



Major Developments Assessments
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Our ref ER20296
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Attention: Sara Wilson

Dear Sara

Moolarben Coal Stage 2 Preferred Project Report

I refer to your letter received on 27 January 2012, requesting the NSW Office of Water's comments regarding the Preferred Project Report (PPR) to the proposed Stage 2 mining development to the Moolarben Coal Project (MCP). The following comments are submitted for your consideration relating to the interception and extraction by the proposed open cut and underground mining operations in the context of water sharing arrangements in the Upper Goulburn catchment and the proposed open cut and underground mining operations under the *Water Management Act 2000* (WMA). This submission follows previous submissions made with respect to the Stage 2 Moolarben Coal development, dated 28 October 2008, and 27 April and 19 August 2009.

The *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* (WSPHUAWS), which came into force in 2009, imposes statutory rules on extraction and/or interception of water from surface and/or alluvial water sources in the Hunter Valley. The WSPHUAWS is designed to protect planned environmental water and maintain equity in water sharing arrangements between all existing water users. The proposed Open Cut 4 lies entirely within the Wollar water source, and Undergrounds 1, 2 and 4 have revised predicted drawdown impacts upon the Upper Goulburn River water source.

Moolarben Coal Mines Ltd must adhere to the rules of the WSPHUAWS, which are not addressed in the PPR. These rules impose constraints on mining development within the Wollar and Upper Goulburn Water Sources. The Office of Water is of the opinion that it will be difficult for Moolarben Coal Mines Ltd to comply with the rules of, or achieve the outcomes defined in, the WSPHUAWS. The Applicant has provided no commitment in relation to the rules of the WSPHUAWS, especially those applying to the Wollar water source.

The Office of Water has experienced significant difficulty in assessing the impacts resulting from interception of alluvial groundwaters in Open Cut 4. This follows confirmation by Moolarben Coal Mines Ltd that previously identified shallow alluvial aquifers in the Murragamba and Eastern Creeks and along Wilpinjong Creek are underlain by an older paleochannel, which appears connected to the overlying alluvium, and developed to a depth of between 8 and 115 metres below ground level.

The Office of Water regards the groundwater impact assessment as deficient in terms of the conceptualisation of, and quantified interactions between groundwaters contained in the identified Quaternary alluvium and the underlying Tertiary paleo-channel located beneath the valley floor of Wilpinjong and Murragamba and Eastern Creeks. This lack of information extends to the

assessment of contributions to surface flows from the shallow groundwater system (i.e. to minimum and baseflows) and interactions with the highly connected alluvial groundwater within the Wilpinjong Creek.

The absence of this information has significant implications for licensing requirements for the Moolarben Coal Project and potential impacts upon water sharing equity between other water users in the Wollar water source. The Office of Water provides its assessment of these impacts in **Attachment A**.

The Office of Water is not in a position to recommend approval to the proposed Moolarben Stage 2 until such time as appropriate mitigative and remedial measures are adopted that will ensure minimum flows, integrity to groundwater dependent ecosystems and equity to all water users, particularly within the Wollar water source, and to the Upper Goulburn River water source. It is recommended that approval should not be granted to Stage 2 of the Moolarben Coal Mine until a sufficiently robust assessment of alluvial groundwater take by Open Cut 4 is provided, enabling an informed assessment of licensing requirements to be undertaken.

To achieve this outcome, the Office of Water recommends an independent review of the groundwater impact assessment in the PPR should be conducted in consultation with the Office of Water. Following this review, the Office of Water may require a revision of the groundwater model and impact assessment, incorporating the recommendations of the independent review.

The Office of Water recommends a review of geomorphic and hydrogeologic conditions should be undertaken, in order to provide a comparative overview of the processes and surface and ground water interchange, and operational and post-mining responses within the Wilpinjong Creek and Lower Wollar Creek catchments. This is considered essential to water management accounting and any riverine management conditions which may be included in any project approval.

The Office of Water regards the above issues of such significance that an external technical panel, comprising recognised experts within the fields of hydrogeology and fluvial geomorphology should be commissioned to review the proposal, prior to any approval of the Moolarben Stage 2 proposal. This may require referral to the Planning Assessment Commission to convene a suitable expert review panel to advise the Department of Planning and Infrastructure in consultation with the Office of Water.

Should you require further information please contact Fergus Hancock, Senior Planning and Assessment Coordinator on (02) 4904 2632 at the Newcastle office.

Yours sincerely



Mark Mignanelli
Manager Major Projects, Mines and Assessment

24 February 2012

NEW SOUTH WALES OFFICE OF WATER

IMPACT ASSESSMENT COMMENTS

MOOLARBEN COAL PROJECT – STAGE 2 PREFERRED PROJECT REPORT

Water sharing and regulatory arrangements

The *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* (WSPHUAWS) commenced after the assessment of the Moolarben Stage 2 Environmental Assessment was completed.

The MCM Stage 2 Environmental Assessment and subsequent revisions of that assessment in 2009 did not recognise the impending commencement of the WSPHUAWS. The PPR recognises the existence of the WSPHUAWS, but incorrectly locates the proposed MCM Stage 2 Open Cut 4 within the Upper Goulburn water source.

Open Cut 4 primarily lies within an alluvial water source which is highly connected to minor streams and two third order water courses draining to Wilpinjong Creek. All these systems are subject to the rules of the WSPHUAWS. The dealings rules, under s 71 of the WMA, apply to any transfer, subdivision or other changes to access shares in the water source to the mining project. The dealings arrangements encompass off-site (downstream) impacts to and within the Goulburn River National Park, to maintain equity in water availability and reliability of supply to all water users within the Wollar water source. This includes groundwater dependent ecosystems within the project area, downstream along Wilpinjong Creek and from the Wollar Creek confluence into the National Park.

Dealings and works rules within the water source affect MCM's ability to account for interception and take of groundwater by Open Cut 4. These include:

Current management requirements for dealings in access entitlements under the rules of the WSPHUAWS require distance and baseflow assessments to be made and regulated in order to:

- Achieve the requirements to determine an Available Water Determination upon all water user in the Wollar Water Source (CI 54(3))
- Maintain allocations accounts defined by a process determined by the Office of Water, as set out in CI 56(5)
- Maintain surface/ground water connectivity relationships on unregulated river and alluvial access licences (CI 68(2))
- Prevent depletion of alluvial groundwaters and/or disrupt surface/ground water connectivity sufficient to trigger a water shortage order under s 324 of the *Water Management Act 2000* (CI 70(1)(b))
- Avoid a dealing (71T or 71W) which involves a transfer from an existing access licence subject to a s 324 water shortage order (CI 70(j)(xi))
- Impose mandatory conditions on all access licences which prohibit the take of water during very low flow class periods (which will be established by Year 10 of the WSPHUAWS) (CI 76(1)(a))
- To maintain visible flow where visible flow conditions are identified under the rules of the WSPHUAWS (CI 76(6) – CI 68(2))

None of these rules are addressed in the Preferred Project Report. No assessment of impacts upon other water user reliability, Available Water Determinations or water shortage declarations has been conducted. No assessment on planned environmental water requirements, or environmental flow needs is provided. The Office of Water is limited in its ability to make an informed assessment of the application where the statutory rules of the WSPHUAWS are not taken into account, or given sufficient attention by the applicant.

Groundwater impact assessment

The major change in the Preferred Project Report (PPR) from the 2007 EA is the inclusion of a Tertiary age paleochannel, which is described in the most general terms in the PPR document (Fig. 3.3 of Appendix E). The paleochannel aligns parallel to the current course of Wilpinjong Creek westward to Moolarben Creek at its junction with the Goulburn River. The paleochannel occupies a significant area of land which is proposed to be excavated for Open Cut Pit 4, and will drain into the open cut as mining progresses north. The effect of the paleochannel upon hydraulic behaviour in the shallow alluvial aquifer system is not properly specified in the PPR. The PPR asserts a general disconnection between the upper ('Quaternary') and paleo ('Tertiary') unconsolidated materials which effectively isolates the two systems.

This assertion requires substantial evidence in order to be accepted.

Wilpinjong Creek and other surrounding watercourses are developed on inter-layered sand and clay/silty unconsolidated materials. These materials are highly transmissive and receive recharge from stream flows at any time where local groundwater levels are below the stream bed. This inter-relationship forms a significant element in the development of geomorphic structures and features in those rivers. The Applicant's assumption of non-connective conditions in these watercourses based on minimal data is not supported by the Office of Water.

The EA presents results of pump out tests against slug tests to a number of piezometers on proposal site area. Bores located on the valley flat of Murrumbidgee Creek demonstrate strong recovery after pump out drawdown to more than 10 metres from pre-test static water level (SWL). The EA indicates groundwater SWL is generally between 2-6 m below ground surface level. The recovery in these bores indicates highly transmissive alluvial materials which is likely to contain significant volumes of connected groundwater.

This information indicates potentially significant volumes of surficial and shallow groundwaters are stored within the unconsolidated materials in Murrumbidgee and Wilpinjong Creeks. If intercepted by means of the mining operation, this water must be accounted for via access shares in the Wollar Water Source. As indicated above, the total tradeable access shares in the Wollar Water Source total at 1432 shares.

Moolarben Coal possesses Part 5 *Water Act 1912* licences to account for mining production bore extraction to 2650 ML per annum, and three licences to account for dewatering from Pits 1-3 at 350 ML per annum. Moolarben also possesses a water supply work for a dam on the uppermost reach of Wilpinjong Creek (Splitters Creek Dam). However, Moolarben Coal does not possess any water access shares in the Wollar water source.

As a result, Moolarben Coal cannot legally intercept and/or extract any surface and/or groundwaters associated with the Wollar water source, which includes the surface drainage and unconsolidated and alluvial groundwaters within the Wilpinjong, Murrumbidgee and Eastern Creek catchments. It is an offence to take water without a relevant access licence.

Should Moolarben Coal commit to obtain access shares in the Wollar Water source to account for ingress to the Open Cut pit 4, they must make commitment to effectively ensure baseflow contributions from the Murrumbidgee and Eastern Creeks into Wilpinjong Creek will be maintained. The Office of Water does not regard the use of Splitters Hollow Creek Dam an effective means to such baseflow contributions, or the diversion of undisturbed catchment runoff past the Open Cut 4 pits.

Any such mitigation measures can only be prescribed following the confirmation of, and adequate review of likely risks and quantified impact assessment upon, the interconnection between the 'Tertiary paleochannel' and Quaternary alluvium, and the relative and combined quantitative contributions from these groundwater sources to minimum and baseflows within Wilpinjong Creek. This assessment cannot be deferred to a post-approval management plan, as it relates to the potential for the mining operation to intercept a greater volume of alluvial groundwater than predicted or accessible by transfer of entitlement within the Wollar water source.

The impact assessment must include analysis of the risks associated with alteration in groundwater quality resulting from disruption of the local groundwater regime which will eventuate from open cut mining excavation.

Water balance

The site water balance appears to be restricted to on-site collection of runoff and incidental groundwater ingress following the limited groundwater impact predictions noted above. The water balance is extremely sensitive to changes to groundwater interactions and uncontrolled capture of surface flow and runoff into the mining operation.

The water balance report inappropriately states the context to the sub-catchment water balance is the Goulburn River. The proper context to the assessment is the Wollar water source, as defined in the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* (WSPHUAWS). The water balance assessment does not infer contributions from groundwater to surface flows in Wilpinjong Creek. This appears related to the inadequate conceptualisation of groundwater migration and inter-actions between Murrumbidgee and Eastern Creeks to Wilpinjong Creek. The catchment water balance does not incorporate flow gauging data from Wilpinjong Creek, which has been gathered by Peabody Energy over the past five years.

The catchment water balance does not recognise the role of existing levels of alluvial groundwater extraction upon groundwater transmission. Further, the surface water investigation fails to acknowledge the role of surface/ground water connectivity in the catchment water balance. This is clearly seen in the statement made in s 3.1.2:

“...MCM is the only water user in either (Murrumbidgee and Eastern Creek) valley...It is acknowledged that riparian flows from Murrumbidgee and Eastern Creeks contribute, albeit in a very minor way, to the stream flows carried by Wilpinjong Creek.”

This acknowledgement does not extend to investigate the relative role of surficial and/or shallow alluvial groundwater transmission to maintaining baseflows in Wilpinjong Creek. Further, no assessment is provided as to the hydrological relationships within Wilpinjong or Wollar Creeks between surface and alluvial ground waters. Considering the ratio of surface extraction to alluvial extraction within the Wollar water source (95%), the lack of any formal assessment demonstrates the deficiency of the surface water investigation and water balance modelling work conducted.

The site water balance assumes Harvestable Rights will apply to authorise capture and use of water from all sources. The PPR presents an argument that a generalised 10% runoff rule across all MCM property area may be applied to any harvesting of water by Open Cut 4. This conflicts with the Office of Water's interpretation of the NSW Farm Dams (Harvestable Rights) Policy, which prescribes mechanisms based on the cumulative capacity and location of farm dams to comply with the rules applying to harvestable rights.

The PPR does not present dam capacity limits, locations on catchment runoff areas compared to minor or third order or greater streams, or segregation of poorer water quality from undisturbed catchment runoff harvesting, all of which are required under the NSW Farm Dams (Harvestable Rights) Order. The Office of Water is not confident that the harvestable rights assessment provided in the PPR will comply with the intent or the rules of the NSW Farm Dams (Harvestable Rights) Order.

As a result, little confidence can be placed in the catchment-scale water balance assessment provided in Appendix F of the PPR.

The site water balance assessment presents an optimistic assessment of the range of likely water management conditions through mine life. The Office of Water supports the water transfer system devised to on-supply excess mine water sourced from Xstrata Ulan Coal Mine to other industrial water users. This is expected to mitigate deficits in supply to the Moolarben Coal Mine. However, the large area of catchment disturbance which will occur during excavation of Open Cut 4, the extensive alluvial and paleo-alluvial deposits located within the OC 4 footprint, the likely surface fracturing and capture of rainfall to UG 1 and 2, and limitations on available on-site storage indicate significant mine water surplus will occur through mine life. This implies significant mine water discharges to the Goulburn River will be required through the lifetime of Moolarben Coal Mine.

No assessment of the consequences of these likely surpluses is provided in the PPR. No assessment of licensing requirements for surface water harvesting within the rules of the WSPHUAWS is provided. The Office of Water is unable to complete its assessment of the site

water balance, or licensing requirements, or likely impacts upon other water users or maintenance of flows within Wilpinjong Creek based on the assessment within the PPR.

Mitigation Options

Mitigation of loss of contributions to flow is designed around two means; timed release of impounded water within the Moolarben Coal Operation. This includes diversion of upstream runoff and stream flows around the mine site, and the operation of Splitters Creek Dam to maintain baseflow releases into Wilpinjong Creek. The Office of Water raises two concerns regarding the proposed mitigative measures:

1. as the flows in Murrumbidgee and Eastern Creeks are ephemeral (apart from the rock outcrop located on Eastern Creek at mid reach within the footprint of Open Cut Pit 4 and the isolated springs located at various points on Murrumbidgee Creek), diversion of such flows will not maintain contributions downstream in the absence of shallow groundwater head
2. Splitters Hollow Dam is insufficient in capacity and contributing catchment area to maintain baseflows in Wilpinjong Creek by timed releases, which are estimated at around 0.5 ML/day

In the absence of adequate surface/ground water interactions in the catchment water balance assessment, the Office of Water is unable to determine the likely range of loss of contributions to the Wilpinjong Creek system. The Office of Water is unable to complete its review of the likely impacts of the proposal upon Wilpinjong Creek and the Lower Wollar Creek system in the absence of such information.

Table 4 of Appendix F provides an estimated groundwater inflow range reporting to each operational excavation of the Moolarben Coal Project. The range of inflows, from 90-665 ML pa, indicates likely loss of head which is necessary to maintain baseflows in Wilpinjong Creek. In all likelihood, Wilpinjong Creek will lose most, if not all, its baseflows and result in loss of contributing flows to the Lower Wollar Creek.

The minimal mitigative response to such loss of flow is a requirement to procure access licence entitlements in accordance with rules of the relevant water sharing plan. In the absence of adequate quantified flow reduction assessment in the PPR, it is reasonable to assume that potential impacts may encompass the loss of all baseflow in the Wilpinjong Creek, which may amount to over 400 ML (access shares at 1 share equivalent to 1 ML of flow). Such an impact presents serious questions regarding appropriateness and significant complexity in developing meaningful regulatory conditions when considering the long time frames of predicted groundwater recovery in the post-mining landform.

Moolarben Coal Mines may nominate purchase of a minimal number of shares in the Wollar Water Source to account for the above rules. However, consideration must be given that from Year 10 of the WSPHUAWS, reductions or loss of minimum baseflows in Wilpinjong Creek may lead to water shortage declarations being made on all other water users. Unless an agreed strategy incorporating all water users in the Wollar Water Source is developed, it may be impossible to devise any access licence conditions or restrictions which will satisfy the above rules.

In the absence of an accepted, rigorously developed and applicable model which appropriately defines the level and extent of surface/ground water connectivity to the satisfaction of the Office of Water, the above rules of the WSPHUAWS are unlikely to be achieved.

The proposal to divert watercourses necessary to excavate Open Cut 4 is incorrectly formulated against the river styles of streams in the Upper Goulburn catchment. The level of prescription of flow paths, meander radii and stream bed controls does not consider the range of geomorphic attributes, erosional/depositional history or energy management criteria and response measures necessary to ensure both channel stability and diversity which is needed to maintain stream integrity.

Any conceptual design must adopt an adaptive approach based on current processes and responses formed within the channel, and identified erosional risks and effective, non-engineered response measures to address these risks. Such a risk management approach using known

geomorphologic principles to design and install and maintain any diversion(s) should be developed by a qualified fluvial geomorphologist.

Further assessment of surface/ground water interchange and maintenance of near surface groundwater conditions should be undertaken in order to rehabilitate impacts to identified groundwater dependent ecosystems, including the mapped threatened vegetation communities located along Lagoon, Murrumbidgee and Eastern Creeks.

Underground 4

Underground operations 1 and 2 lie beneath exposed sandstone ridges formed of Triassic sedimentary deposits eroded by Lagoon and Moolarben Creeks to the west, and Murrumbidgee and Eastern Creeks to the north and east of the underground proposals. It is unlikely that subsidence fracturing expression will significantly exacerbate impacts on Lagoon, Moolarben and Murrumbidgee and Eastern Creeks above the drawdown impacts created by Open Cut Pits 1-4. This is not the case with respect to Underground No. 4, which flanks the Goulburn River and encroaches close to the Drip and Corner Gorges of the Goulburn River.

Moolarben Coal has made a number of unsupported statements regarding the interaction between its underground mining operation (UG4 and UG1-2) and subsidence-induced fracturing to surface and/or to within the Triassic series overlying the underground mine footprint. It appears substantial fracturing to surface may eventuate from the underground mine layout, especially in UG 1-2. This does not appear to have been assessed in the EA, as shown in statements such as:

'With 400m wide longwall panels, it has been assumed in the model that hydraulic conductivity would be affected up into the Lower Triassic, whereas hydraulic conductivity increases only extend to the Upper Permian model layer above 208m wide longwalls, consistent with observed impacts from pre-2006 mining at Ulan Coal Mine.

As the MCC (Moolarben Coal Co) longwall panels are proposed to be 208m wide, the impacts on the lower Triassic above UG4 will be much less.' (Appendix E, S 6.2.3 p 58)

The management of impacts resulting from UG 4 must include an adaptive mine plan, which may restrict or alter longwall configurations should impacts on Triassic sandstone groundwaters depressurise to the fringe of the Goulburn River, or impact upon neighbouring bores. This adaptive strategy should be designed to ensure minimal impacts upon flows within the Goulburn River resulting from head loss within the Upper Triassic sandstones, and avoid disrupting water supply to other water users.

**End Attachment A
24 February 2012**