



Department of Primary Industries

OUT16/12051

Mr Matthew Riley
Resource Assessments
NSW Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Matthew.Riley@planning.nsw.gov.au

Dear Mr Riley,

**Wilpinjong Extension Project [SSD_6764]
Comment on the Environmental Impact Statement and Development
Application**

I refer to your email dated 25 January 2016 to the Department of Primary Industries in respect to the above matter. Comment has been sought from DPI Water, Fisheries, Agriculture and Lands. DPI Fisheries and Agriculture have no comments on the modification. Water and Lands comments are as follows. Any further referrals to DPI can be sent by email to landuse.enquiries@dpi.nsw.gov.au.

Lands

DPI Lands has reviewed the EIS for Wilpinjong Extension Project has provides the following comments:

- The reference to "Crown Land (Special Lease)" on any applicable Figures should be changed to "Crown Land (Licence)" except where the land referred to is Lot 158 DP721237 which has been correctly identified as a Special Lease.
- Figure 1-5c states that the Landholder for Reference 1 is Peabody Energy. This is incorrect in regard to the lands referred to in Figures 1-5a & 1-5b as "Crown Land (Special Lease)". These lands are mostly Crown lands held under Licence in the name of Wilpinjong Coal Pty Ltd (some licenses may be held in other names). Any reference to Crown land held by Peabody Energy needs to be checked and the correct details noted.
- Attachment 3 Preliminary Schedule of Lands requires amendment:
 - Lot 151 DP755455 is freehold land not Crown land
 - Lot 52 DP755455 is Crown land not freehold land

There are a number of Crown roads and parcels within the proposed development area and DPI Lands has no objection to the proposal subject to the appropriate Crown Lands Act approvals being obtained prior to any use and occupation of any Crown land (including Crown roads). It is recommended that the proponent apply to

close and purchase any Crown Public Roads associated with the proposal in order to avoid restrictions on access and development on these parcels.

For further information please contact Elizabeth Burke, Group Leader, Property Management Services, (Dubbo Office) on 1300 886 235 or at elizabeth.burke@crownland.nsw.gov.au.

Water

DPI Water has reviewed the exhibited Environmental Impact Statement for the Wilpinjong Extension project. Key comments are provided below, detailed comments provided in Attachment A and an assessment of the project against the *NSW Aquifer Interference Policy* (AIP) is presented in Attachment B.

- It is recommended that a supplementary report be provided to demonstrate that water quality impacts will be within Level 1 impacts, as defined in the AIP.
- The proponent should invest in further community consultation with users who may be potentially impacted by the mine activities and allow for private users to participate in the on-going monitoring program.
- A table should be provided reconciling water take both during and post mining with licences held under both the *Water Act 1912* and the *Water Management Act 2000*. This must include additional information regarding extraction under WAL 21449.
- It is recommended that the conditions of consent require the revised Water Management Plan for the site to be developed in consultation with DPI Water.
- Make good provisions must be developed for the predicted Level 2 impacts at the Wollar Public School bore.

For further information please contact Hannah Grogan, Water Regulation Officer (Newcastle West office) on 4904 2516 or at hannah.grogan@dpi.nsw.gov.au.

Yours sincerely



Mitchell Isaacs
Director, Planning Policy & Assessment Advice
18/03/2016

Attachment A

Wilpinjong Extension Project [SSD_6764] Comment on the Environmental Impact Statement and Development Application DPI Water - Detailed comments

1. Project Activities

The proposed Wilpinjong Extension Project involves the following activities:

- Expanding the Wilpinjong Coal Mine by developing a new open cut pit to the east of the current operations and extending various existing open cut pits at the mine.
- Continuing production of up to 16 million tonnes of run-of-mine coal a year.
- Continuing use of existing mine infrastructure and developing new infrastructure, including realignment of Ulan-Wollar Road and associated rail level crossing, relocation of existing electricity infrastructure, construction of additional mine access roads and construction of ancillary mine servicing infrastructure.
- Continuing transport of coal from the mine by rail.
- Extending the life of the mine by 7 years (2033) and progressively rehabilitating the site.

2. Surface Water Assessment

The proposed mine expansion includes an additional 800 ha of open cut extensions, composed of 500 ha of incremental extensions to existing open cut pit areas and 300 ha in the creation of a new pit, identified as Pit 8.

Surface water within the proposed expansion area is managed under the *Water Management Act 2000* (WMA 2000) and is part of the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009*. The project area is within the Wollar Water Source, and the proposed open cut extensions would impact on a number of 1st and 2nd order streams. DPI Water requests additional information on the estimated loss of water from the Wollar Water Source. It is noted that Peabody Pastoral Holdings Pty Ltd hold WAL 21499 in the Wollar Water Source with 474 shares. Information is also requested regarding the use of this licence and whether it will be used to account for additional take from the water source.

Section 8.2.2 states 'All streams potentially diverted by the project open cut extensions are 2nd order and below. On this basis, all water captured in the site water management system is considered to be exempt from licensing.' This section should include a quantified analysis of this conclusion. It is recommended that a table be provided water storages and their capacities and predicted volumes of the water captured by the site water management system.

This needs to clearly demonstrate and describe the separation (where possible) and management of clean and dirty water streams. Capture and take of clean and dirty water may require different consideration with respect to the exemptions under the *Water Management (General) Regulation 2011*.

It is noted in section ES5.7 of the Main Text that 'During mining, flow reductions in Wilpinjong Creek are counteracted to varying extents by the approved water discharges from the water treatment facility in accordance with Environmental Protection Licence [EPL] 12425. The Project would have no measurable incremental impact on flow in Wilpinjong Creek post-mining.' DPI Water understands that EPL 12425 allows for discharge into Wilpinjong Creek of up to 5 ML per day which could be up to 1825 ML per year. The text should include a site

water balance that clearly identifies inflows to and outflows from the site, as well as describing the movement of water within the site.

Figure 3.43 notes the proposed final voids. Additional information is requested regarding the ongoing water licensing requirements of rehabilitation on site and further information regarding proposed ongoing monitoring of the final voids, in relation to water quality.

In relation to post mining water take Table 8.2 indicates that the proposed expansion would increase groundwater baseflow loss by 135 ML per year. Should the proposed expansion be approved total baseflow loss from the catchments described in Table 8.2 from both approved activities and the expansion is 431 ML. This loss of baseflow must be accounted for via the appropriate WALs. DPI Water requests that the proponent demonstrate which water access licence will be used to account for this baseflow loss. This must be demonstrated prior to commencement of construction.

3. Water Licensing

Wilpinjong Coal Mine currently holds the following Water Access Licences:

- WAL 21499 – 474 shares (Wollar Creek Water Source)
- WAL 9476 – 790 shares (Macquarie and Cudgegong Regulated Rivers Water Source)

The table below shows all the extractive licences under Part 5 of the WA 1912 held by the proponent. Wilpinjong Coal mine is located within the Hunter Water Shortage Zone Embargo Order 2016. If additional water is required from the consolidated aquifer the proponent will be required to purchase this water from existing users in the system. The proponent should also consider that the Draft Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources is currently on exhibition, and if they wish to make a submission on the Draft WSP they should do so by 20 March 2016. If the proponent requires further discussion on this matter they are encouraged to contact DPI Water.

LICENCE	STATUS	ISSUE DATE	EXPIRY DATE	PURPOSE	PT
20BL170147	ACTIVE	31-Mar-06	30-Mar-16	(DEWATERING (GROUNDWATER))	20PT911279
20BL170148	ACTIVE	31-Mar-06	30-Mar-16	(DEWATERING (GROUNDWATER))	20PT911279
20BL170149	ACTIVE	31-Mar-06	30-Mar-16	(DEWATERING (GROUNDWATER))	20PT911279
20BL170150	ACTIVE	31-Mar-06	30-Mar-16	(DEWATERING (GROUNDWATER))	20PT911279
20BL170151	ACTIVE	31-Mar-06	30-Mar-16	(DEWATERING (GROUNDWATER))	20PT911279
20BL170152	ACTIVE	31-Mar-06	30-Mar-16	(DEWATERING (GROUNDWATER))	20PT911279
20BL170153	ACTIVE	31-Mar-06	30-Mar-16	(DEWATERING (GROUNDWATER))	20PT911279
20BL170063	ACTIVE	19-Dec-06	18-Dec-16	(DEWATERING (GROUNDWATER))	20PT911350
20BL170059	ACTIVE	19-Dec-06	18-Dec-16	(DEWATERING (GROUNDWATER))	20PT911355
20BL170058	ACTIVE	19-Dec-06	18-Dec-16	(DEWATERING (GROUNDWATER))	20PT911356
20BL173513	ACTIVE	11-Jun-13	10-Jun-20	(MINING)	20PT911995
20BL173514	ACTIVE	11-Jun-13	10-Jun-20	(MINING)	20PT911995

20BL173515	ACTIVE	11-Jun-13	10-Jun-20	(MINING)	20PT911995
20BL173516	ACTIVE	11-Jun-13	10-Jun-20	(MINING)	20PT911995
20BL173517	ACTIVE	11-Jun-13	10-Jun-20	(MINING)	20PT911995

It should be considered that the listed PT accounts correspond with the following entitlement, it can be seen from this table that some entitlement is shared between licences.

- 20PT911279 – 770 ML
- 20PT911350 – 110 ML
- 20PT911355 – 110 ML
- 20PT911356 – 110 ML
- 20PT911995 – 2021 ML

The cumulative entitlement held by the proponent from the consolidated aquifer is 3121 ML. The proponent must ensure that sufficient entitlement is held to account for the maximum predicted possible take prior to commencement of construction.

Table 2-1 in Appendix C is incorrect and the proponent should be aware that licences 20BL170063 and 20BL170062 are no longer active licences as they were cancelled in 2013. The proponent may liaise with DPI Water should they wish to further discuss this issue.

It is noted in section 2.3 of Appendix D there is discussion on aquifer interference (AI) activity approvals. The AI activity approval provisions of the WMA 2000 are not yet switched on and AI activities are currently managed under Part 5 of the *Water Act 1912*.

4. Groundwater Assessment

The proposed modification does not involve mining into or beneath any 'highly productive aquifers' and adheres with the distance requirements specified in the AIP. It is considered that the remote location of the expansion limits the potential impacts to water users. Similarly no high priority groundwater dependent ecosystems will be impacted by the mine.

The Groundwater Impact Assessment (GIA) presents the proposed modification as adhering with category 1 'minimal impacts' with just the one exceedance being a predicted greater than 2m water level decline at the Wollar Public School bore which is used for recreational watering. The proponent must ensure that activity does not inhibit the take of water by any licensed user or for basic landholder rights purposes. The revised Water Management Plan must include 'make good provisions' should mine activities inhibit take of water from the Wollar Public School bore.

Although the proponent holds sufficient entitlement from both the alluvial and porous rock aquifers to offset the predicted modelled peak groundwater take; further information is required regarding WAL 21449. WAL 21449 is jointly held by Peabody Pastoral Holdings, and the portion used for irrigation activities needs to be identified to ensure there is no double accounting. It is recommended that the Annual Environmental Management Report for the project include the metering details of 20CA211216.

The AIP sets a water quality threshold of "No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity". The proponent states "Mining-induced changes to the hydraulic properties and depressurisation of the coal-bearing strata in the Wilpinjong Mine area may result in mixing of potentially chemically different groundwater between surficial and deeper units. However, it is considered unlikely that this will result in changes to the beneficial uses of groundwater in the naturally saline alluvial deposits. The risk of water quality impacts decreases with distance from the mine footprint." As such the proponent has given a Level 1 impact classification.

It is noted that the EIS states “The electrical conductivity (EC) (salinity) for Wilpinjong Creek is relatively constant, between 150 and 1800 microSiemens per centimetre ($\mu\text{S}/\text{cm}$), at the upstream site and more variable (500 to 7500 $\mu\text{S}/\text{cm}$) at the downstream site”. Thus there appears to be a significant salinity rise over the WPCL length of Wilpinjong Ck. The proponent states “The difference in water quality between the upstream and downstream sites is influenced by the greater time between rainfall and flow past the gauge at the downstream site, possible increasing contribution from groundwater and greater role of evaporation at the downstream site, the presence of discharge from the RO plant since 2012, and also flows from tributaries, notably Cumbo Creek, which has older geology (Shoalhaven Group) outcropping within its catchment”. Whilst these are plausible inputs, this doesn’t exclude mining as having induced a water quality impact beyond the AIP threshold. The proponent also stated that “... it is likely that mining in Pits 3 and 4 has strengthened the losing behaviour of Cumbo Creek”. The primary saline input should in theory then have diminished under this scenario.

In addition, DPI Water has several monitoring bores to the east of the proposed modification (Figure 1). Water quality results for bore GW273100 indicates a progressive increase in salinity from 2230 $\mu\text{S}/\text{cm}$ in mid-2007 (approximate commencement of mining) to 3378 $\mu\text{S}/\text{cm}$ in 2013. Similarly bore GW273101 has shown an increase in salinity from 2910 $\mu\text{S}/\text{cm}$ in 2009 to 4513 $\mu\text{S}/\text{cm}$ in 2013. Given the rising trend in salinity noted within both DPI Water bores and alluvial bores of the proponent and the significant change in salinity along the length of Wilpinjong Creek adjacent to the mine, the proponent should provide a supplementary report to support a Level 1 impact classification that ‘No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity’. The report must provide descriptive detail to better understand the drivers for the elevated and rising salinity trends in the shallow groundwater and the salinity increase along Wilpinjong Creek. The report to be accompanied with bore construction and lithology logs as these were not included within the GIA.

At the Department of Planning and Environment community consultation meeting held on the evening of 23 February 2016 at the Wollar Community Hall, several landholders expressed concern that the mine was impacting on their groundwater levels and that they had not been contacted regarding the ability to have their bore levels benchmarked. The closest landholder indicated that they were approximately 5km from the mine, the furthest 16km. Whilst the GIA indicates a census of groundwater users was undertaken, details of the WCPL census are minimal and appear to have been focused on the Wollar township. The local community expressed concern that the census had not achieved the objective and that more effort should be undertaken. DPI Water supports a view that groundwater users potentially impacted by the mines activity should be given the opportunity to participate in the on-going groundwater monitoring program. It is recommended WCPL invest further in providing all groundwater users potentially impacted by the mines activities the opportunity to participate in the on-going groundwater monitoring program. Obtaining these benchmarks is important as it provides additional baseline and information should a community complaint activate a trigger action response plan in the water management plan.

Additionally, Figure 6-5 shows Wilpinjong-specific drawdown extending into the Upper Goulburn Water Source. DPI Water understands that the proponent currently hold no entitlement in this water source. Further information is required regarding whether there is potential incidental take of water from this water source which requires accounting via a water access licence.

DPI Water agrees with the assertion made in section 7.3.4 of the GIA that the ‘water balance should be regularly reviewed to confirm groundwater transmission characteristics and modelling predictions.’ It is also recommended that the conditions of consent include the requirement for the site Extraction Plan, Water Management Plan and Water Monitoring Plans to be reviewed in consultation with DPI Water. These revisions should include detailed trigger action response plans for impacts on ground and surface water and monitoring and mitigation of sediment dam over flow.

5. Independent Peer Review of Groundwater Model

Groundwater modelling has been conducted in accordance with the MDBC Groundwater Flow Modelling Guideline (MDBC, 2001) as well as the Australian Groundwater Modelling Guidelines (Barnett et al., 2012). Under the Barnett et al., 2012 guidelines, this model was classified as having a Confidence Level 2.

The independent peer review of the groundwater model was completed by Dr Franz Kalf. Dr Kalf concludes “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). Water table 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).” Dr Kalf states that “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” and “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”.

DPI Water acknowledges the model satisfies the requirements of Groundwater Modelling Guidelines (2012) with the exception of completing the sensitivity analysis. Dr Kalf did not provide any commentary on the exclusion of sensitivity analysis but DPI Water accepts Dr Merrick’s rationale of the longer term data history and site characterisation to constrain unforeseen risks. It is not expected that this omission would undermine the model classification or predictions made. It is recommended that the monitoring bore construction logs be provided to DPI Water to support the conceptual groundwater model.

DPI Water is generally satisfied that the groundwater risks are manageable, however additional information is required to confirm that the AIP ‘minimal impact considerations’ with respect to water quality (salinity) impacts are within category 1 as affirmed.

End Attachment A

Wilpinjong Extension Project – SSD 6764
DPI Water - Assessment Against the Aquifer Interference Policy

Table 2: Has the proponent:

AIP Requirement		Proponent response				DPI Water Comment	
1	Described the water source (s) the activity will take water from?	Description of Water Sources and Plans provided.				Predicted licenced take divided into the Wollar Ck Water Source and Sydney Basin Upper Hunter.	
2	Predicted the total amount of water that will be taken from each connected groundwater or surface water source on an annual basis as a result of the activity?	PERIOD	EFFECT OF WCM		WITH WEP BOREFIELD		Yes, table clip shown
			Mean	Max	Mean	Max	
		Operational period (2015-2033)	138	170	140	171	
		Post-mining (2033-2040)	125	142	126	143	
		Post-mining (2040-2300)	103	146	104	147	
		units are ML/a.					
3	Predicted the total amount of water that will be taken from each connected groundwater or surface water source after the closure of the activity?	As above				Yes, as above plus 0 ML from Sydney Basin post closure.	
4	Made these predictions in accordance with Section 3.2.3 of the AIP? (refer to	Groundwater modelling has been conducted in accordance with the MDBC Groundwater Flow Modelling Guideline (MDBC, 2001) as well as the Australian Groundwater Modelling Guidelines (Barnett <i>et al.</i> , 2012).				Yes, several years of background data, calibrated numerical model verified by independent review.	

AIP Requirement		Proponent response	DPI Water Comment																		
	Table 3, below)	<p>Under the earlier MDBC modelling guideline, the model is best categorised as an Impact Assessment Model of medium complexity. Under the more recent (Barnett et al., 2012) guidelines, this model would be classified as a Confidence Level 2 groundwater model.</p> <p>A network of groundwater monitoring bores has been operated since April 2006 for the purposes of monitoring water levels and water quality. This monitoring network has been extended in recent times. Laboratory analysis is undertaken by a laboratory which has been accredited by the National Association of Testing Authorities, Australia (NATA) to undertake testing for the parameters being determined. Monitoring frequency varies from 15-minute to hourly (using data loggers) to monthly or quarterly intervals, depending on the relevant strata and proximity to mining.</p>																			
5	Described how and in what proportions this take will be assigned to the affected aquifers and connected surface water sources?	<table border="1"> <thead> <tr> <th rowspan="2">PERIOD</th><th rowspan="2">YEARS</th><th>ALLUVIUM</th><th>HARD ROCK</th></tr> <tr> <th>Wollar Creek Water Source</th><th>Sydney Basin – Upper Hunter</th></tr> </thead> <tbody> <tr> <td>During Mining</td><td>2015-2033</td><td>171</td><td>1099</td></tr> <tr> <td>Post-mining</td><td>2033-2045</td><td>143</td><td>0</td></tr> <tr> <td>Post-mining</td><td>2045-2100</td><td>147</td><td>0</td></tr> </tbody> </table>	PERIOD	YEARS	ALLUVIUM	HARD ROCK	Wollar Creek Water Source	Sydney Basin – Upper Hunter	During Mining	2015-2033	171	1099	Post-mining	2033-2045	143	0	Post-mining	2045-2100	147	0	Yes as per table inserted. Additionally Table 6.6 of report shows annual pit inflows.
PERIOD	YEARS	ALLUVIUM			HARD ROCK																
		Wollar Creek Water Source	Sydney Basin – Upper Hunter																		
During Mining	2015-2033	171	1099																		
Post-mining	2033-2045	143	0																		
Post-mining	2045-2100	147	0																		
6	Described how any licence exemptions might apply?	Not described.	No exemptions.																		
7	Described the characteristics of the water requirements?		Has provided predicted annual pit inflows as shown in Table 6.6. These values appear to have been balanced against operational water demands within another report in order to model future shortfall and what is required from the borefield. The shortfall of water is to be made up from a borefield																		

AIP Requirement		Proponent response	DPI Water Comment																																
			screened in coal seams with requirements presented in Table 6.3.																																
8	Determined if there are sufficient water entitlements and water allocations that are able to be obtained for the activity?	<table border="1"> <thead> <tr> <th>LICENCE NO.</th><th>EXTRACTION LIMIT</th><th>EXPIRY</th><th>PURPOSE</th></tr> </thead> <tbody> <tr> <td>20BL173517*</td><td rowspan="5">2021 units (= 2021 ML/a)</td><td>10 June 2020</td><td rowspan="5">Excavation – Groundwater (Min</td></tr> <tr> <td>20BL173516*</td><td>10 June 2020</td></tr> <tr> <td>20BL173514*</td><td>10 June 2020</td></tr> <tr> <td>20BL173515*</td><td>10 June 2020</td></tr> <tr> <td>20BL173513*</td><td>10 June 2020</td></tr> <tr> <td>20BL170063</td><td>110 ML/a</td><td>18 December 2016</td><td>Water Supply Bore (GWs10)</td></tr> <tr> <td>20BL170062</td><td>110 ML/a</td><td>18 December 2011^</td><td>Water Supply Bore (GWs11)</td></tr> <tr> <td>20BL170061</td><td>110 ML/a</td><td>18 December 2011^</td><td>Water Supply Bore (GWs12)</td></tr> <tr> <td>20BL170059</td><td>110 ML/a</td><td>18 December 2016</td><td>Water Supply Bore (GWs14)</td></tr> </tbody> </table> <p>ML/a = megalitres per annum. * WCPL have recently consolidated the five Excavation or Pit licences into this single site-wide 2021 unit ent ^ WCPL is currently in consultation with DPI Water regarding the renewal of these licences.</p> <p>In addition, Peabody Pastoral Holdings and WCPL jointly own a Water Access Licence (WAL 21499) for the alluvial aquifer in the Wollar Creek Water Source under the <i>Water Management Act 2000</i> with a share component of 474 units</p>	LICENCE NO.	EXTRACTION LIMIT	EXPIRY	PURPOSE	20BL173517*	2021 units (= 2021 ML/a)	10 June 2020	Excavation – Groundwater (Min	20BL173516*	10 June 2020	20BL173514*	10 June 2020	20BL173515*	10 June 2020	20BL173513*	10 June 2020	20BL170063	110 ML/a	18 December 2016	Water Supply Bore (GWs10)	20BL170062	110 ML/a	18 December 2011^	Water Supply Bore (GWs11)	20BL170061	110 ML/a	18 December 2011^	Water Supply Bore (GWs12)	20BL170059	110 ML/a	18 December 2016	Water Supply Bore (GWs14)	Sufficient licences held. However details with Peabody Pastoral Holdings may complicate actual use of water. DPI Water and the proponent need to ensure WAL 21499 is appropriately segregated to represent the proportion of units required to offset the aquifer interference component from that utilised for pasture irrigation.
LICENCE NO.	EXTRACTION LIMIT	EXPIRY	PURPOSE																																
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9	Considered the rules of the relevant water sharing plan and if it can meet these rules?	<p>High Priority GDEs as defined in the relevant WSPs (Section 3.6, Figure 3-3) are too distant from the WCM and WEP to be affected by drawdown from the mine.</p> <p>The relevant WSPs do not list any Culturally Significant Sites in the vicinity of the WCM.</p>	<p>The GDEs and cultural sites considered for distance rules.</p> <p>The GIA refers the reader to Sections 2.2.1 and 7. Section 2.1 covers groundwater licences held and discharge permit EPL 12425.</p>																																
10	Determined how it will	WCPL also hold existing licences to cover extraction of 474 ML/yr of	No new licences proposed.																																

AIP Requirement		Proponent response	DPI Water Comment
	obtain the required water?	take from the alluvium of the Wollar Creek Water Source. This is more than sufficient to cover the predicted take from the alluvium (Table 7-1). No additional licensing for the alluvial deposits is required. No additional licensing for the Permian strata is required.	
11	Considered the effect that activation of existing entitlement may have on future available water determinations?	These figures indicate that mining would have a relatively minor effect on the water balance.	Reviewed losses in baseflow and take of water from Wollar Ck Water Source, and indicated there only minor changes in water balance but no discussion on 'available water determinations' not described in GIA
12	Considered actions required both during and post-closure to minimize the risk of inflows to a mine void as a result of flooding?	Referred to Surface Water Assessment (WRM Water & Environment, 2015)	Not described in GIA but reader referred to Surface Water Assessment (WRM Water & Environment, 2015)
13	Developed a strategy to account for any water taken beyond the life of the operation of the project?		Modelled volumes indicated but not described in GIA.
	<i>Will uncertainty in the predicted inflows have a significant impact on the environment or other authorized water users?</i> <i>Items 14-16 must be addressed if so.</i>	A formal sensitivity analysis has not been carried out (although the calibration processes investigates the sensitivity of various model predictions to different model parameters). A formal analysis is not warranted here because the WCM has been operating for a decade and has an extensive network of groundwater monitoring bores (in the coal seam and the alluvium), surface water monitoring sites, and reasonable records and estimates of groundwater inflow. The calibration of the model to both observed groundwater levels and fluxes, i.e. baseflow separation estimates and inflow to the pits, means that the hydraulic conductivity-to-recharge relationship is relatively well constrained.	Independent review has not commented on the exclusion of the sensitivity analysis but states " <i>No fatal flaws have been detected in the description or modelling work conducted.</i> "
14	Considered any potential for causing or enhancing	No mining activity to be below the natural ground surface within 200m laterally from the top of high bank of 100m vertically beneath (or the	Consistent with AIP minimal impact consideration.

AIP Requirement		Proponent response	DPI Water Comment
	hydraulic connections, and quantified the risk?	three dimensional extent of the alluvial water source – whichever is the lesser distance) of a highly connected surface water source that is defined as a “reliable water supply”.	
15	Quantified any other uncertainties in the groundwater or surface water impact modeling conducted for the activity?	<p>Notes of uncertainty Include</p> <ul style="list-style-type: none"> • formation elevations and thicknesses away from the Project • wrt faults their size, scale, vertical persistence, locations of smaller structures and whether they would act as barriers or conduits to flow. 	These uncertainties do not pose significant risk to model predictions due to distance and size.
16	Considered strategies for monitoring actual and reassessing any predicted take of water throughout the life of the project, and how these requirements will be accounted for?	Groundwater inflows to the pits are monitored by recording pump volumes from the in-pit sumps. Field parameters and a suite of water quality parameters are monitored in the sumps on a quarterly basis. Additional pumping rate data has been collected on a higher frequency, with a record of daily pumping hours at individual pumps collated over the period 2012-14. In future more of the pumping data will be collected via flow meters that have recently been installed on key transfer pumps.	Appropriate

**Table 3: Determining water predictions in accordance with Section 3.2.3
(complete one row only – consider both during and following completion of activity)**

	AIP Requirement	Proponent response	DPI Water Comment
1	For the <i>Gateway</i> process: Is the estimate based on a simple modelling platform, using suitable baseline data, that is fit-for-purpose?		See below
2	<p>For <i>SSD</i> or <i>mining</i> or <i>CSG production</i>, is the estimate based on a complex modelling platform that is:</p> <ul style="list-style-type: none"> • Calibrated against suitable baseline data, and in the case of a <i>reliable water source</i>, over at least two years? • Consistent with the Australian Modelling Guidelines? • Independently reviewed, robust and reliable, and deemed fit-for-purpose? 	Section 5.2 of Groundwater Impact Assessment. Groundwater modelling has been conducted in accordance with the MDBC Groundwater Flow Modelling Guideline (MDBC, 2001) as well as the Australian Groundwater Modelling Guidelines (Barnett <i>et al.</i> , 2012). Under the earlier MDBC modelling guideline, the model is best categorised as an Impact Assessment Model of medium complexity.	Yes, several years of background data, calibrated numerical model adhering to modelling guideline calibration targets and verified by independent review.
3	<p>In all other processes, estimated based on a desk-top analysis that is:</p> <ul style="list-style-type: none"> • Developed using the available baseline data that has been collected at an appropriate frequency and scale; and 		See above

AIP Requirement		Proponent response	DPI Water Comment
	<ul style="list-style-type: none"> Fit-for-purpose? 		

Other requirements to be reported on under Section 3.2.3

Table 4: Has the proponent provided details on:

AIP Requirement		Proponent response	DPI Water Comment
1	Establishment of baseline groundwater conditions?	A network of groundwater monitoring bores has been operated since April 2006 for the purposes of monitoring water levels and water quality. This monitoring network has been extended in recent times. Laboratory analysis is undertaken by a laboratory which has been accredited by the National Association of Testing Authorities, Australia (NATA) to undertake testing for the parameters being determined. Monitoring frequency varies from 15-minute to hourly (using data loggers) to monthly or quarterly intervals, depending on the relevant strata and proximity to mining.	Detailed set of hydrographic and chemistry data provided.
2	A strategy for complying with any water access rules?	No new licences required.	Sufficient licences held. However details with Peabody Pastoral Holdings may complicate actual use of water. DPI Water and the proponent need to ensure WAL 21499 is appropriately segregated to represent the proportion of units required to offset the aquifer interference component from that utilised for pasture irrigation to prevent double take.
3	Potential water level, quality or pressure drawdown impacts on	No mining-related drawdowns have been observed in any hard rock or alluvial monitoring	As flagged in the Independent review, the bore at Wollar Public School will need to be

	nearby basic landholder rights water users?	<p>bore in Wollar Village.</p> <p>Bore on private or public land in the vicinity of the WEP include:</p> <ul style="list-style-type: none"> one bore at Wollar Public School (20BL173431) that is used for watering recreational areas and gardens; and one private bore (GW063717) to the south-west of the WCM for stock and domestic use. <p>The groundwater modelling results indicate that only a single registered bore is predicted to experience drawdown greater than 2m as a result of the WEP operation. This bore is owned by Wollar Public School (20BL173431). The bore is screened in the Shoalhaven Group, which is relatively low-yielding. The bore is 60m deep, with approximately 40-50m of available drawdown. The maximum predicted drawdown is 6m, meaning that the bore is unlikely to go dry because of the WEP.</p>	monitoring and remedial practices put in place if impacted.
4	Potential water level, quality or pressure drawdown impacts on nearby licensed water users in connected groundwater and surface water sources?	Drawdown effects from mining are far more prevalent within the coal seam than in alluvium groundwater levels.	No registered users impacted.
5	Potential water level, quality or pressure drawdown impacts on groundwater dependent ecosystems?	The BoM GDE Atlas indicated that potential GDEs which access groundwater in the subsurface have not been mapped in the area	Fine-scale detail and structure of The Drip will not be captured within this regional groundwater model but groundwater flow

		<p>immediately around WCM. The Hunter Unregulated and Alluvial WSP specifies a number of High Priority GDEs. The nearest of these are 130km northeast or 155km east.</p> <p>Although not defined as a 'High Priority', 'The Drip' and associated features are ecologically and culturally significant. These are located 11 km north-northwest of WCM.</p> <p>Most of these High Priority GDE features will not be affected by the operation or expansion of WCM.</p>	<p>directions and distance from mine would support low risk impact.</p>
6	<p>Potential for increased saline or contaminated water inflows to aquifers and highly connected river systems?</p>	<p>Potential acid drainage at the WCM is managed in accordance with the plans documented in Section 4.0 of Geo-Environmental Management (GEM, 2015). These plans cover the following components:</p> <ul style="list-style-type: none"> • Potential acid-forming (PAF) material separation procedures; • PAF material storage procedures; and • Monitoring of surface water and groundwater for the control of PAF materials. <p>The highest groundwater salinity is associated with the alluvium along Wilpinjong, Wollar and Cumbo Creeks where groundwater EC exceeds 8000 $\mu\text{S}/\text{cm}$ at GWa01, GWa07, GWa11A, GWa16, GWa05, GWa06 and GWa33.</p>	<p>Based on the baseline water quality data risk of water quality deterioration in the alluvium is low.</p>

		<p>Groundwater in the alluvium has a higher average salinity than the underlying coal measures.</p> <p>Dissolved metal concentrations are slightly higher in the alluvium groundwater, on average, than groundwater in the coal measures. The difference is more distinct for aluminium and manganese concentrations, which are an order of magnitude higher in alluvium groundwater than in coal measures.</p>	
7	Potential to cause or enhance hydraulic connection between aquifers?	No mining activity to be below the natural ground surface within 200m laterally from the top of high bank of 100m vertically beneath (or the three dimensional extent of the alluvial water source – whichever is the lesser distance) of a highly connected surface water source that is defined as a “reliable water supply”.	Consistent with the AIP requirements.
8	Potential for river bank instability, or high wall instability or failure to occur?		Not within the GIA
9	Details of the method for disposing of extracted activities (for CSG activities)?	N/A	N/A

1. Table 5: Minimal impact considerations – example tables

Aquifer	Alluvial aquifer	
Category	Highly Productive	
Level 1 Minimal Impact Consideration		Assessment
<u>Water Table</u> <p>Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic “post-water sharing plan” variations, 40 m from any:</p> <p>(a) high priority groundwater dependent ecosystem; or</p> <p>(b) high priority culturally significant site;</p> <p>listed in the schedule of the relevant water sharing plan.</p> <p>OR</p> <p>A maximum of a 2 m water table decline cumulatively at any water supply work.</p>		<p>The relevant Water Sharing Plan is the ‘Hunter Unregulated and Alluvial Water Sources’ (2009).</p> <p>There are no Culturally Significant Sites in the Study Area listed in the WSP. Hence there are no known risks of mine development to such sites.</p> <p>There are no High Priority GDEs listed in this WSP in the Study Area.</p> <p>There is minimal risk of drawdown at current water supply works in excess of the drawdown criterion within the alluvial deposits.</p> <p>Level 1 minimal impact consideration classification.</p>
<u>Water pressure</u> <p>A cumulative pressure head decline of not more than 40% of the “post-water sharing plan” pressure head above the base of the water source to a maximum of a 2m decline, at any water supply work.</p> <p>OR, for the Lower Murrumbidgee Deep Groundwater Source:</p> <p>A cumulative pressure head decline of not more than 40% of the “post-water sharing plan” pressure head above the top of the relevant aquifer to a maximum of a 3m decline, at any water supply work.</p>		<p>There is minimal risk of drawdown at current water supply works in excess of the criterion within the alluvial deposits.</p> <p>Level 1 minimal impact consideration classification.</p>

Water quality

Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity.

No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity.

No mining activity to be below the natural ground surface within 200m laterally from the top of high bank or 100m vertically beneath (or the three dimensional extent of the alluvial water source - whichever is the lesser distance) of a highly connected surface water source that is defined as a “reliable water supply”.

Not more than 10% cumulatively of the three dimensional extent of the alluvial material in this water source to be excavated by mining activities beyond 200m laterally from the top of high bank and 100m vertically beneath a highly connected surface water source that is defined as a “reliable water supply”.

Mining-induced changes to the hydraulic properties and depressurisation of the coal-bearing strata in the Wilpinjong Mine area may result in mixing of potentially chemically different groundwater between surficial and deeper units. However, it is considered unlikely that this will result in changes to the beneficial uses of groundwater in the naturally saline alluvial deposits. The risk of water quality impacts decreases with distance from the mine footprint.

Level 1 minimal impact consideration classification.

This is generally accepted however, it is noted that the electrical conductivity (EC) (salinity) for Wilpinjong Ck is relatively constant, between 150 and 1800 microSiemens per centimetre ($\mu\text{S}/\text{cm}$), at the upstream site and more variable (500 to 7500 $\mu\text{S}/\text{cm}$) at the downstream site. Thus there appears to be a significant salinity rise over the WPCL. The proponent states *“The difference in water quality between the upstream and downstream sites is influenced by the greater time between rainfall and flow past the gauge at the downstream site, possible increasing contribution from groundwater and greater role of evaporation at the downstream site, the presence of discharge from the RO plant since 2012, and also flows from tributaries, notably Cumbo Creek, which has older geology (Shoalhaven Group) outcropping within its catchment”*. Whilst these are plausible inputs, this doesn't exclude mining has induced a water quality impact beyond the AIP threshold. **A supplementary report to support this Level 1 impact classification is warranted.**

Aquifer	Porous rock or fractured rock	
Category	Less productive	
Level 1 Minimal Impact Consideration		Assessment
<u>Water Table</u> Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic “post-water sharing plan” variations, 40m from any: <ul style="list-style-type: none"> (a) high priority groundwater dependent ecosystem; or (b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan. OR A maximum of a 2m water table decline cumulatively at any water supply work.		The relevant Water Sharing Plan is the ‘North Coast Fractured and Porous Rock Groundwater Sources WSP’ (not yet commenced). There are no Culturally Significant Sites in the Study Area listed in the WSP. Hence there are no known risks of mine development to such sites. There are no High Priority GDEs listed in this WSP in the Study Area. There is a likely risk of drawdown in excess of the water supply work drawdown criterion within the Permo-Triassic strata (at one private bore). Level 2 minimal impact consideration classification.
<u>Water pressure</u> A cumulative pressure head decline of not more than a 2m decline, at any water supply work.		Likely risk of drawdown in excess of the criterion within the Permo-Triassic strata (at one private bore). Level 2 minimal impact consideration classification.
<u>Water quality</u> Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40m from the activity.		Mining-induced changes to the hydraulic properties and depressurisation of the strata in the Wilpinjong Mine area may result in mixing of potentially chemically different groundwater between overlying and underlying units. However, it is considered unlikely that this will result in changes to the beneficial uses of groundwater in the Permo-Triassic rock units. The risk

	<p>of water quality impacts decreases with distance from the mine footprint.</p> <p>Level 1 minimal impact consideration classification.</p>
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Proposed remedial actions where impacts are greater than predicted

Point 3 of section 3.2 of the AIP provides a basic framework for considerations to consider when assessing a proponent's proposed remedial actions.

Table 5: Has the proponent:

AIP Requirement		Proponent response	DPI Water Comment
1	Considered types, scale, and likelihood of unforeseen impacts <i>during operation</i> ?	Based on the assessment presented above, and in consideration of the IESC Information Guideline Requirements and the Significant Impact Guidelines 1.3 (Commonwealth of Australia, 2013), the action (as defined in Section 1.4.5) would not result in significant changes to the quantity or quality of water available to third party users or the environment. Accordingly, the action would not have a significant impact on water resources.	Acceptance of the Independent Review findings on Groundwater Model predictions. No groundwater model sensitivity analysis undertaken.
2	Considered types, scale, and likelihood of unforeseen impacts <i>post closure</i> ?	Impacts likely to reduce as mining operations move further away from Wilpinjong Ck and the Drip.	Accepted with note above.
3	Proposed mitigation, prevention or avoidance strategies for each of these potential impacts?	Refer to Surface and Ground Water Response Plan (inclusive of contingency measures required under extraction licences.	Relinquishment of licences not described.
4	Proposed remedial actions should the risk minimization strategies fail?	As above.	DPI Water to review updated WMP.
5	Considered what further mitigation,	As above.	DPI Water to review updated WMP.

	prevention, avoidance or remedial actions might be required?		
6	Considered what conditions might be appropriate?	As above plus WCM operate a number of surface water storages and tailings dams around the site, and diversions up-gradient of the pits. A reverse osmosis (RO) plant has been installed to allow on-site treatment of waste water and subsequent discharge to Wilpinjong Creek in accordance with an Environment Protection Licence (EPL).	DPI Water to review updated WMP

2. Other considerations

These considerations are not included in the assessment framework outlined within the AIP, however are discussed elsewhere in the document and are useful considerations when assessing a proposal.

Table 6: Has the proponent:

	AIP Requirement	Proponent response	DPI Water Comment
1	Addressed how it will measure and monitor volumetric take? (page 4)	Groundwater inflows to the pits are monitored by recording pump volumes from the in-pit sumps. Field parameters and a suite of water quality parameters are monitored in the sumps on a quarterly basis. Additional pumping rate data has been collected on a higher frequency, with a record of daily pumping hours at individual pumps collated over the period 2012-14. In future more of the pumping data will be collected via flow meters that have recently been installed on key transfer pumps.	Accepted.
2	Outlined a reporting framework for volumetric take? (page 4)	The monitoring program has been designed to: <ul style="list-style-type: none"> • Enable construction, calibration and refinement of multiple iterations of groundwater modelling necessary for 	Accepted

		<p>various rounds of approvals;</p> <ul style="list-style-type: none"> • Be used in the continued development of groundwater impact assessment criteria and investigation triggers , as set out in the Groundwater Monitoring Plan; and • Provide input to annual reviews of groundwater monitoring data. <p>Annual Environmental Management Report</p>	
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End Attachment B