



**PEABODY ENERGY
AUSTRALIA PTY LTD
ABN: 93 096 909 410**

100 Melbourne Street
South Brisbane Qld 4101

GPO Box 164
Brisbane Qld 4001
Australia

Tel + 61 (0) 7 3225 5500
Fax + 61 (0) 7 3225 5555

15 March 2019

Emeritus Professor Jim Galvin
Chair, Independent Expert Panel for Mining in the Catchment
Office of the NSW Chief Scientist & Engineer
GPO Box 5477
SYDNEY NSW 2001

Dear Professor Galvin

Re: Independent Expert Panel for Mining in the Catchment – Initial Report on Specific Mining Activities at the Metropolitan and Dendrobium Coal Mines (Initial Report)

We welcome the opportunity to provide a submission regarding the Independent Expert Panel's review into Mining in the Sydney Water Catchment.

We have been involved in developing, and fully support, the New South Wales Mineral Council's (NSWMC) submission.

Our submission includes a formal response to the Initial Report released by the government in December 2018 as well as further issues for consideration as part of the Panel's final report due to be released in August 2019.

The Initial Report is a beneficial addition to the growing knowledge base about mining and water resources in the region. Importantly, the Initial Report highlights the significant progress that has been made, and continues to be made by industry, to improve the understanding and management of mining in the catchment.

Peabody is acutely aware of the sensitive environment in which we operate, we take our environmental responsibilities seriously and operate under a well-established and strict regulatory framework, which includes stringent performance criteria and comprehensive monitoring requirements.

We have ten years of operating data under the current Project Approval – subject to rigorous internal and external review – which demonstrates that our narrower longwalls and depth of operation at the Metropolitan Colliery have not resulted in connective cracking between the surface and the mine.

We acknowledge and recognise the importance of regulatory scrutiny to protect the overall integrity of the catchment. This robust regulatory framework needs to be complemented by pragmatic and transparent government policy to provide certainty and to enable continued responsible extraction of the State's strategically important coking coal resources.

Metropolitan's future operational plans are dependent on the timely extraction of additional coal resources. The future of Metropolitan mine is vital to ensure continued employment to significant numbers of mine personnel (currently 409 people) as well as significant annual economic contributions including:

- royalty payments of \$12.5 million to the NSW Government;
- injection of a further \$173 million to the local economy;
- expenditure in the Helensburgh region, including Metropolitan Coal's community initiatives; and
- indirect employment through supply to the domestic steelworks and through support services and economic stimulus to many times the mine's permanent workforce.

Peabody respects the important role of the Panel and the expertise of its members and acknowledges the information briefing that was provided to Peabody by the Panel in late January 2019.

We look forward to ongoing engagement with the Panel as well as the Department of Planning and Environment and other key stakeholders to ensure sensible outcomes in relation to mining in the Sydney water catchment in the future.

If you wish to discuss this submission further, please do not hesitate to contact me on (02) 4294 7201.

Yours sincerely



Andy Hyslop
General Manager
Metropolitan Mine

1.0 Background

1.1 Overview of Metropolitan mine

Metropolitan Coal's Helensburgh Colliery is Australia's oldest continually-operating coal mine and a key pillar of the local economy having operated in the region for 130 years. The mine directly employs more than 400 workers, it supports hundreds of local businesses and is vital for the local Port Kembla steelworks that rely on the mine's supply of high-quality coking coal for its continued operations.

Peabody plays an active role in the Helensburgh community as a long-term sponsor of Helensburgh Tigers Rugby League team, Helensburgh-Stanwell Park Surf Life Saving Club, environment programs at the Holy Cross and Helensburgh Public Schools, University of Wollongong STEM camps for girls and other community capacity-building initiatives and events.

In 2008/9 the Metropolitan Coal Project was subject to a full assessment process under the NSW *Environmental Planning and Assessment Act 1979*, including a full public merit review process by the Planning Assessment Commission (PAC), now the Independent Planning Commission. The Minister for Planning granted Project Approval for continued operations until 2032.

Peabody is acutely aware of the sensitive natural environment within which it operates, and it works cooperatively with stakeholders to ensure compliance with the extensive regulatory regime already in place.

1.2 The economic contribution of mining in the Illawarra region

Mining has been a central part of the economic fabric in the Illawarra region for around 150 years and is a strategic economic asset for the State now and into the future. The mining industry sustains the economy of the region and is one of the Illawarra's most significant employers.

In 2018, the Metropolitan mine provided more than 400 local jobs, contributed \$12.5 million in royalties to the NSW economy and injected \$173.3 million in wages and business spend to the local economy. Approximately 20 percent of the workforce resides in Helensburgh, and a further 50 percent in the Illawarra region. Many of Metropolitan's workforce are third and fourth generation employees.

Metropolitan is one of five mines in the Illawarra region that produce hard coking coal. Hard coking coal is used to make coke, which along with iron ore is a key ingredient in the production of steel. There is currently no viable alternative to the use of coking coal in primary steel production. Peabody's Metropolitan mine is a significant supplier of coal to local operator BlueScope Steelworks in Wollongong, which employs 3,000 people.

The Southern Coalfield is the only source of hard coking coal currently in operation in NSW. In 2017/18, mines in the Southern Coalfield produced 7.9 million tonnes of saleable coal for both domestic and international markets.

NSWMC's 2017/18 NSW Mining Industry Expenditure Impact Survey shows the extent to which mining is an economic cornerstone of the region.

Last financial year, in the region, the industry:

- Spent \$667 million on wages and suppliers in the Illawarra
- Used 690 local businesses
- Supported 1,500 direct employees and their families
- Delivered \$1.6 billion in value
 - Equal to 7.9 percent of the Illawarra's Gross Regional Product
- Supported more than 12,000 direct and indirect jobs in the region.

Importantly, the true economic value of the industry to the Illawarra would be higher again, as the above only incorporate data from three of the five mines in the region.

1.3 Metropolitan's longwall geometry and environment outcomes

Peabody understands the sensitivity of mining in the Sydney Water Catchment and that it must operate in a way that protects the environment.

Since the commencement of longwall mining methods at the Metropolitan Colliery in 1995, Metropolitan has adopted a conservative mining geometry with significantly narrower longwall panels than industry norms to minimise potential impacts on the environmental values of the area. Metropolitan's longwall panels are among the narrowest of any underground mine in Australia.

As a result of the narrower longwall panels, the extracted seam thickness, considerable depths of cover and thick sandstone/claystone lithologies, there is a substantial constrained zone in the overburden at Metropolitan. The risk of connective cracking between the mine and the surface is very low.

Metropolitan is a dry mine, evidenced by ten years of continuous monitoring of mine water make. The monitored groundwater make has been notably below what has been modelled.

Metropolitan continues to conduct robust monitoring, data collection and reporting and actively consults with the government on approval processes and mine design to ensure that operational impacts are appropriately managed and mitigated.

While Peabody recognises that there have been limited instances of isolated impacts on the Eastern Tributary and Waratah Rivulet rockbar, these impacts have been immediately identified through Metropolitan's extensive monitoring system. Importantly, proactive remediation has been taken to address these impacts. An example of the effective remediation includes a successful program of polyurethane (PUR) injection and aesthetic grouting to ensure surface water flows returned.

Case study – Rockbar remediation (PUR)

During mining of Metropolitan's previous longwall blocks, some surface water was being lost to subterranean flow in the Waratah Rivulet as a result of rockbar cracking caused by subsidence.

While the flow was ultimately restored downstream and didn't affect the quantity of water reaching the Woronora Reservoir, the cracking meant sections of pools and rockbars (WRS3 & WRS4) were left dry.

This impact led Metropolitan to investigate options for restoration.

Sand was initially trialled, before PUR injection proved effective. PUR – being harmless to the environment, permanent, non-mobile and able to be used in flowing water – was injected into the series of fractures in the rockbar, over time restoring the pool levels to preimpact levels. The process was supported by strict environmental controls and evaluated using key success criteria.

Aesthetic grouting was subsequently applied to the rockbar and these restoration works continue to be subject to an extensive monitoring program.

Metropolitan won the 2008 Annual Environment Award at the NSW Minerals Council Environment and Community Excellence Awards for its initial trial work remediating the Waratah Rivulet.

2.0 Peabody response to the Initial Report

Metropolitan Coal understands the Panel's Initial Report "*is intended to prompt submissions to assist the Panel in addressing Terms of Reference 2 and 3, which require it to assess environmental consequences for swamps and cumulative impacts, update the findings of the 2008 Southern Coalfield Inquiry and provide advice to the Department of Planning and Environment as required on mining activities in the Catchment Special Areas*".

The Initial Report also states: "*This is an initial report, reflecting Panel observations arising from reports made available to it, site visits and initial submissions. In addition to a small set of recommendations, uncertainties are highlighted and questions posed. It is intended that stakeholders will consider and provide feedback on these matters, to inform further Panel deliberations and conclusions in its next report*".

Outlined below are Metropolitan Coal's response to key issues contained in the Initial Report. Appendix A provides further detailed responses relating to monitoring and analysis of the quantity of water entering the Woronora Reservoir.

Metropolitan Coal requests the Panel clarify or correct some of its statements made in the Initial Report in the next report in consideration of Metropolitan's responses.

2.1 Metropolitan daily water inflow

Metropolitan is a dry mine, evidenced by ten years of continuous monitoring of mine water make. The monitored groundwater make has been notably below modelled groundwater make.

Peabody supports the Panel's key finding that there is no evidence at Metropolitan of connective cracking between the mine workings and the surface, and therefore no loss of surface water to the mine.

Notwithstanding the above, Metropolitan has been the subject of incorrect or misleading media statements as a result of discrepancies between page III and page 50 of the report, outlined below. The Initial Report (page III) states:

"In the case of Metropolitan Mine: the average daily water inflow of about 0.5 ML/day displays no evidence of a connected fracture regime to surface or correlation with rainfall."

The Initial Report (p50) also states: "*Since 2009, the mine water make has averaged 0.09 ML/day and, with the exception of May 2011, the 20 day average water make has been below 0.5 ML/day (Hebblewhite et al., 2017)*".

Metropolitan uses a rolling 20-day average for mine water make to reduce short term irregular bias from pumping activities and maintenance events. The quoted 0.5 ML/day is a level below which all 20-day averages have been recorded, except in May 2011. As stated on page 50 of the report, the actual daily average over almost a decade of data, since 2009, is 0.09 ML/day.

Metropolitan requests a correction to page III of the Initial Report, to reflect 0.09 ML/day as the quoted average, as per the text on page 50 of the Initial Report.

2.2 Valley closure 200 mm target criterion

The Metropolitan Coal Project Preferred Project Report (HCPL, 2009) indicated that valley closure values of greater than 200 millimetres (mm) were predicted for a number of pools/rock bars on the Waratah Rivulet, Eastern Tributary and other streams.

The Director-General's Environmental Assessment Report for the Metropolitan Coal Project (June 2009) (page 21) stated (**emphasis added**):

..... It has also been accepted by the PAC as the target for HCPL to aim for in limiting impacts on watercourses – the PAC's proposed standard of "negligible consequences" for key watercourses is "assumed to be achieved" where predicted valley closure is less than 200 mm.

*Nonetheless, the Department notes that MSEC has proposed the 200 mm valley closure threshold based solely on its own qualitative review of watercourse-related subsidence impacts at its client mines. It is generally accepted that the figure is far from established. **It must be seen as indicative rather than determinative. There remains a possibility, particularly for fragile rock types, that significant buckling and shearing of sections of stream beds will eventually be observed where predicted valley closure is less than 200 mm.** Notwithstanding, such impacts are considered to be less likely for rockbars, which by their nature are formed by the more massive and resistant rock strata.*

Subsidence impacts to a number of pools on the Eastern Tributary occurred during the mining of Metropolitan Longwalls 26 and 27 at predicted valley closure values of less than 200 mm.

The Initial Report recommends the concept of restricting predicted valley closure to a maximum of 200 mm to be revised for watercourses to avoid significant environmental consequences.

Metropolitan Coal agrees that the 200 mm valley closure concept requires revision in relation to the Eastern Tributary only, noting that the unexpected impacts are specific to the Eastern Tributary and not the Waratah Rivulet. Restricting predicted valley closure to 200 mm has been a successful design tool for mining in the vicinity of the Waratah Rivulet and should be permitted to continue for future longwalls.

3.0 Strategic issues for consideration

3.1 Incremental approvals

The Panel endorses the NSW Department of Planning and Environment's (DPE) approach to piecemeal approvals of future longwall panels through the Extraction Plan process. This approach presents an ongoing approval risk and the imposition of unnecessarily onerous operating conditions. This also creates a high level of uncertainty about future capital investment at Metropolitan, as the staged approval approach impacts on the timing of longwall extraction as well as the amount of coal that can be extracted.

Following a rigorous environmental assessment and approvals process, in June 2009, the NSW Government approved the Metropolitan Coal Project to extend the life of the mine for a further 23 years. We accept the need to secure secondary approvals for the approved Project; however, the current incremental approvals process, such as one or even partial panel approval, is unnecessarily complex, adding time, uncertainty and risk for our business.

Changes to the incremental approvals approach is required so that mining companies and regulators are not in a continual cycle of short-term approvals that are only granted immediately before they are required, or delays in approvals resulting in significant cost to the company to stand down operations.

Peabody believes an approvals process where at least three longwall panels are approved at a time would provide a sensible balance of delivering some degree of certainty for its business while ensuring the DPE is equipped with recent information and monitoring results to support their decision-making.

Case study

Metropolitan is currently working with the DPE on secondary approvals for its current longwall panels (Extraction Approvals and First Workings).

The current process for seeking extraction and first workings approvals is becoming more complicated and uncertain as to timing. There are a number of government advisory agencies already included in the process as well as Metropolitan's local independent panel and the new overall Independent Expert Panel.

While Peabody support full decision-making processes by Government, there needs to be some controls on timing for inputs by all these agencies so that applicants have clear understanding of the timeframes involved and DPE can meet clear timelines. The extra time taken for the Panel to review documentation and provide advice has led to real impacts on the timing of approvals provided to the business, resulting in significant uncertainty and risk.

In addition, each new secondary approval application requires commentary and monitoring results from the prior application. This has created a situation whereby there is limited lead time for applications to be submitted with the required information and therefore approvals being granted immediately before mining is due to commence.

3.2 Governance of the panel

Metropolitan Coal recognises the important work of the Panel and the sensitivities of mining in the catchment, however it is concerned about the Panel's decision-making process.

Metropolitan Coal currently has no means to discuss with the Panel the science behind their decisions, and there is no clear governance or timing around the Panel's involvement in the approval process for Extraction Plans.

To date, how the Panel undertakes its assessment function has been poorly defined, as has the scope of the Panel's reviews and how this integrates with other reviews undertaken in the assessment process.

Peabody believes it is important that the Government:

- Defines the precise role of the Panel in the assessment process
- Clarifies how this role fits within the broader structure of expert input already a part of the assessment process
- Takes steps to improve transparency around Panel timeframes for:
 - Assessments
 - Responses to requests for advice.

3.3 Risk assessments and independent peer review processes

The Panel recommends that all applications to extract coal within Catchment Special Areas be supported by independently facilitated and robust risk assessments that conform to ISO 31000. Metropolitan Coal supports this recommendation and has undertaken independently facilitated and robust risk assessments for each of its Project applications.

The Panel also recommends the potential implications for water quantity of faulting, basal shear planes and lineaments be considered, and risk assessed at all mining operations in the Catchment Special Areas. Metropolitan also supports this recommendation; however, it has some concerns regarding the Panel's inferences about potential impacts of lineaments on subsidence and groundwater in the Southern Coalfield based on experience in the Western Coalfield.

Drawing comparisons of lineament behaviour between two geographically separated regions is problematic, given the geological variability evident. Depth to the basement rock is a key variable with likely substantive influence on behaviour of lineaments and is markedly different between the Western and Southern Coalfields. Notwithstanding, lineaments will be carefully considered.

Metropolitan Coal support the idea of robust, independently facilitated peer review in the assessment process for our mining approvals. Independent experts have been engaged by Metropolitan, with the endorsement of DPE, to prepare a Woronora Reservoir Impact Strategy to provide a staged plan of action for further investigations and a report into the impacts of Metropolitan mining near the Woronora Reservoir. The Woronora Reservoir Impact Strategy Panel has also been asked to provide the DPE with independent advice and recommendations in relation to Metropolitan's existing (Longwall 303 extension) and upcoming (Longwall 304 Extraction Plan) applications. Metropolitan Coal seeks clarification on the need for further independent peer review processes on top of this existing panel and requests that any unnecessary duplication is avoided.

3.4 Standard agreed to by key stakeholders

The Panel recommends that field investigations and data collection, analysis and reporting need to be based on a standard agreed to by key stakeholders.

In accordance with its Project Approval, Extraction Plan development includes the preparation of detailed management plans and monitoring programs in consultation with key stakeholders and to the satisfaction of the Director-General (now Secretary) of the DPE and for some plans, also to the satisfaction of the Division of Resources and Geoscience. The Extraction Plans are required to be prepared in accordance with NSW Government guidelines and the Project Approval.

Metropolitan is also required to obtain all necessary approvals from the Minister administering the *Mining Act 1992* in accordance with the requirements of the *NSW Dams Safety Act 2015* and the Dams Safety Committee.

Metropolitan appreciates the input of its key stakeholders to the development of the management plans and seeks to address and/or respond to stakeholders' comments. Metropolitan endeavour to reach mutually acceptable outcomes with key stakeholders in relation to its mining operations in the Woronora Special Area.

Metropolitan is already highly regulated. Given the varying interests and objectives of key stakeholders, Metropolitan seeks clarification from the Panel as to how they envisage this would be achieved to reflect a NSW Government position, and at the same time not result in unnecessary over-regulation in light of the extensive stakeholder engagement that occurs.

3.5 Upland swamps

Some of the criticisms in the Initial Report would appear to be incorrectly applied to Metropolitan, such as the criticisms of Trigger Action Response Plans (TARPs) for swamps. The swamp impact TARPs include triggers associated with piezometer monitoring and therefore the Panel's conclusion that "*TARPs do not reflect the groundwater-dependence of the upland swamp ecosystems*" is incorrect.

In relation to current knowledge regarding upland swamps, the Initial Report states:

Swamp leakage – in cases where the groundwater in the sandstone lying directly underneath a swamp is depressurised due to mining, downward pressure gradients can accelerate the vertical drainage of the swamp. This reduces horizontal surface flow and subsurface flow towards the swamp outlet, although the increased vertical flow may express as surface flow further down the watercourse. (p98); and

Nevertheless, what is observed with increasing certainty is that when a longwall panel passes under watercourses and swamps (and in their vicinity in some cases) there is at least localised loss of water. How much of the lost water re-emerges to surface watercourses further downstream is not accurately quantified. (p117)

Metropolitan request that a distinction be made with regard to water behaviour in swamps. While depressurisation of sandstone beneath swamps has been observed at Metropolitan, to date changes to water levels within the substrate of swamps has occurred at two swamps in the Project area. Analysis of swamp substrate water levels of Swamps 25, 30, 33 and 35 overlying Longwalls 20-27 and Swamps 40, 41, 46, 51, 52 and 53 overlying Longwalls 301-303 compared with control swamps (Swamps 101, 137a and 137b) and rainfall records have not shown any mining effect. Both control and longwall swamps have responded similarly to reduced rainfall under drought conditions.

Appendix A

Issue	Relevant section of Initial Report	Metropolitan's response
Modelled flow losses	<p>“Significant losses have been observed at 1st and 2nd order watercourses but monitoring of 3rd and 4th order watercourses shows no strong evidence that there are losses significant for surface water supplies. However, the absence of strong evidence does not necessarily mean that significant consequences do not exist. The numerical models used to detect or predict flow consequences cannot provide the accuracy required to conclude on small (but potentially significant) consequences. A summary of modelled flow losses is included in Chapter 4 of this report.” p97.</p>	<p>We are not aware of any evidence of permanent losses - as opposed to underflow which return downstream - on 1st and 2nd order streams at Metropolitan Mine.</p> <p>The relevant performance measure at Metropolitan Coal is negligible reduction in quantity of water reaching the reservoir.</p> <p>The distinction between flow diversion and permanent loss should be made in the Panel's future report.</p>
Rainfall-runoff model	<p>“The AWBM rainfall-runoff model is employed at Metropolitan Mine. A revision to the model to improve the baseflow estimation has been peer-reviewed and considered to be a successful revision (Peabody Energy, 2018c). Recent results indicate that the model continues to have low accuracy during very low flow periods (HEC, 2018a). Low accuracy during very low flows is a characteristic of rainfall-runoff models, and analysis of accuracy is confounded by low flow observations errors, hence this accuracy issue may not be resolvable. Nevertheless, the potential for improving the model for each site should be re-assessed annually.” p113.</p>	<p>Given that the performance measure that Metropolitan is required to comply with is <i>negligible reduction to the quantity of water reaching the Woronora Reservoir</i> we do not see the criticality of reduced accuracy in modelling or measuring very low flows.</p> <p>Very low flows will have little effect on the quantity of water reaching the reservoir.</p> <p>There is also a problem with revising the models annually - a baseline model is needed (i.e. a model calibrated to baseline data to use as the control for detecting impacts). If the model is changed with post baseline period date it will lose its validity as a tool for detecting changes due to mining.</p>

Control catchments	“Woronora and O’Hares Creek gauges are mentioned as control catchments in the WMP; however, a control catchment is not mentioned in the analysis of HEC (2018a). p114	As the quantity of water entering Woronora Reservoir from the Waratah Rivulet has not been significantly different post-mining compared to pre-mining, there has not been a need to make a comparison against the control catchments.
Surface water quantity TARP	“The Metropolitan Mine TARP triggers related to surface water quantity are also potentially ineffective. The Level 1 trigger is: ‘The median of the ratios does not fall below the 35th percentile of the baseline data’. As described in this report, depending on how the percentile is calculated, it leaves room for significant losses to happen with no trigger activation.” p116	Metropolitan considers the TARP triggers for water quantity to be effective, and disagrees with the statements. TARP’s are developed in consultation with relevant stakeholders and Metropolitan Coal invested considerable resources developing a TARP that meets stakeholder expectations. The TARP levels reflect levels that are not significant in terms of quantity reaching the reservoir.
Localised water loss	“Nevertheless, what is observed with increasing certainty is that when a longwall panel passes under watercourses and swamps (and in their vicinity in some cases) there is at least localised loss of water. How much of the lost water re-emerges to surface watercourses further downstream is not accurately quantified.” p117	Underflow (localised loss) has been observed in many instances most frequently in association with fracturing of pool rockbars. The focus of monitoring has not been specifically directed toward establishing re-emergence of water downstream, rather focus has been on establishing compliance or otherwise with the performance measure of negligible reduction in flow reaching the reservoir. This performance measure has been met.
TARPs	<p>a. At both the Dendrobium and Metropolitan mines, the nature of surface water TARP triggers is not suited to determining the level of confidence that can be placed in surface water modelling results.</p> <p>b. The TARPs for surface flow losses are not explicitly related to materiality of flow losses, rather they are defined only by terms such as “negligible”. This limits the objectivity of performance evaluation.</p>	<p>We agree with point ‘a’, however do not see that a function of a TARP would be to document the level of confidence that can be placed in surface water modelling results. That would be more sensibly associated with documentation on the actual modelling and its calibration.</p> <p>We also agree with point ‘b’ however the reference to negligible relates to the Performance Measure wording.</p> <p>TARPs do not classify the seriousness of events. The assessment methods (i.e. performance indicators) have</p>

	<p>c. In the present situation, TARPs classify the seriousness of events that have already occurred rather than fulfilling a role of early signalling to prompt intervention that prevents escalation of impacts. p118.</p>	<p>several triggers which indicate, at different levels of sensitivity, some level of evidence that the Performance Measure is being achieved (i.e. a non-negligible reduction in the quantity of water reaching the Woronora Reservoir).</p> <p>They are triggers which if exceeded result in further action – either more intensive monitoring or an investigation to determine whether the Performance Measure has been exceeded.</p>
<p>Surface water monitoring and modelling</p>	<p>“To ensure confidence in the accuracy and validation of surface water models and conclusions and to support transparency in decision-making:</p> <ul style="list-style-type: none"> i. a statement is provided on all relevant modelling assumptions and which good practice guides have been followed and how they have been followed, with justification of any departures from good practice ii. updated peer reviews of rainfall-runoff modelling and reporting be undertaken by a suitable independent experts and published iii. the principle of ‘reverse onus of proof’ is applied, whereby the mining company should demonstrate that on the balance of probabilities there is no significant consequence.” p119 	<p>i We are unaware of any good practice guidelines for surface water modelling specifically for assessing flow losses associated with longwall subsidence. In the absence of such guidelines one would have to rely of the more general guideline which are available such as the eWater series of guidelines. Metropolitan’s experts are using the best available resources to support surface water modelling.</p> <p>ii The Metropolitan Coal modified AWBM models have been peer reviewed by recognised independent expert Emeritus Professor Tom McMahon. It is not proposed to update or otherwise change models which were calibrated to the baseline period because this would invalidate/diminish validity in their use to detect reductions in catchment yield after the baseline period.</p> <p>iii the “reverse onus of proof” is already being applied. To date Metropolitan Coal has demonstrated, on the balance of probabilities, that there has been a negligible reduction to water volumes reaching Woronora Reservoir from the Waratah Rivulet and Eastern Tributary catchments after commencement of monitoring.</p>

		If the evidence for loss (we have not seen any clear evidence of loss to the reservoir) is balanced against the evidence of no-loss and the strength of evidence of no-loss, it is our opinion that any reasonable person would conclude that on the balance of probabilities that there has not been a loss.
Reservoir water balance	"A reservoir water balance model needs to be developed that should include drought periods and results for these periods should be highlighted." p125	A trial water balance model is currently being developed for the Woronora Reservoir as a component of the Woronora Reservoir Impact Strategy.