NSW GOVERNMENT | Department of Primary Industries

OUT15/30660

Mr Stephen O'Donoghue
A/Director Resource Assessments
NSW Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Stephen.O'donoghue@planning.nsw.gov.au

Dear Mr O'Donoghue,

Bylong Coal Project [SSD 14_6367]
Response to exhibition of Environmental Impact Statement

I refer to your email dated 21 September 2015 requesting advice from the Department of Primary Industries (DPI) in respect to the above matter.

DPI has assessed the Environmental Impact Statement (EIS) for the above Project and advises thefollowing key issues, with detailed assessments also attached. from a DPI perspective are the lack of assessment of potential impact to agriculture from loss of groundwater, and potential security of water supply to the mine during drought.

1. The proponent should provide a more comprehensive assessment of the potential impacts that may result from the reduction in availability of groundwater to agriculture during dry years.
2. DPI Water advises that the water security to the project during extended drought periods remains uncertain and this warrants further consideration by the proponent.
3. Impacts to Biophysical Strategic Agricultural Land (BSAL) are likely to be underestimated by the EIS due to:
    a. Uncertainty in the verification methodology
    b. Some BSAL being surrounded by disturbed areas and subsequently impacted
    c. Biodiversity offsets including BSAL.
    d. No impacts considered to BSAL resulting from underground mining
4. Improvements are recommended to the rehabilitation methodology and documentation.
5. Resolution of access and ownership of Crown Land.

Detailed comments are provided as follows;

- Attachment A –DPI Water detailed comments and recommendations.
- Attachment B – DPI Water comments relating to assessment against the Aquifer Interference Policy (AIP).
- Attachment C – DPI Agriculture detailed comments.
- Attachment D – DPI Lands comments.

For further information DPI Water, please contact Alison Collaros, Senior Water Regulation Officer, [Newcastle Office], on 4904 2527 or at alison.collaros@dpi.nsw.gov.au.

For further information DPI Agriculture please contact Jo Powells, AIS Officer, (Orange office) on 6391 3885, or at: jo.powells@dpi.nsw.gov.au, or John Friend, Technical Leader, Agricultural Land Management, (Port Stephens office) on 4916 3800 or at john.friend@dpi.nsw.gov.au.

For further information from DPI Lands contact Kay Oxley, Senior Natural Resource Management Officer, (Orange Office) on 6391 4334 or at kay.oxley@lands.nsw.gov.au.

DPI Fisheries Comment

DPI Fisheries advise nil issues in relation to direct impacts on Aquatic habitats. However the potential for any water loss from the alluvial system and subsequent potential impacts on the downstream receiving waters should be considered in assessing the impacts of this proposal.

For further information please contact Scott Carter, Regional Manager – Central/Metro, (Port Stephens Office) on 4916 3931, or at scott.carter@dpi.nsw.gov.au.

Yours sincerely

Mitchell Isaacs
Director, Planning Policy & Assessment Advice
11/11/2015

Attachment A

Bylong Coal Project [SSD 14_6367]
Response to exhibition of EIS
Detailed Comments - DPI Water

Insufficient information is supplied in the report with respect to the proposed borefield and other aspects of the groundwater assessment. The independent groundwater modelling reviewer has assessed the model and concluded the model to be fit for purpose according to the framework of the Australian Groundwater Modelling Guidelines. There are however, a number of limitations that DPI Water noted below which need to be resolved via provision of a supplementary report.

1) Aquifer Interference Policy

Drawdown impacts from the mine related impacts onto nearest users cannot be reliably predicted. This issue is compounded in that the details of the proposed borefield location have not been presented and it is unclear how this extraction is considered within the groundwater model. Further, the alluvial aquifer is of limited thickness and any additional decline in water levels, particularly during a drought would impact significantly on adjoining groundwater users. Any additional water table decline as a consequence of the mine, particularly during a drought, could make many wells non-viable.

To address this concern, upon commencement of mining, implementation of "make good provisions" should apply to all impacted users within the alluvial area of the project boundary. Applicable make good provisions should be detailed by the proponent prior to the commencement of operations.

There is potential for salinity change and contamination transport from overburden emplacement areas. Whilst the geochemistry has been thoroughly addressed, the supporting documentation to mark the boundary between colluvium and alluvium is minimal. This is because the soil mapping is produced at a broad scale and will have inaccuracies. The consequence being that there is potential for mining and mine spoil emplacement to be located within alluvial boundary where such inaccuracies exist.

To address this concern further supporting documentation is required delineating at a local scale the alluvial/colluvial boundary from which the 150m setback will apply. This should therefore be verified by field work using the proponent's mine plans to ensure the alluvium setbacks are maintained in the field.

2) Mine Water Security

Water supply reliability of the proposed borefield including planned expansions during extended drought periods is unknown and insufficient detail about the borefield was provided for review. Section 13.6 from the EIS summarises the precarious capacity of the alluvial aquifer to meet mine water demands, both during open cut and underground operations.

"During the dry season, it is likely that many of the irrigation wells are unable to sustain high abstraction volumes, and the groundwater modelling confirms this."

The security of mine's water supply warrants detailed consideration and reporting.

3) Aquifer Conceptualisation

Conceptual hydrogeology could not be adequately assessed due to the proponent not providing bore logs and groundwater contour maps for each aquifer.

4) DPI Infrastructure

DPI Water requires ongoing access to network infrastructure which is situated within the Project area. These bores are to be used as part of the ongoing regulation of the Bylong River Water Source.

5) Groundwater Model

- No groundwater level outputs from the model for layers between the Alluvium and Coggan seams were provided to understand the model behaviour in these layers.
- The sensitivity analysis was not thorough enough in terms of varying the ratio between horizontal to vertical hydraulic conductivity nor was justification for the magnitude difference provided.
- The model is over predicting water levels which means there is too much water in the model that is then potentially available to attenuate the water levels in the alluvium aquifer (with low vertical K values) resulting in dampened drawdown predictions due to mining.
- The likely presence of multiple semi-confined aquifers separated by aquitards and the potential for several distinct, largely unrelated shallow water tables to be present within the modelling domain suggests that other model codes could be better suited to the site.

It is suggested therefore that the model should be used with care when assessing drawdown effects and the propagation of the drawdown cone outwards from open cut and underground mines.

6) Water Licensing

The proponent does not currently hold a licence under Part 5 of the Water Act to account for the take of water from the Permian aquifer. The predicted maximum take of groundwater from the Permian aquifer is approximately 2093ML. The proponent will be required to apply for a licence under Part 5 of the Water Act 1912 and provide sufficient modelling and supporting information to justify the requested volume. The application is subject to assessment and there is no guarantee that the requested entitlement can be granted.

The proponent holds total licensed entitlement of 2535 shares within the Bylong water source. The maximum total take of surface and alluvial water from the Bylong water source is predicted to be 1149ML, with an average take of 491ML per annum. Therefore, it appears that sufficient entitlement is held to account for take of surface and alluvial waters. However there are significant constraints on the availability of water within the alluvial aquifer, meaning that it may not be possible for the proponent to access the full entitlement in dry periods during high demand.

Calculated harvestable rights of the lands held by Kepco is 355ML. Kepco currently have 63 dams on minor streams with a combined estimated volume of 89ML. Additional harvestable rights water is therefore potentially available.

Section 9.2.5 states that ‘further water allocations under the HUAWSP may also be secured by KEPCO into the future through a new water licence application under Part 5 of the Water Act”. It is noted that an application under Part 5 of the Water Act can only be accepted for the Permian aquifer, which is not covered by the HUAWSP. Any entitlement obtained in this manner will not be able to be used to account for take of water from the alluvial aquifer. Further, the Permian aquifer will be covered by the Water Sharing Plan for the North Coast Fractured and Porous Rock Water Sources in the near future.

In order to ensure that all water use by the proponent is adequately monitored, including mining and agricultural enterprises, the proponent will be required to fit an appropriate measurement device to all extraction points and any relevant transfer or pump locations on the mine site.

7) Subsidence

The EIS states that sections of Dry Creek have potential to be impacted by surface cracking as a result of subsidence. The EIS states that "…*stream bed surface cracking that occurs as a result of mining will be remediated by infilling and regrading (where accessible) as soon as practical after being identified".* DPI Water has two concerns with this statement.

No remediation technique has been proposed for sections of creek that are not accessible by machinery. It is requested that additional strategies be identified to avoid, minimise and manage surface cracking in less-accessible sections of Dry Creek.

Recommendations

With regard to this EIS proposal for the Bylong mine, insufficient information has been provided for DPI Water to assess the overall impacts and additional information is required:

With regards to Water Licensing it is recommended:

- The proponent must obtain a licensed entitlement of at least 2093ML under the *Water Act 1912* to account for predicted take from the Permian aquifer. The proponent must submit an application to DPI Water for such a license.

- The proponent must supply a plan for monitoring actual take of water and how any changes from the predictions will be accounted for with water licences and remediation, as required by Recommendation 5 of Section 17H4(a)(iv) of the Gateway Certificate Recommendations.

With regard to the AIP "minimal impact considerations", it is recommended:

- A hydrogeolological assessment report of the borefield extraction proposal, including a detailed local scale map showing the proposed water supply borefield location and borefield expansion locations along with a proposed take from each individual bore.

- Perform appropriately designed aquifer pump testing of key individual aquifers with monitoring of nearby bores.

- The proponent commits to implement "make good provisions" for all existing landowners reliant on the alluvial aquifer within the project boundary upon commencement of the mine. These provisions must be described by the proponent prior to commencement of operations.

- To manage contamination transport from the coal spoils areas, implement RGS Environmental Pty Ltd management measures with additional appropriate groundwater and spoil seepage monitoring.

- Supporting documentation is required delineating at a local scale the alluvial/colluvial boundary from which the 150m setback will apply. Perform field mapping within a 200m setback vicinity of pits, spoil or overburden emplacement areas that are in proximity to the DPI mapped alluvium.

With regard to mine water security, it is recommended:

- That intensive borehole water level monitoring is relied upon during mining to monitor drawdown impacts.

With regard to Aquifer Conceptualisation it is recommended:

- Provide bore logs, drilling reports and bore construction details including any downhole geophysical logs, where applicable, for all groundwater monitoring bores or other bores that provided reliable information about the state of water saturation in the subsurface.
- A sufficient number of legible cross-sections to be provided in all orientations to adequately describe the geology.
- A map showing recharge zones/areas for each individual aquifer.
- Proponent to revisit the groundwater level and geological data obtained from field work and provide local scale groundwater contour maps (described below) for each individual aquifer, limited to within their geological extent, with bores labelled with a representative rest water level. Provide a summary table of all the bores screened within the individual aquifers and provide an additional map showing locations of the named bores at a local scale.
- Provide maps that separate the shallow water table for the hilly areas, especially in the north east of A287, from the shallow water table in the valley floor Alluvium aquifer. The groundwater contour map of the Alluvium aquifer is to be provided without amalgamation of other water level data from the Basalt, Permian or Triassic Aquifers. The thickness of the saturated zone and unsaturated zones in the Alluvium is also to be provided.
- Provide separate groundwater contour maps for the Coggan and Ulan Coal Seam Aquifers unless they can be shown to be hydraulically well connected.
- Provide separate groundwater contour maps for each of the formation strata overlying the Coggan and Ulan Coal Seam Aquifers or justify, using field data, the presumption of unsaturated conditions occurring all the way up into the aquifer surrounding the basalt. The thickness of the saturated zone and unsaturated zones within these strata is also to be provided.
- A map depicting the depth of the weathered zone within the Project boundary and comment in greater detail on the water bearing capacity of this zone.
- Provide a separate groundwater contour map for the Basalt aquifer beneath Dry Creek. The thickness of the saturated zone and unsaturated zones in the Basalt is also to be provided.
- Provide a water balance for each of the aquifers in the project area and quantify the volumes available for use as a water supply source to understand the availability of water during extended drought periods.
- Due to uncertainty with the current hydrogeological conceptual model, future drilling and construction of a limited and reasonable number of monitoring bores into sandstones may be required should a data gap be recognised (Farmers Creek Formation, the Gap Sandstone, Watts Sandstone or other aquifers).

- Proponent to standardise a naming convention for the geology and hydrogeology (aquifers or aquitards) on site and to clear up uncertainty about the basement geology on site.

With regard to access to DPI Infrastructure, it is recommended:

- The proponent commit to the continued access to DPI Water monitoring bores.

With regard to groundwater model, it is recommended:

- Re-run the model with a lower order of magnitude difference between the vertical and horizontal hydraulic conductivity and report on the results.

Additional recommendations include:

- A seepage meter be installed further downstream of ID5 on the existing freehold property to gauge whether the river is losing or gaining here and see if there is a correlation with water use by other users in the area.
- That further streamflow measurement locations are located at the confluence of the Bylong River and Growee River to measure upstream contributions from each of these rivers respectively. In addition, a further stream flow measurement location is recommended at the confluence of Lee Creek and the Bylong River.
- An automated Class A pan for measuring evaporation is installed on site.

Additional strategies should be identified to avoid, minimise and manage surface cracking and subsequent impacts in Dry Creek and other water courses affected by surface cracking.

End Attachment A

Attachment B

Bylong Coal Project [SSD 14_6367]
Response to exhibition of EIS
Detailed comments - DPI Water

DISCLAIMER
This is a document produced to aid interpretation and application of the NSW Aquifer Interference Policy (2012). All information in this document is drawn from that policy, and where there is any inconsistency, the policy prevails over anything contained in this document.

Any omissions from this framework do not remove the need to meet any other requirements listed under the Policy.

Assessing a proposal against the NSW Aquifer Interference Policy

Note for proponents:
This is the basic framework against which the DPI Water uses to assess project proposals against the NSW Aquifer Interference Policy (AIP).

While you are not required to use this framework, you may find it a useful tool to aid the development of a proposal or an EIS.

We suggest that you summarise your response to each AIP requirement in the table below, and provide a reference to the section of your EIS that addresses that particular requirement. Using this tool can help to ensure that all necessary factors are considered, and will help to understand what the requirements of the AIP are.

Step by step guide to assessing a proposal against the AIP:

Table 1: Does the activity require detailed assessment under the AIP?

	Consideration	Response
1	Is the activity defined as an aquifer interference activity?	If **NO,** then assessment is complete. No assessment is required under the AIP. If **YES,** continue to 2.
2	Is the activity a defined minimal impact aquifer interference activity according to section 3.3 of the AIP?	If **YES**, then no further assessment against this policy is required. Volumetric licensing still required for any water taken,

		unless exempt. See the implementation manual for a more detailed discussion. If **NO**, then continue on for a full assessment of the activity.

Section 3.2 of the AIP defines the framework for assessing impacts. These are addressed here under the following headings:

1. Accounting for, or preventing the take of water.
2. Addressing the minimal impact considerations.
3. Proposed remedial actions where impacts are greater than predicted.

1. **Accounting for, or preventing the take of water**

Where a proposed activity will take water, adequate arrangements must be in place to account for this water. It is the proponent's responsibility to ensure that the necessary licences are held. These requirements are detailed in Section 2 of the AIP, with the specific considerations in Section 2.1 addressed systematically below.

Where a proponent is unable to demonstrate that they will be able to meet the requirements for the licensing of the take of water, consideration should be given to modification of the proposal to prevent the take of water.

Table 2: Has the proponent:

	AIP Requirement	Proponent response	DPI Water Comment
1	Described the water source (s) the activity will take water from?	Based on the AIP, the groundwater system impacted by the Project can be separated into two systems, as follows: • porous and/or fractured consolidated sedimentary rock of the Permian coal measures; and • groundwater within alluvium associated with the Bylong River and Lee Creek alluvium Water quality and yields for the coal measures and Permian coal measures is considered a less productive aquifer according to the AIP because yields >5L/sec are considered unlikely and salinity <1,500 mg/L is not common, while the Bylong River and Lee Creek alluvium is considered a highly productive aquifer as yields >5L/sec are considered achievable and salinity <1,500 mg/L occurs in some areas.	The alluvial groundwater forms part of the Bylong River Water Source under the rules of the Hunter Unregulated and Alluvial Water Sharing Plan. For porous and fractured rock aquifers at Bylong the area is currently managed under Water Act (1912), but will change to Water Management Act once a Groundwater Sharing Plan is completed by DPI Water. Information on volumes of groundwater take is summarised in the following point but missing the take of water from the basalts, overlying the porous rock aquifer. It is recommended that proper aquifer pump testing of sufficient duration, that includes monitoring at nearby bores, be conducted in order to confirm the assumptions by the proponent. The proponent has not provided groundwater contour maps for individual aquifers nor differentiated between shallow water tables within the alluvium on the plains and shallow water table surface aquifers on the hills. A discussion and detailed information about the capacity of the aquifers and aquitards above the Ulan and Coggan Coal seam aquifers is generally lacking in the report (including lack of borelogs).

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?	Predicted take based on this modelling for the Project include: • Permian coal measures: 2,109 ML/year at peak, 1,200 ML/year on average • Quaternary alluvium: 1,149 ML/year at peak, 491 ML/year on average • Take from Bylong River baseflow and Lee Creek baseflow is accounted for in Quaternary alluvium water take	1149 ML/year of take from the quaternary alluvium Bylong Water Source volumes have been estimated. The borefield pumping estimate peak is 1172 ML/year (average 338 ML/year) for mine water needs and indirect take from the alluvium to the mine its peak 295 ML/year and average 153 ML/year. Proponent has estimated the major alluvial take from Bylong River and Lee Creek but no commentary on the location of the borefield and subsequent impacts. There is some concern on the losses of alluvial groundwater outside the limits set by the model to the coal seams when underground mining occurs. The coal sub crops below the alluvium and the model may be under estimating the inflow take of water from the alluvium into the mine working. The proponent has not provided a map of locations of 15 bores from which take will occur. The effect of extended drought could result in up to 31 additional bores being drilled in other areas, the locations of these bores have also not been provided. The expected take from each bore has not been considered.

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?	• Gradual recovery to pre-mining conditions, and no greater water takes than that predicted during mining operations	Table 10.6 is provided in the EIS Requires ongoing monitoring post–closure.
4	Made these predictions in accordance with Section 3.2.3 of the AIP? (refer to Table 2, below)	• Based on 3D numerical modelling.	Noel Merrick of Hydro Simulations, in his capacity as independent reviewer, has appraised the modelling work according to the Australian Groundwater Modelling Guidelines and he has concluded that the model as being "fit for purpose". However there are some limitations and model outputs should used with caution. Pumping of the Ulan and Coggan Coal seam aquifers is likely to result in drawdown in the Alluvium aquifer (additional to that caused by the bores taking water from the Alluvium) and result in decreased baseflows in the local rivers and creeks in what is a hydraulically connected groundwater system . There is uncertainty if there will be sufficient supply during drought years to meet their demands.
5	Described how and in what proportions this take will be assigned to the affected aquifers and connected surface water sources?	Predicted takes based on the modelling for the Project include: • Permian coal measures: 2,109 ML/year at peak – 1,200 ML/year on average • Quaternary alluvium: 1,149 ML/year at peak 491ML/year on average	Mining volumes provided but requires further breakdown with details.
6	Described how any licence exemptions might apply?	• Not necessary.	Not described

7	Described the characteristics of the water requirements?	Initial estimates: • Mine Industrial Areas and Workforce Accommodation Facility– 22 ML/year • Open Cut – 1,041 ML/year • Underground – 50 - 500 ML/year • CHPP – 249 – 395 ML/year	Recommend a bar chart (or similar) be provided displaying predicted take of water against water demand on annual basis.
8	Determined if there are sufficient water entitlements and water allocations that are able to be obtained for the activity?	KEPCO has secured approximately 2,535 units of water allocation from the Bylong Water Source under the Hunter Unregulated and Alluvial Water Sharing Plan.	Proponent has estimated the take to be 3258 ML/year from both the Permian Coal seam aquifers and the Alluvium. Appear to hold sufficient entitlement from the Bylong River Water Source. They have no entitlement from the Permian and will need to make an application for the peak predicted take of water managed under the Water Act (1912).
9	Considered the rules of the relevant water sharing plan and if it can meet these rules?	No cease to pump rules have been established for Bylong River water source. The Hunter Unregulated WSP requires cease to pump rule be established by 2019. As a large landholding has been acquired by the proponent this affords the opportunity to space abstraction wells at sufficient distances to minimise drawdown and ensure compliance with future cease to pump levels.	The proponent has a large buffer in their alluvial entitlement should an available water determination (AWD) be proclaimed on the Bylong River Water Source. DPI Infrastructure (bores) lies within the proponent's land. The WSP outlines a commitment to establish cease to pump (CtP) rules based on water levels within these bores. The proponent's activities may influence both the triggers established at these reference sites and the actual triggering of the CtP.
10	Determined how it will obtain the required water?	Via seepage to the mine face – a portion will likely evaporate or be removed as moisture in coal and will not enter the site water circuit. A supplementary bore field will also be constructed within the alluvium.	The extraction borefield in the alluvium has not been described in required detail to demonstrate the impacts on nearby users and the environment. No local scale maps for the locations of boreholes nor the proposed take volumes from each of the bores, was provided. The borefield is a critical element for water security to the mine where the level of detail provided within the EIS is not commensurate

			with this risk. Aquifer pump testing is a key component of this assessment.
11	Considered the effect that activation of existing entitlement may have on future available water determinations?	Modelling indicates the existing bores with entitlements cannot take their full entitlement due to the limited saturated thickness of the aquifer system. Current groundwater entitlements for Bylong River are 5,843 units (or ML/year at full AWD). The proponent has secured almost half of this at 2,535 units.	Proponent has estimated the take to be 3258 ML/year for their operations. The proponent proposes that based on existing information from landowners the aquifer is potentially over allocated. During extended drought years a question mark remains as to whether the proponent will obtain sufficient water for their operations. DPI Infrastructure (bores) lies within the proponent's land. The WSP outlines a commitment to establish cease to pump (CtP) rules based on water levels within these bores. The proponent's activities, particularly the borefield may influence both the triggers established at these reference sites and the actual triggering of the CtP.
12	Considered actions required both during and post-closure to minimize the risk of inflows to a mine void as a result of flooding?	Open cut mine plans have been designed to be located outside of the flood limits of Bylong River and Lee Creek. The Open Cut Mining Area at completion of open cut operations will retain a void which is proposed to be backfilled throughout the ongoing underground mine life, and will therefore the final landform will not obtain a mining void post mining activities.	The hydraulic conductivity of the backfilled open cut voids is higher. The capacity to store greater amounts of water within the filled void could result in overland flow being altered so that flows into local creeks and rivers could potentially be altered and have an impact on the environment. Overall low risk.
13	Developed a strategy to account for any water taken beyond the life of the operation of the project?	Allocate existing and future water entitlements to the Project water takes to license take of water as necessary.	Satisfactory.

	Will uncertainty in the predicted inflows have a significant impact on the environment or other authorized water users? *Items 14-16 must be addressed if so.*	The proponent has secured a large landholding surrounding the mine and a large volume of water entitlements. This creates a large buffer around the mining Project, meaning impacts on users beyond this buffer are considered unlikely.	There is a risk that this may be the case. The model predictions to be used with caution due to model limitations and "Make Good provisions" should be implemented at the immediate onset of mining to ensure remaining landowner within authorizations endure no delays in their security of water supply.
14	Considered any potential for causing or enhancing hydraulic connections, and quantified the risk?	Mine plan has been designed to remain outside of the 150 m from the edge of the neighbouring alluvium to ensure that impacts to the alluvial system are minimised as far as possible. Underground mine will potentially fracture overlying strata, but this will not result in any direct connection to the alluvial aquifer. Designs have incorporated angle of draw to stay outside 40 m stand off from the alluvium.	The setback distances from the alluvium are determined from the boundary of the extent of the alluvium as depicted on broad scale mapping. There is potential for this mapping to be inaccurate and should therefore be verified by field work using the proponent's mine plans to ensure the alluvium setbacks are maintained in the field. Seepage through the higher hydraulic conductivity of the mine spoils could potentially flow over underlying strata or through the underlying strata towards the Alluvium aquifer.
15	Quantified any other uncertainties in the groundwater or surface water impact modelling conducted for the activity?	A sensitivity and uncertainty analysis has been completed to identify parameters that demonstrate most substantial changes in the predictions.	The sensitivity and uncertainty analysis of the model has been independently reviewed according to the Australian Groundwater Modelling guidelines as being very good. A further sensitivity test on the model would be useful by minimising the vertical to horizontal hydraulic conductivity ratio parameter to constrain it to within one or two orders of magnitude.

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?	Ongoing monitoring and verification of modelling.	More monitoring bores at key sites are recommended.

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	NOW Comment
1	For the *Gateway* process: Is the estimate based on a simple modelling platform, using suitable baseline data, that is fit-for-purpose?		NA
2	For *SSD* or *mining* or *CSG production*, is the estimate based on a complex modelling platform that is: • Calibrated against suitable baseline data, and in the case of a *reliable water source*, over at least two years? • Consistent with the Australian Modelling Guidelines? • Independently reviewed, robust and reliable, and deemed fit-for-purpose?		The independent reviewer assessed that the model underpinning the groundwater assessment is “fit for purpose” where the primary purpose of the model is the prediction of environmental impacts in the context of the Aquifer Interference Policy, and estimation of water takes for licensing.

3	In all other processes, estimated based on a desk-top analysis that is: • Developed using the available baseline data that has been collected at an appropriate frequency and scale; and • Fit-for-purpose?		NA

Other requirements to be reported on under Section 3.2.3

Table 4: Has the proponent provided details on:

	AIP Requirement	Proponent response	NOW Comment
1	Establishment of baseline groundwater conditions?	Refer Section 7. The Project's monitoring program is extensive and has been undertaken over more than 2 years.	More monitoring bores are required into aquifers that were not targeted. A summary of all the monitoring bores per specific stratigraphic unit is recommended
2	A strategy for complying with any water access rules?	Sufficient water licences are held by proponent to account for the predicted water take. No cease to pump rules have been established for Bylong River water source. The Hunter Unregulated WSP requires a cease to pump rule be established by 2019. As a large landholding has been acquired by the proponent this affords the opportunity to space abstraction wells at sufficient distances to minimise drawdown and ensure compliance with future cease to pump levels.	Agree, but the proponent's activities, particularly the borefield may influence both the triggers established at these reference sites and the actual triggering of the CtP.

3	Potential water level, quality or pressure drawdown impacts on nearby basic landholder rights water users?	No private bores predicted to be impacted >2 m	This prediction is based on modelling subject to limitations and caution needs to be utilised in interpreting model derived drawdown predictions. This issue is compounded in that the details of the proposed borefield location have not been presented and it is unclear how this extraction is considered within the groundwater model. Further, the alluvial aquifer is of limited thickness and any additional decline in water levels, particularly during a drought would impact significantly on adjoining groundwater users. It is of note that the level of

			accuracy for many of the model calibration targets approximates the AIP threshold. Therefore it is recommended that “make good” provisions are instituted immediately at the onset of mining for those licensees within the alluvial extent of the project boundary.
4	Potential water level, quality or pressure drawdown impacts on nearby licensed water users in connected groundwater and surface water sources?	No private bores are predicted to be impacted on land not owned by proponent	As above.
5	Potential water level, quality or pressure drawdown impacts on groundwater dependent ecosystems?	A low risk of temporary drawdown at River Oak and Blakely Red Gum a vegetation communities on Bylong River.	The level of accuracy for many of the model calibration targets approximates the AIP threshold. Monitoring of the impacts at these water dependent assets is a preferred action.

6	Potential for increased saline or contaminated water inflows to aquifers and highly connected river systems?	No mining activity below the ground surface will occur within 200 m laterally from the top of high bank. Study identified the potential for the project to increase salt loads, but the risk of changing the beneficial use of the water source was considered improbable	The risk for salinity increase and contaminated inflows has been recognised by the independent geochemical assessor RGS Environmental Pty Ltd. It is recommended that all their management measures recommendations be implemented with additional appropriate groundwater and spoil seepage monitoring. Further supporting documentation is required delineating at a local scale the alluvial/colluvial boundary from which the 150m setback will apply.
7	Potential to cause or enhance hydraulic connection between aquifers?	No - underground mine will potentially fracture overlying strata, but this is not predicted to result in any direct connection to the alluvial aquifer	This is a greenfield site and the potential for enhancing hydraulic connection between the

			alluvial and Permian aquifers, due to the depressurization caused by underground mining is a possibility. The status of aquifers overlying the coal seams targeted by underground mining has not been adequately presented to DPI Water. Sufficient hydrogeological information was not provided about groundwater contours in individual aquifers.
8	Potential for river bank instability, or high wall instability or failure to occur?		Not addressed within the groundwater assessment.
9	Details of the method for disposing of extracted activities (for CSG activities)?	N/A	N/A

2. **Addressing the minimal impact considerations**

Section 3.2.1 of the AIP describes how aquifer impact assessment should be undertaken.

1. Identify all water sources that will be impacted, referring to the water sources defined in the relevant water sharing plan(s). Assessment against the minimal impact considerations of the AIP should be undertaken for each ground water source.
2. Determine if each water source is defined as “highly productive” or “less productive”. If the water source is named in the register of highly productive water sources, then it is defined as highly productive, all other water sources are defined as less productive.
3. With reference to pages 13-14 of the AIP, determine the sub-grouping of each water source (eg alluvial, porous rock, fractured rock, coastal sands).
4. Determine whether the predicted impacts fall within level 1 or level 2 of the minimal impact considerations defined in Table 1 of the AIP, for each water source, for each of water table, water pressure, and water quality attributes. The tables below may assist with the assessment. There is a separate table for each sub-grouping of water source – only use the tables that apply to the water source(s) you are assessing, and delete the others.
5. If unable to determine any of these impacts, identify what further information will be required to make this assessment.
6. Where the assessment determines that the impacts fall within the Level 1 impacts, the assessment should be “Level 1 – Acceptable”
7. Where the assessment falls outside the Level 1 impacts, the assessment should be “Level 2”. The assessment should further note the reasons the assessment is Level 2, and any additional requirements that are triggered by falling into Level 2.
8. If water table or water pressure assessment is not applicable due to the nature of the water source, the assessment should be recorded as “N/A – *reason for N/A*”.

Table 5: Minimal impact considerations

Aquifer	Alluvial aquifer
Category	Highly 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, 40 m from any: (a) high priority groundwater dependent ecosystem; or	The proponent indicates a low risk of temporary drawdown at River Oak and Blakely Red Gum. These are not currently listed in the WSP. Proposed monitoring of these communities is recommended to be picked up as part of the

(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.	EMP. The proponent indicates no category 2 impacts. However, of note that the level of accuracy for many of the model calibration targets approximates the AIP threshold. Additionally, the alluvial aquifer is of limited thickness and any additional decline in water levels, particularly during a drought would impact significantly on adjoining groundwater users. Therefore it is recommended that "make good" provisions are instituted immediately at the onset of mining for those licensees within the alluvial extent of the project boundary. No assessment of the "Mine Water Supply" borefield has been provided.
<u>Water pressure</u> 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. **OR**, for the Lower Murrumbidgee Deep Groundwater Source: 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.	Addressed above.
<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. 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 indicates the risk for salinity increase and contaminated inflows has been recognised by the independent geochemical assessor RGS Environmental Pty Ltd. It is recommended that all their management measures recommendations be implemented with additional appropriate groundwater and spoil seepage monitoring.

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".	Further supporting documentation is required delineating at a local scale the alluvial/colluvial boundary from which the 150m setback will apply. Further, as alluvial water level declines occur, salinity increases. Consideration of the impact of the operating borefield on water levels and thereby water quality is warranted.

Aquifer	Porous rock or fractured rock
Category	Less productive

Level 1 Minimal Impact Consideration	**Assessment**
Water Table 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: (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	Unknown

work.	
Water pressure A cumulative pressure head decline of not more than a 2m decline, at any water supply work.	
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40m from the activity.	Unlikely to be an issue for Permian aquifers.

3. **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	NOW Comment
1	Considered types, scale, and likelihood of unforeseen impacts *during operation*?		Information needs to be provided about the mine borefield in alluvium.
2	Considered types, scale, and likelihood of unforeseen impacts *post closure*?		No specifics outlined
3	Proposed mitigation, prevention or avoidance strategies for each of these potential impacts?		No specifics outlined
4	Proposed remedial actions should the risk minimization strategies fail?		No specifics outlined
5	Considered what further mitigation, prevention, avoidance or remedial actions might be required?		No specifics outlined
6	Considered what conditions might be appropriate?		No specifics outlined

4. **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	NOW Comment
1	Addressed how it will measure and monitor volumetric take? (page 4)		No specifics outlined
2	Outlined a reporting framework for volumetric take? (page 4)		No specifics outlined

End Attachment B

Attachment C

Bylong Coal Project [SSD 14_6367]
Response to exhibition of EIS
Detailed comments - DPI Agriculture

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1. Biophysical Strategic Agricultural Land (BSAL) Verification

The BSAL assessment has been conducted by the proponent which the Gateway Panel described as insufficient. It was not independently verified by the Gateway process. Notwithstanding, this verification should provide a better estimate than the mapped BSAL available so where possible, DPI has used the KEPCO verified BSAL. All references to BSAL within the project area refer to KEPCO verified BSAL and all references to BSAL outside the project area refer to mapped BSAL.

The way the soil data has been presented makes it impossible to verify their statements with the results for a number of reasons:

- The salinity measurements have been (presumably) presented as $EC_{1:5}$ in the soil laboratory results in Appendix C. However, although particle size analyses have been provided, there is no presentation of soil texture. Thus a conversion from $EC_{1:5}$ to EC_e is not possible, meaning that no verification could be made of soils culled due to salinity. The only soil this refers to is 31.3 ha of Eutrophic Black Dermosol in the Bylong Soil Landscape within the project boundary, but 574.4 ha is contained within the study area.
- The soil test results in Appendix C of the Soil, Land Capability and Strategic Agricultural Land Assessment (Appendix V). Soil parameters could not be matched to soil test results for soil type numbers BH1-P1, BH1-P2, BH2-P2, B04, B05, B09, G02, G03, G04-P1, G05-P1, G06-P1, G11, G14-P1, G16, O2 and O2-P1. Of these, B9 and G02 are listed as BSAL. It should be noted that while there is no B9 and G02 in the project boundary, there is a total of 109.6ha (19.9ha of B9 and 89.7ha of G02) of BSAL in the study area. This should be noted if subsequent modifications to the project boundary are requested.
- Many soil test results have been included which are not referenced in the rest of Appendix V. These clearly form part of the soil survey but cannot be clearly associated with any soil type. These include:
    - GSSE 2012 sample ID numbers 73, 45, 48, 70, 57, 36, 35, 37, 23, 24, 59, 58, 64, 74, 75, 65, 13, 10, 7 and 34.
    - February sample ID numbers 1 and 6.
    - Bylong Sample ID numbers 8.x, 77.x, 83.x and 80.x
    - May 2013 sample ID numbers 117, 202, 77, 76, 79, 83, 236, 234, 225, 303, 311, 215, 297, 293, 156, 5, 37, 50, 284, 290, 253, 274, 266, 264, 259, 64 and 73.

The proponent has also only used a single site as a “representative” site for each soil type. Since soil types which are inherently fertile enough to be BSAL encompass up to 443ha, a single soil sample is insufficient to accept or reject an area of this size.

2) BSAL Impacts

The project will have impacts to land identified as BSAL from both the open cut and underground mining operations as well as from the proposed biodiversity offset plan.

- The proponent has committed to reinstating 227ha of BSAL which is 10 per cent more than the 206.3ha contained within the “direct and permanent” area affected.
- The proponent has committed to maintaining agriculture on 109.44 ha of BSAL within the biodiversity offset areas.
- The proponent will not mitigate the 171.8ha of BSAL within the subsidence study area. This will be utilised as biodiversity offsets and will be unavailable for agricultural production.
- The proponent has committed to repairing 62.7ha of BSAL within the “direct and temporary” area affected (after infrastructure and haul roads are decommissioned) although page 66 App W appears to refute this.

- A considerable area of BSAL has been identified which will be fully encompassed by the open cut related mining activities and is unlikely to be available to agricultural production. The proponent has not identified where such areas will be closed off to the mining activities, therefore no estimate of how much BSAL will be taken out of production can be made.
- It was not possible to verify any of the soil figures in the BSAL verification due to the way the soil data were presented.
- The proponent has not commented on the effects of the project on adjoining BSAL as raised by the Gateway Panel.
- The table below outlines each area of potential BSAL loss based on information from the EIS (appendix W and X).

Table 2: BSAL impact areas and calculations

	Total ha of area studied	**Total ha impacted by project**	**Mitigation Proposed**	**Project Total loss**
Subsidence Study Area	1714.3	171.8	No mitigation proposed. All BSAL in this area will be used for Biodiversity Offset purposes	356.11 ha[#]
Direct & Temporary (within disturbance footprint)	240.9	62.7	This BSAL is to be fully rehabilitated after infrastructure and haul roads are decommissioned although page 66 App W appears to refute this.	
Direct & Permanent (within disturbance footprint)	919.5	206.3	227ha of land within this disturbance area category (includes areas of both open cut pits and overburden emplacement areas) will be rehabilitated to meet BSAL criteria.	
Biodiversity Offsets (includes both onsite and offsite areas)	4082	486.25*	282ha of cleared/cultivated land within the nominated offset areas will be retained for agricultural land use, 109.44ha of this land has been identified as BSAL.	
* This includes the 171.8ha BSAL located within the subsidence study area.				
[#] BSAL loss = (biodiversity offset area BSAL loss (AIS p33)- BSAL retained for agricultural use within offset areas (AIS p33)) + (direct and permanent BSAL loss (Appendix W, p34) - proposed area rehabilitated to BSAL (Appendix W, p36)) BSAL loss = (486.25 - 109.44) + (206.33 - 227) BSAL loss = 376.81 + (-20.7) BSAL loss = 356.11 ha				

The total net BSAL lost to agricultural production is 356.11ha as a result of BSAL: retained for agriculture in the biodiversity offset areas; reinstated by the proponent; lost to agriculture in the subsidence study area; and lost to agriculture in the biodiversity offset areas.

3) CIC Impacts

The project EIS identifies no viticulture CIC impacts. Equine CIC has been mapped in the Bylong Valley region and covers both the open cut mining and biodiversity offset areas. Of the 699.9ha within the project boundary, and 584 ha within the offsite areas, a total of 515ha will be permanently lost to agriculture. The potential add-on impacts of the project on the Equine CIC remain unquantified.

All references to CIC are based on the SRLUP maps (January 2014).

Table 3: Total Equine CIC impacts

	Total CIC impact (ha)	Impacted by project	Mitigation Proposed	Project Total Loss
Within Project boundary	1283.9ha	699.9ha	The reinstatement of the post-mining Land & Soil Capability (LSC) (see AIS table 42) will not prevent CIC utilisation of this land within the project boundary.	515ha
Within offsite offset areas		584ha	Of the 584ha identified, 69ha is located within the identified "cultivated land" that will remain available for agricultural activities; therefore 515ha of equine CIC will be lost.	
Note: CIC impact area data sourced from AIS p.81.				

The EIS (App W, p37) notes that the main post-mining LSC classes are 3 and 5, which have been identified as suitable for equine land use and should not limit the use of this land for equine CIC related activities.

The permanent losses of equine CIC land is the result of a change in land use due to biodiversity offsets.

4) Water Impacts

The AIS states "no loss to the current utilised agricultural water available under KEPCO water allocation entitlements is predicted as a result of mining activities" (AIS p95). The impact of KEPCO's allocation on agricultural water use in the area both currently and into the future has not been addressed.

KEPCO holds existing water license allocations of 2535 units (currently equals 2535ML/year when Available Water Determinations (AWD's) are at 100%). This water is available for use by KEPCO as it sees fit however, the AIS does not identify if or how much of this water will be available for agricultural use on KEPCO owned land.

The impact of KEPCO's purchasing of its 2535 units of water on the broader agricultural region has not been identified. The Report Card for the Bylong River Water Source indicates that the area has a total groundwater entitlement of 5843 ML/ year all of which was used for irrigation purposes. KEPCO's ownership of 2535 units represents 43.4% of the licensed water availability in this area. This project represents a significant change in how water is used in the area where previously 100% of the allocation was used for irrigation, to only 56.6% remaining available for irrigation.

The impact of KEPCO's allocation on agricultural water use in the area both currently and into the future has not been addressed.

5) Biodiversity Offsets Impacts

The project's biodiversity offsets package will result in approximately 3800 ha of land being lost from agricultural production (estimated value of up to $1.4 Million) (AIS p97). Of the 3800ha of lost land, 1158ha has been identified as arable land, 1318ha as extensive grazing land and 1324ha as heavily timbered country (AIS p68). Within the biodiversity offset areas, is a total of 486.25ha of KEPCO verified BSAL.

KEPCO has identified existing areas of cultivation within the 5 offset properties totalling 282 ha (Figure 7, AIS p27) and committed to making this land "available for agricultural production" (AIS p51). Of these identified cultivated areas, 109.44ha is KEPCO verified BSAL.

It is DPI Agriculture's position that lands set aside for biodiversity offsets should avoid BSAL. It is noted that the proponent has tried to minimise BSAL impact from biodiversity offsets however, there is still a net loss of 376.81ha of BSAL to biodiversity offsets. Further consideration should be given to revising the biodiversity offsets to reduce the impact on BSAL.

Further, it is recommended that the proponent commits to ensuring the continued utilisation of the 282ha of identified "cultivated" land identified in the AIS, either by the proponent as part of their farming operations, or included in neighbouring agricultural production systems. Ensuring the land remains in production will reduce barriers to production following the completion of mining.

6) BSAL Rehabilitation

The proponent is proposing to undertake the reinstatement of 227ha of BSAL to offset the 206.3ha lost in the disturbance footprint. There will be no reinstatement to offset the loss of 171.8ha in the subsidence study areas nor the 205ha in the other biodiversity offset areas.

The evidence provided within the documents is insufficient to demonstrate that the BSAL can be reinstated or that the proponent is capable of successful reinstatement of BSAL.

The proponent has committed to reinstating 62.7ha of BSAL within the haul roads and infrastructure areas at the end of the project, however this appears to contradict their statement on page 66 of Appendix W where the proponent states that "Of the 919.5ha to be directly and permanently disturbed, land associated with the Internal Roads and Rail Loop will not be returned to a pre-mining land use and will remain as non-rehabilitated infrastructure". The proponent is only offering to offset the BSAL lost within their defined disturbance area.

In the Interim protocol for site verification and mapping of BSAL, Anthroposols (man-made soils) have not been considered in the soil fertility rankings, and therefore cannot be returned to BSAL, so BSAL cannot be reinstated. However, DPI is willing to consider that if reinstated land can be brought back up to fertility and productivity standards in both dryland and irrigated scenarios, with all of the soil constraints contained within the Interim protocol eliminated, then this could suffice.

Further information on rehabilitation of BSAL and some of the challenges of rehabilitation can be provided by DPI.

Recommended consent condition in response to this issue:

That the proponent must demonstrate the ability to create BSAL through a long-term project which must:

(a) be established within five years of mining activity commencing and carried out on land that has previously been an active mining area;
(b) be prepared in consultation with crop and pasture experts, in accordance with any relevant DPI guideline and to the satisfaction of the Director-General of DPI;
(c) include detailed performance and completion criteria for evaluating the performance of the rehabilitation and trigger points for remedial action (if necessary);
(d) include measures of success in reinstating BSAL, developed in conjunction with NSW DPI and include the following:
    - a comprehensive suite of indicators of productivity and environmental sustainability (including soil settling, soil profile development, soil strength, water transmissivity and plant water availability, agricultural productivity, fertiliser needs, weeds and pests) over a 20 year period; and
    - provide a publically available annual report, with the final report to be peer reviewed and published.

7) Rehabilitation Strategy

Rehabilitation Trials

The information provided on the proposed rehabilitation of BSAL (Secondary Domain B – Cropping Land, AppW, p.97) does not provide enough detail on how the trial could be designed and implemented to achieve viable information. The proponent identifies that an area 50m by 100m will be used (outside the project's disturbance boundary) but no depth information is provided. There is also no information provided on potential trial treatments (soil placement methods, use of annual or perennial crops, irrigated or un-irrigated etc), replication options, monitoring methodologies (soil or vegetation) or timing of the trials. The transferability of any trial results onto the projects nominated OEA and open cut pit rehabilitation sites is also unknown.

Given the proposed rehabilitation schedule for the project (App W, figure10-14), it is likely that the proponent will attempt to reinstate BSAL and LSC class 3 lands early in the project's life. Therefore, any BSAL rehabilitation trials should commence as early as possible to usefully inform the proponent's rehabilitation activities.

Recommendation

The proponent consult with DPI Agriculture to develop an appropriate trial design and detailed monitoring program for the reinstatement of BSAL/ LSC class 3 lands. The outcomes of the trial and the rehabilitation activities (both positive and negative outcomes) should be made publically available in a timely manner.

It is also recommended that rehabilitation trials of the areas classified as "Secondary Domain A – Grazing Land" (App W, p.97) be considered. These should include pasture establishment and agricultural production aspects and could investigate the very important aspect of legume establishment in pastures.

The project proposes that rehabilitation activities will commence early in the mine's life, with grazing land rehabilitation within the first 3 years and BSAL reinstatement commencing between years 3-5. Therefore, the outcomes of any trials and the rehabilitation activities (both positive and negative outcomes) should be made publically available in a timely manner. This will allow a sharing of the very limited knowledge on BSAL rehabilitation that can be utilised by other projects and ideally lead to better rehabilitation outcomes across the state.

Recommendation

That rehabilitation trials of the areas classified as "Secondary Domain A – Grazing Land" (App W, p.97) be undertaken. Trials should address pasture establishment and agricultural production aspects and investigate the very important aspect of legume establishment in pastures.

Rehabilitation Monitoring Methodology

- All soil chemistry analysis (App W, table 24) needs to include Colwell Phosphorus, Phosphorus Buffering Index (PBI) and all exchangeable cations.
    - Floristic Survey (App W, p94) (assuming this was to be applied to pasture and grazing rehabilitation areas); vegetative composition must be on a dry matter basis (Primefact 323 *Pasture assessment & livestock production*, NSW DPI 2006) and vegetative groundcover targets should be 70% or greater (Agfact P2.1.14, *Maintaining groundcover to reduce erosion and sustain production*, January 2005).

▪ *Grazing Land (10.2.1, App W,p.95)*

- The proposed monitoring program (App W) is not considered to be adequate for monitoring agricultural production. The proposed frequency of pasture monitoring to be carried out every 6 months for the first 3 years and annually afterwards (AppW,p95) is inappropriate, especially if the proponent is attempting to prove ecosystem land use sustainability (as defined by DRE, *ESG3: Mining Operations Plan (MOP) Guidelines*, September 2013).
- Nominated pasture composition (App W, p95) of perennial grass: annual legume (80:20) should be done on a dry matter basis (Primefact 323), and legumes should be annual or perennial.

- Using dry matter yields as the only measure to compare pasture production to the nominated reference site is not appropriate for monitoring and/or comparing grazing systems. Livestock grazing influences both pasture composition and production, so it is recommended that pasture and livestock production monitoring be included into the monitoring program to ensure the pastures can sustain grazing activities, not just produce vegetation. Reference sites will also need to be managed in the same way that rehabilitated sites are to ensure fair comparisons of pasture and livestock performance.
- Whilst it is acknowledged that Landscape Function Analysis (LFA) is used in the mining rehabilitation industry, we do question the relevance of using LFA after pastures/ crops have been established. It may be quite relevant to use LFA for the first 0-5 years or up until a good vegetation cover has been establish however, after that time more relevant monitoring practices should be adopted such as those outlined in Lodge, G. (1998) *Themes and experimental protocols for sustainable grazing systems*, Occasional Paper No 13/98. Land and Water Resources Research and Development Corporation.
- Guidance material: www.dpi.nsw.gov.au/agriculture/pastures, www.dpi.nsw.gov.au/agriculture/pests-weeds

▪ *Cropping Land (10.2.2, App W,p.96)*
  - The proposed monitoring regime is not appropriate for monitoring cropping activities.
  - Crops comparisons should be made only with reference sites of a similar crop age, plant density and soil fertility.
  - Crop health and pest management should be included into the monitoring program.
  - The crops should be monitored through all stages of crop development, not just twice a year (for years 0-3) and annually thereafter as suggested by the proponent.
  - Guidance material: www.dpi.nsw.gov.au/agriculture/broadacre, AHCBAC501A Manage agricultural crop production

Trigger Action Response Plans (TARP's) (App W, tables 27 - 29)
- Soil pH unit methodology has not been identified. It is assumed that the figures provided in tables are $pH_{(water)}$ since the values for class 3 LSC are consistent with BSAL pH values in water. Soil pH information should be provided in calcium chloride ($CaCl_2$).
  - The identified sodicity targets for exchangeable sodium percentage (ESP) of <15 for LSC Classes 3 & 5 and <8 for LSC Class 4 is considered to be too high. Soils with an ESP of >6 are generally regarded as sodic (agriculture.vic.gov.au/agriculture/farm-management/soil-and-water/soils/soil-physical-properties) and when wet, can become dispersive and/or prone to slaking. This can lead to soil surface crusting (which prevents seed germination) and/or soil erosion (an issue for topsoil and subsoils).

DPI Agriculture recommends a consent condition in relation to this issue to address the shortfalls in the proposed rehabilitation monitoring regime (frequency and methodology) and the TARP's key elements (pH and sodicity).

Recommendation
That the project's Rehabilitation Management Plan (including TARPs) be reviewed by DPI before project work commences.

8) Socio-economic Assessment

The following is an assessment of the socio-economic aspects of the AIS (Appendix X) provided as part of the Bylong Coal Project (BCP) Environmental Impact Statement (SSD 14-6367).

The AIS and supporting documentation were reviewed with reference to the following material: Strategic Regional Land Use Policy Delivery Guideline – Guideline for AISs (March 2012), AIS Fact Sheet (September 2012), and the Strategic Regional Land Use Policy Guideline for AISs (Re-issued October 2012).

8.1 Impacts on agricultural support services, processing and value adding industries and regional employment.

a) Agricultural support services

The proposed mine plan has a disturbance area of 2,874.7ha which includes 1,714.3ha to be affected by mine subsidence, with the remaining 1,160 ha to be directly affected by construction and operation of the project (Section 8.1.1, Table 35, p66). The Proponent estimates that converting this agricultural land to other uses will result in a maximum loss of $819,864 in annual gross value of agricultural production (Section 8.1.1, Table 36, p67). Some of the area is intended to be rehabilitated and 227ha returned to cropping and 497ha to grazing (Table 43, p76).

The Project also includes converting 4,082ha to a biodiversity offset of which 3,800ha will be removed from agricultural production – noting that 35% (1,324 ha) of this land is considered land of limited agricultural value (Section 5.2.2, p51). The Proponent estimates that converting this agricultural land to mining use will result in a permanent loss of $1,433,312 from annual agricultural production (Section 8.1.2, Table 37 p68). The Proponent estimates the annual gross value of agricultural production lost from the transfer of water from agriculture to mining use is $410,532 (Section 8.1.5, Table 39 p7).

This combined loss is $2,663,708 or 4.12% of the total annual gross value of agricultural production for the Mid-Western LGA region (Section 8.1.5, p71). The Proponent has used a suitable valuation method for assessing production from cattle, equine and cropping enterprises.

The proponent acknowledges that there is approximately 2,400ha of mapped Equine Critical Industry Cluster (CIC) land located within the Agricultural Assessment Areas representing 0.94% of the mapped area (Section 3.5, p33). The mapped land is towards the western geographic edge of the Equine CIC. There are currently no thoroughbred enterprises in the area however the Proponent has attempted to estimate the value of the Equine CIC area if it was used for lucerne hay and thoroughbred broodmare production, and have estimated the annual gross value lost would be $7,860,620 (Table 27, p58). However, the potential add-on impacts on the Equine CIC as a whole remains unquantified.

This assessment has been informed by the following material:
ABS 2014 Database for SLA in NSW - Value Ag Commodities accessed
http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/7503.02010-11
NSW DPI Beef stocking rates and farm size - Hunter Region.
http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0014/70610/Beef-stocking-rates-and-farm-size---Hunter-region.pdf
NSW Department of Primary Industries Beef gross margins - December 2012
http://www.dpi.nsw.gov.au/agriculture/farm-business/budgets/livestock
Department of Planning and Infrastructure (2012) Upper Hunter Strategic Regional Land Use Plan https://www.nsw.gov.au/sites/default/files/initiatives/upperhunterslup_sd_v01.pdf

b) Processing and value adding industries

The Proponent has not provided sufficient information to allow the assessment of the impacts from change in land use on the Equine CIC as a whole which is a value adding industry.

The Proponent has however provided information from which to assess the impacts from change in land use on agricultural output, which will have flow-on impacts to processing and value adding industries. This is independent of any Equine CIC flow on impacts (Section 5.3.2, p55). The Proponent estimates that the reduction in cattle output of 1997 head p.a. for mined lands plus biodiversity offset area (Section 8.1.1, Table 36, p67; Section 8.1.2, Table 37, p68). It is unlikely that the stock will be sent entirely to one saleyard. The total throughput for the combined three saleyards in 2013/14 was 137,697 head. The loss of throughput as a result of the project for these combined saleyards represents a regional loss of 1.5% of throughput.

This estimated change is below the 5% level recommended by DPI as a significant threshold (NSW DPI AIS technical notes, April 2013, Section 4.3, p9).

This assessment has been informed by the following material:
National Livestock Reporting Service NSW Cattle SALEYARD SURVEY Year Ended 30th June 2014
http://www.beefcentral.com/wp-content/uploads/2014/09/NSW-cattle-2013-14.pdf
NSW DPI Agricultural Impact Statement Technical Notes (October 2012)
http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0010/463789/Agricultural-Impact-Statement-technical-notes.pdf

c) Local and regional employment.
The Project establishes a new mine with associated infrastructure. The project will create new employment opportunities in the mining sector however it will also result in a loss of 16 jobs in the agricultural sector due to displacement of land use (Section 8.1, Table 40, p72).

The Proponent has provided ABS employment data for the Mid-Western Regional Council Local Government area for 2006 which indicates there were approximately 486 jobs associated with beef, beef/sheep or beef/grain farming. The projected job loss is below the 5% level recommended by NSW DPI as a significant threshold (NSW DPI AIS technical notes, April 2013, Section 4.3, p9).

The Proponent has indicated that they will develop an employment strategy to employ locals (Section 8.11, p89). It is noted that the Proponent expects the construction workforce to be 90% non-local hires, with a similar high percentage (85%) for the operational workforce (Appendix AC, p91).

This assessment has been informed by the following material:
ABS 2014 Database for SLA in NSW - Value Ag Commodities
http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/7503.02010-11
Bylong Coal Project EIS, Social Impact Assessment, Appendix AC
NSW DPI Agricultural Impact Statement Technical Notes (October 2012)
http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0010/463789/Agricultural-Impact-Statement-technical-notes.pdf

8.2 Potential impact on visual amenity, landscape values and tourism infrastructure relied upon by local and regional agricultural enterprises.

a) Visual amenity
The Mining and Petroleum Gateway Panel (M&P GP) report concluded that the "loss of scenic and landscape values will have a significant impact on the Equine CIC" (M&P GP Report Section 5.2.5 'The loss of scenic and landscape values', p31). The Proponent has not provided sufficient information to allow the assessment of the impacts from change in land use on the Equine CIC as a whole.

In the risk assessment reported in the AIS, the Proponent has rated the visual and lighting impacts as a low risk issue (Section 7, Table 34, p64). The Proponent indicates that the expected visual impact from the open cut operation will be limited, with an expected duration of between 2-5 years as a result of progressive rehabilitation.

The Proponent is committed to work with stakeholders surrounding the site to resolve issues as they arise associated with sensitive viewing locations (Section 9.6, p96).

This assessment has been informed by the following material:
Mining and Petroleum Gateway Panel (2014), Report by Mining and Petroleum Gateway Panel to accompany a Conditional Gateway Certificate for the Bylong Coal Project, 15th April 2015, p31: http://www.mpgp.nsw.gov.au

b) Landscape values

Further to 2a), the Mining and Petroleum Gateway panel report concluded that the "loss of scenic and landscape values will have a significant impact on the Equine CIC" (M&P GP Report Section 5.2.5 'The loss of scenic and landscape values', p31).

The Proponent states that the 'total direct disturbance' area of mapped Equine CIC as a result of the project is 699.9ha (within the project boundary) and an additional 584ha of mapped Equine CIC removed as part of the biodiversity offset area (Section 8.5, p81). The Proponent has not provided sufficient information to allow the assessment of the impacts from change in land use on the Equine CIC as a whole.

This assessment has been informed by the following material:
Mining and Petroleum Gateway Panel (2014), *Report by Mining and Petroleum Gateway Panel to accompany a Conditional Gateway Certificate for the Bylong Coal Project*, 15th April 2014, p31: http://www.mpgp.nsw.gov.au

c) Tourism infrastructure
The proposed Project will include a Workforce Accommodation Facility, which will have capacity of 650 beds in years 1-2 which will then be reduced to 350 beds for years 3-6. The provision of the facility during the construction phase will reduce pressure on tourism accommodation facilities in adjacent towns such as Mudgee, Gulgong or Denman. The development of this accommodation facility is likely to reduce the likelihood of adverse impacts on tourist accommodation availability.

8.3 Mitigation measures for minimising adverse impacts on agricultural resources, including agricultural lands, enterprises and infrastructure at the local and regional level.

a) Agricultural lands
The Proponent states that it will retain services of a professional farm manager to "ensure the continued productivity of agricultural land" under its control in the Bylong Valley (Section 9.3, p.94). The Proponent has also committed to developing a Farm Management Plan which includes sustainable farming practices including reduced till farming and rotational grazing techniques (Section 9.3.2, p94). However, the Proponent makes no reference to which specific sustainable farming and rotational grazing practices would be applied.

Information provided by the Proponent is not sufficient for an assessment of the intended sustainable farming/rotational grazing practices and their prospective profitability to be made.

b) Agricultural enterprises
The Proponent indicates that the post-mining land use for the open-cut areas will include 227ha of cropping and 497ha of grazing (Table 43, p76). No evidence is provided of the Proponent's prior experience and success in rehabilitating such areas to productive levels. The Proponent indicates that 161.8ha of "Non-rehabilitated Infrastructure" will remain including the rail loop which covers 88.3ha (Table 35, p66). It is not clear how this area would be managed after mine closure, by whom and what the impacts of its management would be on adjacent agricultural enterprises.

Information provided by the Proponent is not sufficient for an assessment to be made.
This assessment has been informed by the following material:
Bylong Coal Project EIS, Rehabilitation Strategy and BSAL Reinstatement Strategy, Appendix W.

c) Agricultural infrastructure
i) The project proposes the closure of Upper Bylong Rd to the south of the Project Disturbance Boundary (PDB). This closure will increase travel time for residents and also impacts property management regimes. This is an issue for concern for the community (Section 6, Table 33).

The Proponent indicates that it is working with the Mid-Western Regional Council and residents to resolve this issue which includes consideration of compensation options.

ii) The project has the potential to increase traffic on the Bylong Valley Way which links Bylong to the Golden Highway and Muswellbrook Shire. Maintenance of this road is shared between Mid-Western Regional Council and Muswellbrook Shire Councils. The Proponent states that a Voluntary Planning Agreement (VPA) being negotiated with Midwestern Regional Council for road maintenance of the Bylong Valley Way (EIS Traffic and Transport Impact Assessment, Section 6.4, p66). However, the identified traffic impacts will not stop at the shire boundary and hence impacts on road users will be continued and sustained along the section of Bylong Valley Way which is maintained by Muswellbrook Shire Council.

Recommendations:
a) Before project approval is granted, negotiations with residents affected by the proposed road closures should be completed to ensure that property access is maintained and adequate roads are provided for servicing these properties.

b) Muswellbrook Shire Council should be included as a signatory to the proposed VPA to ensure Bylong Valley Way is maintained to a standard so that agricultural and equine industries users are not adversely impacted.

This assessment has been informed by the following material:
Bylong Coal Project EIS, Traffic and Transport Impact Assessment, Appendix Z

8.4 Impacts of physical movement of water away from agriculture
The proposed Project will result in a change in water usage and pattern of use in the Bylong Valley, as described earlier in section 4 of this attachment, and in advice from DPI Water in Attachment A.

The socioeconomic impacts of this have not been fully assessed.

8.5 Summary of Assessment
From review of the AIS and supporting EIS documents and other independent information, the Project appears unlikely to have significant negative socio-economic impacts on agricultural resources and industries and the agricultural community in the region. However, as noted above, there are two issues to be further resolved and which conditions of consent are recommended. These are related to 1) Access for land owners affected by the proposed closure of the upper Bylong Rd and 2) Voluntary Planning Agreement for maintenance of the section of Bylong Valley Way managed by Muswellbrook Shire Council.

Further clarification by the Proponent is also warranted in regard to issues relating to impacts on the Equine CIC as a whole entity, proposed sustainable grazing practices, final management of the non-rehabilitated infrastructure and quantification of potential impacts from the project water use on agricultural water users.

9) Soil Reinstatement Volume Calculations
Due to the quality of the soil information supplied, it has not been possible to check the volumes which would be available for soil reinstatement. The proponent also states that a total of 7.42 million cubic metres (MCM) will be available and of this, 5.51 MCM is available from land to be directly and permanently impacted upon. They do not state where the other 1.91 MCM will come from. Moreover, they have stated that the total volume is enough for reinstating the 757.7 ha of land affected by the direct and permanent impacts.

There is an assumption that the other soil may come from the remaining 161.8 ha of permanently disturbed land associated with internal roads and the rail loop which will not be returned to a pre-mining land use and will remain as non-rehabilitated infrastructure. However, this is not clear in the documentation.

The proponent states that there is enough material for reinstatement of all soils and that "a Soil Resource Management Plan will be developed and documented in the approved MOP."

Recommendation:
That the project's Mining Operations Plan (MOP) be assessed by DPI to determine the availability of soil volumes available for rehabilitation before the project activities commence.

End Attachment C

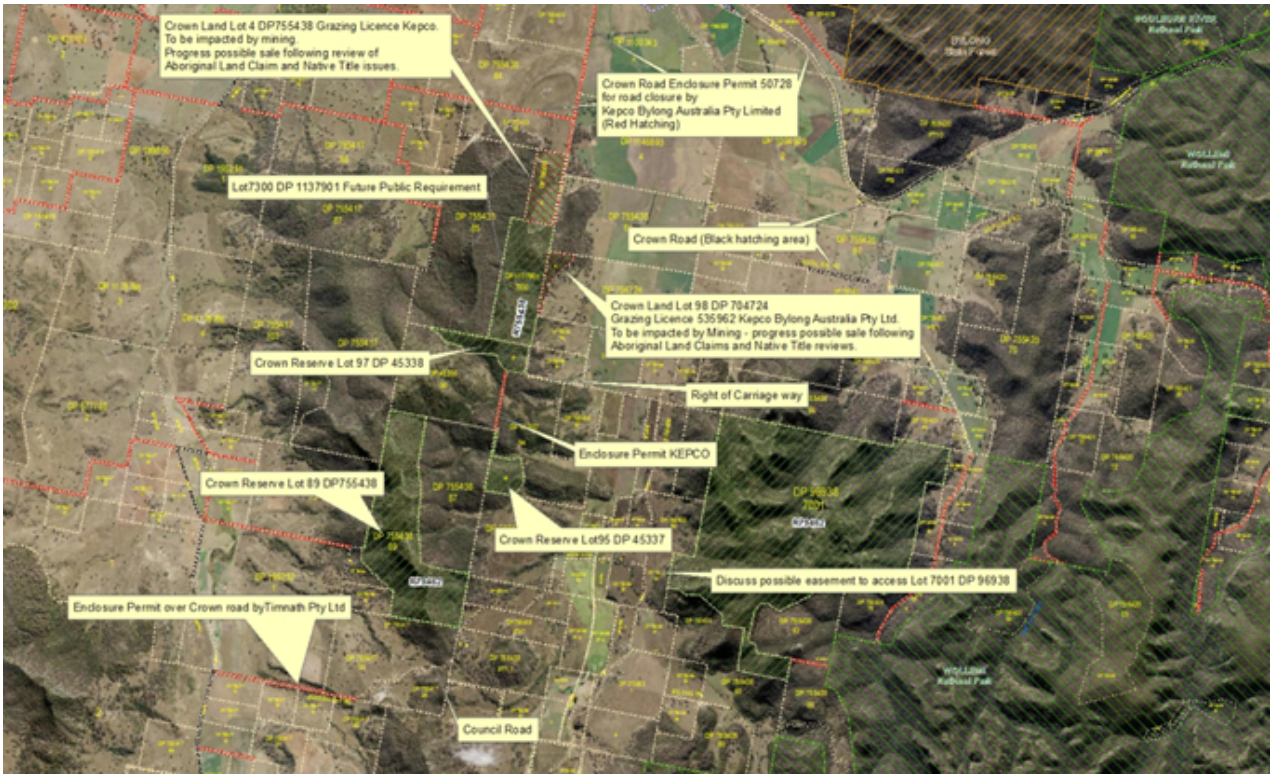
Attachment D

Bylong Coal Project [SSD 14_6367]
Response to exhibition of EIS
–Comments from DPI Lands

DPI Lands

DPI – Lands has reviewed the 'Environmental Impact Statement for the Bylong Coal Project' September 2015 and notes the following.

· An access easement is required prior to any Crown Road closures that provide access to and through Lot 4 DP755438, Lot 7300 DP1137901, Lot 89 DP 755438, Lot 95 DP 45337 (Attachment B).
· Any proposed Crown road closures (Attachment B) by KEPCO Bylong Australia Pty Limited (KEPCO) be progressed following the implementation of an access easement.
· The purchase of Lot 4 DP755438 and Lot 98 DP 704724 is progressed by KEPCO as these Crown Reserves will be impacted by open cut and overburden emplacements resulting in a modified landform.
· If purchase is not achievable prior to the commencement of any surface disturbance, a landowner access agreement is to be negotiated with DPI–Lands for Lots 4 DP755438 and Lot 98 DP 704724.



End Attachment D