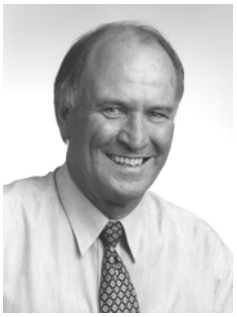

PARLIAMENT OF AUSTRALIA
HOUSE OF REPRESENTATIVES


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# Submission

15th September 2008

The Secretary
Senate Standing Committee on Rural and Regional Affairs and Transport
Parliament House
Canberra ACT 2600

## Inquiry into water management in the Coorong and Lower Lakes.

Dear Senate Committee Members,

Please accept my submission to your inquiry.

I welcome the passage of the two motions into your realm of investigation and ask that you consider the broader basin in your deliberations as obviously what happens upstream in the Murray Darling system has an impact on the Coorong and Lower Lakes.

I would like to draw to your attention the area of the Liverpool Plains in my electorate of New England currently subject of a number of mining exploration licenses.

The Liverpool Plains is part of the Namoi Valley which in turn is part of the Murray Darling system and therefore any water use in this part of the system forms part of the Murray Darling Basin Cap.

The fact that the Senate is examining water supply and availability to address the so-called water crisis in the Coorong and the Lower Lakes of the Murray River and other related matters allows the broader issue of groundwater to be addressed as well.

It is known that there is a relationship between groundwater systems and river water in the Murray Darling system, hence the availability of water for any delivery process in that system.

What is not known is the potential impact on that system of longwall mining that is currently being explored on the black soil Liverpool Plains.

What is also not known is the impact of slashing the hydraulic pressure of these interconnected systems on downstream aquifers and surface water.

An application was made to the previous Government and another to the current Government seeking an Independent study into the impact of long wall mining on the Liverpool Plains and further down the Namoi Valley.

I believe that this lack of any real knowledge and hence the poor public policy is the reason an Independent study into the impact of longwall mining on the total groundwater system is required.

The very reason and logic for the two motions in the Senate has been based on poor public policy founded on little knowledge of those policy decisions in the past.

Over-allocation of water licences and improper landscape management have led to the investigation for a rescue package for the Murray system.

We cannot blame bad past public policy for the plight of the Coorong and Lower Lakes and then allow poor planning policy to remain in terms of mining and groundwater which could exacerbate the problem they are trying to solve.

The Committee would be aware of various references in the House of Representatives relating to a knowledge base on interconnectivity issues. The former Prime Minister John Howard and former Environment Minister Malcolm Turnbull are on record in Question Time raising concerns about the degree of scientific knowledge on the matter.

If the Committee does not have sufficient knowledge on these key issues, the capacity to embrace strategies that increase inflows into the system and eventually have meaningful impact at the Murray mouth becomes questionable.

The Namoi Valley stretching from the Liverpool Ranges in the southern part of the Electorate to the community of Walgett some 300km in distance has been the most studied groundwater system in NSW.

There are 12 water zones in the Upper Namoi and one large water zone in the Lower Namoi.

It is believed these zones are interconnected and responsive to gravitational hydraulic pressures that drive the underground water westward with various interactions with the Namoi River and other surface water systems that are part of the Murray Darling system.

The degree of absolute knowledge of this system is debatable and needs much more study.

I therefore seek the inclusion of a recommendation of the Inquiry to be “to carry out an independent study into the impact of longwall mining on the Liverpool Plains and further downstream groundwater systems of the Namoi Valley.”

A copy of the study proposal is attached.

Yours sincerely

Tony Windsor MP
Member for New England

## *Coal and water resources - protecting the integrity of groundwater*

***3-D mapping of surface and groundwater in the Gunnedah Basin as an aid to strategic assessment of coal mining potential and associated environmental impacts***


**A collaborative study undertaken by**

**Liverpool Plains Land Management Committee, Gunnedah**

**School of Biological, Earth and Environmental Sciences, University of New South Wales**

**School of Environmental and Rural Science, University of New England**

**Centre for Water in the Minerals Industry, University of Queensland**


## Overview

The Liverpool Plains boasts some of the world's best soils underlain by secure, high quality water supplies and an estimated 300 billion tonnes of coal.

This proposal will demonstrate a template process for sound co-development of soil and coal resources **without compromising the long-term value of the surface and ground water resources** of the region.

Maps will be developed which indicate the areas of coal development which will most threaten the water resources. These will be underpinned with a 3-D model of the surface and groundwater systems allowing rigorous accounting for water, and a sound understanding of open cut and longwall coal mining. The project will be led from the community level by the LPLMC and conducted by an expert university consortium.

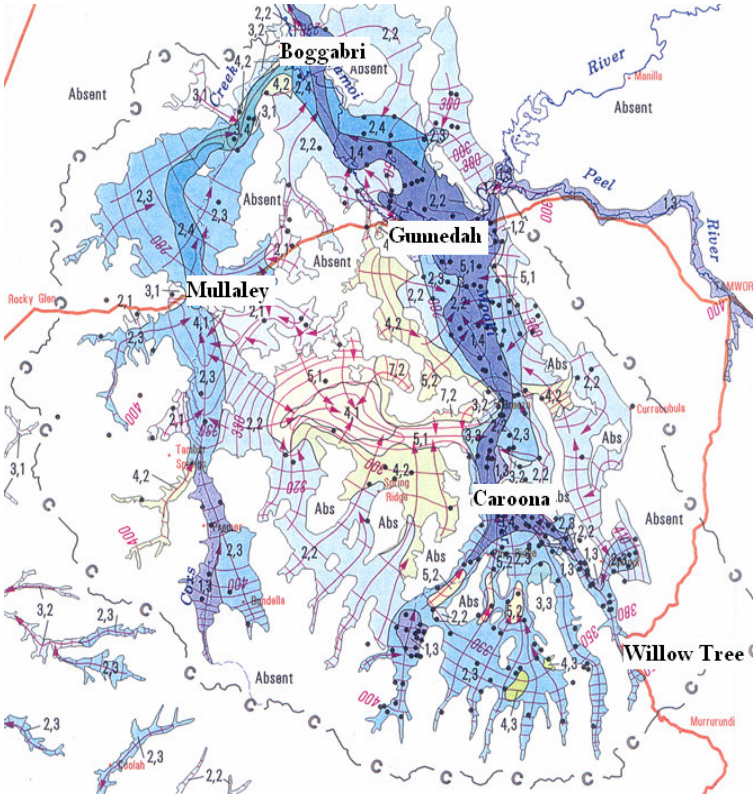


**Figure 1. Groundwater systems of the Liverpool Plains.**

# Why this study is needed?

The Liverpool Plains in NSW comprise some of the most significant high quality freshwater aquifer systems in Australia. These provide reliable water supplies for some 20,000 households in the region, as well as for livestock, manufacturing industries, and irrigation. Groundwater irrigation in the Namoi generates approximately $50M annually, even after recent cutbacks to address over-allocation of the resource by the NSW Government.

The groundwater systems are mainly comprised of river paleochannels extending from Willow Tree in the South to Narrabri in the North (Figure 1). The aquifers show varying degrees of interconnectivity, but water movement is generally from South to North, as is surface water movement in the Namoi system.

The Liverpool Plains alluvial floodplains are comprised of some of the most productive and resilient soils in Australia, with the capacity to support profitable agriculture even under the impact of increasing climatic variability.

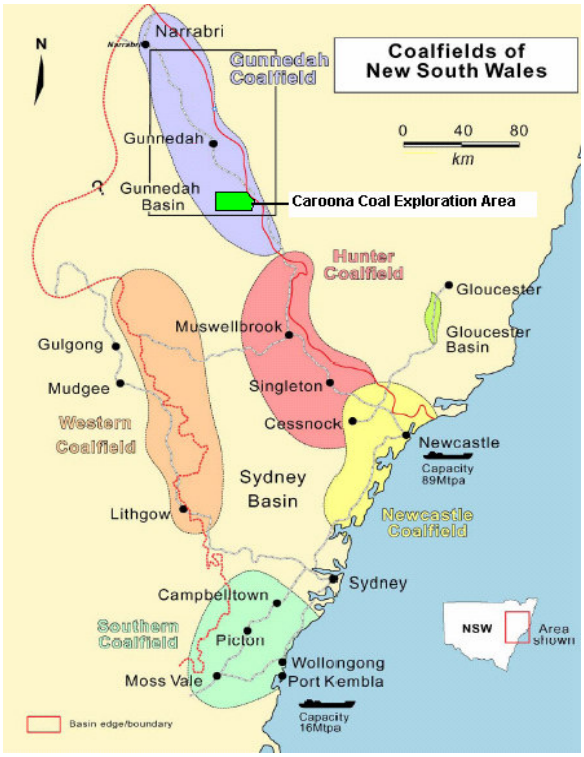


**Figure 2. Coalfields of NSW.**

Coal reserves in the Gunnedah Coalfield are estimated to be 300 Billion tonnes, over an area of approximately 8,000 km$^2$ extending from Willow Tree to Narrabri. The coal is contained in multiple seams of varying thicknesses, generally below the aquifers, but in some places in close association with them.

Coal mining in other regions, e.g., Hunter and Illawarra regions, has resulted in permanent impacts to aquifers, dependent environments, communities and water security. One explanation is that understanding of the systems and their importance was incomplete, and the extent of off-site and cumulative impacts not foreseen. The impacts may be incremental, or not apparent until a later time, and may be located at some distance from the mine site. High quality baseline information, combined with a risk management approach has the advantage over the *status quo* of better quantifying the extent of potential damage, developing appropriate and agreed mitigation/control measures and ensuring clear ownership of risks and responsibilities.

The burgeoning interest in the exploitation of the coal reserves in the Gunnedah basin has been paralleled by widespread community concern. Therefore, it is important that mine development will adequately value and safeguard existing natural resource assets (soil, water and community) and their ability to maintain productivity in the long term when mining has ceased.

The Liverpool Plains Land Management Committee (LPLMC) staged a research forum *Coal, Aquifers and the Liverpool Plains* in June 2006. Information presented to the community at that forum by leading groundwater, floodplain and mining engineering scientists has confirmed that threats are real if not managed. It is important that:

- each mining approval be examined with cumulative and off-site impacts being rigorously addressed (This is particularly significant where a number of sequential developments are likely),
- longwall mining under extensive areas of floodplain/alluvial soils, particularly in association with alluvial aquifers, can be demonstrated to protect, in the long term, the natural assets,

- guidelines on 'safe' distances to mine in proximity to alluvial gravel aquifers are established and are accepted by the community, and
- NSW Legislation is updated to ensure that responsibility for damage to groundwater systems is clear.

There is now a clear realisation that water is a resource that should not be compromised. We need to demonstrate how the natural resources of a region can be developed to protect the water resources in the long term without having to forego the wealth that can flow from the development of the coal reserves.

This is particularly the case in inland Australia. Water supplies over large tracts of the Murray-Darling Basin are now so constrained that water use is restricted only to essential town water.

The benefits of this study will be extensive and ongoing. First, a clear, scientifically-robust statement of the areas where coal development might proceed with least impact on the water resources and land productivity of the region will be available for the approvals/assessment process.

Second, once mining is underway, the risk maps and supporting hydrological modelling capability will be available for ongoing monitoring of the mitigation of the risks. An unprecedented baseline of information, based on risk assessment, will potentially be paradigm-changing for the co-development of minerals and agriculture.

This project approach provides a novel water resources assessment process – spatial risk assessment underpinned with sound natural resources science directed and implemented by a community group - whose principles are likely to be applicable in many situations of competitive development. It will be the first time that an extensive model of the geological and hydrogeological context of the Liverpool Plains has been achieved. This alone will significantly improve the basis upon which management decisions are made.

## What does the study comprise?

There are more than 900 irrigation bores into the deep alluvium, each costing approximately $100,000, and the NSW Department of Water and Energy has previously invested in the construction of approximately 150 deep piezometers in the 1970's as part of the Water Resources Inventory of the area.

There have been several hundred deep coal investigation bores with a value of tens of millions of dollars.

The data sets from these two major national resources have never been integrated. To successfully manage the combined resource and to enable sensible planning to occur, this integration is now essential.

It is proposed that a single 3-D geological model be built and operated by the LPLMC with expert advice provided by the Universities of New England, New South Wales, and Queensland. Available data sets held by these Universities in the form of student honours projects and PhD theses, that have previously been unpublished, will be used to constrain the modelling. The occurrence of groundwater and the importance of the low permeability clays are not well known, despite the groundwater modelling that has occurred in the past. This information will be integrated with coal resource estimates, coal mining practice information and surface water knowledge and data to map the areas of greatest risk associated with coal mining.

The study will map the risks to water resources and land productivity associated with the development of coal mining in the Gunnedah Basin. The mine developments which create the greatest impact on water resources (quantity and quality) and/or on land productivity will be regarded as those with highest risk. The main impacts of mining that are likely to cause these risks are:

(1) subsidence and cracking associated with underground long-wall mining disrupting surface water flows and aquifers; and

(2) poor quality coal seam water being brought to the surface as part of the mining process potentially compromising rivers, wetlands and land.

Additionally, the likely demand on fresh water supplies from mining development and the parallel proposal for coal-fired power stations/s will be assessed.

The risk mapping process will be underpinned by an integrated surface and ground water systems model that will allow the assessment of various scenarios of coal mine development.

This project will set standards of resource planning that are applicable nation-wide, and will employ 3-D modelling of the existing geological and hydrogeological data. Aspects of the proposed 3-D geological modelling for aquifer management have recently been successfully applied to the Edwards Aquifer in the USA (http://esp.cr.usgs.gov/info/edwards/modeling.html). Database tools will be employed to manage the growing data set.

A key aspect of this project is to provide a robust, risk-based, whole-of-catchment context for planning mine developments. Previous experience with mine-by-mine decision making has been demonstrated to result in long term impacts that may have been better managed had a whole-of-system approach been adopted from the outset.

The risk maps will help ensure that development of the coal resources of the Liverpool Plains region is compatible with the existing management of water resources, and that risks of degradation of quality and quantity of water resources and consequent regional and national impacts are minimised.

## Who will carry out the study?

The study will be carried out as a joint venture between the Liverpool Plains Land Management Committee (LPLMC), as representative of the local community and advocate of sustainable development of the resources of the area, the University of New South Wales (as lead researcher), the University of Queensland and the University of New England. Key personnel are David Walker, Executive Officer of LPLMC, Professor Ian Acworth, Gary Johnston Chair of Water Management at UNSW, Professor Peter Flood, Pro-Vice Chancellor Research at UNE, Professor Chris Moran, Director of the Centre for Water in the Minerals Industry at UQ, and Associate Professor Bryce Kelly of UNSW.

The study will be managed locally in Gunnedah by LPLMC, which is a local community organisation, initiated in 1992 by landholders in response to concerns regarding land degradation. LPLMC has played a coordinating role in a number of research projects that have been implemented across the Liverpool Plains since that time. LPLMC enjoys a high degree of community support and confidence and has been central in advocating the changed land management practices identified by the research projects, and providing incentives to landholders to promote their adoption. In a time when NRM bodies have been continually changing, LPLMC is well-established and intends to continue promoting sustainable resource management and biodiversity conservation.

With this current proposal, a major priority will be to continue engagement with the local community. This engagement will ensure the local community is aware of the results of the study as they come to hand and has ownership of the improved planning process. The opportunity to develop a constructive relationship between mining and agriculture will be fostered. Also involved in overseeing the study and ensuring the engagement of the community will be the three Shire Councils of the study area (Gunnedah, Liverpool Plains and Narrabri Shires) and Namoi Water representing water users.

The existing geological and hydrogeological data is disparate and not well-documented. The data all needs to be collected and reduced to a common base for inclusion in the geological model. It is proposed that a team of 2 from UNSW collect existing data and supplement the existing data by additional geophysical logging of DNR bores. An interactive 3-D geological model would initially be built at UNSW. Staff from LPLMC would then be trained to operate the package and the model installed at Gunnedah for continuing update and development by LPLMC in the adoption phase.

Staff from UNE will assist with the interpretation of the geological data to characterise the coal reserves and resources and their suitability for exploitation based upon their extensive experience in the area. UNE also have extensive experience in the land productivity of the region and will provide this input to the risk assessment associated with mining impacts.

Staff from UQ will assist with the characterisation of topographic and hydrological changes associated with long-wall mining, understanding and quantification of coal seam water supplies and on-site water demand and management. UQ will take the lead in development of a framework for spatial mapping of risks associated with mine developments.

The three universities will work together with a full-time employee at LPLMC and appropriate community representatives to develop the final spatial risk maps.

# How much will the study cost?

The total cost of the study is projected to be $6.74M. Of this, a contribution of $1.96M is to be made by the partner organisations, leaving funding of $4.88M necessary from the Dept of Environment & Water.

**Table 1. Summary of requirements for and uses of funding.**

| | Year 1 | Year 2 | Year 3 | Year 4 | Total |
|---|---|---|---|---|---|
| Salaries | $ 563,113 | $ 715,169 | $ 813,381 | $ 853,496 | $ 2,945,159 |
| PhD students | $ 180,000 | $ 189,000 | $ 198,450 | $ 251,415 | $ 818,865 |
| Field work & travel | $ 102,500 | $ 104,750 | $ 109,738 | $ 117,474 | $ 434,462 |
| Computing & software | $ 200,000 | $ 35,500 | $ 66,025 | $ 41,576 | $ 343,101 |
| Map production | $ 20,000 | $ 5,000 | $ 30,000 | $ 30,000 | $ 85,000 |
| LPLMC operating | $ 60,000 | $ 62,500 | $ 65,125 | $ 67,881 | $ 255,506 |
| | **$1,125,613** | **$1,111,919** | **$1,282,719** | **$1,361,842** | **$4,882,093** |

The budget salary provisions include dedicated senior and support staff from each of the contributing institutions in years 1, 2 and 3. In the fourth year the positions are only partially funded indicating a reduction in technical work required and an increase in the training and education components. The LPLMC will be allocated a position across the 4 years to coordinate interactions with the universities. In the third and fourth years a second position is allocated to LPLMC to ensure that there is sufficient capacity to take up the project outputs.

Significant budget allocation is made to support PhD students. It is considered an important aspect of the project that this type of integrated undertaking can be repeated in other contexts. The completed PhD students will add a significant national resource to the small pool of young people who are technically competent to carry out such projects.

Some of the software required in this project carries significant entry costs. This is mostly for hydrological and hydrogeological modelling, subsidence and aquifer interference estimation and spatial risk analysis.

The project will require considerable computing power in each institution. Provision has been made to augment (but not to build from scratch) computing laboratories in each institution.

Significant budget provision has been made for map production. This is because of the importance of building community capacity in understanding spatial information of this kind as a means of planning. We expect to circulate a significant number of maps within the community to achieve this.

An estimate of the current value of field and laboratory facilities and equipment has also been included.

In-kind contributions are dominated by staff salary and overhead costs. The time from the four university professors who will oversee the technical work will be paid by university funds. University overheads on the new positions will be carried by the individual universities as will the overheads for LPLMC staff. The remainder of the in-kind contribution are made up of software and computing, management, community liaison, and laboratory and field equipment.

**Table 2. In-kind contributions.**

| | |
|---|---|
| Salaries | $ 754,272 |
| Software & computing | $ 118,101 |
| Community liaison | $ 40,000 |
| Laboratory and field equipment | $ 150,000 |
| University overheads | $ 901,176 |
| **TOTAL** | **$ 1,963,549** |