar geological reports indicate the presence of two lineaments intersecting or proximately adjacent to the project site.

A7. Assessment by NOW against the Aquifer Interference Policy (AIP).

Table 1: Does the activity require detailed assessment under the AIP?

Consideration		Response
1	Is the activity defined as an aquifer interference activity?	YES
2	Is the activity a defined minimal impact aquifer interference activity according to section 3.3 of the AIP?	NO

Accounting for, or preventing the take of water.

Table 2: Has the proponent:

AIP Requirement		Proponent response	NOW Comment
1	Described the water source (s) the activity will take water from?	Listed surface water sharing plans: <ul style="list-style-type: none"> Jilliby Jiliby Creek Water Source 2003 Central Coast Unregulated Water Source 2009 (Wyong River) 	No mention of groundwater sources. Overlies Sydney Basin – Lower Hunter/Central Coast, and is within a 10km proximity of the Hunter Unregulated and Alluvial 2009 WSP.
2	Predicted the total amount of water that will be taken from each connected groundwater or surface water source on an annual basis as a result of the activity?	The Groundwater Model predicts a cumulative seepage of 26,500 ML over 28 years. Water Allocations: Predicted average annual take is estimated to be around 660 ML/year (Coal measures: 638.75 ML/yr, Alluvial: 7.3 ML/yr, Shallow Hardrock: 14.6 ML/yr). For surface water: 270 ML/yr for Jilliby Jiliby Creek and 30 ML/yr for the Wyong River.	Daily influx ranges from 0 ML/day in the first year, to 2.5 ML/day in the 19 th year. Applicable groundwater source is Sydney Basin – Central Coast once the North Coast Fractured and Porous Rock WSP commences.
3	Predicted the total amount of water that will be taken from each connected groundwater or surface water source after the closure of the activity?	Groundwater to infill mining void after the closure of the mine.	No mention of volume entering the voids post mining.
4	Made these predictions in accordance with Section 3.2.3 of the AIP? (refer to Table 3, below)	Yes.	Yes, however it is not clear if the adjunct modelling used to quantify water table impacts in the alluvium were subject to the

AIP Requirement		Proponent response	NOW Comment
			independent peer review.
5	Described how and in what proportions this take will be assigned to the affected aquifers and connected surface water sources?	Yes (see above point 2)	Yes
6	Described how any licence exemptions might apply?	No	No
7	Described the characteristics of the water requirements?	Loss of pressure within the strata will induce seepage into the mine working.	Likely variable due to rainfall and fracture storage. At times unavoidable due to nature of the workings.
8	Determined if there are sufficient water entitlements and water allocations that are able to be obtained for the activity?	Since no WSPs are in place with respect to groundwater, no water access licences will be required in respect to the Water Management Act. Water licences will be required under Part 5 of the Water Act in respect to any groundwater take for the project.	This is currently correct. Once a WSP commences there will be unassigned water in water source. Surface water entitlement would be obtained by a dealing under the WSP rules.
9	Considered the rules of the relevant water sharing plan and if it can meet these rules?	Only surface water plans applicable.	This has been sufficiently addressed.
10	Determined how it will obtain the required water?	Yes.	Yes, however the implications of receiving entitlement once a WSP commences has not been considered.
11	Considered the effect that activation of existing entitlement may have on future available water determinations?	Not addressed.	Not addressed, however issued entitlement is lower than the long term average annual extraction limit so impact is unlikely.
12	Considered actions required both during and post-closure to minimize the risk of inflows to a mine void as a result of flooding?	Not addressed.	Not applicable
13	Developed a strategy to account for any water taken beyond the life of the operation of the project?	The mine will act as a groundwater sink for 500 years.	Unlikely that take would be greater than that during the mine life and would therefore be covered by any entitlement held. The proponent may be required to retire entitlement to account for the ongoing take.

AIP Requirement		Proponent response	NOW Comment
	<i>Will uncertainty in the predicted inflows have a significant impact on the environment or other authorized water users?</i>		Yes, hence 14-16 must be addressed.
	<i>Items 14-16 must be addressed if so.</i>		
14	Considered any potential for causing or enhancing hydraulic connections, and quantified the risk?	Refer to discussion in Section 4.1 above.	Refer to discussion in 'conceptualisation of vertical hydraulic conductivity' above.
15	Quantified any other uncertainties in the groundwater or surface water impact modelling conducted for the activity?	Not addressed.	No uncertainties are provided with the model. Limited monitoring and water level information. Predictive accuracy of the model is therefore difficult to assess.
16	Considered strategies for monitoring actual and reassessing any predicted take of water throughout the life of the project, and how these requirements will be accounted for?	Development of a comprehensive groundwater monitoring program will include measurement of rates of groundwater seepage and monitoring of groundwater quality as part of the mine water management system. Production of annual reviews.	A monitoring plan to address this has been provided and will be satisfactory if implemented as described.

Table 3: Determining water predictions in accordance with Section 3.2.3

AIP Requirement		Proponent response	NOW Comment
1	For the Gateway process: Is the estimate based on a simple modelling platform, using suitable baseline data, that is fit-for-purpose?		(N/A)
2	For SSD or mining or CSG production, is the estimate based on a complex modelling platform that is: <ul style="list-style-type: none"> Calibrated against suitable baseline data, and in the case of a reliable water source, over at least two years? 	Calibration of the model focussed on alluvial systems and the water table response to rainfall. <ul style="list-style-type: none"> Limited measurements of water rest levels. Dependant on the measurements and assignment of formation hydraulic properties as determined by packer and core tests. Independently reviewed by Kalf and Associates 	<ul style="list-style-type: none"> Very limited spatial coverage of bore network. 2 years of water measurement readings from one area of the project site, therefore limited and incomplete baseline information. Given that the risk of causing more than minimal harm to surface water is generally low, this is

AIP Requirement		Proponent response	NOW Comment
	<ul style="list-style-type: none"> Consistent with the Australian Modelling Guidelines? Independently reviewed, robust and reliable, and deemed fit-for-purpose? 	(KA).	<p>considered acceptable, provided monitoring and mitigation measures are in place.</p> <ul style="list-style-type: none"> Considered consistent with Australian Groundwater Modelling Guidelines. The peer review recommends that it is suitable for public exhibition. It is unclear if the adjunct modelling undertaken to predict the impact on water tables in the alluvium was subject to the peer review.
3	<p>In all other processes, estimated based on a desk-top analysis that is:</p> <ul style="list-style-type: none"> Developed using the available baseline data that has been collected at an appropriate frequency and scale; and Fit-for-purpose? 		(N/A)

Other requirements to be reported on under Section 3.2.3.

Table 4: Has the proponent provided details on:

AIP Requirement		Proponent response	NOW Comment
1	Establishment of baseline groundwater conditions?	Addressed.	<ul style="list-style-type: none"> Use of existing water quality data (from 1996 – 2004, 2006 – recent). Groundwater levels from specific alluvial monitoring bores.
2	A strategy for complying with any water access rules?	If the project is granted development consent, by the operation of section 89J of the EP&A Act, it will not require water use approvals under section 89 of the Water Management Act, water management approvals under section 90 of the Water Management Act, or a controlled activity approval (except for an aquifer interference approval) under section 91 of the Water	Acknowledges licensing requirements. Unlikely to be relevant given take is incidental.

	Management Act.		
3	Potential water level, quality or pressure drawdown impacts on nearby basic landholder rights water users?	<p>Yes.</p> <p>Potential impacts include:</p> <ul style="list-style-type: none"> • Reduction in regional hard rock pressures. • Leakage of groundwater from shallow alluvial sediments to deeper systems. • Change in shallow aquifer storage induced by subsidence. • loss of groundwater yield at existing bore locations • change in groundwater quality. 	Refer to table addressing the minimal impact considerations.
4	Potential water level, quality or pressure drawdown impacts on nearby licensed water users in connected groundwater and surface water sources?		Refer to table addressing the minimal impact considerations.
5	Potential water level, quality or pressure drawdown impacts on groundwater dependent ecosystems?	<p>For the project, the most significant aspect of subsidence with the potential to impact on GDE's is considered to be the temporary change in water table.</p> <p>The water table is expected to fall by up to 1.3 metres.</p>	Refer to table addressing the minimal impact considerations.
6	Potential for increased saline or contaminated water inflows to aquifers and highly connected river systems?	<p>There may be localised changes in salinity where groundwater mixes with fragmented materials in the goaf.</p>	This is considered satisfactory.
7	Potential to cause or enhance hydraulic connection between aquifers?	<p>There is potential for groundwater exchange between strata via fractures and micro cracks which introduce secondary permeability if they are connected.</p>	See discussion in above.
8	Potential for river bank instability, or high wall instability or failure to occur?	<p>Potential for the associated river valleys to be affected by subsidence.</p>	<p>Most issues relate to subsidence of the alluvial water source causing issues with river baseflow.</p> <p>Changes to creek/river beds as a result of subsidence are given, however, subsidence issues relating to river banks are not available.</p>
9	Details of the method for disposing of extracted activities (for CSG activities)?	N/A	N/A

Addressing the minimal impact considerations.

Aquifer	Alluvial
Category	Less productive
Level 1 Minimal Impact Consideration	Assessment
<u>Water Table</u>	Level 1 - Acceptable
Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic "post-water sharing plan" variations, 40 m from any: (a) high priority groundwater dependant ecosystem; or (b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan.	There are no high priority groundwater dependant ecosystems or high priority culturally significant site identified in the WSP for Jiliby Jiliby Creek or the WSP for Central Coast Water Supply. Although it should be noted that forthcoming mapping of high value GDEs indicate that they will exist within the area of impact.
OR	
A maximum of a 2 m water table decline cumulatively at any water supply work unless make good provisions apply	Maximum drawdown in the water table is predicted to be 1.4 m. Maintained by the assumption that the flow conditions in the Creek remain unchanged.
<u>Water pressure</u>	N/A
A cumulative pressure head decline of not more than 40% of the "post-water sharing plan" pressure head above the base of the water source to a maximum of a 2 m decline, at any water supply work.	
<u>Water quality</u>	Level 1 - Acceptable
Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity. No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity. No mining activity to be below the natural ground surface within 200 m laterally from the top of high bank or 100 m vertically beneath (or the three dimensional extent of the alluvial water source - whichever is the lesser distance) of a highly connected surface water source that is defined as a "reliable water supply".	No long term change in water quality, including salinity, is predicted since subsided areas will essentially reflect unsubsid conditions with respect to aquifer material properties, rainfall recharge and surface drainage systems when mining is complete. While there is no direct mining activity within these prescribed limits, consequential subsidence has direct impact on the alluvial groundwater systems. However, these impacts are not likely to affect the long term viability of the water source.

The groundwater model and assessment presented by the proponent show no specific information regarding minimal impact considerations to the water sources underlying the local alluvial system, and hence no assessment can be made.

Aquifer	Porous rock or fractured rock
---------	-------------------------------

Category	Less productive
Level 1 Minimal Impact Consideration	
<u>Water Table</u> Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic "post-water sharing plan" variations, 40 m from any: (c) high priority groundwater dependent ecosystem; or (d) high priority culturally significant site; listed in the schedule of the relevant water sharing plan. OR A maximum of a 2 m water table decline cumulatively at any water supply work.	Assessment Not available. No assessment has been made.
<u>Water pressure</u> A cumulative pressure head decline of not more than a 2m decline, at any water supply work.	Not available. No assessment has been made.
<u>Water quality</u> Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity.	Not available. No assessment has been made.

PART B: Potential impacts on surface water systems and water users.

The EIS identifies potential impacts on surface water (4.1 Appendix J). One of the key issues of concern is loss of surface water from the Gosford-Wyong Water Supply Scheme through enhancement of hydraulic connectivity between surface waters and underground aquifers.

The EIS predicts a maximum subsidence of 2.6 metres on creek beds. The EIS further predicts that subsidence within the water supply catchment areas has the potential to affect the yield of surface water through altered drainage patterns and efficiency and changes to groundwater recharge due to subsidence of creek beds and aquifers. Base flows contribute to 14% - 28% of the flow in the Wyong River.

The licences and approvals held by the Gosford-Wyong Water Authority from the Wyong River Water Source are subject to conditions related to stream flows. Continuous and uncontrolled reduction of base flow in the Wyong River during low flow periods will reduce extraction opportunities available to the water authority. The same scenario will apply to all other downstream users and the environment.

If the proponent needs to undertake a dealing under s71 of the *Water Management Act 2000* in order to take water, then Office of Water is required to consider the Access Licence Dealing Principles (ALDP) in the determination of such application.

PART C: Licence requirements

Water Act 1912

- All groundwater sources in the area are currently managed under the *Water Act 1912*.
- No exemptions for licences under the *Water Act 1912* apply as a result of approval under the *Environmental Planning and Assessment Act 1979*.
- Licences required for all bores under Part 5 (s.112) of the *Water Act 1912* (definition of a bore is provided under s.105).
- Monitoring bores may require licensing under Part 5 of the *Water Act 1912* unless the bores meet the criteria for exempt monitoring bores as defined in the *Water Management (General) Regulation 2011*.
- Flood control works will require licensing under Part 8 of the *Water Act 1912*.

Application forms for licences and approvals are available on the Office of Water website at www.water.nsw.gov.au.

Water Management Act 2000 (WMA)

- Water Access Licences are required to take water from any water source managed under the WMA.
- Exemptions for access licences are provided in Clause 18 and the Schedule 5 of the *Water Management (General) Regulation 2011*.
- Section 54 of the WMA provides details on harvestable rights.
- Requirements for access licence dealings are provided in the following documents:
 - Section 71 of WMA
 - Access Licence Dealing Principles
www.legislation.nsw.gov.au/maintop/view/inforce/subordleg+433+2004+cd+0+N
 - Part 12 of the Water Sharing Plan
www.legislation.nsw.gov.au/maintop/view/inforce/subordleg+347+2009+cd+0+N

Application forms for access licence and access licence dealings are available on the Office of Water's website at www.water.nsw.gov.au.

PART D: NSW Office of Water Recommended Conditions of Approval.

Should the application be approved, the NSW Office of water recommends the following

1. The proponent is required to estimate the volumes of water taken from both the surface water covered by the *Water Sharing Plan for the Central Coast Unregulated Water Sources 2009* and the *Water Sharing Plan for the Jilliby Jilliby Creek Water Source 2003* and obtain sufficient licensed entitlement to account for take from all water sources managed under the *Water Management Act 2000* prior to commencement of activities.
(Note: Actual allocation may vary from time to time due to changes in available water determination.)
2. The proponent is required to obtain all necessary licences and approvals under the *Water Act 1912*.
3. The proponent is required to hold or retire sufficient licensed entitlement to cover the perpetual take of water flowing into the final void (and out of the evaporative sink) at the cessation of mining.
4. The proponent must report on the groundwater monitoring and evaluation program as outlined in the EIS every two years after the commencement of the project. The report is to include records of groundwater take against licences, groundwater hydrographs, assessment of groundwater impacts, including a comparison against predicted impacts, and details of the response to any such impacts.
5. The proponent must adhere to a groundwater monitoring program consistent with that described in Section 9 of the Groundwater Impact Assessment Report. A particular focus should be upon the uncertainty relating to the presence any regional faulting and its implications for greater than predicted vertical leakage.
6. The proponent must provide the report identified in condition 4 & 5 to the NSW Office of Water when requested, and include it in the annual environmental monitoring report.
7. The Site Water Management Plan should include:
 - a methodology to estimate the annual volume of surface water and alluvial groundwater intercepted by the operation;
 - a groundwater monitoring and contingency plan;
 - review and validation of model predictions using groundwater monitoring data; and
 - strategies to manage water in the post mining landscape to minimise harm to water sources or their dependent ecosystems.
8. The proponent must undertake a full fluvial geomorphic assessment which specifically details the risk of bed and bank erosion, change in slope or plan form for individual longwall panels and the cumulative risk as a result of subsidence over the life of the mine.

End Attachment B