

# Water Research Laboratory

## Independent peer review of Watermark Coal Project groundwater modelling report

Never Stand Still

Faculty of Engineering

School of Civil and Environmental Engineering

**Client:** Caroona Coal Action Group (CCAG)

**Year:** 2014-2015

**Project Reference:** 2014015, 2014114

In 2012 Shenhua Australian Holdings submitted an Environmental Impact Statement (EIS) to NSW regulators for the Watermark Coal Project. The proposal was for an open cut coal mine located adjacent to the Mooki River, a major tributary of the Namoi Catchment, 25 km from Gunnedah in Northern NSW.



The Water Research Laboratory (WRL) was commissioned by the CCAG to provide independent review of the conceptual and numerical groundwater modelling reported by Shenhua. The review was requested by CCAG on behalf of its individual members and the NSW Irrigators Council who, given the economic value of agricultural production in the region, wished to ensure rigor in the environmental assessment and approvals process.

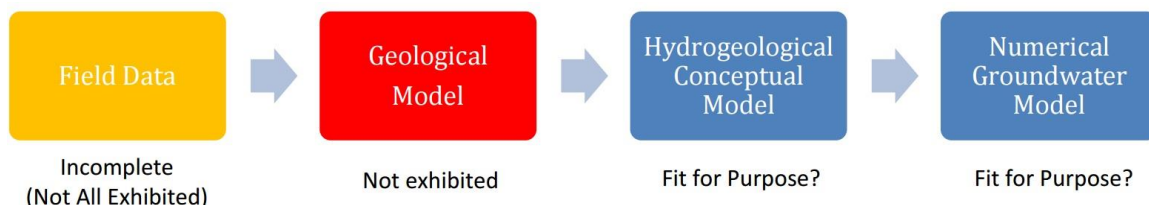
The Watermark Coal Project proposal was for a new 4,084 ha open cut coal mine located immediately west of Breeza producing up to 10 million tonnes of coal per annum for up to 30 years. To access the coal resource, excavation of the Permian age bedrock adjacent to the fertile black soils of the Namoi Alluvium was proposed to

depths of 40-95 m below the groundwater level in the adjacent Namoi Alluvial Aquifer.

The fertile black soils and groundwater of the Namoi Alluvium are amongst NSW's most productive agricultural resources. To protect these resources the EIS proposed a range of controls including mining setbacks and adaptive management plans. The EIS reported that the project would likely have minimal impact upon groundwater, as defined by the NSW Aquifer Interference Policy. Following a review process, the project was approved by NSW Government.

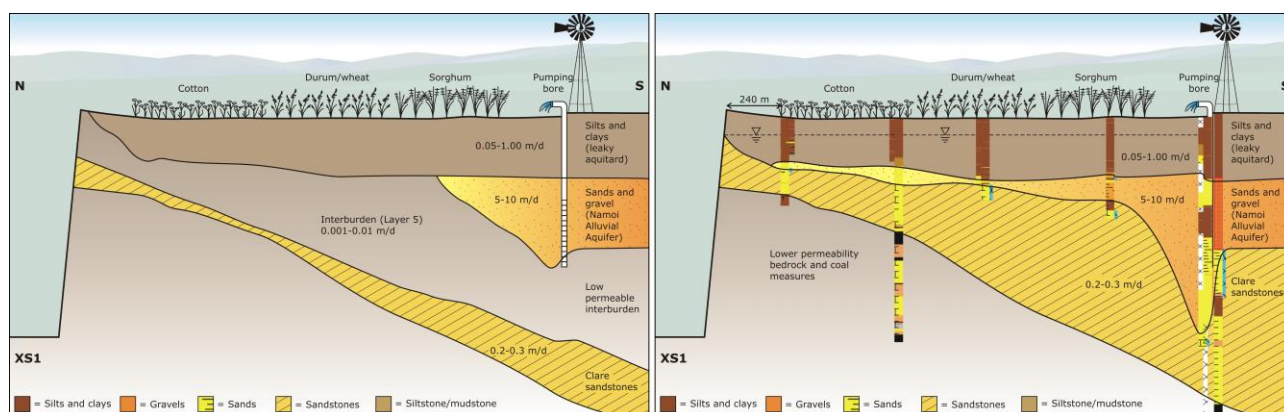
WRL's independent peer review of the EIS identified a number of issues with the EIS reporting finding that regulators may have made decisions without access to, or review of, all of the available scientific data relevant to the project. General concerns raised by WRL's independent peer reviewer included, but were not limited to:

1. Insufficient information exhibited in support of the provided groundwater impact predictions;
2. Shenhua's lack of consultation with experts on the geology and hydrogeology about Breeza;
3. The effect of non-uniqueness in Shenhua's conceptual model on predictions of groundwater impacts;
4. Representativeness of the uncertainty analysis; and
5. Existing self-assessments by Shenhua indicating that a fit for purpose Class 3 model had been developed



Specifically, WRL's independent peer review found that:

- The proponent relied upon the results of field investigations (resistivity and seismic surveys and borehole data) and geologic modelling that was not publically exhibited, nor made available to those providing written submissions to NSW Government or presentations to NSW Planning and Assessment Commission (PAC);
- The proponent's conceptual models relied upon select, non-unique interpretations and overly simplified representations of the available field data;
- The proponent had not satisfactorily demonstrated that all plausible alternative interpretations of the field data and geology were captured within the proponent's uncertainty and sensitivity analysis, and consequently that the bounds of likely impact were not greater than the reported impacts; and
- The proponent's self-assessment of a Class 3 and then Class 2 model (suitable for medium risk developments) did not appear to consider all the model calibration criteria of Australian Groundwater Modelling Guidelines, in particular the length and magnitude of stresses in the field data record in relation to the Permian bedrock units that would host the mine.



(Left) A geological cross section generated from the EIS by WRL. (Right) A geological cross section by WRL taken from the logs reported by Shenhua in the EIS (note the differences to the conceptual model on the left).

WRL's independent peer review findings were presented during 2014 in reports to CCAG and in presentations to the NSW Planning and Assessment Commission (PAC). Shenhua subsequently revised their modelling work, undertaking additional modelling sensitivity tests for PAC, which formed the basis for NSW Government's January 2015 conditioned approval of the project. Following referral of the project to the Commonwealth for EPBC approval (February 2015), technical briefings on WRL's work were requested by and provided to staff from the Commonwealth Department of Agriculture, including the Federal Minister for Agriculture.



Recently sown crops adjacent to the Mooki River near the site of the proposed Watermark Coal Project

Subsequently UNSW's Dr Ian Acworth, a researcher with extensive knowledge of the hydrogeology of the region wrote to the Independent Expert Scientific Committee (IESC) on 3 March 2015 informing them that:

***"I published in Aust J Earth Sciences in 2009 a paper that shows... observations of fracturing and leakage in the clays... from a site on the Plains very close to the proposed mine..."***

***My principal concern is that this sequence of silt and clay dominated soil will leak badly when drained - as proposed adjacent to an open mine, or, for that matter, by too much abstraction by the agricultural sector. These concerns do not seem to be getting any consideration- despite being in the public domain as published papers,***

***I have never seen them referenced in the reported work or in the EIS etc... I have been working on this part of the Plains for 20 years yet I have not been approached by any one of the... review groups. Not even a phone call. I have no doubt that the groundwater modelling has been carried out by experts with a detailed knowledge of the various groundwater packages that exist. My concern is that the conceptual model is simply wrong. If this is the case then the groundwater models will all have given the wrong answer - no matter how good the various professionals are."***

At the request of the CCAG, WRL subsequently reviewed the EPBC Terms of Reference (ToR) provided to the IESC by the Commonwealth Department of Environment. WRL's review identified that the ToR restricted the scope of IESC's review to consider only those materials available from the NSW Department of Planning Website. As these materials were found to be deficient by WRL's independent peer review, as described above, WRL followed up the review with a letter to the Commonwealth. This letter recommended the ToR for the IESC be expanded to consider all relevant scientific material and not just those materials available from NSW Department of Planning.

#### References

- WRL (2014a), Independent Review of Shenhua Watermark Coal EIS – Part T (Groundwater Impact Assessment – February 2013), WRL Letter Report to CCAG: 2014015DJA L20140417, 17 April 2014
- WRL (2014b), Review of Watermark Coal Groundwater Impact Assessment, Presentation to the NSW PAC by Mr Doug Anderson on behalf of the NSW Irrigators Council, June 2014
- WRL (2014c), Re: Shenhua Drilling 4/5/2012, Memorandum to CCAG: WRL2014015DJA M20140909, 9 September 2014
- WRL (2014d), Re: Shenhua Response to PAC Submissions by WRL and Dr Colin Mackie, WRL Letter Report to CCAG: 2014114.01DJA L20141208, 8 December 2014
- WRL (2014e), Comments on Proponent's Response to the WRL Review, Presentation to the NSW PAC by NSW Irrigators Council prepared by Mr Doug Anderson, December 2014
- WRL (2014f), Re: Watermark Coal Project - Request for Advice #2011/6201 (26 Feb 2015), WRL Letter to the Department of the Environment, 04 March 2015

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