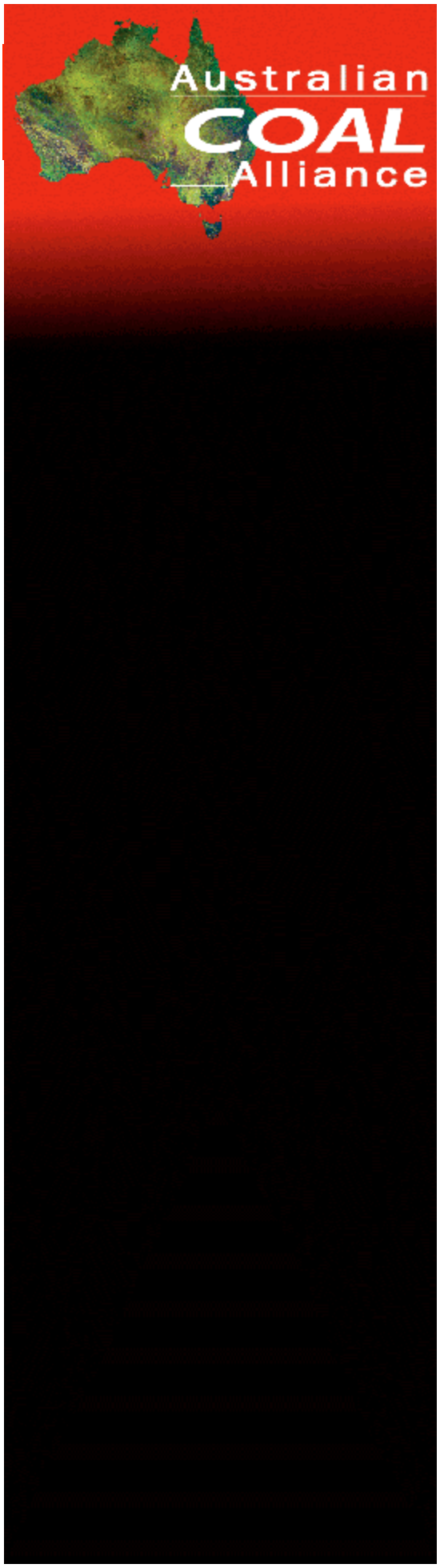

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AUSTRALIAN COAL ALLIANCE

SUBMISSION

Wallarah 2 Coal Project
Environmental Impact Statement
2013

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INTRODUCTION

The Australian Coal Alliance (ACA) is the incorporated body representing the Central Coast community in opposing the Wallarah 2 Coal Project.

Central Coast citizens are greatly concerned about the impact a longwall coal mine will have upon their drinking water catchment, their health, their lifestyle, their amenity and the local environment.

The Dooralong and Yarramalong Valleys is the largest drinking water resource for the entire Central Coast population, more than 300,000 people, and account for approximately 53% of the drinking water supply, which is drawn from the streams and aquifers. The various streams, creeks and rivers within the water catchment are primarily fed from the underground aquifers, providing approximately 68% of the water to these streams. The water catchment valleys were proclaimed as a water catchment district in 1950, gazette number 153 of the Local Government Act 1919. Mardi Dam was proclaimed water catchment in 1987.

The ACA is concerned that Kores' Environmental Impact Statement (2013) of the Wallarah 2 Coal Project is only a re submission of their previous submission, dealing with some of the matters in a different way but still providing the same conclusions as previously. Because of this, several issues raise herein use information in reports prepared in response to the first Wallarah 2 submission of 2010. The recommended two-year water study, as recommended by the previous State Government before any consideration to the approval of longwall coal mining be given, was not undertaken by the proponent to quantify the dynamics of the surface and sub surface aquifers inter relationships over this period. This required the refurbishment of more than 200 bore holes. The proponent ignored this requirement! Instead they drilled five cluster bores on property owned by the proponent for the two-year study. It would seem that none of these results were used and submitted in the EIS. A study of the EIS bore mapping does not reveal any reference to these bore hole results having been used.

There is also concern that all the Wallarah 2 water and subsidence reports were generated using data from the Southern and Northern Coalfields and provides unrealistic assumption due to the unique nature of the geology in the Dooralong and Yarramalong Valleys.

A report on Jilliby Jilliby Creek, prepared in 2004 by River Care, in association with Hunter-Central Rivers Catchment Management Authority, National Heritage Trust and the Department of Infrastructure, Planning and Natural Resources, declared this water system as one of the most pristine in New South Wales. This report also raises concern of the potential damage that may be caused by longwall coal mining directly beneath the creek system and within the catchment area.

The ACA is also concerned that coal extraction from beneath the water catchment valleys will have enormous environmental, health, economic and social impacts on the Central Coast. In particular the problem of ground subsidence impacting on the water supply and the habitat of many endangered species of fauna of national significance, flora and fauna that are listed as threatened and endangered and the impact, airborne coal dust particles emanating from the coal loading facility and rail transport will have on human health.

There are a number of international waders, recorded under the Australian Government agreements with China, Japan and South Korea, whose fragile habitat is entirely dependent

upon the health of the water catchment river systems, and thirty-three (33) State endangered or threatened species of flora and fauna within the catchment valleys. Concern is raised at the threat posed to the habitat of the various endangered and threatened species of flora and fauna.

Wyong Shire is the largest urban growth area in NSW, with allowed increased urbanisation and clean industry in accordance with the NSW Government's plans, particularly in the adjacent areas and close to the proposed coal handling facility. A coalmine of this magnitude does not fit in with these plans and would tantamount to building a longwall coal mine in the Galston-Dural District of Sydney with the coal handing facility being located at Castle Hill. It would not be allowed.

The previous Minister for Planning Tony Kelly rejected the Wallarah 2 mine proposal because of too many uncertainties. He confirmed his reasons in a letter to the ACA's executive member Mike Campbell on the 21st March 2011 and said, "**the project does not adequately address potential surface water quality impacts, resulting in uncertainty around the ability of the project to meet acceptable water quality outcomes."** Mr. Kelly further said in conclusion in his letter, **"the project is not considered consistent with the principles of ecologically sustainable development, including the precautionary principle, and as a consequence is not considered to be in the public interest."**

It is also noted that there has been no direct consultation either on a group basis or one-on-one with anyone within the mine footprint area.

The benefit of this proposed project to the State of NSW is questionable. Royalties of less than $22 million per annum, at the current cost of selling coal, would be generated for the life of the mine. The cost of remediating water and health issues to the Central Coast community would more than likely outweigh the expected royalty income. The only benefit derived from this project is to a foreign government, who do not have to accept any of the risk.

Alan Hayes

Campaign Director
Australian Coal Alliance Inc

EXECUTIVE SUMMARY

WATER CATCHMENT

Concerns

- The extraction area is part of a major water supply catchment.
- The mine footprint is directly under water supply streams and the water supply aquifer.
- Potential for interruption to water supply.
- Disruption of the aquifer feeding water supply streams. It is directly beneath the major water flow-through of the underground aquifers. The aquifer provides approximately 68% of the water recharge to Jilliby Jilliby Creek and the Wyong Creek (River).
- Water quality will be impacted.
- Significant dependence on Groundwater by residents and agriculture in the extraction area and by Central Coast residences as the major harvesting area for the suburban water supply.
- The dependence of the newly completed Mardi-Mangrove pipeline link on the continual availability of water from the catchment area.

SUBSIDENCE

Concerns

See previous list above.

- Potential environmental impact on:

  Wetlands.
  - Cliff/formation subsidence.
  - Tree root impacts leading to dieback.
  - Vegetation and eco-systems.
  - Stream morphology and erosion and sedimentation processes.

- Structural damage to water supply infrastructure, such as weirs, irrigation pipelines, pump stations has not been ruled out. Domestic infrastructure: dams, farm bridges, grazing areas and loss of service water.
- Reduction and/or destruction in farm produced income from subsidence and water loss.
- Wyong weir and the Mardi pump-pool are all within the horizontal subsidence zone.

- Jilliby Jilliby Creek and Little Jilliby Jilliby Creek that have been mapped are fault lines (trending west to east towards Mt. Alison) and Aquifers are directly above the proposed mine. Subsidence will create additional transient pathways when intersecting these fault lines. It is reasonable to assume that these fault lines and other similar geological structures have been allowing water to seep from surface to coal seam post volcanism, which is how the water reached the coal seam in the first instance. Proof has been found on the bore cores, which show discreet areas of **'rust'** (iron oxide).

- Wyong River and Wyong Creek are within the horizontal subsidence zone.

- Loss of the drinking water catchment. (The Dooralong and Yarramalong Valleys are the major water catchment area for the entire Central Coast.)

- Unacceptable subsidence impacts to 245 homes, outbuildings, agricultural industry, (including turf farms, livestock breeding, orchards, vegetables, bees, cattle) dams and roads within the mine footprint, and without appropriate mitigation strategies.

FLORA AND FAUNA IMPACTS

Concerns

- Mining is a "key threatening process" for the extensive vegetation communities in the region that includes many threatened species. There are likely impacts arising on:

    - Wetlands.
    - Corridors.
    - Threatened species and habitats

- The development is likely to have far reaching impacts on vegetation beyond the immediate area of the mine head and stock piles, eg., the complete rail loop, introduction of Phytophthora.

- A likelihood of pollution in Tuggerah Lakes, which would cause an unacceptable loss of its biodiversity.

- Unacceptable loss of the biodiversity of the two valleys and the pristine nature of the environment.

- Potential destruction of the two major riparian corridors.

SOCIAL IMPACT AND HEALTH

Concerns

Social Impact

- A development of this scale has significant impacts on local training, community facilities and services, housing, schools, hospital, etc.

- It significantly increases demands on social/cultural/recreational services.

- Coal loader will be built adjacent to the largest growing urban area on the Central Coast and NSW, including the planned new city of Warnervale and the Wyong Employment Zone.

- Undue angst for people affected by subsidence and coal dust emissions.

- Wallarah 2 have not obtained a social licence (acceptance from the community) and have failed to adequately address community concerns or consult with them. In particular there has been a total failure by the proponent to engage in a one-on-one discussion programme with landowners within the mine footprint. Distributed newsletters have done no more than promote Wallarah 2 propaganda, lulling landowners into a false sense of security that there will be no impact upon there properties.

Air Quality

- Potential for significant stack emissions.

- Potential for dust generation throughout construction and operation of the project, including along the entire rail corridor, and wide spread emissions of fine dust particles across the urban growth area of the North Wyong Region when the mine is operating.

- The potential for release of methane gas despite programmes to extract it in advance of mining operations.

Health

- Problems associated with coal dust (respiratory and skin disease) being transported on the wind. (The Central Coast already has one the highest incident of respiratory ailments in NSW and in Australia due to the proximity of the power stations).

- Mortality from fine airborne coal dust emissions as clearly stated in the Wallarah 2 Executive Summary (page xi) and Appendix M, pages 6 - 17 of the Health Assessment Risks.

Noise and Vibration

- There is significant potential for generation of noise and vibration arising from construction, operation and coal transport.

- This would be occurring in a quiet rural setting and adjacent to the largest growing urban area on the Central Coast.

- Potential for noise and vibration impacts on local fauna.

LOCAL FLOODING

Concerns

- Local creeks flood rapidly.
- There is generally poor access for residences in the area of proposed extraction.
- Increased flooding for many properties due to subsidence and five homes being pushed into the 1 in 100 flooding zone. Since 1981 there has been the equivalent of six 1 in 100 floods in the Dooralong Valley.

SOIL & LAND CAPABILITY

- Detailed assessment of soil and land resources insufficient. Does not meet DCR.
- Survey scale of soil and agricultural resources across the Project Area is not reported.

  Minimum action required by the proponent: report survey scale for transparency.

Executive Summary:

Appendix 1
Biodiversity

KORES proposals are incompatible with the Threatened Species Conservation Act 1995, the Commonwealth Environment Protection and Biodiversity Conservation Act1999 (EPBC Act 1999) and the NSW Water Act 2000. Longwall coalmining will also destroy wildlife of National and International significance (registered under protective ordinances) within the Catchment district, and the ecological integrity of the Wyong Water Catchment. High conservation values must be paramount and practised ***as stream health and environmental flows*** are critical to ensuring the continuity of potable water resources. These essential public water resources are immediately threatened by longwall mining subsidence occurring in the catchment.

Ecological processes maintain the biological diversity and ecosystems in the Tuggerah Estuary are dependent upon periodic inundation of the flood plains and wetlands and a continuity of the movement of aquatic organisms between fresh water inflow and estuarine habitats. Subsidence will cause pollution of these habitats, which are of National and International significance as food resources for international migratory avifauna waders. Coal seam waters that will destroy sedimentary organisms within the Tuggerah Lakes Barrier Estuary will pollute the two riparian corridors of Wyong River and Jilliby Jilliby Creek.

The Strategic Assessment Report - *Coal Mining Potential in the Upper Hunter valley December 2005 Department of Planning* - describes the potential short and long term impacts of mining in the Upper Hunter Valley, which is considered relevant to the Yarramalong and Dooralong Valleys. The ecological integrity of stream corridors and their flow regimes is predicated upon the assessment and management of activities in the catchment, which would otherwise have recognised adverse impacts throughout the coal zones.

The Commonwealth Minister for Sustainability, Environment, Water, Population and Communities has determined the Wallarah 2 Coal Project, involving the development and operation of the Wallarah 2 underground coal mine, is deemed to be a ‘controlled action’ under Section 75 of the Environment Protection & Biodiversity Conservation Act 199/EPBC Act.

As such, the action is likely to have a significant impact on the EPBC Act listed threatened species including Charmhaven Apple (Angophora inopina) and Black-eyed Susan (Tetratheca juncea), listed as vulnerable under the Act and Spotted-tail Quoll (Dasyurus maculates) and Giant Barred Frog (Mixophyes iteratus) listed as endangered under the Act.

Executive Summary:

Appendix 2
Environment Impacts

We also draw your attention to statements by ***John Williams, former NSW Land and Water Conservation Department (1999), from his document Coal Mining and Groundwater Management***.

"Mining the coal resource has potential to result in a number of environmental and social impacts most of which is related to aquifer depressurisation. Groundwater impacts include reversal of flow directions, increased aquifer infiltration, water quality changes, potential impacts on stream base flow conditions and possibly aquifer collapse due to removal of fluid void pressure."

Attention is also drawn to the Mineral Resources Department's own document ***"Strategic Study of Northern New South Wales Coalfields - Executive Summary (Nov 1999) (3)."*** We refer you to page 10, last paragraph:

". . . mining that is likely to adversely impact either the agricultural potential or groundwater integrity to a significant degree, will not be permitted."

MAIN REPORT

WATER

1
The Proclaimed Wyong Water Catchment District

Wyong Water Supply Catchment District was Proclaimed in NSW Government Gazette No.153 29/11/1950 under the Local Government Act, 1919 p.533-534 Section 401 Division 7 Local Government Act Catchment districts and ordinances. 401(2) (b), (2)(h) **are still relevant and enforceable** . . . **(2b)** *"The protection of the Catchment district, or any watercourse therein, from pollution, and the protection of any property of the Council on such catchment district* **and (2h)** *Preventing the diversion of or the taking of water from any natural or artificial watercourse the water of which flows into the Council's works except by or under authority of the Council or of any Statute".*

Documentation of subsidence damage in the Northern, Southern and Western coalfields of NSW from longwall mining indicates that this project cannot satisfy these ***protective statutes*** and recent reassurances by this company - *the security and continuity of potable water resources would be maintained and protected.* ***Recurring residual, active and horizontal subsidence*** is inevitable below Jilliby Jilliby Creek and flood plains, the Yarramalong flood plains and will also intercept Wyong River with a potential loss of potable water resources - some 53% currently supplying Wyong communities and Gosford City.

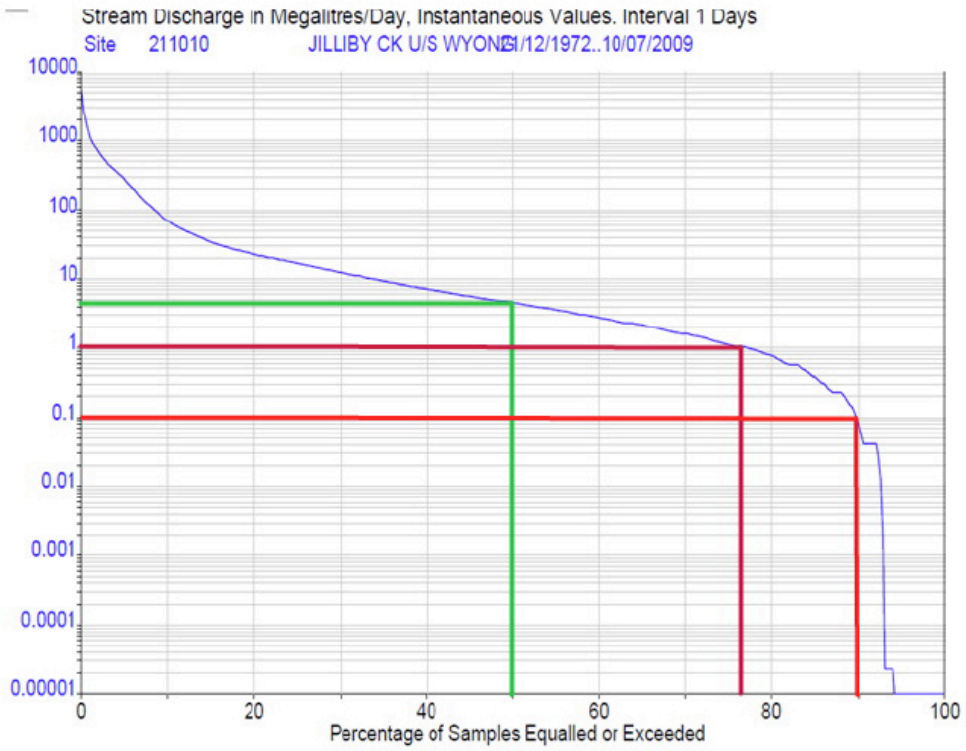
It is stated in the Wallarah 2 EIS that it will take almost 40 years to complete all the planned longwalls. It must be realised that the workings will remain depressurised until the last longwall is completed.

Figure 1 gives the statistical analyses of the flows in Jilliby Jilliby Creek, upsteam of the Wyong River, from records since 1972.

The median flow rate is 4.5 Megalitres per day (ML/day). However, the flow is less than 1 ML/day for 24% of the time of record, and less than o.1 ML/day for 10% of time.

The data in Figure 2 shows that for 190 days, flows were less than 2ML/day (less than half the average), and again for different periods of 180, 168, 166 and 135 days.

FIGURE 1



Statistics of flows in Jilliby Jilliby Creek, 1972 – 2013.

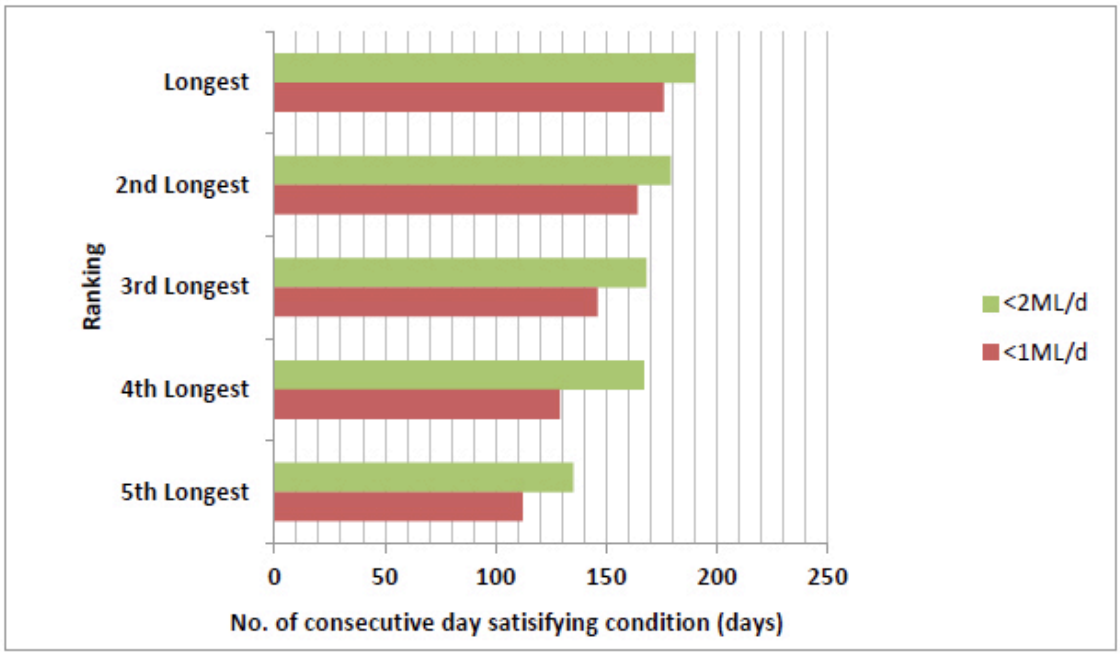


Figure 2: Consecutive days for which flow in Jilliby Jilliby Creek was less than either 1ML per day or 2ML per day.

All science and every experience in groundwater flow, down to depths of at least 500m, demonstrates that it is fracture permeability that matters and not core permeability. There are many references to support this contention with many being cited in the following recent publication:

- *A method of estimating bulk potential permeability in fractured-rock aquifers using field-derived fracture data and type curves*, Mandala, Mabee, Boutt and Cooke, Hydrogeology Journal, Volume 21, Number 2, March 2013.

The Mackie assumption as to the absence of fractures within the bulk of the Narrabeen sequence is also in contradiction to findings of a paper by Cook (2009) which are as follows:

> *"The bores intersected Terrigal Formation with a preserved thickness of up to 145m in the LGA. Extensive geological and geophysical bore logging delineated aquifers and enabled stratigraphic correlation within and between borefield..... Aggregate yields greater than 15 L/s were recorded from multi-layered aquifers in several bores.*
>
> *Networks of nested multi-level hardrock and alluvial monitoring bores installed in the borefields revealed direct and indirect hydraulic connection between multi-layered hardrock aquifers with varying degrees of artificially induced vertical leakage from the overlying valley-fill systems during pumping."*

The Mackie 3D groundwater model assumes that there will remain a 150m to 300m thick layer with a very low vertical permeability even after mining is completed. This assumption

that there will be a Constrained Zone dictates the findings of the Wallarah 2 model. This assumption that there will be a Constrained Zone of unaffected permeability more than 220m above the level of extraction cannot be justified on the basis of data from the Southern Coalfields and at Ulan.

The assumptions regarding permeability in the Mackie 3D model are contradicted by calculations given in the MSEC/SCT report in Appendix F to the EIS. The calculations show some disruption of the strata throughout the 350m profile above the level of extraction.

The hydraulic conductivity values adopted in the Wallarah 2 model are substantially on the low side of reality. Therefore, the computed mine inflows and the rate at which depressurisation progresses through the strata are substantially on the low side of reality. If Mackie had adopted the parameters recommended in the previous chapter in the same EIS, then depressurisation would have been calculated at occurring much faster and to a much greater extent.

This reduction in permeability has a very important impact on the computed mine inflows and the rate of depressurisation. There is no information in the EIS and in particular Appendix G that sets out what assumptions have been made in the model in respect to permeability reduction in the desaturated zone in the goaf. Therefore, it is impossible for a measured review to be made of the model results. It would have been proper for the assumptions to be validated against field data from Mandalong Colliery, where there has been substantial depressurisation above the extracted longwalls, viz:

The following is from the Mandalong, August 2012 Longwall 12 report –

> *Mining of the longwall panels has however resulted in depressurization of the deeper overburden.*
>
> *Whereas at some depths this may be a temporary depressurization due to bedding parting, at deeper levels the bedrock has probably been permanently depressurized/dewatered when mining intersected a fault and/or goafing provided hydraulic connection with the mine.*
>
> *The data also indicates that the Great Northern Seam to the south of the Mandalong Mine may have been depressurized as a result of mining in the area, but that the deeper Fassifern Seam has not been impacted.*

The Mackie assessment of permeability values is based on the assumption that there are no significant fractures (joints, faults, dykes etc) in the Narrabeen Formation below the weathered near surface environment.

Leaving aside increases in permeability above extraction areas, there is a fundamental issue in respect to the use by Mackie of the permeability of intact core samples, as being a realistic measure of rock mass permeability.

The concept that groundwater flow through rock masses is normally dominated by fracture flow, and not substance (core) flow, is so well established in the civil engineering, tunnelling and mining professions that it does not warrant that this writer spring to its defence. All field permeability testing that has been done for dams, tunnels and coal mines in the Sydney Basin over the past 80 years was unnecessary if core permeability was the relevant measure.

The permeability values adopted for Wallarah 2 model are given in Figure 3 (taken from Appendix G of EIS).

Figure 3
NARRABEEN FORMATION (PRE-MINING) PERMEABILITY (HYDRAULIC CONDUCTIVITY) VALUES ADOPTED BY MACKIE FOR THE WALLARAH 2 MODFLOW MODEL

UNIT	HORIZONTAL		VERTICAL	
	m/day	m/sec	m/day	m/sec
Terrigal Formation	2.1×10^{-5}	2.4×10^{-10}	3.6×10^{-6}	4.2×10^{-11}
Patonga Claystone	1.8×10^{-5}	2.0×10^{-10}	3.8×10^{-6}	4.3×10^{-11}
Tuggerah Formation	3.1×10^{-5}	3.5×10^{-10}	1.5×10^{-6}	1.7×10^{-11}
Munmorah Conglomerate	3.4×10^{-5}	3.9×10^{-10}	2.3×10^{-6}	2.6×10^{-11}
Dooralong Shale	2.0×10^{-5}	2.3×10^{-10}	2.7×10^{-6}	3.1×10^{-11}
LOG MEAN		2.7×10^{-10}		3.0×10^{-11}

Analysis of the field measurements from Coffey Partners International[5] (Wyong), Pacific Power (Dooralong) and Mackie Environmental Research (Ulan) give the following log mean values for the Narrabeen Formation.

[5] The writer has ignored all the Coffey results that are presented simply as $<43.2 \times 10^{-5}$ m/day.

Wyong and Dooralong	3.37×10^{-9}
Ulan	4.69×10^{-7}

It can be seen from the above data that the vertical permeability values adopted by Mackie for the Wallarah 2 model are between 100 and 1000 times lower than values suggested by the field testing.

These values apply to ground that has not been disturbed by subsidence effects and are used by Mackie in the so-called Constrained Zone that is considered to exist from 220m above the extraction level to the weathered portion of the Narrabeen Formation. Therefore, in essence, Mackie assumes that there will remain a 150m to 300m thick layer with a very low vertical permeability even after mining is completed. This assumption dictates the findings of the model. This assumption that there will be a Constrained Zone of unaffected permeability more than 220m above the level of extraction cannot be justified on the basis of data from the Southern Coalfields and at Ulan.

2
Physiography and Soils

2.1
Physiography

The physiography of this Catchment records Wyong River Weir Catchment of 436sq. km and Jilliby Jilliby Creek Catchment of 101sq. kms. A *series of steep strike ridges and deep gullies are considered the ground water recharge areas (Northern Geosciences, 2005),* which form part of the water catchment district boundary under the Water Management Act 2000. Wyong River is a Regulated River and receives a supplementary supply in seasonal needs from Mangrove Creek Dam via the Boomerang Creek Tunnel to maintain Wyong River and environmental flows. *Subsidence conditions will destroy these groundwater recharge areas.*

2.2
Soil and Land Capabilities

Director General Requirements

Land Resources – including a detailed assessment on the potemial impacts on:

- Soil and land capability (including land contamination);
- Landforms and topography, including cliffs, rock formations, steep slopes etc;
- Land use;
- Agricultural resources and/or enterprises in the local area, including:
    - Any change in land use arising from requirements for biodiversity offsets;
    - A detailed description of measures that would be implemented to avoid and/or minimize the potential impacts of the project on agricultural resources and/or enterprises; and
    - Justification for the long-term changes to agricultural resources, particularly if highly productive agricultural resources (e.g. alluvial lands) are proposed to be affected by the project.

Relevant policies and Guidelines listed in DGRs

- Draft Agricultural Assessment Guidelines 2011 (DP&I)
- AgFact AC25: Agricultural Land Classification (NSW Agriculture)

2.2.1: Insufficient baseline data collected

Required: Detailed assessment of soil and land resources. This baseline data is used for an assessment of potential impacts and feeds into the Agricultural Impact Statement. The Draft Agricultural Assessment Guidelines 2011 specify that detailed information on soil and land resources is required.

Survey scale is inadequate and fails to satisfy the DGRs

- Survey scale of soil and agricultural resources across the Project Area is not reported.

- Survey scale is a maximum of 24 observations over 4,558 ha. This equates to 0.005 obs per hectare and in accordance with the reference listed in Section 5 of the report, *Guidelines for Surveying Soil and Land Resources (Second Edition)*, means that this observation density is a broad low intensity survey scale of ~ 1:500,000. This scale is the opposite of what is considered to be a detailed assessment and therefore does not satisfy the DGRs.

  Minimum action required by the proponent should have been to undertake a detailed soil and land resources assessment at an appropriate scale commensurate with the potential project impacts and agricultural resources of the area.

2.2.2: Survey Methodology is inadequate

Survey methodology is inadequate

- Survey observations consisted of 20 Soil and Land Information System (SALIS) data points and 4 ground truthed sites. SALIS data is not provided and therefore the level of detail provided by the SALIS records is unknown. There are various levels of data that can be entered into the SALIS system and the dataset used for the project may cover some or all of the parameters listed in the reports Table 1.
  Further, SALIS data may not have been collected by verified CPSS soil scientists or by technically accredited government staff member as the database is open for submission by the general public. Eg. Farmer Joe Blogs can add data to the file. Therefore transparency on the level of detail provided by the SALIS records and the technical competency of the data collector is required to accompany the use of SALIS data.

- Section 8.2 states that opportunist ground-truthed observations were assessed in accordance with the parameters listed in the reports Table 1. No evidence has been provided to support this. Further, the authors state that information was collected only down to a maximum of 0.3 – 0.4 m and that no chemical analysis was undertaken on the profiles to assess soil pH, salinity or sodicty characteristics, which are significant drivers of a soils assessment with regards to applying the Australian Soil classification nomenclature and recommending appropriate soil erosion controls.

  The proponent should have appended soil log data sheets used in the field. If no chemical laboratory data is available and verifiable (e.g. field chemical data collected by a CPSS scientist or laboratory Certificate of Analysis) then a detailed soil and land resources assessment at an appropriate scale commensurate with the potential project impacts and agricultural resources of the area, including provision of sufficient laboratory data should have been undertaken.

2.2.3: Soil Survey Assessment is inadequate

Soil type ASC names cannot be verified

- The dominant soil type in the Project Area is listed in the report as a Kurosol. This soil type by definition has a strong acidic subsoil. No data has been presented to verify that the soils in the Project Area are strongly acidic.

- The second dominant soil type in the Project Area is a Sodosol. This soil type has strongly sodic subsoil. No data has been presented to verify that the soils in the Project Area are strongly sodic.

Insufficient details on each representative soil type

- The soil types are inadequately described. There is none to limited reference to soil texture, soil structure, consistency, effective rooting depth, colour etc.
  The assessment has not been written up to show that it has been conducted in accordance with the *Australian Soil and Survey: Field Handbook* as specified in the methodology. Conversely the assessment contains less information than the desktop reference *Soil Landscapes of the Gosford-Newcastle region*. The soil types have been rudimentarily classified to family level, which does not provide enough information for an inherent fertility assessment, a land capability assessment (which is weighted by soil erodible characteristics, such as topsoil texture) or for topsoil salvage assessment.

  Minimum action required by the proponent should have been to provide full profile descriptions of the representative soil types, including valid field and or laboratory data to support the ASC naming.

2.2.4: Soil mapping is not consistent with reference material

Soil Map is incorrect

- The Yarramalong landscape has alluvial soils as well as red gradational soil, yellow and brown duplex soils and some solodics/soloth soils on terraces (*Soil Landscapes of the Gosford-Newcastle region)*. However, the report has identified all of the non-channel land associated with the Yarramalong soil landscape unit as containing sodic subsoil (solodics/soloth soil types). Solodics/Soloths are considered to be a minor soil type by the reference material; however, the report identifies it as being a dominant soil type, which subsequently downgrades the land's potential agricultural productivity.

  There is no data provided to support the presence of sodic subsoils and the report's mapping conflicts with the reference material. Given that the report's survey scale is significantly broader than the reference material, which is 1:100,000, then the background reference material needs to be used otherwise the assessment is invalid.

  The proponent should re-assess the land covered by the Yarramalong soil landscape unit using information from a detailed survey. Particular importance to be placed on this unit, as it may be Class II land and is in the disturbance zone of the Project. Therefore a survey scale of 1:25,000 is the standard practice and in line with the best practice guideline *Biophysical Strategic Agricultural Land Verification Guidelines* (OEH, 2013)

2.2.5: Land Capability does not comply with DGRs/relevant planning Instruments & policies

Land Capability system applied is outdated

- The NSW strategic regional land use policy and associated Strategic Regional land Use Plans have adopted the Land and Soil Capability classification system (OEH 2011, 2012) to appropriately classify rural land for agricultural potential. The Rural Land Capability system applied in the report is not using the latest endorsed assessment guideline, which has been developed specifically to improve the agricultural classification system used to assess land with competing land uses.

  Minimum action required by the proponent should have been to assess the Project Area using the Land and Soil Capability classification system.

2.2.6: Land Capability mapping is incorrect

Land Capability mapping is incorrect

- The Kandasol soil type has been assessed as Rural Land Capability Class VI. The information provide in section 9.2 describes a soil type and landform commensurate with a Rural Land Class IV or V classification.

  Land capability classification should have been associated with the Kandasol soil type.

- The Gorokan landscape typically has undulating low hills and rises with slope gradients of less than 15% and has low limitation for grazing and high limitations for cultivation. This information, which has come directly from the authors background reference - *Soil Landscapes of the Gosford-Newcastle region*, describes a soil landscape unit that has a Rural Land Capability classification of Class IV or V - refer Table 3 of the report.

  The assessment potentially incorrectly classifies the Gorakon landscape unit as being Class VI, which is generally commensurate with land that has slopes >20%.

  Land capability classification assessment should have been associated with the Gorokan soil landscape unit.

- The Yarramalong landscape typically has low limitations for both cropping and grazing. This information, which has come directly from the author's background reference - *Soil Landscapes of the Gosford-Newcastle region*, describes a soil landscape unit that has a Rural Land Capability classification of Class II or III - refer Table 3 of the report.

  The assessment potentially incorrectly classifies the Yarramalong landscape unit as being Class III rather than Class II. The existing land use of a turf farm within this vicinity validates that land is capable of being regularly cultivated.

  Land capability classification assessment should have been associated with the Yarramalong soil landscape unit.

  The proponent should have assessed land capability classification associated with the Yarramalong soil landscape unit.

2.2.7: Agricultural Suitability mapping is incorrect

Agricultural Suitability mapping is incorrect

- The land area classified as Agricultural Suitability Class 3 land that is associated with the Jilliby Jilliby Creek (refer Figure 8 of the report) does not correlate with the assigned classification Rural Land Capability Class III land (refer Figure 6 of the report). This Agricultural Suitability Class classification means that it is considered suitable to grazing and limited for cropping whereas the assigned Rural Land Capability classification means that is highly suited to cropping.

  These two assessments using the two classification systems are contradictory and highlights that the report has not been authored by a technically competent person. No validation has been provided, such as the lack of transport links, with the exception of one sentence in Section 10.2.3, which says, "human elements such as viability of regional infrastructure to support activities are also taken into account". Further detail on these human element(s) is required to justify the agricultural downgrading of the land.

  The proponent re-assess Agricultural suitability classification of the Class 3 land!

- The land area classified as Agricultural Suitability Class 5 in the west of the site (refer Figure 8 of the report) does not correlate with the classification Rural Land Capability Class VI land (refer Figure 6 of the report). This Agricultural Suitably Class 5 capability classification means that the land is considered *unsuitable* for almost any agricultural use whereas the Rural Land Capability classification means that is suited to light grazing.

  These two assessments using the two classification systems are clearly contradictory.

  The proponent re-assess Agricultural suitability classification of the Class 5 land!

2.2.8: No potential assessment of potential Biophysical Strategic Agricultural Land

- The DGRs do not specify that verification of Biophysical Strategic Agricultural land (BSAL) is required; however, it is highly likely that some of the alluvial derived landscapes will be BSAL. Therefore it would be deemed reasonable and appropriate for the proponent to verify if BSAL is present such that mitigation and/or avoidance strategies can be employed.

  The Project Area should have been assessed for BSAL in line with a precautionary principled approach.

2.2.9: Topsoil balance is invalid

- The topsoil balance only includes rehabilitation of 14 ha of land as it is assumed that the proposed land use of industry at the Tooheys Road Site will be approved. Given, that there is no rehabilitation strategy a full topsoil balance should have been undertaken to ensure that sufficient resources are available for full rehabilitation of the site, and developed in consultation with the community and government stakeholders.

  The proponent should have developed a rehabilitation strategy and revised the top soil balance. Strategy should have been developed in consultation with both community and government stakeholders.

(i): Topsoil stripping assessment is inadequate

- There is no description of soil pedality, structure, texture to back up the topsoil salvage assessment in Section 11. Specific soil characteristics, as detailed in the reports Table 7, are required for assessing topsoil suitability using the Elliot & Venness procedure. The report does not provide supporting information to verify the assessment and given the lack of information provided for each soil type in Section 9 of the report it is likely that the Elliot & Veness procedure has not been applied properly.

  The proponent failed to provide full profile descriptions in accordance with the ASC nomenclature (Isbell, 1996) and the *Australian Soil and Survey: Field Handbook* as specified in the reports methodology to support the topsoil stripping assessment.

- The soils differ in their suitability for stripping and re-use in rehabilitation operations. These limitations are based on soil structure, soil texture, pH, dispersibility, etc. characteristics. There has been no assessment that details the limitations of each soil type and which ones are to be preferentially stripped.

  The proponent has not provided information to support the recommended soil depth stripping assessment, nor provided preferential stripping information to support rehabilitation success.

(ii): Topsoil management measures are inadequate

- The soil management measures are inadequate and generic.

  For example the Kurosol detailed in section 9 is as being moderately to highly erodible and possibly dispersive. This soil type will require soil amelioration measures such as gypsum and organic amendments to improve soil structure and prevent/reduce dispersion when stockpiled.

For example the Sodosols will likely have hard setting surface characteristics, which means that the stripped soils will require special handling.

The proponent did not provide soil management measures that are applicable to the soil types as described for the Project Area.

2.2.10: Acid Sulphate assessment is inadequate

- The soil type associated with the Wyong landscape unit is described in the reports reference material (*Soil Landscapes of the Gosford-Newcastle region)* as being a potential acid sulphate soil. This soil type comprises a significant portion of the Tooheys Road Site, which is to be disturbed – refer Figure 5 of the report.

  The report states in section 12.2 that areas of acid sulpahte potential are outside of the disturbance area. This is in direct contrast to the reference material that the desktop assessment has been predominately based on..

  The proponent did not assess the potential for acid suplate soil to occur within the Project Area correctly.

SUMMARY

- ❖ Broad scaled survey design fails to satisfy the DGRs
- ❖ Limited detail on key soil and land characteristic
- ❖ Contradictory soil mapping
- ❖ Contradictory Rural Land Capability and Agricultural Suitability Classes
- ❖ Incorrect Rural Land Capability and Agricultural Suitability Class classifications
- ❖ Outdated land capability system applied
- ❖ No consideration of the Strategic Regional Land Use Policy
- ❖ Topsoil balance invalid
- ❖ Contradictory Acid Sulphate assessment

Flow on effects:

- ❖ Invalid Agricultural Impact Assessment as the soil and agricultural information used to assess agricultural impact is obtained from the soil and land capability report.

- ❖ Invalid Rehabilitation strategy as the return to post-mining classes is dependent upon an appropriate pre-mining assessment. Further topsail balances will be incorrect and invalid.

- ❖ Surface water report if it has referenced alluvial information derived from the soil and land capability report will also be invalid unless significant in field testing was undertaken by the surface water specialists.

2.3
Rehabilitation Strategy

Director General Requirements

Rehabilitaion - including the proposed rehabiltation strategy for the site, having regard to the key principles in the Strategic Framework for Mine Closure , including:

- rehabilitation objectives, methodology, monitoring programs, performance standards and proposed completion criteria;
- nominated final land use, having regard to any relevant strategic land use planning or resource management plans and policies; and
- the potential for integrating this strategy with any other rehabilitation and/or offset strategies in the region.

Relevant policies and Guidelines listed in DGRs

Rehabilitation

Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth of Australia)
Mine Closure and Completion – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth of Australia)
Strategic Framework for Mine Closure (ANZMEC-MCA)

2.3.1
No Rehabilitation Strategy

Required: Rehabilitation objectives, methodology, monitoring programs, performance standards and proposed completion criteria

No rehabilitation strategy has been provided. The main EA document and the soil and land capability report provides limited information on proposed decommissioning strategies. No rehabilitation objectives, methodology, etc have been provided. The commitment to develop a strategy within 5 years of mine closure is not sufficient given the Mining Operations Plan will need to address rehabilitation actions through time.

Further, the post-mining land capability and land use assessment for the Project are required to be integrated with the rehabilitation strategy otherwise post-mining land capability/land use cannot be nominated and verified. The absence of a rehabilitation strategy means that the nominated land use/land capability classifications in the soils and land capability report lack a supporting validation and require further assessment.

3
Geology, Tectonic Activity, Connectivity

Valley areas are of consolidated segments of Triassic Hawkesbury Sandstone and Gosford Formation within Hornsby Plateau subdivision of the Sydney basin. Extensive areas of unconsolidated alluvial soils occur along major valleys and streams. Several sets of high angle (near vertical), well-developed joints are identified in the valleys crush zones of permeable Hawkesbury Sandstone to **create *transit pathways for horizontal and vertical water distribution***. A thick sequence of deeply weathered gravels alluvial scree residual clay and sandy soils at 10-20m overlay fractured and faulted weathered and fresh sandstone of the Hawkesbury and Gosford formation to a depth of 400m.

Geological factors influence stability and instability within soil profiles. Longwall mining creates major stress factor changes, within soil profiles, which are considered permeable . . . ***" tectonic activity opened up overlying strata which provided an escape route to the possibility of groundwater flow between the coal seams and the shallow aquifers. The role of meteoric water migration through the coal seams in the enhancement of methanogenesis processes carrying bacteria and nutrients, has ready access to flow through the coal seams"*** . . . *(Faiz et. al. 2003, Evans, R. 2005)*. Connectivity is clearly established!

3.1
Geophysical Fault Zone

A major geological feature of Jilliby Jilliby Creek is a fault zone approximately 1.3km west of Mount Alsion. The drainage runs along this fault line in almost a direct line south for approximately 1.5km midway along this feature Little Jilliby Creek converges into Jilliby Jilliby Creek. The whole of the Little Jilliby Creek is at right angles from Jilliby Jilliby Creek and is interpreted as a ***conjugate fault zone***. *The significance of this feature is that it provides a significant pathway to groundwater movement and discharge into surface steam flow regimes of Jilliby Jilliby Creek. Subsidence has the potential to destroy this flow and intercept polluted coal seam waters prior to final discharge (after the confluence of Jilliby Jilliby Creek with Wyong River) into Tuggerah Lakes estuary. Northern Geosciences, 2005).*

4
Interception and Loss of Potable Water Flows

Jilliby Jilliby Creek, Wyong River, flood plains and drainage zones will be undermined by longwall coal panels resulting in surface subsidence - *a significant pathway to potable groundwater movement before confluence*. Interception, arising from "subsidence and cracking", will divert these waters into a lower polluted coal seam aquifer. Longwall coal panels *are located dangerously close to Wyong River creating a high probability that horizontal subsidence will intercept this river and provide transit pathway/s to heavily polluted coal seam aquifer and natural drainage into the estuarine sediments of Tuggerah Lake*.

5
Longwall Mining (LWM)

Attention is drawn to the *State Scientific Committee report* commissioned by NSW government, regarding the Threatened Species Conservation Act 1995 (Chairperson Dr. L. Hughes) in relation to longwall coal mining in NSW. Their Final Determination listed ***Alteration of Habitat***, following subsidence due to longwall coalmining, ***a Key Threatening Process in Schedule 3 Part 2 of the Threatened Species Conservation Act 1995.*** *(Gazettal.15/07/05)*. Members of the Expert Panel are invited to familiarise themselves with determinations by the ***State Scientific Committee*** that are considered relevant to KORES project proposals for Wyong Water Catchment District. Long-term studies of LWM in USA also indicate reductions in diversity and abundance of aquatic invertebrates may still be evident 12 years after mining.

5.1
ACARP Research on Longwall Coalmining (LWM)

The Australian Coal Association Research Programmes (ACARP) research reports: C8005 Stage 1 March 2001, C9067 Stage 2 June 2002, and C1023 of September 2003 details serious impacts arising from longwall coal mining subsidence in the Northern, Southern and Western coal fields of NSW. Particular reference is drawn to *strata and hydrology of river valleys and river systems, lithology, sub-surface fracturing bed cracking and groundwater analysis.* Determinations in these two reports could be applied to proposals for coalmining in Yarramalong and Dooralong Valleys within Wyong Water Catchment.

A Department of Primary Industry (DPI) publication **PRIMEFACTS MINE SUBSIDENCE February 2006** is also relative to this submission due to explicatory considerations on longwall coalmining pertinent to the Wyong Water Catchment District supplying potable water resources to and from Mardi Dam. Longwall underground panels 4.4 km long x 250/300m.wide x 4-4.5m.high will penetrate 8km. westerly into the Catchment District within the Yarramalong and Dooralong Valleys. *Repetitive longwall "coal panel air voids" (excavated coal areas) will cause major subsidence to undermine flood plains, drainage lines, creeks and rivers which supply some 50% of potable water resources to Mardi Dam for community services*.

6
MINING SUBSIDENCE

Kores state in their May 2013 newsletter that, *"The only direct impacts from the project will occur on suitability zoned land generally owned by W2CP at Buttonderry and Tooheys Road."* This statement is deceptive and would lead the lay person to believe that there will be no subsidence impacts on private land. The Department of Planning and Infrastructure has further exacerbated this confusion by declaring in a recent press release, *"The mining area is predominantly underneath Wyong State Forest"*. Only one-fifth of the mine will be beneath the State Forest.

Approximately 25% of the mine footprint will be under the Jilliby Conservation Area, and the balance of the mine (more than 50% of the mine surface area) will be directly under private property and the water catchment. New brick homes in the Hue Hue area subdivision through

to the houses and farms of Jilliby, Dooralong and Wyong Creek will be affected by subsidence.

Wallarah 2 state in their EIS 245 private homes will be impacted by subsidence. In their newsletter and in presentations to local government they state, *"The large majority of these (homes) will experience only negligible to minor impacts from subsidence"*.

The way in which the subsidence information has been presented makes it impossible for property owners to determine which houses will be impacted by subsidence and to what extent. Kores distributed a leaflet that had on one side a map which could not be deciphered and therefore had no real benefit for property owners in the affected mine area. On the reverse side no mention was made as to the substantial impacts contained in their own Appendix H of the EIS. They merely said, *"homeowners should lodge a submission to the EIS"*. Without any supporting data as to the true facts and without any personal consultation meant little to the person receiving it. The Wallarah 2 Project has not made any direct approach for consultation with local groups (ie. Dooralong Valley Residents Association), and the property owners within the mine footprint.

Analyses of Appendix H subsidence data by our geo technical engineer, has revealed that the subsidence impacts will be catastrophic. 118 homes will be subsided from one metre up to 2.3 metres, 65 homes will be subsided from 200mm to 950 mm, and the balance of the homes by a lesser amount. (See Appendix 3)

The EIS also reveals that insufficient consideration and mitigation strategies have been given to impacted properties, agricultural industry and Council assets, such as roads. Wallarah 2 merely states that the impact is within a subsidence zone and that Mine Subsidence Board will make good on the damages. History clearly reveals the problems and difficulty foisted upon property owners in trying to extract compensation from the Mine Subsidence Boards. Lives are destroyed for a generation or more.

There has also been given no consideration to the impact of subsidence of the local agricultural industry. Page 17 of the Wallarah 2 EIS Executive Summary says, *"…a turf farm could require mitigating works and have a reduced production capability after subsidence impacts… The complete loss of turf farm production over a two-year period is estimated to have a maximum value of $0.86 Million per annum."* The document further doesn't place any significance of the impact that the disruption from subsidence has caused to ongoing viability of the turf farm and other agricultural businesses. It says, *"The overall total impacts to the agricultural contribution of the Disturbance Area, Subsidence Impact Limit and the biodiversity offset area is very small when compared to total agricultural production on a regional, state and national scale."* **This is nothing more than arrogance on the part of the proponent in demeaning the worth of those businesses and what their worth is to the local community and the business owner.** Any disruption, such as described, would make it extremely difficult, if not impossible, to recover from loss of clientele during the disruption period, and who would be forced to establish alternate business arrangements.

It is also noted that there has been no mitigating strategies from subsidence in respect of the transmission lines that cross the valley floor. The proponent merely says that they will continue to talk with Transgrid, but offer no viable solution to towers that may collapse, nor say how they would be re erected on unstable ground.

6.1
Empirical Curve Assessments and Dichotomy

Dr. Gang li, Principal Subsidence Mining Engineer, Department of Primary Industry NSW, clarified Dr L Holla's empirical curve determinations in assessing mining subsidence arising from longwall coalmining, i.e. ... *"that calculations cannot take account of the constant unknown factors of the geophysical change and range of soil types within a mining lease"*. Irrespective of any new sophisticated assessment technology, this unknown factor must, and will always dominate in subsidence assessments - *an assumption and hypothetical determination subjected to unknown variants that can cause unidentified serious major geophysical changes in the overburden above the valleys longwall coal panels within the 37sq. km of mining areas*.

The question of a dichotomy does not arise. Dr. L. Holla's subsidence predictions were based upon perceived geophysical correlation between the Wallarah 2 coal zone areas and those of the Southern Coalfields of NSW at recorded mining depths of 300m-650m. Dr. L. Holla (1996) divided Wallarah 2 coal areas into 8 subsidence assessment zones ranging from 0.6m-2.9m and declared***, "there are no geological anomalies or topographical features modifying the standard subsidence behaviour"***. Subsidence levels were assessed at coal depths of 2x600-650m, 1x500-600m and 5x 250-500m at a coal seam thickness of 2-6m and Pillar widths were @ 10% of mining depths. KORES statement . . . ***"subsidence over longwall panels could be expected to cause transient (temporary) changes in groundwater storage components in shallow aquifers systems which will lead to very short term depletion of alluvial groundwater storage followed by a rapid recovery"***… is extraordinary and misleading in view of excessive subsidence levels that were determined by Dr L. Holla. No research has been produced in support of this determination, which we consider erroneous and uncertifiable. KORES confirmation of *safety of catchment water* supplies conflicts with indisputable evidence, which demonstrates a catastrophic loss and severe destruction of water resources.

Subsidence predictions for areas in these two valleys reinforce an understanding of the "common system of procedural interpretation by *empirical curves' assessments*". The ACA has no reason to question these assessments in the knowledge that Holla's assessments were as a result of some 30 years experience in the industry in which he was held in very high esteem. They are at best, only a guide to events, providing that associated factors are relevant, **and that is the unknown factor and will always be so**.

6.2
Subsidence Research

Research undertaken by Australian Coal Associations Research Programme (ACARP) and NSW State Scientific Committee clearly enunciate the damaging consequences arising from longwall coal mining. In a NSW publication - *Primefacts 2 Mining Subsidence Department of Primary Industry NSW February 2006* - details of this damaging mining procedure are discussed. *Ecological Sustainable Development* (ESD) and the *Precautionary Principles* are compromised if longwall mining occurred in this Proclaimed Catchment.

6.3
Subsidence Impacts

Horizontal subsidence is recorded extending to some 3km. This would negatively impact upon catchment areas and ***establish "additional" permeable transit water conduit pathways*** (identified in earlier geophysical surveys). These new "conduits" facilitate the ingress and drainage of raw water, which would adversely impact upon the dynamic water balance. The occurrence of subsidence was acknowledged although KORES have stated **a)** *"we will see and deal with this matter when it occurs and we will see what happens in the rock similar to those in the valleys where research is continuing"* and **b)** *"the local water catchment would not be damaged and subsidence was not expected to damage nearby rivers and aquifers"*. These are misleading statements and have no validity. Detailed published evidence from the experience in the northern and southern coalfields of NSW is contrary to KORES statement/s.

Diega Creek in Lake Macquarie LGA is a classic example of the destruction of a creek system as a result of longwall coal mining. A recent Hunter-Central Rivers Management Authority report on Diega Creek (*Diega Creek Rivercare Plan, October 2003*) revealed that subsidence from longwall coal mining cracked the creek's rivers and beds, leaving it now no more than a dry river bed. *Cracks of up to 10cm wide formed after longwall mining under the creek between 1999 and 2005. (Impacts of Longwall Coal Mining in NSW. Total Environment Centre, January 2007. See appendix 4).*

Diega Creek before and after longwall coal mining

Even the mining company, Oceanic Coal, has acknowledged in the Newcastle media its contribution to the serious decline in the health of the creek.

The Rivercare Plan addresses the result of longwall mining starting at Part 3.3 on page 30 -

"**3.3 Mine Impacts**

Underground longwall mining commenced beneath certain sections of Diega Creek in

2000. Changes to the creek hydrology and geomorphology (geo=earth, morph=shape) took place as a result of subsequent land subsidence and tension cracking. These changes included creek bed fracture, subsequent creek flow interruption, bed-lowering and bank erosion. The most noticeable change to the creek setting, which has taken place as a result of those impacts in the loss of pools over more than half the study area.

Holla and Barclay, 2000 state that cracks due to mine subsidence are associated with edges of longwall panels. The loss of flow and pools in the creek is caused by the effects of subsidence cracking on surface permeability and an increase in infiltration of precipitation and runoff.

The impacts of the mining on Diega Creek became an increasing concern to the Department of Planning and Infrastructure. In its draft guidelines for mining operations on riverine corridors, DoPI lists the following as potential impacts of underground mining on stream systems:

- Fracturing in stream beds and capture of stream flows
- Bed cracks and fractures leading to incision, bed lowering and bank erosion
- Sedimentation of stream systems as a result of induced erosion on bed and banks
- Groundwater movement away from streams and alluvium"

The response from Kores to this issue is that -

> "The risk has been avoided in the case of Wyong River by excluding longwall panels under or in immediate proximity to the river."

The assertion regarding the geological setting of the overburden is not that there will be no subsidence. The assertion is a confirmation that there will be subsidence the magnitude of which is presently not known. It is cold comfort to the community to know that the geological setting "enhances the accuracy of subsidence prediction" when the magnitude is not known, but is likely to exceed 2.4 metres.

In 2001, the issue of water loss and damage was highlighted at the Commission of Inquiry into the proposed Dendrobium Mine. In its submission, Sydney Catchment Authority said *"There is evidence of pools being drained, reduced flows and a reduction in water quality . . . a potential for cracking beneath swamps to drain a significant amount of water contained in the swamps. This could lead to drying of swamps - adversely affecting their ecological integrity but also reducing water flows down-stream. Practical means of remediation are generally not available"*.

Recorded damage too many creek and river systems has been associated with *subsidence induced cracking within the stream bed. This was followed by significant dewatering of permanent pools and in some cases complete absence of flow, due to longwall coal mining. Water that re-emerged downstream was notably deoxygenerated and heavily contaminated with iron deposits; no aquatic life was found in these areas. Reduction of surface river flow was accompanied by the release of gas, fish kills, iron bacteria mats and deterioration of water quality. (Everett et.al. 1998)*.

At the June 2006 Wallarah 2 Coal Project community liaison meeting, Mr Graham Cowan, a senior engineer with the Department of Primary Industries, said (which appears in the minutes of that meeting) this about subsidence predications and subsequent damage: *"Until it (the longwall coal mine) is mined you won't know, things will change and they will be dealt with"*.

The coal industry portrays longwall subsidence impacts as being a short-term problem, but subsidence problems, which has caused cracking of creeks and riverbeds and the subsequent compromise of their integrity, has been well recorded as a long-term problem (see Appendix Four). Once subsidence begins, the majority of the ground movement does usually occur within the first three to nine months, however, experience has shown that sufficient ground movement to damage structures and thwart repair efforts often continues for many years. In the case of disrupted water tables and aquifers, no one can accurately forecast how long it will be, if ever, before usable water will once again be available.

The surface cracking associated with longwall mining degrades streams and groundwater resources. The cracking causes a large volume of rainfall and stream flow to sink into the ground; history shows that groundwater levels drop.

Given the documented experiences in recent years of the impacts of longwall coal mining on river and creek systems, such as Diega Creek, river bed cracking associated with the Dendrobium Mine, the Cataract River, the Upper Cataract River, and the Georges River, and as recently as the Mandalong mine in 2012, it beggars belief that in 2013 -

- any responsible mining company
- any competent mining engineer
- any reputable hydrogeologist
- any subsidence expert
- any properly advised inquiry panel
- any responsible Minister

with any concern for the environment and properly understanding their respective functions could propose, support, recommend or approve a longwall mining proposal within, or even in proximity to, the riverine corridor of two streams that account for some 53% of the combined Central Coast Water Supply.

The material available reporting the experiences of the effect on longwall coal mining in the last decade leads to the inevitable conclusion that such mining under and immediately adjacent to Wyong Creek and Jilliby Jilliby Creek will cause catastrophic creek bed fracture, creek flow interruption, bed lowering and bank erosion.

In short, there will be a devastating loss of a vitally important water supply.

6.3.1 Flooding

Subsidence damage to the floodplain (Dooralong and Yarramalong Valleys) area can range from sinkholes to more than two-acre water traps. Large widespread troughs over mined out panels can severely disrupt surface drainage patterns making fields too wet to farm or carry out the various rural activities such as organic vegetable growing, orcharding, cattle grazing,

turf farming and usefulness for the various horse studs and spelling facilities.

Farm dams and major impoundments can have banks and shorelines disrupted and can even be drained. Cracks and deep fissures arising from subsidence would pose hazards to livestock, farm equipment, and vehicles on damaged roadways.

Within the valleys catchment mining zones cracking, fracturing and faulting, arising from subsidence in these weakened geological areas, would create further "conduits" into the lower aquifers that would be subjected to "forced feeding" by volumetric water displacement and pressure gradients during seasonal flooding conditions and compounded by ponding in association. The major flood-prone low lying areas of Jilliby Jilliby Creek and Wyong River are subjected to extensive flooding from abnormal heavy recurring precipitation or from repetitive prolonged general rainfall periods when soil saturation is evident causing destructive and increased drainage flows, extensive scouring and property damage.

Major subsidence throughout the catchment would compound flooding and ponding on access roads and properties. Geological faulting is exacerbated by "flood water pressure penetration" through "vertical drainage subsidence cracking" would open up further conduits to create weakness in the sub-strata and compounding the "draw angle"(limit of mining influence outside an extraction panel). Although longwall mining is designed to final collapse, fault lines and cracking areas would present a pathway for an uncontrollable "driving water force pressure" of some 1-tonne per cubic metre to penetrate and exploit these weakened areas. Depressed subsided landforms will retain, divert or impede raw water drainage and contribute to flooding hazards and increased water retention throughout both valleys. ***The magnitude of such an occurrence will contribute adversely to the dynamic water balance within longwall mining areas.***

At a minimum five homes would be forced into the 1 in 100-year flood zone. This situation is further exacerbated by the fact that since 1981 there has occurred the equivalent of six 1 in 100-year flood events.

Flooding in the Dooralong Valley above the proposed mine footprint

6.3.2
Groundwater Withdrawal

"A small change in effective stress of an engineering soil at depth is accompanied by a small change in volume when considering a column of soil. The application of a sustained "constant head" draw down to a groundwater regime triggers a subsidence process, which does not occur immediately. The response of the ***porous sediment, that forms the subsidence rate***, will taper off gradually ***and can take many years before stability is re-established***. The magnitude of the "draw down head" influences the resulting duration of subsidence and its limits conditioned by joints, reactivated joints, fractures and mining induced cracks etc.

Geological factors influence the stability, or instability of the site even in the absence of mining activities. Natural changes in the level and lateral movement of the ground surface are features that arise from seasonal changes. The type of geological conditions encountered at the surface overlying LWM operations strongly influences the general character and magnitude of the resulting subsidence. The presence of faults and natural fissured rocks can appreciably influence the nature of subsidence and strain profiles. Strength and rock type conditions can greatly influence the magnitude and limits of longwall mining". (*Whittaker, B.N. & Reddish, D. J. Dept of Engineering University of Nottingham U.K. Elsevier Science Publications Amsterdam, Oxford, New York, Tokyo1989 IBSN 0-444 8724-4. Vol56*).

"In lowering of the water table, drainage leaves "soil pore spaces" which allows particles to settle into voids vacated by water and the permeability is dependent upon soil type. ***A subsidence process is not reversible even on restoration of the water table to its original position and a fluctuating water table can weaken soil structures to induce structural collapse of soils resulting in subsidence***. Further, soil shrinkage arising from reduced moisture content results in changes overall". (*Holla, L. Empirical Predictions Subsidence Movement Southern Coalfields NSW Int. Congress1985a*).

Detailed research by ***L Razowska of the Polish Geological Institute, Upper Silesian Branch***, recorded in the ***Journal of Hydrology No.244 6th December 2000*** the *Changes in Groundwater Chemistry caused by flooding of iron mines (Czestochowa Region, Southern Poland).* The emphasis is of course to water regimes and flooding arising from mining which can be applied to the KORES project: ***The hydro geological environment is always altered by mining activities due to drainage of the aquifer, which results in the formation of a cone of depression.(Rubio and Lorca 1993) and the reduction of groundwater resources. The lowering of the groundwater table changes groundwater recharge and discharge(Pigati and Lopez 1999) and causes catchment modifications (Dudgeon 1999). Flooding of the mines causes the rebound of the cone of depression but it also leads to significant pollution.***

The object of recording this study in this submission is to identify the dominant hydro geo0logical and hydro geochemical processes ***operating in a disturbed aquifer*** and the attempt to predict any quality changes of ground waters. Most certainly, this KORES project ***will cause serious subsidence and upsidence of valley floors and cracking of creek beds over the 37sq. km. mining zones***.

Subsidence will also destroy the riparian corridors in the Yarramalong and Dooralong Valleys due to interruption to the aquifers and the termination of normal flow regimes within these two corridors and their "drainage feeder creeks". It is also recognised that ***an environmental flow regime*** may not necessarily be a constant flow when such a flow, may be ecologically

unsound as it fails to recognise natural variability - species in terrestrial and aquatic environments may be dependant upon seasonal variability, i.e., interrupted flow regimes but not cessation of flow in perpetuity, from a disturbed aquifer.

6.4
Subsidence and Biodiversity

Subsidence threatens biodiversity, ecological integrity, habitats, rivers, streams, creeks, flood plains, wetlands and species of national and international significance in the terrestrial and/or aquatic environments. ***Subsidence will cause major destruction and permanent changes*** to refuge areas, transit zones, food resources, habitats, ecosystems, community structures and composition in two major riparian river corridors of Yarramalong and Dooralong valleys. ***A dramatic loss of aquatic species will occur from "drying out of critical aquatic habitats as normal and/or environmental flows*** *are displaced or diverted into subsidence areas. Soil erosion, turbidity and changed stream chemistry will arise from subsidence impacts.*

The Hunter-Central Rivers Catchment Management Authority expressed concern on the impact of longwall coal mining on Jilliby Jilliby Creek and Little Jilliby Jilliby Creek in the Jilliby Rivercare Plan, 2005.

"Conditions permitting longwall coal mining may be carried out in the future and this may have implications to the functioning of Jilliby and Little Jilliby Creeks . . . The impacts of the mining on Jilliby Creek are consistent with those which have become an increasing concern to the Hunter-Central Rivers Catchment Management Authority (HCRCMA). In its draft guidelines for mining operations on riverine corridors, HCRCMA lists the following as potential impacts of underground mining on stream systems:

- Fracturing in stream beds and capture of stream flows
- Bed cracks and fractures leading to incision, bed lowering and bank erosion
- Sedimentation of stream systems as a result of induced erosion on bed and banks
- *Groundwater movement away from streams and alluvium*

6.5
Subsidence and Hydrological Characteristics

The Minister for Mineral Resources (1988) instructed curtailment and authorised only partial extraction of coal resources in the Hue Hue Mine Subsidence Zone due to perceived subsidence problems arising. There was a clear understanding of serious deficiencies in general knowledge of hydrological and hydro geological characteristics of these two valleys. The quantifiable level and time frame for recharge, from precipitation into these valley aquifers, in unknown but is considered to be over an extensive period. Current water balance and maintenance of this need still remains to be defined although it is recognised that seasonal precipitation over the Watagan Mountains, is the "recharge supply engine" to the catchment aquifers and coal seams together with natural flood plain surface and sub-surface drainage and permeation.

The recommended two-year water study, as recommended by the previous State Government before any consideration to the approval of longwall coal mining be given, was not undertaken by the proponent to quantify the dynamics of the surface and sub surface aquifers inter relationships over this period. This required the refurbishment of

more than 200 bore holes. The proponent ignored this requirement! Instead they drilled five cluster bores on property owned by the proponent for the two-year study. It would seem that none of these results were used and submitted in the EIS. A study of the EIS bore mapping does not reveal any reference to these bore hole results having been used.

6.6
Subsidence Cracking and Sealing

Media statements by KORES that *"subsidence will happen but self sealing of subsidence cracking will automatically occur from "plastic sedimentary deposition" of alluvium, during sub-surface water movements*, is un certifiable, assumptive and inconclusive in a major fractured subsidence zone at mining depths of 320-500m. ***This supposition is flawed, without foundation and can be dangerously misleading in a sensitive high risk and critical public water supply resource zone.*** Temporary sealing is *"prone to collapse and wash out"* from trapped water pressures compounded by leaking aquifers in "cracking fracture zones" within subsidence areas. Subsidence will also *significantly and adversely impact on* ***the natural dynamic water balance*** *in local and regional groundwater regimes*. Longwall coalmining can be likened to an *"engineered discharge"* causing subsidence and connectivity between these water regimes as "panel voids" are repetitively established after coal recovery throughout the coal fields. *Very high conductivity and subsequent losses in water flow is a major feature arising from a dynamic subsidence wave*. (*ACARP*)

6.7
Subsidence and Altered Chemical Properties

Subsidence cracks, joint sets and discrete fractures allow surface waters to mix with sub-surface waters of altered chemical properties. *Loss of terrestrial and aquatic species will occur as a result of iron toxicity pollution i.e. . . . "bacteria commonly occur in Hawkesbury Sandstone where seepage through the rock is rich in iron compounds and able to grow in water lacking dissolved oxygen"* (Jones & Clark 1991). Subsidence induced cracking within a stream bed was followed by water that emerged downstream *"was notably deoxygenerated and heavily contaminated with iron deposits; no aquatic life was found and the reduction of surface river flow was accompanied by release of gas, fish kills, iron bacteria mats and deterioration of water quality"*. . . (Everett, et. al. 1998).

6.8
Subsidence and In-stream Biota

Longwall mining (LWM) subsidence can dramatically change the diversity and abundance of aquatic organisms, which occur in rivers/streams. The recovery of in-stream biota communities in *our rivers, creeks and streams, which form part of the ecosystem and supporting food chain, must be considered as highly improbable. There will also be a further dramatic loss of aquatic organisms if the salinity and the electrical conductivity of these waters are changed as many organisms are* ***stenohaline*** *- tolerant of only small variations in salinity*.

7
POLLUTION

7.1
Coal Seam Waters

A heavily polluted ***"coal seam methane saturated saline, and highly mineralised (with anolytes) aquifer***, represents a dangerous threat from "subsidence cracking." *"Cracking" will permit alluvial aquifer flow to intercept polluted coal seam waters prior to their discharge into the Wyong River*. ***Natural drainage flow is not trapped by alluvium translocation*** during surface/sub-surface drainage flow. The ecological health of water resources is predicated upon land use management, protecting stream health and the environmental flows requiring management and maintenance of high conservation and environmental values. ***Subsidence will compromise/destroy the ecological health of potable water resources drawn from this catchment and seriously impact upon the environmental integrity within the catchment***.

7.2
Wyong River and Tuggerah Lakes Estuary

The Tuggerah Lakes Barrier Estuary is a major food resource habitat for nineteen International and National avifauna migratory waders protected under NSW State and Commonwealth Regulatory Acts and the China/Australia and Japan/Australia International Bird Treaties (CAMBA and JAMBA) under the Bonn Convention. *The pollution of Wyong River will occur (from subsidence and cracking) at the interception of heavily polluted coal seam water, which will poison aquatic organisms during discharge into the estuarine sediments and aquatic habitats of Tuggerah Lakes*.

8
TUGGERAH LAKE MESOTROPHIC BARRIER ESTUARY

An independent enquiry into the NSW Coastal Lakes - Healthy Rivers Commission April 2002 - reports Tuggerah Lakes as at extreme risk, modified, of high conservation value with a potential for rehabilitation of modified ecosystem processes. *Longwall coal mining would negate*, and *compound progressively* ***proposed rehabilitation processes as longwall coal panels penetrate*** westerly beneath valley flood plains, rivers and creeks. Ecological processes, which maintain the biological diversity, are dependent upon periodic inundation of the flood plains and wetlands and continuity of movement of aquatic organisms between fresh water inflow and estuarine habitats. ***These requirements are compromised by longwall coalmining***.

Estuarine benthic habitats depend upon ecologically sustainable foreshore management and Catchment management - ***two critical pivotal roles to maintain this interdependency*** between the catchment, the barrier estuary and Tuggerah Bay (identified as an ecological sensitive habitat within the estuary). *Polluted coal seam waters will destroy this sensitive environment*. It is clearly evident that the ecological integrity of stream corridors and their flow regimes must be protected and actively managed if these water resources are to maintain their qualitative ecological integrity. It is clearly evident that ***Ecological Sustainable Development and the Precautionary Principles will be compromised by longwall coalmining***.

9
RIPARIAN GREEN CORRIDORS

Protection of raw water in the catchment, and flow regimes within the two Riparian Corridors (providing transit lanes, habitat, food and refuge areas) is paramount in any catchment management plan. The need for ***ecological sustainable development (ESD)*** and applications of ***the precautionary principle (PP)*** are compromised by ***longwall mining (LWM)***. When researched by Department of Primary Industry NSW and the State Scientific Committee in 1994/95 it was determined that LWM is a ***Key Threatening Process*** under the ***Threatened Species Conservation Act 1995*** in view of the excessive environmental damage it creates.

Maintaining the ecological integrity of riparian corridors is critical as these waterways also assist in controlling drainage flow from excessive flood levels after heavy seasonal precipitation. A healthy corridor of native vegetation including grasses, rushes, trees shrubs and vines, assists in maintaining river bank stability against high stream flows and also reduces turbidity within the flow. Native vegetation provides an important food source (for macro vertebrates and terrestrial animals) and acts as a buffer and filter assisting to prevent contaminant movements. ***LWM subsidence will destroy critical sensitive environmental areas***.

10
CONNECTIVITY

Connectivity between pools provides refuge for aquatic fauna and aquatic flora - the latter are a stabilisation factor of sediment and oxygenated waters to form the basis of aquatic food chain and channel stability - the Geomorphic factors - which may be reduced from recurring subsidence. Changing water balance influences' soil shrinkage behaviour, its permeability and lowers a water table creating instability. ***Subsidence will destroy these attributes and environmental flows, which are essential for maintenance and protection of wildlife, ecosystems and habitats within these two essential wildlife corridors***.

11
POLLUTED COAL SEAM WATER STORAGE DAMS

The polluted coal seam waters Mine Operations Storage Dam will be responsible for the retention of some 30ML/per month rising to some 900ML/per month. *These extraordinary high levels of heavily polluted coal seam waters present "a life of mine immediate danger" from leakage within their storage area and consequent interception of natural drainage flow into Wallarah Creek wetlands to discharge into Budgewoi Lake*. There is no evidence of "fail-safe secure containment" and/or "protective impervious sealing procedures" to prevent leakage of these stored polluted coal waters.

A storm event, such as that which occurred on the June 2007 long weekend, could present problems in the containment of this contaminated mine water and preventing it from entering the Porter's Creek wetlands. Storm and flooding events of similar magnitude, 1/100 year events, have occurred in recent times in 1974, 1981, 1989, 1991 and 1996. The Insurance Australia Group web site now predicts those previous 1/100 storm events (such as was

experienced in June 2007) can now be expected every 17 years. However, from the climatic charges now occurring due to global warming and the evident previously recorded dates, this type of event is likely to be far more frequent.

12
ENVIRONMENTAL RESOURCE MANAGEMENT

12.1
Natural Resource Management

The granting a license to operate longwall coal mining in these two valleys *would be in direct conflict with the NSW Government decision in April 2003 to introduce* ***"A new Approach to Natural Resource Management"***. This decision resulted in the appointment, by The Hon. Premier B. Carr M.P. of a Native Vegetation Reform Implementation Group (NVRIG) Chaired by the Right Honourable Ian Sinclair AC together with NSW Farmers' Association, peak environmental interests, the Wentworth Group and representatives of key Government agencies. The object was to ". . . *ensure a solid foundation for better protection of our native vegetation and natural resources"* with an allocation of $406.3 million dollars to fund locally driven organisations and land managers. Most certainly, the authoritative responsibility of this new body must be clearly directed to maintaining the ***Charter***, clearly laid down in a number of determinations in the document - ***A New Approach to Natural Resource Management*** - and particularly regarding:

> *"providing protection for significant areas of native vegetation, including areas that are classified as endangered or vulnerable under current arrangements"*
>
> and
>
> *"providing exemptions which will be restricted to clearly defined routine agricultural activities"*

12.2
Proclaimed Wyong Water Catchment Act and Statutes

Attention is drawn to Page 1.Section 1 of The Proclaimed Wyong Water Catchment Statutes 401(2)(b) and 2(h) and the following Threatened Species Protection legislation for species protected under the Commonwealth EPBC Act 1999 and the NSW Sate Act 1995 (Refer Section 17 below).

This submission has indicated the adverse nature of longwall mining technology and the serious environmental degradation arising which must surely raise the question of due diligence being exercised by the Expert Panel, in advice to the NSW Government. The granting of a license to operate a coal mining operation in this proclaimed water catchment, in the full knowledge of the serious adverse outcomes which can arise, is in direct contradiction to the aims, expectations and need for maintaining intergenerational equity. It would also contradict clearly defined environmental standards both scientific and social in the protection of wildlife species of International and National Significance on the Australian continent. The Natural Resources Commission and Advisory Council is the consulting authority.

13
THREATENED SPECIES PROTECTION

13.1
Commonwealth
Environment Protection and Biodiversity Conservation Act (EPBC Act1999)

Australia's international bird treaty obligations (Bonn Convention) to JAMBA, CAMBA and ROKCAMBA protecting 19 avifauna migratory waders of National and International and Significance whose fragile habitat is entirely dependent upon the health of the water catchment river systems.

Alteration to Habitat, following uncontrollable subsidence (active and residual) arising from long wall coal mining, has been determined by the NSW Scientific Committee as a Key Threatening Process under Schedule 3. Part 2. of the Threatened Species Conservation Act 1995. (Gazzetal date 15/07/05).

Current Listing

		CAMBA	JAMBA	
Scientific Name	**Common Name**	**Annex**	**Annex**	**Wader**
Ardea alba	Great Egret	*	*	*
Ardea ibis	Cattle Egret	*	*	*
Plegadis falcinellus	Glossy ibis	*		*
Hallaeetus leucogaster	White Bellied Sea Eagle	*		*
Gallinago hardwickii	Lathams Snipe	*	*	*
Limosa lapponica	Bar-Tailed Godwit	*	*	*
Numenius madagascariensis	Eastern Curlew	*	*	*
Tringa stagnatilis	Marsh Sandpiper	*	*	*
Tringa nebularia	Common Greenshank	*	*	*
Calidris canutus	Red Knot	*	*	*
Calidris ruficollis	Red-necked Stint	*	*	*
Calidris acuminata	Sharp-tailed Sandpiper	*	*	*
Calidris ferruginea	Curlew Sandpiper	*	*	*
Pluvialis fulva	Pacific Golden Plover	*	*	*
Sterna caspia	Caspian Tern	*	*	*
Sterna albifrons	Little Tern	*	*	*
Chlidonias leucopterus	White- winged black Tern	*	*	*
Hirundapus caudacutus	White-throated Needletail	*	*	*
Apus pacificus	Fork-tailed Swift	*	*	*
	TOTAL	19	17	

Reference Data:

- *New Atlas of Australian Birds. 1998-2005. NSW.*

- *Australian Government*
  Department of Environment and Heritage, Canberra.
  Marine Division. Listed Migratory Species under JAMBA and CAMBA. 24/08/06

13.2
NSW
Threatened Species Conservation Act 1995(TS Conservation Act 1995.)

Ref: Data Exchange SIAS Group NPWS 16/07/07 advise: 23 species of fauna and 4 species of flora re registered under the TS Con. Act 1995. 9 species of fauna are also protected under the EPBC Act 1999 and are additional to the 19 species of migratory waders of International significance.

Species Protected under the EPBC Act

Myobatrachidae	*Mixophyes balbus*	Stuttering Frog	Endangered
	" "	Giant Barred Frog	Endangered
Cacatuldae	*Calyptorhnynchus lathami*	Glossy Black Cockatoo	Vulnerable
Mellphagidae	*Xanthomyza phrygia*	Regent Honeyeater	Endangered
Tytonidae	*Tyto novaehollandiae*	Masked Owl	Vulnerable
Dasyuridae	*Dasyurus maculatus*	Spotted-tailed Quoll	Vulnerable
Petauridae	*Petaurus australis*	Yellow-bellied Glider	Vulnerable
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying Fox	Vulnerable

It should be noted that westerly and southerly sections, of the 37sq.km of longwall coal mining, pass under Jilliby Jilliby State Conservation Area and Wyong State Forest. These exceptional communities of Vulnerable and/or Endangered wildlife will be threatened by LWM subsidence causing serious environmental degradation throughout the coal zones in the Yarramalong and Dooralong Valleys within the Proclaimed Wyong Water Catchment District. It would be considered an act of criminal negligence to permit coal mining, and then compound the situation by allowing venting of coal seam methane into environmentally species sensitive areas, of exceptional significance, for the Eastern Pygmy Possum, Greater Glider, Koala, Squirrel Glider and Yellow Bellied Glider (also refer 16.1).

14
SOCIAL ACCEPTANCE

Social Implications of a large scale coal mine

Kores had failed in their duty to obtain the "Social Licence to Operate" and win the hearts and minds of the affected populous. The subsidence parameters have never been discussed in open forum. Kores deliberately remain silent on this and many others issues.

Various issues, unfavourable to the social amenity of Wyong and to residents who would be directly impacted by the Wallarah 2 mine, has now been uncovered from the recesses of the E.I.S, heavily camouflaged, and have conveyed a very distressing message to those who live over the footprint of the mine.

The water study is consistent with that found within their first submission. Other essential material was also found.

Kores demonstrate in their actions a belief that they are owed a mine by the State Government, and further believe that the water issue will go away if it is not discussed in open forum.

They continually espouse their belief that aquicludes exist in the upper surface alluvials, which will prohibit vertical downward water migration. This myth has again been debunked by Professor Philip Pells, who clearly demonstrates that the water table will drop around 100 meters. Several other experienced geoscientists and water consultants have as well rallied against the aquiclude theory, including ERM Mitchell McCotter (consultants for the original proponents BHP Billiton) and have determined independently that longwall mining will destroy the surface aquifers.

ERM Mitchell McCotter said that "silt and clay lenses are not anticipated to impede the transmission of bulk water" down to the coal seam.

Clearly identified within the voluminous Wallarah 2 EIS was the following:

- 245 houses will be subjected to vertical subsidence of up to 2.3 metres. The breakdown being
- 13 houses will subside more than 2 metres
- 105 houses will subside from between 1metre and 2metres
- 65 houses will subside from 200mm up to 1 metre.
- The balance of the houses to a lessor amount.
- 755 rural structures are listed in the EIS as being affected by subsidence.
- 420 farm dams will be affected by subsidence.

A high price to pay!

Against this Kores have continued to publish statements proclaiming that this mine will not impact on the community. Water, dust, subsidence are manageable and pose no problems. An outright lie deluding no-one.

Not once in the 8 years that the ACA have been involved in opposing the Wallarah 2 proposal has Kores produced logical, accurate and believable facts. Not once has Kores involved itself with the local valley populations ass suggested within the E.I.S. Kores is apprehensive in meeting the local people.

- We believe Kores has not been candid in producing vital information to the general public.

- Kores should not be granted a mining licence.

- That the process of evaluation should involve the "Precautionary Principle".

- That failure to implement this procedure will have devastating consequences on the environment, the shallow surface aquifers providing water for over 300,000 people and the decimation of 1 if not 2 pristine valleys and their eco systems.

- That adaptive conditions should have no consideration in the decision making process as it did in the last submission where 42 latent conditions were tabled.

- That a public arena be provided in order to debate the real issues involved with this mine together with the Planning Assessment Commission.

- That longwall mining has no place in a burgeoning area such as the North Wyong Region with its exploding population, under a proclaimed water catchment area and its surface facilities impacting on the fastest growth area in the State.

15
COAL DUST AND HEALTH

15.1 Coal Dust

Against a backdrop of the increasing influx of young families and an aged population, there are other factors arising from the proposed coal development with the potential to affect the social capital of the newly created area. With reference to the NSW Health - Mine Dust and You - fact sheet, Issued January 2006 the potential for amenity impacts will become apparent.

Dust settling on fresh laundry and car's duco will be some aspect of the proposed development that a resident will have to deal within the home, but of equal importance in a distance of 2.4 - 3.2 kilometres of the proposed stockpile facility are the schools of Blue Haven Public, Lake Haven, Woongarrah and Warnervale. At times of high dust levels, the department's advice is to keep Windows and doors closed - outdoor activities should be limited.

What advice does the Department of Planning and Infrastructure suggest should be given to the new schools, sporting groups and open space users that already will be in existence prior to any approvals given for an above ground facility? What monitoring will/could be done and what if levels of dust are unsafe and how will the open space users or be notified and/or restricted?

People who may be susceptible to the health effects of airborne coal dust are:

- infants, children and adolescents (there is an increase of young families moving into Wyong Shire and an increase in child-care facilities)
- elderly (there a large aged population in Wyong Shire)
- people with respiratory conditions such as asthma, bronchitis and emphysema
- people with heart disease people with diabetes

The impact on your health from breathing in coal dust can be:

- cough
- wheeze, or worsening of asthma
- increased need for medications (eg puffers, antibiotics)
- increased breathlessness

High levels of Total Suspended Particulate Matter (TSP) may also cause coughing, sneezing and sore eyes.

15.2
Coal Dust Pollutants and Coal Handling Facility

Coal Dust Pollutants, both respirable and inspirable suspended particulate matter indicates a health hazard as coal dust entering the respiratory tract may be further divided into respirable (very fine dust) which reaches the lower bronchiales and alveolar regions of the lung. Local Meteorology –wind speed direction and stability from the Tooheys Road rail loop coal dump and infrastructure site - would most certainly transport particulates from the 250,000 tonnes product stockpile, the 4000 tonnes' p/hr. constant traffic input from the minehead into Tooheys Road coal dump, a 2000t.p/hr. overhead tripper to stack crushed coal on the 250,000 tonne product stockpile and a 4500t/phr. train loading system. Coal dust particulates will, under suitable wind pressures, extend to some 10kms from Tooheys Road rail loop, which will inundate Wyong Hospital, schools, the new Warnervale Township, and the urban expansion around it, and extending into the outer urban areas and Wyong Township. Coal loading, dust and noise will be a repetitive 24hr. cycle operation continuing for 42 years. The ACA has viewed coal dust problems in the Hunter mining area and note that although dust suppression requirements are in force, it is quite inadequate to control. We consider that these polluting conditions will prevail in the Wallarah 2 project and this will compounded by uncovered coal trains permitting continual release of coal dust particulates throughout their transit areas to Newcastle docks.

Coalmine dust is heterogenous mixture containing more than 50 elements and their oxides, which cause severe lung disorders and other invasive registered dangerous medical conditions.

The current National Environmental Protection Measures (NEPM) for ambient Air regarding particulate matter, specifies a goal of 50 ugm-3 with a diameter of less than 10 microns (PM10). Recent studies confirm that in urban areas, PM 2.5 is overwhelmingly the most significant fraction-60%- of total suspended particulates (TSP) taking into consideration

particle size, weight and wind velocity, which determines distance to a receptor. Particle fractions (PM10 and PM2.5) are capable of entering the human respiratory tract whereas coarse particulates - larger particles - although considered a nuisance is unable to enter the human respiratory tract and are not generally considered to pose a health risk. It is recorded that sensitive receptors, at less than 3km. distance from active areas of the mine, is at risk as air quality standards deteriorate with greater concentrations of heavier particulates. Transport of fine particulates leads to higher proportionate of distribution at some distance from the coal mine/ workings. The new Warnervale town site and other residential areas will be subjected to serious coal dust particulates/pollution.

15.2.1
Control of Coal Dust

The experience in other areas has shown that it is impossible to control the spread of airborne coal dust. In Gladstone, Queensland, it has been clearly demonstrated that control of dust is not successful. Anger is growing in Central Queensland that black coal dust is blanketing the community of Gladstone.

The community is seeking answers as to what they see as a growing problem.

"The coal dust is coming into my house and into my cupboards, I have to wash my plates before I even use them," one resident said.

"I'm going to court and I'm seeking massive damages," said local business owner Evan Ryan.

This example in Gladstone demonstrates that it is not possible to guarantee that coal dust won't be emitted from the area causing adverse effects.

The medical profession views the potential risk of coal dust as serious and this would add to the already high levels of respiratory problems experienced by residents on the Central Coast. Avoidable deaths from respiratory system diseases are already above State and Australian averages. Central Coast children have high rates of Asthma. (*Population health profile, Central Coast NSW Division of General Practice: supplement. March 2007*).

15.3
Health Impacts and Air Quality

Page 11 of the Executive Summary candidly points to the expected death ratio associated with this development caused by exposure to dust and contaminants. It states, ***"Analysis provided conservative estimates of the increase in annual and daily mortality due to dust emissions from the Project at the most affected receiver on the worst day. The increase in risk of daily mortality on the worst day of the life of the Project is estimated to be approximately 1 in 100,000 and as such represents a small risk."***

Pages 9 to 17 of the Health Assessment Risk Report, again candidly points to the expected death ratio associated with this development caused by exposure to dust and contaminants. It again states there is a chance of an increase in mortality of 1 in 100,000 of the population. This is a conservative estimate only and does not take into account the increasing population growth of the northern suburbs of Wyong Shire, nor does it take into account people with

diabetes, heart disease and respiratory ailments, all of who are extremely susceptible to debilitating and terminal illness from fine airborne coal dust particulates.

Further, the EIS does not seem to be based on localised data even though for decades the medical profession has voiced its concern over the higher rates of respiratory diseases particularly in the northern areas of Wyong Shire. Surely the rate of mortality and morbidity would be greater given the following data being taken into account.

As far back as 1985, Lake Munmorah Public School respiratory conditions were evident in about 40% of children, including 76 children having asthma. Doctors at Lake Munmorah recorded 30% of children attending their surgery had respiratory problems, which was double the national average, and they signed a letter to suggest that, from their own research, the source of this problem was the power industry (including coal stockpiling and handling) complexes existing in near proximity.

Since that time the broad community has called on successive governments to begin a cumulative air quality study of the area but each time this has failed to emerge. This was clearly pointed out at the 2010 PAC Hearing into this same Wallarah 2 proposal.

According to Wyong Council State of the Environment Report 2008/9 Total Suspended Particles (TSP) in the shire DOUBLED between 1994 and 2008.

Dr. Peter Lewis, Director of Public Health for the Central Coast and Northern Sydney in his submission to the previous PAC in 2010 (which was incidentally hidden out of public view by the Department of Planning at the time) states:

"A major concern is the level of increased particulate pollution experienced well beyond the boundaries of the land owned by the proponents at both Buttonderry and Tooheys Road sites. This concern exists because any increased exposure to particulate pollution is associated with increased adverse health outcomes, EVEN IF the levels are BELOW the current guidelines."

"The predicted 10ug/cm increase in PM10 will produce increased respiratory and morbidity among residents.

"Assessment focuses on deaths and hospitalisations, ignoring the more commonly seen increase in respiratory symptoms associated with increasing particulate pollution, e.g., children having chest colds, night-time cough and trips to the doctor. There is little acknowledgement of population growth in the areas with increased particulate pollution for the Health Risk Assessment".

"Projects of the scale of Wallarah 2 Coal Project must be considered in the context of the whole region, not as a standalone project".

Doctor Lewis is highly qualified to comment as he did. He won the Medical Journal of Australia Wyeth Award for his research on the effects of particulate pollution on children in Newcastle and Wollongong.

One would have thought that on the basis of history of health issues in the northern area of Wyong that the previous PAC would have rejected the project. It must be remembered that the previous Government in March 2011 eventually rejected this mine proposal on the basis of unacceptable impacts to the region.

It continues to astound residents of this region that companies such as Kores and Governments themselves are prepared to push on regardless knowing full well that major impacts will almost certainly result in growth of respiratory diseases and other more serious diseases perhaps various cancers in the local population as time proceeds.

Disappointingly, the current NSW Government, without any on ground consultation with those of us involved in expressing public health concerns over decades, decided to place an air monitor system to evaluate Wyong air quality on the Wyong Racecourse complex. This location is remote from emitting industries in the north, and is an isolated and benign atmosphere with only the nearby railway to impact upon it. Lower range pollutant readings are highly likely to result.

The Tooheys Road complex is only 2klms from nearby Blue Haven which contains schools and several pre-schools and only 3klms to the new expanding Wyee township, where only recently a 1000 housing lot development has been planned right next to the railway upon which the coal trains will travel.

The EIS states that Annual Coal Dust emissions from the Tooheys Road stockpiles, works and conveyor systems will total about 68,000 kilograms of TSP's and at Buttonderry another 23,337 kilograms of TSP's will emanate from the ventilation shaft.

In both circumstances that is a huge impost into the air in which the associated population must endure. The EIS (in Appendix M page 6) states that:

"Over the last few decades, there has been a substantial amount of research that added to the evidence that breathing PM is harmful to human health".

The EIS lacks a proper map of probable deposition of dust particles encompassing the broad area including addressing the deposition of coal dust along the rail corridor. It is known that the coal trains will not be covered and so coal dust will be of a concern both in the loaded trip and the return trip. Recent revelations along the Hunter rail corridor emphasise that this problem is downplayed.

The PAE Holmes report (Appendix L, page 55) suggests that the trip from Tooheys Road to the Port of Newcastle is "relatively short" (Relative to what, at trip through deserted regions of WA?). Any casual observer would laugh that this be considered a truthful statement and suggest that the author should take this trip through the southern suburbs of Lake Macquarie and Newcastle.

The accumulated Greenhouse Gas Emissions from this project over an extent of 38 years are totalled as 360,866,275 tons of CO2 expressed as (t CO2-e). (Appendix L, page 59). It would seem that for the sake of future generations and for the general health of the planet, that this mine should never be considered. The costs are too great. The cost to our health and our environment is never expressed in valued cost to us now or for the future.

15.3.1
Airborne Coal Dust

Population projections in the northern suburbs of Wyong Shire (the area that would be most affected by airborne coal dust) show a staggering 100% increase in growth in the 10-year

period to 2106. With diabetes for the Central Coast matching the NSW prevalence, the projected growth will place greater demands on the health system and that need must be supplemented. A NSW Health publication (issued January 2006) indicates that people such as those with diabetes may be ***"more susceptible to the health effects of fine and coarse particles"***. Further, the department of Health advise that those more susceptible to health effects of dust emissions in the air as a result of mining activities include infants, elderly, those with respiratory conditions such as asthma and heart disease.

The northern area of Wyong Shire has a high prevalence of young families moving into the area, and an extremely high aged population - the two groups most susceptible to disease and respiratory ailments from coal dust.

Twenty years ago it was firmly established that the incidence of asthma and other respiratory ailments was high in the northern part of Wyong Shire due the placing of the power stations and their coal facilities. A coal handling facility adjacent to the largest urban growth area in NSW would only exacerbate this problem.

16
NOISE

Another consideration in terms of noise must be on the employment activities of current and future residents. Residential suburbs such as Blue Haven have a high number of commuter residents. People choose to live there because of its proximity to the F3 Freeway. The people characteristically leave home early in the morning and return in the early evening. Many may also be involved in night work. Sleep patterns for these residents are very important and reduced sleep resulting in noise related activities may result in heightened levels of stress and associated productivity losses. The most consistent impact of insomnia is a high risk of depression.

(1. Insomnia: Epidemiology, Characteristics, and Consequences. Clinical Cornerstone Vol. 5, No. 3. 2003 Excerpta Medica, Inc.

(2. Maria Thomas, Helen Sing, Gregory Belenky, Henry Holcomb, Helen Mayberg, Robert Dannals, Henry Wagner Jr., David Thorne, Kathryn Popp, Laura Rowland, Amy Welsh, Sharon Balwinski, Daniel Redmond (2000) – Neutral basis of alertness and cognitive performance impairments during sleepiness. 1. Effects of 24 h of sleep deprivation on waking human regional brain activity. Journal of Sleep Research 9 (4), 335-352.)

17
INTERGENERATIONAL EQUITY & CLIMATE CHANGE

The topic of green house gas production is one that cannot be dismissed. Whilst the proposed final destination of the coal to be extracted is overseas, the proposed development will generate as a final end, produced green house gas. The two forms of green house gas concerns lodged by the Alliance are the burning of the coal and the coal seam methane released as the coal is extracted. Australia has the highest per capita green house gas emission's figure in the world (Australian Institute Figures) and coal accounts for approximately 35% of Australia's greenhouse emissions (2003 Australian Greenhouse Office figures) with coal being the fastest

growing source of greenhouse gas emissions in Australia.

For the next 42 years of the proposed development, coal will be burnt, green house gas, both in the extraction and the burning of the product, will occur and the generations of successive Australians will suffer as result of this.

The ruling, by Justice Nicola Pain, has ramifications when considering major projects such as the KORES proposal. The ruling requires that the Government will now have to take account of the greenhouse gas emissions from burning the mine's output. There seems to be no calculations made in regards to the Wallarah 2 proposal at this stage. The Panel might like to explore this area, as the final project would impact heavily on Climate Change issues, to determine the total amount of CO2 that will be produced and how the proponent seeks to modify or ameliorate the greenhouse gases as a result of this development.

Similarly, Central Coast residents have raised very strong concerns by the use of desalination plants for water purifying. These water-purifying plants are themselves large users of power as well as noise production. The Alliance seeks more information on the total power consumption of the mine's operation.

Intergenerational equality questions arise from the alienation of the State Forests for mine ventilation stacks for the proposed 42 years of the lease. How will these ventilation stacks be monitored and what impacts will they have on flora and fauna in the State forests? What height are these units and what noise do they produce from operation?

Other intergenerational equality concerns are the proposed rezoning and alienation of 6(a) open space lands. Can the proponent outline the cost to the community of the alienation of these lands for 42 years?

Further amenity issues arising from the preliminary report by the proponent are the use of lighting. Lighting in what areas and for what times? And how is the lighting to be diffused so as not to disrupt local amenity?

Further concerns of intergenerational equality are the subsidence issues as a direct result of the proposed development. Whilst water is one area of potential damage by subsidence, the Alliance raises issues of road construction and maintenance, building construction and restrictions (reference is made to the Valleys Studies of Wyong Shire Council) and any damage done to local open space and recreational areas such as the State Forests and sporting fields.

17.1
Climate Change

The mine is unacceptable from changes to climate. These impacts include:

- Increased global average temperatures – unacceptable
- Increased acidity of the ocean – unacceptable
- Direct economic cost – unacceptable
- Increased human suffering – unacceptable

- Decreased rainfall – unacceptable
- More intense drought – unacceptable
- Increased storm intensity – unacceptable
- Increased flooding / storm surge – unacceptable
- Loss of biodiversity – unacceptable
- Decreased water supply – unacceptable
- Decreased food supply – unacceptable
- Loss of coastal land / property – unacceptable
- Decreased human health – unacceptable
- Increased human disease – unacceptable
- Decreased fish and other ocean resources – unacceptable
- Political unrest – unacceptable
- Destabilization of human society – unacceptable

The EIS and the Statement of Commitments does not adequately address the impact of the mine on global warming or on ocean acidification.

It is noted that the conditions imposed on mines are not enforced and mines break their conditions as a matter of course. This makes the proposed mine even more unacceptable.

The EIS has not provided sufficient justification for approval.

Detail

We consider there is plenty of evidence to support the following contentions that form the basis of our submission:

a) Green house gases have been significantly increased in the atmosphere by human activities. In this case the green house gas under consideration is CO2 which has increased approximately 40% as a result of human burning of fossil fuels, mostly in the last 30 years.

b) The scientific evidence is incontrovertible that increased CO2 in our atmosphere is causing increased global average temperatures, which will continue to rise into the future.

c) There is sufficient scientific evidence that the increase currently threatens to be more than 2 degrees (average global temperature rise) and that under current policies 3 to 6 degrees is likely.

d) The results of such a rise represent a catastrophe for the human race and must be avoided.

A short list of the impacts under a warming global temperature, include all the objections listed above. It would appear to be madness to continue to increase our burning of fossil fuels under these conditions but that is exactly what is proposed under the Wallarah 2 Coal Mine project. In this case we are actually to expand the use of fossil fuels by opening up a new resource.

Recent reports by Price Waterhouse Coopers, the International Energy Agency and the World Bank indicate that we are taking insufficient action to reduce emissions. A report issued in May 2013 (Unburnable Carbon) indicates that to have an 80% chance of remaining below the 2 degree threshold agreed by countries at the Copenhagen 2009 UN conference, total fossil carbon burned by 2050 must be less than 900 Gt. Current recognized global assets of fossil carbon amount to more than 2,500 Gt. This effectively means we must leave most of the currently 'banked' fossil fuel assets in the ground.

In this submission we intend to focus on the economic costs of the mine but it should be borne in mind by the approver of this mine that the social, human and environmental impacts of our current path towards more and more combustion of fossil fuels are too huge to quantify.

Just taking one example, how do we value the cost to a thousand generations into the future of the loss of land to sea level rise. A rise of more than 5 metres (likely in the longer term of hundreds of years if we continue on our current path) would result in the loss of all the major river deltas of the globe: Lower Egypt, Amazon delta, Bangladesh, Yellow River delta, and many more. Such losses would displace hundreds of millions of people from the most productive agricultural lands of this planet. We do not believe this could be evaluated purely on an economic basis.

Economic impacts

Many economists have estimated the economic impact of climate change! A reasonable range of estimates is from $20 to $150 per tonne. The value depends on the discount rate and the actual effort to reduce emissions that is undertaken.

The Wallarah 2 mine intends to mine 150.9 million tonnes of coal which results in emit 369 million tonnes of CO2-e green house gas emissions. This value does not appear to include transport outside Australia. All but 2.5% of the 369 MtCO2-e comes from burning the coal (equivalent to 100.64 MtC).

Adopting a value of $40 /t for social cost of carbon gives a total of: $4.03 billion.

If the social cost of carbon were to be in the upper range of assessments ($150/tC) the total cost of this mine relating to climate change would be: $15.1 billion.

To put this into perspective:- this single mine, not large when considered in the context of coal mines in Australia, could cause climate change costs equivalent to the entire military budget of a mid-sized developed country (e.g., Israel's military budget is $15 billion).

A decision to allow this mine will unleash costs of billions of dollars onto future generations. This must be taken into consideration in the economic assessment of this mine. This mine will

see the likely costs per tonne of carbon to go up as will the likely trend in temperature increase into the next century and beyond. The costs associated with a rise of 4 degrees will be increased enormously over the costs of a 2-degree rise due to the disruption of society and collapse of nations.

As the recent statements by the Chief Economist of the International Energy Agency, Fatih Birol (to the UN climate talks conference of parties in Bonn, June 2013) – Two-thirds of all proven reserves of oil, gas and coal will have to be left undeveloped if the world is to achieve the goal of limiting global warming at two degrees Celsius:

"We cannot afford to burn all the fossil fuels we have. If we did that, it [average global surface temperature] would go higher than four degrees."

"Globally, the direction we are on is not the right one. If it continues, the increase would be as high as 5.3 degrees and that would have devastating effects on all of us."

It is better to leave this coal un-developed rather than expose future generations to huge costs for adapting to the impacts of climate change. It is highly likely that the State Government will to have to buy the mine back in 10 years time when we finally realize the madness of allowing it to start in the first place.

Conclusion

This proposed coalmine is not in the local community, the State's or the wider global public interest. The Environmental Impact Assessment (EIS) does not provide sufficient justification for it to be approved considering the huge costs both economic and in human terms from the impacts of climate change.

References:
IEA Report 2013:
http://www.worldenergyoutlook.org/media/weowebsite/2013/energyclimatemap/RedrawingEnergyClimateMap.pdf
PwC Report 2012 Too late for 2 degrees:
http://www.pwc.com/en_GX/gx/low-carbon-economy-index/assets/pwc-low-carbon-economy-index-2012.pdf
Carbon Tracker, Unburnable Carbon:
http://carbontracker.live.kiln.it/Unburnable-Carbon-2-Web-Version.pdf
World Bank Turn down the Heat:
http://climatechange.worldbank.org/sites/default/files/Turn_Down_the_heat_Why_a_4_degree_centrigrade_warmer_world_must_be_avoided.pdf

18
FLORA AND FAUNA ISSUES

Whist the submission contains a detailed section of the use and potential damage of the groundwater supplies, similar concerns are raised on the potential damage to the local creeks such as Wallarah Creek from dust emissions and transfers. How are these emissions to be calculated? What effect will they have on the local streams and creek? How are they to be monitored for subsequent effects on the fauna in the area?

19
ECONOMIC CONSIDERATIONS

Significant concerns are raised over the numbers proposed by the applicant. Startling figures show those job numbers in the coal industry are falling in the face of larger production and booming export numbers.
"Between 1996 and 2001, the number of coal mining jobs in the Lower Hunter in NSW fell to 3,560, a drop of 27%. In the rest of the Hunter, the number fell 18% to 2,443. Mining of all kinds (which is mostly coal) makes up just 2% of the employment in the Lower Hunter (of 4,099 jobs) and 8% in the rest of the hunter (2,717 jobs)."
(www.australiancoal.com.au/industrystats.htm#employment).

Remediation of the proposed ventilation sites, subsidence sites, road and open space damage, flora and fauna impacts, amenity (specifically including health costs) and property values are just some of the economic criteria that the proponent should be examining and forecasting some type of recompense to the community as a result of the proposed development if it were to proceed.

19.1
Social and Economic significance to the local community, the region and State

The draft Central Coast Regional Plan provides for future growth in population of between 68,000 and 100,000 new residents. Underground mining and/or any surface facility would not be compatible with a large population interface and other desirable employment opportunities, but would be counter productive in attracting business and residential investment.

Potential negative effects from coal dust and subsidence, in fact are not denied by proposed mining plans currently put forward for consideration. Instead the Preliminary Risk Assessment for the Wallarah 2 proposal talks about minimising and monitoring. This clearly indicates that it can't be prevented.

19.2
Negative Impacts on Employment

The Wyong Employment Zone, which extends from Sparks Road through to the Link Road, (adjacent to the Kores coal handling facility site) has the potential to create 6,000 new jobs. Both the Wyong Council and the Wyong-Tuggerah Chamber of Commerce are campaigning to attract clean industry to this area, in particular the food industry to compliment the already existing Woolworths food distribution centre.

The existence of a coal mine and coal loading facility close by would discourage industry into the area and would mean the sacrifice of many jobs for the sake of the few generated by the mining company.

The Central Coast Regional Strategy states in regards to future employment growth:
Key opportunities for the Region include –

- *Intensified economic activity and provision of quality office space to increase local business services such as accounting, financial management, IT service and legal firms*
- *Significant retail growth, including more speciality shops, bulky goods outlets and*

department stores

- *Growth in health services, driven by population growth, lifestyle preferences, an aging population and growing sophistication and complexity of services. The number of health-related jobs is forecast to increase substantially over the life of the Strategy.*
- *Growth in education services, with a corresponding increase in the associated employment in this sector. New schools, vocational education and higher education infrastructure will be required to support a growing population with participation in education and skills training*
- *Development of business parks, which provide good building design and layout, emphasis on light industrial and value-adding industries and integration of industrial, warehousing and office activities. Significant opportunities also exist to expand technology-based jobs in the Region*
- *Forecasted high rates of growth for cultural industries as well as accommodation and hospitality. The Region's tourism advantages are also likely to increase*
- *Growth of home-based businesses.*

The Strategy also says:

> *The Department of Primary Industries, the Department of Energy, Utilities and Sustainability and the Department of Planning, in conjunction with the Department of Natural Resources, to review planning for the Central Coast plateaus and Wyong valleys to consider agriculture, extractive resources, water supply values and tourism uses and address any conflict between these uses.*

The proposed mining activities and in particular the pit head near Blue Haven would be incompatible with the Strategy. It is reasonable to conclude that while it is predicted that mining will generated a limited number of jobs this type of industrial use will discourage other industries mentioned in "Key Opportunities" listed previously, including the proposed Wyong Employment Zone. Many of the proposed employed lands are within 2.5 kilometres of the Tooheys Road site and are well within zones for noise and coal dust issues.

Further, the Strategy also states:

> *The Wyong Employment Zone is a major employment opportunity for the Central Coast Region. Planning for this area will include investigation of land to the immediate west of the Sparks Road - F3 Freeway interchange for future employment opportunities that take advantage of this key transport interchange.*

The intent of the Central Coast Strategy is to create employment opportunities that meet the needs of the increased population. Using the principles of "sustainable communities", residential development needs to be close to transport hubs and employment opportunities. This type of employment use needs to also provide a healthy environment that is compatible with being close to residential development, making the area attractive to both business and potential population movement.

An extractive resource industry, such as the Wallarah 2 coal proposal, would be in conflict with other possible employment/residential uses and in fact that land at Tooheys Road would be more valuable for other use that would be more compatible with interfacing residential developments at Blue Haven, Warnervale and proposals at Wyee.

19.3
Potential Negative Impacts on Current and Proposed Residential Areas

Any potential mining and above surface related infrastructure by their mere nature has the potential to adversely effect the values of residential property. Subsidence, noise and dust can severely lower house and land values across the northern suburbs of Wyong and in those suburbs of Jilliby, Dooralong and Wyong Creek.

This would occur at a particularly bad time with many residents already suffering from increased mortgage commitments and already falling house values. In many cases, a large number of people would owe more than their property is worth. This could have a serious impact on the Central Coast economy.

This same problem could also impact on new housing developments, making them less attractive and not drawing necessary investment. The Central Coast does not have an existing mining culture mentality, and the general community would see so new mining projects in the Wyong LGA as a negative.

The Wallarah 2 proposal would have its main surface facility in close proximity (2.4 kilometres) to the new Warnervale Township and hub. This development could be heavily impacted by a coal loading facility, pushing much needed investment elsewhere.

Other considerations are:

- Proximity of Tooheys Road site to Blue Haven and Wyee Schools
- Proximity to new residential area at Warnervale and Charmhaven
- Increased health impacts related to dust and noise in residential areas
- Decreased tourism leading from adverse publicity and public perception
- Location of Tooheys Road site to "gateway" off F3 to Northern Wyong Suburbs

20
LAND USE AND MANAGEMENT STRATEGY IN THE WATER CATCHMENT VALLEYS

Closer rural settlements are envisaged in a selection over 15 sites in the Dooralong Valley and one site in the Yarramalong Valley.

Adverse environmental impacts will arise from subsidence and *it will be impossible to maintain a healthy fresh water river system,* which is envisaged as and when ***new Riparian Corridors are created*** under this new management strategy. Subsidence will create addition flooding over the 37 sq. km of sub-surface mining zones. This will adversely impact upon groundwater levels, flood levels, wetlands, streams, and have potential impacts upon environmentally significant areas, which are vulnerable to land subsidence and changed groundwater levels. It is envisaged there will be serious pollution arising from fractures in the subsurface overburden allowing interception of heavily polluted coal waters to discharge into local streams and rivers. The potable water system will be destroyed by mining subsidence.

The distribution of plant communities is strongly influenced by the geological features and soil types that are evident in the two valleys that contain five (5) soil landscapes. ***The two valleys present an ecological overlap of two climatic zones,*** which results in a ***"uniqueness***

of habitat" between species ***of tropical areas from the North and the temperate areas from Southern Australia***. It is recorded that ***the ecological phenomenon of plant and animal diversity is extremely high***. These attributes are considered to be of the highest conservation value and must be protected.

The following points must be considered:

- Will longwall coal mining activities be compatible with the aims and ideals of the water catchment? No.
- Is it possible to constrain and/or manage subsidence? No, it is indeterminable.
- Will this mining project satisfy the STATUTES of the Proclaimed Catchment Protective Act? No.
- Can Kores quantify, qualify and satisfy
    - The Threatened Species Conservation Act 1995? No.
    - The Commonwealth Environment Protection and Biodiversity Conservation Act 1999? No.
- Will coalmining pollution waters be controllable? No.
- Will active, residual and horizontal subsidence perpetuate? Yes.

20.1
Current Dooralong and Yarramalong Valley Land Use Activities

The following business activities identified as occurring in the valleys and would be subject to adverse environmental impacts caused by subsidence (see 23).

- Hydroponics vegetable growing
- Organic Vegetable Farming and Orchards
- Farm riding trails
- Farm tours (lavender farm)
- Stain glass manufacture
- Vineyards
- Macadamia farm
- Turf farms
- Cattle farms
- Horse studs
- Horse spelling farms
- Orange orchards
- Apiaries

20.2
Agricultural, Equestrian, Rural and Tourist Activities

Yarramalong and Dooralong Valleys are the rural hinterland of the Wyong LGA. Wyong Council and those who live and work in the valleys are committed to maintaining the rural character of the area.

Within the valleys there are thoroughbred horse breeding, spelling and training establishments, turf farms, cattle breeding properties, a lavender farm, alpaca farms, riding schools, hydroponic farming and orchards. There are also tourist destinations such as Dooralong Valley Resort, Yarramalong Macadamia Farm and Cedar Park Lavender Farm. These destinations are attracting visitors not only from the Central Coast and Sydney, but increasingly inbound tourists from eastern Asian countries such as mainland China and South Korea.

To a greater or lesser extent all of these activities are dependent, and rely, on an assured water supply from Wyong Creek, Jilliby Jilliby Creek or the aquifers within the valleys.

Reducing the streams in the valleys to the condition of Diega Creek, as shown in the Rivercare Plan would decimate these activities. Even assuming it were available, the purchase of water from the town water supply system would not be an economically viable option for most of these activities.

Without the investment required to support ongoing agricultural and rural activities, in the absence of water, properties would fall into disrepair and become unkempt and overgrown. Noxious weeds would proliferate, as property owners would have no incentive to eradicate them. The attractive and scenic quality of the valleys would be lost and the area would cease to be a desirable attraction for tourists. The proprietors of the various business activities in the valleys and their staff will lose their livelihoods and the contribution made by these businesses to the economy of the Central Coast would be lost. In short, the two valleys would be devastated.

21
OTHER CONCERNS

21.1 - Rail Capacity

There is concern as to whether the extra coal trains using the already busy Main Northern Rail line between Sydney and Newcastle would adversely affect current freight and passenger services. The Panel should examine in detail capacity issues and whether the current line could cope with additional coal trains, as well as increasing freight and passenger needs over the life of the project.

21.2 - Foreign Export

Concern is also expressed that this coal is destined for foreign export. We have more than 50 ships sitting off our coast on a regular basis, waiting to be loaded. Even with the newly touted third coal loader in Newcastle, the port is already at capacity. Bringing on line a new coal mine on the Central Coast would further choke this system.

CONCLUSION

Longwall coalmining is incompatible with environmental management as a result of the excessive damage caused from subsidence, which will destroy the water catchment in perpetuity. The environmental degradation arising from this coal recovery processes is inestimable and will be progressively and adversely compounded by coal recovery. The registered environmental attributes of these two catchment valleys and public water resources are, therefore, clearly unsustainable in any introduced longwall mining environment.

The desired objective - ecological sustainable development - is compromised by this form of mining, which causes uncontrollable active, residual and horizontal subsidence extending over indeterminable periods before, and if ever, overburden resettlement is established. There is ample evidence in NSW that this mining technology causes massive geological faulting/fractures destroying wetlands, creeks, flood plains, rivers, increased flooding and private property damage and serious water loss.

The strong argument that an extractive industry will bring benefits to the State and local economy is highly questionable when put into perspective with the potential negative effects on families, health, environment, tourism, local industry and small business. Tourism for example will generate far more jobs than mining and have a far more positive impact on public perception.

The Central Coast already has a population of more than 300,000 people and this is expected to grow to more than 420,000 by 2031. There has to be the correct synergy of investment, employment, social issues and environment for this region to successfully integrate this population.

It is illogical and irrational to even contemplate longwall coal mining beneath a water catchment area given the recent experiences in other areas where streambeds have been fractured and stream flows compromised and lost.

Statements of Commitment, such as Kores issues, are not a substitute for properly researched and analysed expert reports confirming that a project will not have a particular impact. Statements of the “trust me, it will be alright” nature are not an acceptable basis for recommending approval of a project with the real potential for devastating consequences affecting, among other things, the water supply and lifestyles of 300,000 people.

When viability is dependent on, among other things, environmental considerations how can there be a claim that a viable mine is possible?

There is no demonstrated basis upon which coal mining under the Yarramalong and Dooralong Valleys can be permitted.

Proposed mining and its inherit risks through subsidence and health issues, not denied by the industry, comes only with a commitment to try and “manage” potential problems.

This is not sufficient to risk our vital water catchment and risk the health of Central Coast residents.

APPENDIX 3

SUBSIDENCE IMPACT ON HOMES

ACA House Identifier	Subsidence Millimetres	LONGWALL AREA	SUBSIDENCE DISTRICT	ADDRESS
1	1300	SOUTH	Wyong	85 Brothers Rd
2	480	SOUTH	Wyong	65 Brothers Rd
3	110	SOUTH	Wyong	40 Brothers Rd
4	2180	SOUTH	Wyong	80 Brothers Rd
5	1520	SOUTH	Wyong	290 Jilliby Rd
6	2100	SOUTH	Wyong	80 Brothers Rd
7	2180	SOUTH	Wyong	102 Wategan Forest Rd
8	2300	SOUTH	Wyong	83 Wategan Forest Rd
9	2050	SOUTH	Wyong	100 Wategan Forest Rd
10	2000	SOUTH	Wyong	61 Wategan Forest Rd
11	1950	SOUTH	Wyong	68 Watagan Forest Rd
12	1800	SOUTH	Wyong	66 Watagan Forest Rd
13	2000	SOUTH	Wyong	10 Dunks Lane
14	1350	SOUTH	Wyong	51 Watagan Forest Rd
15	1800	SOUTH	Wyong	110 Dunks Lane
16	1100	SOUTH	Wyong	131 Dunks Lane
17	1240	SOUTH	Wyong	279 Jilliby Rd
18	1400	SOUTH	Wyong	242 Jilliby Rd
19	1400	SOUTH	Wyong	251 Jilliby Rd
20	1460	SOUTH	Wyong	242 Jilliby Rd
21	1480	SOUTH	Wyong	226 Jilliby Rd
22	1050	SOUTH	Wyong	9 Watagan Forest Rd
23	350	SOUTH	Wyong	9 Watagan Forest Rd
24	140	SOUTH	Wyong	2 Watagan Forest Rd
25	700	SOUTH	Wyong	33 Dunks Lane
26	1500	SOUTH	Wyong	87 Dunks lane
27	130	SOUTH	Wyong	19 Davenport Lane

28	40	SOUTH	Wyong	35 Davenport Lane
29	1320	SOUTH	Wyong	219 Jilliby Rd
30	1250	SOUTH	Wyong	12 Dunks lane
31	130	SOUTH	Wyong	18 Dicksons Lane
32	80	SOUTH	Wyong	30 Treelands Drive
33	45	SOUTH	Wyong	24 Treelands Drive
34	25	SOUTH	Wyong	20A Treelands Drive
35	100	SOUTH	Wyong	12 Treelands Drive
36	200	SOUTH	Wyong	143 Dunks Lane
37	150	SOUTH	Wyong	143 Dunks Lane
38	40	SOUTH	Wyong	409 Yarramolong Rd
39	20	SOUTH	Wyong	411 Yarramolong Rd
40	70	SOUTH	Wyong	79 Kidsman Lane
41	20	SOUTH	Wyong	65 Kidsman Lane
42	80	SOUTH	Wyong	68 Kidsman Lane
43	30	SOUTH	Wyong	58 Kidsman lane
44	20	SOUTH	Wyong	28 Treelands Drive
45	20	SOUTH	Wyong	42 Treelands Drive
46	20	NORTH EAST	Wyong	232 Durren Road
47	70	NORTH EAST	Wyong	500 Dicksons Road
48	100	NORTH EAST	Wyong	222 Durren Road
49	280	NORTH EAST	Wyong	204 Durren Road
50	1000	NORTH EAST	Wyong	160 Durren Road
51	1140	NORTH EAST	Wyong	160 Durren Road
52	1400	NORTH EAST	Wyong	147 Durren Road
52A	1180	NORTH EAST	Wyong	147 Durren Road
53	1300	NORTH EAST	Wyong	140 Durren Road
54	1330	NORTH EAST	Wyong	147 Durren Road
55	1100	NORTH EAST	Wyong	488 Dicksons Road
56	1200	NORTH EAST	Wyong	475 Dicksons Road
57	1150	NORTH EAST	Wyong	3 Cottesloe Road
58	1200	NORTH EAST	Wyong	4 Cottesloe Road

59	1150	NORTH EAST	Wyong	5 Cottesloe Road
60	1350	NORTH EAST	Wyong	13 Cottesloe Road
61	1230	NORTH EAST	Wyong	435 Dicksons Road
62	1050	NORTH EAST	Wyong	418 Dicksons Road
63	1100	NORTH EAST	Wyong	12 Cottesloe Road
64	1050	NORTH EAST	Wyong	6 Cottesloe Road
64A	200	NORTH EAST	Wyong	7 Cottesloe Road
65	250	NORTH EAST	Wyong	10 Cottesloe Road
66	20	NORTH EAST	Wyong	9 Cottesloe Road
67	1050	NORTH EAST	Wyong	419 Dicksons Road
68	1010	NORTH EAST	Wyong	11 Cottesloe Road
69	1320	NORTH EAST	Wyong	405 Dicksons Road
70	1350	NORTH EAST	Wyong	358 Dicksons Road
71	1320	NORTH EAST	Wyong	358 Dicksons Road
72	1180	NORTH EAST	Wyong	6 Smiths Road
73	1150	NORTH EAST	Hue Hue	347 Dicksons Road
74	1200	NORTH EAST	Wyong	393 Dicksons Road
75	1200	NORTH EAST	Wyong	310 Dicksons Road
76	1220	NORTH EAST	Hue Hue	317 Dicksons Road
77	1250	NORTH EAST	Hue Hue	299 Dicksons Road
78	1120	NORTH EAST	Hue Hue	251 Dicksons Road
79	1100	NORTH EAST	Wyong	246 Dicksons Road
80	1250	NORTH EAST	Hue Hue	213 Dicksons Road

81	70	NORTH EAST	Wyong	2376 Dicksons Road
82	40	NORTH EAST	Hue Hue	103 Dicksons Road
83	20	NORTH EAST	Wyong	96 Dicksons Road
84	1000	NORTH EAST	Hue Hue	47 Parkridge Drve
85	1030	NORTH EAST	Hue Hue	45 Parkridge Drive
86	1020	NORTH EAST	Hue Hue	43 Parkridge Drive
87	1000	NORTH EAST	Hue Hue	41 Parkridge Drive
88	1000	NORTH EAST	Hue Hue	39 Parkridge drive
89	1000	NORTH EAST	Hue Hue	37 Parkridge Drive
90	1000	NORTH EAST	Hue Hue	35 Parkridge Drive
91	1020	NORTH EAST	Hue Hue	33 Parkridge Drive
92	1000	NORTH EAST	Hue Hue	29 Parkridge drive
93	1000	NORTH EAST	Hue Hue	31 Parkridge Drive
94	970	NORTH EAST	Hue Hue	27 Parkridge Drive
95	950	NORTH EAST	Hue Hue	25 Parkridge Drive
96	940	NORTH EAST	Hue Hue	23 Parkridge Dirve
97	710	NORTH EAST	Hue Hue	5 Pedaman Place
98	620	NORTH EAST	Hue Hue	4 Pedaman Place
99	400	NORTH EAST	Hue Hue	3 Pedaman Place
100	60	NORTH EAST	Hue Hue	6 Marion Place
101	30	NORTH EAST	Hue Hue	1 Parkridge Drive
102	910	NORTH EAST	Hue Hue	38 Parkridge Drive
103	910	NORTH EAST	Hue Hue	36 Parkridge Drive
104	1000	NORTH	Hue Hue	20 Crestwood Road

		EAST		
105	960	NORTH EAST	Hue Hue	34 Parkridge Drive
106	1000	NORTH EAST	Hue Hue	32 Parkridge Drive
107	920	NORTH EAST	Hue Hue	30 Parkridge Drive
108	1030	NORTH EAST	Hue Hue	28 Parkridge Drive
109	940	NORTH EAST	Hue Hue	26 Parkridge Drive
110	800	NORTH EAST	Hue Hue	19 Parkridge Drive
111	670	NORTH EAST	Hue Hue	6 Pedaman Place
112	500	NORTH EAST	Hue Hue	2 Pedaman Place
113	120	NORTH EAST	Hue Hue	5 Parkridge Drive
114	60	NORTH EAST	Hue Hue	3 Parkridge Drive
115	30	NORTH EAST	Hue Hue	2 Parkridge Drive
116	1060	NORTH EAST	Hue Hue	8 Crestwood Road
117	1030	NORTH EAST	Hue Hue	13 Crestwood Road
118	940	NORTH EAST	Hue Hue	18 Crestwood Road
119	820	NORTH EAST	Hue Hue	24 Parkridge Drive
120	660	NORTH EAST	Hue Hue	17 Parkridge Drive
121	530	NORTH EAST	Hue Hue	1 Pedaman Place
122	130	NORTH EAST	Hue Hue	7 Parkridge Drive
123	60	NORTH EAST	Hue Hue	9 Parkridge Drive
124	40	NORTH EAST	Hue Hue	4 Parkridge Drive
125	760	NORTH EAST	Hue Hue	1 Crestwood Road
126	760	NORTH EAST	Hue Hue	3 Crestwood Road
127	940	NORTH EAST	Hue Hue	7 Crestwood Road

128	800	NORTH EAST	Hue Hue	5 Crestwood Road
129	860	NORTH EAST	Hue Hue	16 Crestwood Road
130	780	NORTH EAST	Hue Hue	14 Crestwood Road
131	690	NORTH EAST	Hue Hue	22 Parkridge Drive
132	660	NORTH EAST	Hue Hue	20 Parkridge Drive
133	540	NORTH EAST	Hue Hue	18 Parkridge Drive
134	250	NORTH EAST	Hue Hue	16 Parkridge Drive
135	220	NORTH EAST	Hue Hue	13 Parkridge Drive
136	90	NORTH EAST	Hue Hue	11 Parkridge Drive
137	60	NORTH EAST	Hue Hue	10 Parkridge Drive
138	20	NORTH EAST	Hue Hue	6 Parkridge Drive
139	780	NORTH EAST	Wyong	80 Sandra Street
140	680	NORTH EAST	Wyong	70 Sandra Street
141	680	NORTH EAST	Hue Hue	2 Crestwood Road
142	670	NORTH EAST	Hue Hue	4 Crestwood Road
143	670	NORTH EAST	Hue Hue	6 Crestwood Road
144	660	NORTH EAST	Hue Hue	8 Crestwood Road
145	650	NORTH EAST	Hue Hue	10 Crestwood Road
146	350	NORTH EAST	Hue Hue	5 Brookfield Close
147	150	NORTH EAST	Hue Hue	13 Brookfield Close
148	100	NORTH EAST	Hue Hue	14 Brookfield Close
149	40	NORTH EAST	Hue Hue	12 Parkridge Drive
150	30	NORTH EAST	Hue Hue	8 Parkridge Drive
151	100	NORTH	Wyong	60 Sandra Street

		EAST		
152	220	NORTH EAST	Hue Hue	6 Brookfield Close
153	130	NORTH EAST	Hue Hue	7 Brookfield Close
154	70	NORTH EAST	Hue Hue	12 Brookfield Close
155	40	NORTH EAST	Hue Hue	11 Brookfield Close
156	30	NORTH EAST	Wyong	50 Sandra Street
157	60	NORTH EAST	Hue Hue	85 Sandra Street
158	40	NORTH EAST	Hue Hue	75 Sandra Street
159	25	NORTH EAST	Hue Hue	1 Tracey Lea Close
160	20	NORTH EAST	Hue Hue	55 Sandra Street
161	30	NORTH EAST	Hue Hue	5 Tracey Lea Close
162	25	NORTH EAST	Hue Hue	4 Tracey Lea Close
163	65	NORTH EAST	Hue Hue	8 Brookfield Close
164	45	NORTH EAST	Hue Hue	9 Brookfield Close
165	40	NORTH EAST	Hue Hue	10 Brookfield Close
166	30	NORTH EAST	Hue Hue	2 Marion Place
167	30	NORTH EAST	Hue Hue	3 Marion Place
168	20	NORTH EAST	Hue Hue	4 Marion Place
169	30	NORTH WEST	Wyong	708 Jilliby Road
170	2200	NORTH WEST	Wyong	145 Beaven Lane
171	60	NORTH WEST	Wyong	245 Little Jilliby Rd
172	150	NORTH WEST	Wyong	227 Little Jilliby Rd
173	30	NORTH WEST	Wyong	262 Little Jilliby Rd
174	20	NORTH WEST	Wyong	190 Little Jilliby Rd

175	20	NORTH WEST	Wyong	188 Little Jilliby Rd
176	20	NORTH WEST	Wyong	No address available
177	40	NORTH WEST	Wyong	86 Smiths Road
178	500	NORTH WEST	Wyong	675 Jilliby Road
179	700	NORTH WEST	Wyong	671 Jilliby Road
180	1080	NORTH WEST	Wyong	644 Jilliby Road
181	1320	NORTH WEST	Wyong	621 Jilliby Road
182	1410	NORTH WEST	Wyong	619 Jilliby Road
183	1500	NORTH WEST	Wyong	606 Jilliby Road
184	1800	NORTH WEST	Wyong	80 Beaven lane
185	1630	NORTH WEST	Wyong	38 William lane
186	1550	NORTH WEST	Wyong	209 Little Jilliby Rd
187	920	NORTH WEST	Wyong	209 Little Jilliby Rd
188	20	NORTH WEST	Wyong	162 Little Jilliby Rd
189	20	NORTH WEST	Wyong	162 Little Jilliby Rd
190	220	NORTH WEST	Wyong	87 Little Jilliby Rd
191	70	NORTH WEST	Wyong	95 Little Jilliby Rd
192	20	NORTH WEST	Wyong	110 Little Jilliby Rd
193	980	NORTH WEST	Wyong	57 Smiths Road
194	1200	NORTH WEST	Wyong	40 Smiths Road
195	1180	NORTH WEST	Wyong	6 Smiths Road
196	1200	NORTH WEST	Wyong	6 Smiths Road
197	1200	NORTH WEST	Wyong	621 Jilliby Road
198	1320	NORTH	Wyong	619 Jilliby Road

		WEST		
199	1200	NORTH WEST	Wyong	606 Jilliby Road
200	1270	NORTH WEST	Wyong	548 Jilliby Road
201	1270	NORTH WEST	Wyong	532 Jilliby Road
202	1320	NORTH WEST	Wyong	518 Jilliby Road
203	1120	NORTH WEST	Wyong	25 Beaven Lane
204	1400	NORTH WEST	Wyong	50 Beaven Lane
205	1320	NORTH WEST	Wyong	117 Durren Road
206	1150	NORTH WEST	Wyong	75 Durren Road
207	1150	NORTH WEST	Wyong	75 Durren Road
208	1150	NORTH WEST	Wyong	71 Durren Road
209	1050	NORTH WEST	Wyong	505 Jilliby Road
210	1150	NORTH WEST	Wyong	495 Jilliby Rod
211	1050	NORTH WEST	Wyong	7 Beaven Lane
212	1150	NORTH WEST	Wyong	50 Beaven Lane
213	1120	NORTH WEST	Wyong	473 Jilliby Rd
214	1190	NORTH WEST	Wyong	471 Jilliby Rd
215	1180	NORTH WEST	Wyong	463 Jilliby Rd
216	1020	NORTH WEST	Wyong	449 Jilliby Rd
217	380	NORTH WEST	Wyong	432 Jilliby Rd
218	40	NORTH WEST	Wyong	76 Little Jilliby Rd
219	20	NORTH WEST	Wyong	20 Brothers Rd
220	20	NORTH WEST	Wyong	60 Little Jilliby Rd
221	20	NORTH WEST	Wyong	56 Little Jilliby Rd

222	20	NORTH WEST	Wyong	57 Little Jilliby Rd
223	20	NORTH WEST	Wyong	37 Little Jilliby Rd
224	20	NORTH WEST	Wyong	10 Little Jilliby Rd
225	30	NORTH WEST	Wyong	7 Little Jilliby Rd
226	30	NORTH WEST	Wyong	36 Jilliby Rd
227	20	NORTH WEST	Wyong	357 Jilliby Rd
228	20	NORTH WEST	Wyong	357 Jilliby Rd
229	20	NORTH WEST	Wyong	351 Jilliby Rd
230	20	NORTH WEST	Wyong	347 Jilliby Rd
231	20	NORTH WEST	Wyong	337 Jilliby Rd
232	30	NORTH WEST	Wyong	319 Jilliby Rd
233	20	NORTH WEST	Wyong	10 Little Jilliby Rd
234	25	NORTH WEST	Wyong	330 Jilliby Rd
235	Not used			
236	200	SOUTH WEST	Wyong	400 Little Jilliby Road
237	500	SOUTH WEST	Wyong	64 Boyds Lane
238	900	SOUTH WEST	Wyong	65 Boyds Lane
239	400	SOUTH WEST	Wyong	45 Boyds Lane
240	200	SOUTH WEST	Wyong	45 Boyds Lane
241	900	SOUTH WEST	Wyong	369 Little Jilliby Road
242	100	SOUTH WEST	Wyong	843 Yarramalong Road
243	80	SOUTH WEST	Wyong	310 Little Jilliby Road
244	90	SOUTH WEST	Wyong	245 Little Jilliby Road
245	300	SOUTH WEST	Wyong	186 Little Jilliby Road

APPENDIX 4

The following analysis of **Coal Seam Water** was obtained from samples of water drawn from the two Sydney Gas test wells in the Dooralong Valley, and analysed by the University of New South Wales water testing laboratories.

The two test wells, Jilliby 1 and Jilliby 2, were way outside limits on several parameters - Iodide, Total Dissolved Solids (TDS), Barium, Aluminium, Chloride and pH. A comparison of the results of the two Jilliby wells was made with the Australian Drinking Water Guidelines and water extracted from coal seam methane wells in the Powder River Basin, Wyoming, USA.

Selected Chemical Analysis of Coal Seam Water

	Australian Drinking Water Guideline	Powder River USA	JILLIBY 1	JILLABY 2A
pH	6.5 - 8.5	7.3	9.1	8.7
Total Dissolved Solids (TDS)	500mg/l	850	**3,976**	**5,452**
Total iron	0.30mg/l	0.8	<0.30	<0.30
Sodium	180 mg/l	300	**1,646**	**2,232**
Magnesium	150 mg/l	16	2.95	4.63
Chloride	250 mg/l	13	**590**	**590**
Barium	0.70 mg/l	0.62	**1.58**	**3.3**
Aluminium	0.20 mg/l	<0.05	**0.218**	0.044
Iodide	0.10 mg/l		**0.689**	**1.27**
Boron	0.30 mg/l		0.242	**0.301**
Calcium	80 mg/l	32	4.91	8.08
Ammonia	0.50 mg/l	2.4	<0.50	<0.50
Nitrate	1.50 mg/l		<5.00	<5.00
Fluoride	1.50 mg/l	0.92	2.98	2.91
Silver	0.10 mg/l		0.002	0.003
Chromium	0.05 mg/l	<0.001	0.005	0.009
Copper	2.0 mg/l	0.0076	0.017	0.084
Lead	0.01 mg/l	<0.0001	0.0005	0.0002
Nickel	0.02 mg/l	0.005	0.001	0.003
Zinc	3.0 mg/l		0.147	0.013
Mercury	0.001 mg/l	<0.0001	0.0003	0.0001
Manganese	0.50 mg/l	0.032	<0.50	<0.50
Arsenic	0.007 mg/l		0.005	0.004
Cadmium	0.002 mg/l	<0.0001	0.0001	0.0002
Selenium	0.01 mg/l	<0.002	0.005	<0.001
Molybdenum	0.05 mg/l		0.009	0.01

Powder River data from Rice *et al*. 2000; Jilliby data from Jones 2005

APPENDIX 5

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APPENDIX 6

DAMAGE OCCURRING AS A RESULT OF LONGWALL MINING

SOUTHERN COALFIELDS

Lower Cataract River (Tower Colliery BHP Biliton)	Hundreds of cracks in Lower Cataract River.
Upper Georges River- Appin and West Cliff Colliery	Surface cracking of riverbed announced by Douglas Park when hinge joints were opening up.
Minister for MR The Hon. I Macdonald 1/7/03 Appin Colliery	Mining within 600m of F5 Freeway Bridge at Upper Nepean River.
Stokes Creek Appin and West Cliff Colliery	Undermined 1990-99 loss of water and leaching of oxide.
Bargo River-Tahmoor Colliery (Centennial Coal)	Damage to Bargo River in 2002 completely dry for 2km. and large cracks .
Flying Fox Creek Wongawilli Creek & Native Dog Creek, Dendrobium Mine and Elouera Mine (BHP)	Subsidence induced cracking. dewatering, swamp drainage and pollution .
Waratah Rivulet	Rivulet ceased to flow much of length, tilted, sandstone stream bed cracked , iron oxide pollution.

WESTERN COALFIELDS IMPACTS

Goulburn River & Moolarben Creek	24 longwalls proposed. Still under consideration.
Wollangambe River & Farmers Creek Clarence Colliery	Cracking, Wollangambe River polluted, iron and manganese being deposited.
Cox's River- Angus Place, Spring Vale & Clarence Colliery	Rising salinity and alkalinity due to mine dewatering and reduced environmental flows.
Kangaroo Creek –Angus Place (Centennial Coal)	Puncturing 2-underground aquifers - pumps 12m/L saline water daily from mine.

HUNTER COALFIELD IMPACTS

Hunter River	Pollution & salinity are future concerns.
Bowmans Creek	Loss of water , river stopped flowing.
South Wambo Creek- Hunter Coal (Wollemi UGM)	South Wambo Creek cracked and drained.
Diega Creek - West Wallsend Colliery (Xstrata Coal)	Longwall mining cracks 10cms. Water loss.
Glennies Creek, Eui Creek, Fishery Creek, Black Creek & Foy Brook	Subsidence, all listed creeks are damaged and cracked.

References: IMPACTS OF LONGWALL MINING ON THE ENVIRONMENT IN NSW. Total Environment Centre, Sydney South 1235. January 2007.

APPENDIX 7

TERMS AND DEFINITIONS

Conjugate	Joined, Connected
Methanogenesis	An aerobic situation and process of methane gas release.
Invertebrate	Without backbone, destitute of a skull.
Lithology	Science of rocks
Impirical	Resting on trial or experiment
Permeable	Porous
Impermeable	Not porous
Turbidity	Muddy, Muddled, Cloudy
Dynamic	Moving driving force
Stenohaline	Tolerant of small variations in salinity
Hydrogeological	Water and rock systems
Alluvium	Water borne deposited matter (fine grain)
Colluvium	Loose bodies of sediments.
Analytes	Separating into Elements (in water)
Riparian	Vegetation along river banks and streams.
Macro	Large
Micro	Small
Geomorphic	Channel stability, stabilisation
Inspirable	Able to inhale
Respirable	Breath in or out
Particulates	Small micro air-borne particles (pollutants)
Anoxic	Methane migration oxidation consuming oxygen= heating soil.
Benthic	Invertebrate organisms highly sensitive to pollution