Attachment 4

Peer Review Letters

28 September 2015

WEP - Noise and Blasting Assessment Peer Review Letter 20150928.docx

Wilpinjong Coal Pty Ltd
c/- Resource Strategies Pty Ltd
Suite 2, Level 3
24 McDougall Street
MILTON QLD 4064

Attention: Mal Edwards

Dear Mal

Wilpinjong Extension Project - Noise and Blasting Review

As requested, I have reviewed the SLR Consulting Australia Pty Ltd 610.10806.00400-R3 "*Wilpinjong Extension Project - Noise and Blasting Assessment*" prepared by Glenn Thomas.

I have over 35 years relevant experience in the field of noise and blasting impact assessment and in the control and management of noise and vibration emissions. I have conducted or directed Noise and Blasting Assessments for numerous coal and other mining projects, including:

- Mount Owen Coal Mine
- Donaldson Coal Mine
- Camberwell Coal Mine
- Mt Thorley Coal Mine
- Glennies Creek Coal Mine
- Parkes Gold Mine
- Mount Arthur North Coal Mine
- Cadia Gold Mine
- Dartbrook Coal Mine
- Lake Cowal Gold Mine
- Bellbird South Coal Mine
- Peak Hill Gold Mine
- Duralie Coal Mine
- Lihir Gold Mine

I confirm however that I have had no involvement in the Wilpinjong Extension Project studies and have no responsibility for the project; hence my review is independent.

In conducting the review I have considered relevant statutory requirements such as the NSW Department of Planning and Environment (DP&E) Secretary's Environmental Assessment Requirements (SEARs) for the Project dated 9 December 2014, including the Environmental Planning Instruments, Policies, Guidelines & Plans contained therein. I was also be guided by relevant Australian and International Standards and industry practices.

As noted within, the Noise and Blasting Assessment has been prepared in accordance with appropriate guidelines, including:

- The *NSW Industrial Noise Policy* (NSW Environmental Protection Authority [EPA], 2000);
- *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC, 1990);
- *NSW Road Noise Policy* (EPA, 2011);
- *Environmental Assessment Requirements for Rail Traffic Generating Developments* (Office of Environment and Heritage, 2011); and
- The *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009).

My review confirms that the Noise and Blasting Assessment conforms to the above-mentioned relevant guidelines, is comprehensive and has been undertaken in a professional manner.

Notwithstanding, a number of issues and points of clarification were identified by the review. As a result of this, the issues that were identified in the draft document and subsequently either resolved or addressed in the final Report included:

- Simplification and increased clarity and consistency of expression of technical terminology.
- Improvements in the labelling and readability of tables, particularly to the lay person.
- Inclusion of additional information regarding communication with the community and regulators.
- Clearer description of project features and operational processes, including sequencing.
- Identification of instances where discussion of analysis impacts had been overlooked.
- Clarification of assessment criteria for the 330kV electricity towers.
- Clarification of approach to managing blast impacts at rock art sites.
- Clarification of the treatment of Project-generated and cumulated road traffic.
- Correction of formatting and minor grammatical typographical errors.
- Improved consistency in interpretations and descriptions of the likely subjective perceptions of emission levels and their potential impacts.

In summary, I conclude that the report "*Wilpinjong Extension Project - Noise and Blasting Assessment*" is comprehensive, conforms to the relevant guidelines and has been undertaken in a professional manner.

Please do not hesitate to contact the undersigned if you have any queries.

Yours sincerely

Richard Heggie

RICHARD HEGGIE

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6 October 2015

Attention: Mal Edwards

Dear Mal,

Review of Air Quality and Greenhouse Gas Assessment Report for the Wilpinjong Extension Project

I have reviewed the draft and final versions of the report titled *Air Quality and Greenhouse Gas Assessment - Wilpinjong Extension Project* prepared by Todoroski Air Sciences.

I found no significant flaws in the draft report (see my comments supplied 1 September 2015) and all comments I made in the review of the draft report at that time have been appropriately dealt with in the final report.

I am satisfied that the report has followed the relevant assessment procedures for this type of assessment and will provide regulatory agencies and the public with a realistic assessment of the effects that the extension project will have on air quality. I am also satisfied that the emissions of greenhouse gases have been estimated appropriately.

Yours faithfully
NH2 Dispersion Sciences

N.E. Holmes.

Nigel Holmes PhD
Atmospheric Physicist

KALF AND ASSOCIATES Pty Ltd
Hydrogeological, Numerical Modelling Specialists

KA Peer Review of HydroSimulations Groundwater Assessment of the Wilpinjong Extension Project

Dr F. Kalf
B.Sc. M.App.Sc PhD
26 November 2015

Table of Contents

Background and Brief Summary

This report is the Kalf and Associates Pty Ltd (KA) peer review commissioned by Wilpinjong Coal Pty Ltd (WCM) for the HydroSimulations (HS) hydrogeological and groundwater modelling assessment. This final KA review follows from contributions by KA to an earlier second draft version of the HydroSimulations report. For the modelling review herein the available Modelling Guideline documents (NWC 2012, MDBC 2001) content have been taken into account in this assessment.

WMC is seeking approval to extend mining at the current operational Wilpinjong mine. With regard to the hydrogeological component of the proposal, WCM is proposing to extend mining in several additional zones depicted in Figure 2-1 (HS 2015). These zones include extensions of operational and mined out open-cut pits as well as a new proposed open-cut Pit 8, situated along Slate Gully immediately west of the current operations. The addition of the proposed open-cut mining zones will extend the mining life by 7 years.

Current and proposed mining operations occur within the underlying geological Permian coal strata, which include the Ulan Coal seam, the primary coal resource for WCM.

Modelling of mining at Wilpinjong has included the influence of previous and currently mined zones, the proposed extensions, mine bore pumping, as well as the influence of the Moolarben open-cut and proposed longwall mine situated about 8 kilometres northwest of the Wilpinjong mine. Both the cumulative, and Wilpinjong drawdown alone have been determined for both the coal seam depressurisation and the shallower watertable. Coal seam depressurisation (lowering of the potentiometric head) in either case, as expected, expands out many kilometres in a predominately north-east direction but is impeded in a corresponding opposite south-west direction because of the termination of the coal seam saturation and subcrop. The deep depressurisation would not result in widespread dewatering of the seam and would be of no major consequence to any groundwater users or to the environment (Fig 6-5 HS 2015). Watertable drawdown on the other hand is restricted in its propagation and confined predominately within the boundaries of the current and proposed mining zones (Fig 6-6 HS 2015).

The modelling results indicate that for the Wilpinjong project only one Crown owned registered bore is likely to have a drawdown exceeding the 2m maximum allowable under the AIP policy.

The modelling results indicate that the limited change in water table levels in the alluvium and other shallow strata would not affect the surface ecosystems to any significant extent (Section 7.2.3, HS 2015).

Pit inflows according to the model results will have reached a maximum during 2014-15 at 1420 ML per annum. Overall inflow will remain in the range 1000 to 1200 ML per annum. Baseflow reduction in Wilpinjong Creek is predicted to be relatively small at 0.47 ML/day due to mine influence.

Groundwater quality in the region of the mine site is highly variable but overall is of poor quality suitable only for livestock and salt tolerant crops. The highest salinity exceeding 8000 micro Siemens occurs along the Wilpinjong, Wollar and Cumbo Creeks. This increased naturally occurring salinity and variability is most likely due to evapotranspiration

of a watertable at shallow depth and intermittent influence of better quality runoff and rainfall.

There has not been any significant influence to water quality surrounding the tailings facilities according to the HS report.

At completion of mining and rehabilitation there would be three relatively small final voids within the post-mining landform (Fig 2-4 HS 2015). Results from the information exchange between HS and the surface water consultants WRM, indicates that two voids (Pits 6 and 2) would act as groundwater "sinks" in perpetuity. Pit 8 void in Slate Gully could at times remain dry or act as flow-through conduits for incident rainfall and runoff.

KA is in agreement with the assessment of the key issues presented in the HS report as summarised above based on the HS reporting and model predictions.

Peer Review Assessment

Previous Studies and Reviews

Previous studies are listed in the HS report in the References section of the report.

Hydrogeological and Modelling Description

The hydrogeological description of the region and modelling work described in the HS (2015) report is detailed, comprehensive and has been completed and presented in a professional manner in my opinion.

The report covers a wide range of topics that are included within the main headings of: existing and proposed operations; hydrogeological setting; groundwater modelling; predictive model scenario analysis; Impacts on the groundwater resource; climate change and groundwater; conclusions and references. In addition nine appendices include site photos, stratigraphy; groundwater level and quality, model confidence, model description, aquifer parameters, modelled groundwater levels and drawdown assessment.

The report also provides a very useful tabulation noting the relevant sections of the report that cover assessment requirements. These include requirements stipulated by the Department of Planning and Environment (DPE) and the NSW Office of Water (NOW) covering water sharing plans, licensing, groundwater and dependent ecosystems issues. Similar tables also are available for requirements by the Office of Environment and Heritage (OEH) dealing with water and soils, cumulative impact related to ground surface disturbance, heritage and biodiversity.

The report has also taken into consideration all of the groundwater related technical and policy guidelines (Section 1.2).

Model Conceptualisation, Design and Simulation Methods

Model conceptualisation for Wilpinjong by HS is considered suitable as well as the model layering configuration described in the HS report.

HydroSimulations have used a method of cell construction that is the basis of a relatively new groundwater modelling computer code issued by the United States Geological Survey known as MODFLOW-USG (USG) as opposed to the availability of the well-known MODFLOW-SURFACT (MS) code previously used by HS. HS have also used proprietary software, 'AlgoMesh' developed by HydroAlgorithmics, for generating cell mesh.

One of the main advantages of USG code is that it is possible to focus into the overall mesh with much higher resolution cells in various orientations compared to MS as well as allowing, overall, a significant reduction in cell count. While the mesh generation is different to MS, practically all of the boundary conditions applied are similar to those used in the MS computer code. HS have conducted comparison between USG (using a version USG-Beta) and MS in another groundwater modelling project peer reviewed by KA where they found model results to be essentially the same as those produced by MS. The comparison also indicated the validity of the AlgoMesh generation utility adopted for USG model.

The boundaries chosen for the model area are also suitable as well as the depiction of the various ephemeral and perennial stream channels (Figure 5-4 HS 2015). Rivers have been modelled using USG 'river' package with the ability to set stage such that the creeks can act either as a gaining or losing streams. This is considered suitable for the modelled area. The model uses variable gross recharge and evapotranspiration as input and output respectively, which is suitable, rather than application of variable net recharge.

Steady-state simulation was used to set up initial conditions and was combined with transient runs in the HS model. This is a suitable and desirable methodology. Open-cut mining was simulated using the standard 'drain' methodology with subsequent spoil infilling and changes in hydraulic parameters and rainfall recharge.

Hydraulic parameters are based on measured values and those used in previous modelling studies of the Wilpinjong mining site. Modelled strata thickness and regional hydraulic conductivity maps are provided in the report's (HS 2015) Appendix B and G. Hydraulic parameters used in the model are provided in Table 5-6 (HS 2015).

Model Calibration

Calibration has been conducted under both steady-state and transient conditions. Both manual (trial and error) and automated parameter estimation (PEST) software was used. In addition volumetric flow targets for mine inflow and baseflow were used in the calibration which is normally not attempted.

Calibration fit statistic for the transient case is up to a maximum of about 6% (scaled root mean square) which is well within the target of 10% as suggested in the modelling guidelines document (MDBC 2001). Comparison made between measured and modelled hydrographs are considered to be quite acceptable. There is also reasonable agreement between current measured mine inflow and model calculated inflow considering the accuracy, modifying factors and practical difficulties of obtaining such measured data.

All data was used for calibration without verification which is normally the case depending on the duration of the water level record available. Verification can be conducted after an additional few years of mine operation.

The total water balance presented in Table 5-4 (HS 2015) is considered plausible as is the water balance at the end of mining Table 6-5 which indicates that mining will have a relatively minor effect.

Groundwater Monitoring

There is currently a comprehensive groundwater monitoring network in place at the Wilpinjong mine and surrounding area (Section 3.8.2 HS 2015). The HS report states that this existing network has in more recent times been upgraded by WCPL. It is agreed that this network is adequate for current and future mining model recalibration and prediction and water quality.

Conclusions and Considerations

This peer review has assessed the adequacy of the hydrogeological data and the numerical model for predicting the drawdown influences of the proposed extensions of the current operational Wilpinjong mine. The hydrogeological description, conceptualisation, model design, simulations and reporting have been conducted in a professional manner and described in detail. No fatal flaws have been detected in the description or modelling work conducted.

All drawdown predictions, and in particular water table drawdown within alluvial sediments, are considered plausible.

Predictions of drawdown due to the proposed extensions together with the existing approved mine plan and cumulative effects will have minimal influence on the environment. Only one private bore in the area will be affected by more than 2m. Hence this bore should therefore be monitored regularly and remedial action taken should drawdown cause an unacceptable influence on pumping yield.

Monitoring bore data should be reviewed and compared with modelling results every 5 years.

References

HydroSimulations (HS) 2015, Groundwater Assessment*. Wilpinjong Extension Project. Report prepared for Wilpinjong Coal Pty Ltd. Report HC2015/042, October.*

National Water Commission (NWC) 2012 *Australian Groundwater Modelling Guidelines. Report prepared by Barnett, B., et. al. Waterlines Report Series No 82, June.*

Murray Darling Basin Commission (MDBC) 2001. *Groundwater Flow Modelling Guideline. Report prepared by Middlemis, H., Merrick, N., and Ross, J., Jan.*

T.A. (Tom) McMahon FTSE
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Attention: Mal Edwards

Dear Mr Edwards

I have completed my assessment of the Wilpinjong Extension Project Surface Water Assessment Report and my comments are set out below. My review consisted of reading and commenting on a draft of the Report by WRM Water & Environment Pty Ltd (Wilpinjong Extension Project Surface Water Assessment 1052-01-B5, 23 October 2015). Responses from WRM to my comments were provided to me. Based on my reading and study of the Report, I recommended a number of changes, and I can confirm that all these were appropriately addressed in the updated Report (1052-01-B9, 25 November, 2015). The Report consists of 10 sections plus two appendices.

Following a brief introduction to the Project (Section 1), Section 2 describes the regulatory framework. This includes the Strategic Regional Land Use Policy, relevant aspects of the Water Management Act 2000 and Water Act 1912, Australian Guidelines for Fresh and Marine Water Quality, Commonwealth Environment Protection and Biodiversity Conservation Act 1999, Dams Safety Act 1978, Managing Urban Stormwater Soils and Construction, Protection of the Environment Operations Act 1997 and the Flood Prone Land Policy. This section concludes with a listing of the Secretary's Environmental Assessment Requirements relevant to surface water and identifies in the Report where the items are addressed. As far as I can ascertain, all these requirements have been dealt with.

In Section 3 the existing surface water environment is described and supplemented by maps, photos, figures and tables. Rainfall, evaporation and streamflow are summarised in tabular form. In order to extend the rainfall and evaporation data for the water balance studies, daily data were obtained for the mine location covering the period from January 1889 to July 2015 from the Queensland Department of Science, Information Technology, Innovation and the Arts. The adoption of this data set is standard hydrology practice. Regarding surface water quality, there is an extensive programme, which started in 2004, of water quality measurements in and around the mine site. I believe the data provide an excellent baseline on which to assess any impact of the proposed mine extension on the water quality in and around the mine. In Section 3.7 there is a discussion of the Environment Protection Licence Release Conditions for surface water releases and the operation of the RO Plant. The daily visual inspection of the monitoring equipment and

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diversion valve and regular testing of the equipment provides confidence that any water releases to Wilpinjong Creek are within EPL limits. Finally, Section 3.8 notes that all the project open cut extensions are beyond the extent of the 1 in 1000-year AEP design flood.

Existing water management strategy and infrastructure are described in Section 4. The key objectives of the WCM surface water management strategy for each type of water use (external water, mine water, groundwater, surface water, and diverted water) are listed in Section 4.3. The strategy proposed for dealing with each type of water is logical. This section contains details about the key components of the existing water management system including water storage, pit/tailings dams, CHPP/industrial area, and the RO plant and concludes with details of present and future water supply.

The proposed water management strategy and the relevant infrastructure are outlined in Section 5. The main components of the water-related infrastructure are detailed in Section 5.2 including the proposed layout for the six phases of the Project (phase 1 2016, phase 2 2018, phase 3 2020, phase 4 2024, phase 5 2028 and phase 6 2031), mine water storage and sediment dams. It is proposed that sizing of the sediment dams will be based on the NSW construction guidelines.

Section 6 describes the mine water balance model (known as OPSIM), the system operation and the simulation methodology. OPSIM is an appropriate model that simulates dynamically on a daily time-step the operation of the water management system. I consider the approach as industry best practice. Model details are shown schematically in Figures 6.2 to 6.7 for the six phases of development and the operating rules listed in Table 6.2. While it is not possible to assess these in detail, I queried several of the dewatering rates and was satisfied with the responses of the consultants. Based on 126 years of simulation (rainfall and evaporation data were available for that period), a static water balance analysis was performed for each phase of development. The results were supplemented by 108 time-series or replicates, each 19 years in length of consecutive daily data, which allowed analyses of the performance of the water management system under various climate stress levels from extremely wet conditions through to extremely dry periods. While there are more sophisticated approaches that could be used for this analysis, I regard this procedure as very satisfactory as it reveals how the water management system performs under a range of conditions.

The remainder of Section 6 deals with site water demands. The demand that is probably least certain is the water required for haul road dust suppression. As far as I can ascertain there is no standard industry approach to estimating water requirements. Overall, the approach adopted by the consultant is logical. While I may have adopted an alternative procedure to estimate the evaporative demand for dust suppression, the annual demands tabulated in Table 6.6 are reasonable.

The two main sources of water for mine operations are groundwater (details were not reviewed by me) and surface runoff. Surface runoff was estimated on a daily basis using the Australian Water Balance Model (AWBM) which is adopted extensively across Australia for rainfall-runoff modelling. Because no rainfall-runoff data are available within the mining site or the proposed extension, parameters for the model were based on other projects with similar

climate and landscapes. I consider the AWBM model to be a most appropriate model for this application.

Little data were available to calibrate OPSIM but the comparison between the observed total site water inventory and the modelled inventory in Figure 6.9 provides confidence in the modelling of the total site inventory.

Section 7 summarises the results of the water balance modelling. The information is provided in a systematic and logical manner where Tables 7.1 and 7.2 provide succinct summaries. These tables are supplemented by forecasts of mine water and pit water inventories. The remaining sub-sections deal with external makeup water requirements and water discharges from the reverse osmosis plant. The penultimate sub-section in Section 7 addresses surface runoff salt balance. Based on the flows produced by the OPSIM model, an annual salt balance is developed for each phase of development. Section 7 concludes with a sub-section on model sensitivity. The approach is standard and straightforward and provides guidance on how several key variables (peak in-pit inundation volume, peak annual external supply volume and peak annual RO discharge volume) could change if several of the inputs are in error.

I have read closely Section 8 dealing with impact assessments. In the areas where I have some expertise (final void, flow regime in receiving waters, flood impacts and climate change) I am confident that the assessments are consistent with the results of the analyses presented in the Report. From the hydrology information presented in the Report, I concur with the consultants that there should be no measurable incremental impact by the Project on the flows in Wilpinjong Creek. Cumulative surface water impacts due to localised or regional activities are discussed in Section 9. The observations appear reasonable.

The final section of the Report deals with mitigation, management and monitoring. These appear to be logical extensions of the analyses and discussion in the Report concluding that the impacts can be managed and mitigated through implementation of the existing and proposed water management strategy. In regard to monitoring, I recommend the meteorological station be maintained to provide continuous records of solar radiation, maximum and minimum temperature, wind run and humidity. It would be helpful for details of the flow recording and related measurements (including missing data and how infilled, and streamflow rating information) be incorporated into any future assessments at the Wilpinjong Coal Mine.

In summary, I conclude that overall the study detailed in the Report Wilpinjong Extension Project Surface Water Assessment was completed in a professional and detailed manner, and the conclusions in the Report are appropriately supplemented by the modelling studies carried out by the consultants.

Yours sincerely

Thomas A McMahon

T.A. McMahon
26 November 2015

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Attention: Mal Edwards

Dear Mal,

Re: **Review of report on the 'Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project' prepared by Deloitte Access Economics for Peabody Energy Australia Pty Limited**

I have now completed my review of the report on the 'Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project' that has been prepared by Deloitte Access Economics. My assessment of the report was based on versions of the report that I received on 5 November, 20 November and 24 November, 2015 and 18 December, 2015.

The report consists of a detailed cost benefit analysis of the Wilpinjong Extension Project accompanied by a computable general equilibrium (CGE) analysis of its economic contribution to New South Wales together with a broader regional impact assessment also using the CGE model. The report sets out in detail the methodology that has been applied in making these assessments, states the assumptions made and includes a sensitivity analysis on key model parameters.

I supplied the authors of the report detailed comments on its content and suggestions for improvement based on the draft supplied to me on 5 November, 2015.

These comments have been addressed by the authors in the subsequent versions of the report supplied to me on 20 and 24 November, 2015 and 18 December, 2015.

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In my review I also noted that some assumptions used by Deloitte Access Economics to estimate the potential economic effects of the Wilpinjong Extension Project (e.g. existing Wilpinjong Coal Mine workers who would continue to be employed as a result of the Wilpinjong Extension Project would all find alternative employment immediately if the Wilpinjong Extension Project is not approved) could be considered to be conservative. In other words, such assumptions will tend to have under-stated the benefits to New South Wales of approval of the Extension Project.

In my assessment the current version of the report has been competently completed and provides an accurate assessment of the net value of the Wilpinjong Extension Project to New South Wales. There remains some uncertainty in my mind regarding the split of net benefits between the region and the remainder of New South Wales that has been derived from the CGE analysis. That is, the estimates contained in the report could overstate the regional impacts as a proportion of the total New South Wales impacts – this is not an issue with the methodology but rather the data that are available to adequately disaggregate separate regions from the state total. Regardless of this issue I believe that Deloitte Access Economics has demonstrated that the Wilpinjong Extension Project will make a large net contribution to the economy of New South Wales should it be approved and I am in no doubt that the total net benefit to New South Wales as a whole that has been estimated by Deloitte Access Economics is a reasonable reflection of likely total net benefits.

As part of the review process I made detailed comments regarding some of the key assumptions underlying the assessment and the methodology that has been employed. In my opinion the assumptions adopted in the final assessment, including those adopted for the sensitivity analysis, encompass a range that might be reasonably expected to represent the prospects for the coal industry in the long term, the time period over which decisions need to be assessed for investment in very long term assets.

Yours sincerely,

Brian S Fisher PhD DScAgr AO PSM FASSA
Managing Director

22 December, 2015