



**ATTACHMENT 3**

**METROPOLITAN COAL PROJECT  
ENVIRONMENTAL ASSESSMENT**

# **Review of Metropolitan Coal Project Surface Water Assessment (Gilbert & Associates, 2008)**

## **REVIEW BY DR WALTER BOUGHTON**

**August 2008**

### **Background**

Gilbert & Associates have undertaken a Surface Water Assessment as part of the environmental assessment required for regulatory approval of the Metropolitan Coal Project. I was invited by Helensburgh Coal Pty Ltd to review the Surface Water Assessment and comment on the work undertaken. My review focused on catchment hydrology related issues and did not include review of water quality related assessment.

I met with staff of Gilbert & Associates and Resource Strategies in the offices of the latter company on 11 April 2008 for a briefing on the project. I visited the offices of Gilbert & Associates on 16 April 2008 for more detailed briefings on the hydrological assessment. I visited the catchment area of Woronora Dam on 24 April 2008.

Gilbert & Associates gave me a copy of their report dated August 2008. The following is my review of their Surface Water Assessment.

### **Data**

The underground mining is below the catchment of the Waratah Rivulet tributary of Woronora Dam. Approximately 13 months of streamflow data is available for Waratah Rivulet. This was supplemented with data from Woronora River (which also flows to the Dam) and from O'Hares Creek (an adjoining catchment). The use of data from streams close to Waratah Rivulet adds significantly to the information available for the stream that is the main focus of attention.

In addition, Gilbert & Associates have correlated 31 years of inflows into Woronora Dam (estimated from fluctuations in reservoir level) with estimated catchment runoff based on rainfall-runoff modelling. Overall, the use of these additional sources of information has added substantially to the data available for Waratah Rivulet.

### **Analysis of low flows**

Any effect of underground mining on streamflow would be most evident on the very low flows, and would show as a transmission loss on the characteristics of the low flows. Therefore, the part of the assessment dealing with low flows is most important in looking for such effects.

Figure 19 of the Gilbert & Associates report dated August 2008 shows the recorded streamflow on Waratah Rivulet. I have examined the raw data in addition to the plot in Figure 19, and can see no evidence of any transmission loss or similar loss in the low flows that might be attributed to effects of underground mining.

In addition, a comparison has been made between the low flows on Waratah Rivulet and those on the adjoining Woronora River and O'Hares Creek (Table 10 of the Gilbert & Associates report). The low flows on Waratah Rivulet for the period of record 21 February 2007 to 27 March 2008 are significantly higher when adjusted for size of catchment area than those in the adjoining streams. Again, the comparison with adjoining streams gives no evidence of any water loss in Waratah Rivulet due to underground mining.

### **Rainfall-runoff modelling**

Gilbert & Associates calibrated the AWBM model on flows in Waratah Rivulet and O'Hares Creek. I developed the AWBM model in the early 1990s so I am familiar with its capabilities and methods of use. The model has been calibrated on hundreds of catchments in Australia and has been used in many rainfall-runoff modelling studies. The model is quite suitable for the modelling in the present study, and the calibrations by Gilbert & Associates have been properly made.

The data available on Waratah Rivulet for the calibration is too short to calculate measures of calibration that are normally used when much longer periods of data are available. Instead, the plot in Figure 20 (Gilbert & Associates, 2008) showing recorded and modeled flows show substantial agreement, indicating that the calibration gives estimates of streamflow that are in close agreement with measured flows. I have examined the raw data used in preparing Figure 20 and can confirm that the figure gives a true indication of the results of modelling.

The calibrated model was used to estimate inflows into Woronora Dam for the 31 years from 1977 to 2008. These estimates were compared with estimates of inflows derived from records of storage in the dam. The lack of information on water lost by unmeasured or poorly measured flows over the spillway of the dam creates uncertainty in the comparison, except for the most recent years of drought when there were no spillway losses. In this recent period, there is good agreement between the modeled inflows into the dam and inflows derived from fluctuations in reservoir levels. This is a more stringent test of the model calibration than the comparison of streamflows given the continuous streamflow data available for calibration.

The calibrated values of parameters in the AWBM model for both Waratah Rivulet and O'Hares Creek (Table 10 of the Gilbert & Associates report) are consistent with calibrations on similar catchments in Australia. The average surface storage capacities shown in Table 10 are high by comparison with other Australian catchments but are consistent with the sandy nature of soils in the two catchments and the extensive "swamps" evident in maps of the catchment. I can see no evidence in the calibrations of the AWBM of any effect of underground mining on the streamflow in Waratah Rivulet.

## **Report by Gilbert & Associates dated August 2008**

The report by Gilbert & Associates gives an accurate record of the work undertaken and the results that they have obtained. I have reviewed all of their data files and calculation files that produced the results in the report, and can confirm that the work undertaken and the report are consistent. I found no evidence of any omissions or results that would conflict with the report or its conclusions.

### **Summary**

The methodologies used in the assessment are appropriate and adequate to look for effects of underground mining on inflows into Woronora Dam. There were four methods used to look for such effects – analysis of low flows in Waratah Rivulet, comparison of low flows in Waratah Rivulet with corresponding flows in Woronora and O'Hares Creeks, rainfall-runoff modelling in Waratah Rivulet and O'Hares Creek and a comparison of the modeled streamflows in Waratah Rivulet with recorded inflows into Woronora Dam.

None of the methods used showed any evidence that underground mining has had any effect to date on inflows into Woronora Dam. I agree with the conclusion made in Section 7.1.5 of the Gilbert & Associates report that all evidence now available indicates that "future proposed mining is not expected to have an effect on catchment yield". I note that the independent inquiry titled "Impacts of underground coal mining on natural features in the Southern Coalfield: strategic review" prepared by the NSW Department of Planning (2008) says in the Executive Summary:

"No evidence was presented to the Panel to support the view that subsidence impacts on rivers and significant streams, valley infill or headwater swamps, or shallow or deep aquifers have resulted in any measurable reduction in runoff to the water supply system operated by the Sydney Catchment Authority or to otherwise represent a threat to the water supply of Sydney or the Illawarra region."

This adds confirmation to the Conclusions of the Gilbert & Associates' report.

I confirm that the study by Gilbert & Associates has been carried out in a professional and detailed manner. The conclusions of the report are amply supported by the studies undertaken. I can see no other studies that might have produced any other conclusions.

### **Acknowledgements**

I am grateful to the staff of Resource Strategies who facilitated my inspection of the catchment of Woronora Dam, and I am grateful to the staff of Gilbert & Associates for their cooperation in giving me ready access to all of their data and calculation files relevant to the project.

*Walter C. Boughton*

Dr Walter C. Boughton, M.E., PhD.

*21 August 2008*



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22nd August 2008

Helensburgh Coal Pty Ltd  
PO Box 402  
Helensburgh NSW 2508

Attention: Greg Tarrant

Re: Metropolitan Coal Project Aquatic and Terrestrial Ecology Assessments

Dear Mr Tarrant,

As requested, I have reviewed the following studies which have been prepared as technical appendices to the Metropolitan Coal Project (the Project) Environmental Assessment:

- *Baseline Flora Survey – Proposed Longwall Mining Area*, prepared by Bangalay Botanical Surveys
- *Terrestrial Vertebrate Fauna Survey*, prepared by Western Research Institute and Biosphere Environmental Consultants
- *Aquatic Ecology Assessment*, prepared by Bio-Analysis Pty Ltd
- *Terrestrial Flora and Fauna Impact Assessment*, prepared by FloraSearch and Western Research Institute

I have personally been involved with and contributed to the *Terrestrial Vertebrate Fauna Survey* and *Terrestrial Flora and Fauna Impact Assessment* studies. I have also acted in a peer review capacity for the *Baseline Flora Survey – Proposed Longwall Mining Area* and *Aquatic Ecology Assessment* studies.

I consider the surveys and assessments presented in the above mentioned studies to be adequate and concur with the findings of the studies. Further, based on the information presented in the studies, I am of the opinion that the Project is unlikely to have a significant effect on threatened species, populations, endangered ecological communities, or their habitats or on matters of national environmental significance.

Yours faithfully,

A handwritten signature in black ink that reads 'David Goldney'. The signature is written in a cursive, flowing style.

**David Goldney**

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7 July 2008

Greg Tarrant  
Metropolitan Colliery  
Helensburgh Coal Pty Ltd

**Review of the Aboriginal Cultural Heritage Assessment for the Metropolitan  
Coal Project - Kayandel Archaeological Services, July 2008**

In reference to your request to review Kayandel's Aboriginal Cultural Heritage Assessment for Helensburgh Coal Pty Ltd, I have undertaken this with an acknowledgement of the requirements of other involved parties and not simply regarding what I would see as required.

In response to my comments, I confirm that all the issues raised have been dealt with to my satisfaction, and hence I consider the report to be a reasonable assessment of the Aboriginal Cultural Heritage and the recommendations to be appropriate and acceptable.

Yours Sincerely,



R. G. Gunn