NSW GOVERNMENT | Department of Primary Industries

OUT15/34461

Mr Hamish Aiken
Resource Assessments
NSW Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Hamish.Aiken@planning.nsw.gov.au

Dear Mr Aiken,

Rix's Creek Mine Extension Project (SSD_6300)
Response to exhibition of Environmental Impact Statement

I refer to your email dated 2 November 2015 requesting advice from the Department of Primary Industries (DPI) in respect to the above matter.

No comment is provided from DPI Fisheries or DPI Lands.

Comment by DPI Agriculture
DPI Agriculture advise that there are no outstanding issues of concern. The following comments are provided.

Specific Agricultural Issues arising from the Agricultural Impact Statement

1. Biophysical Strategy Agricultural Land (BSAL)

NSW DPI notes that sampling and mapping protocol undertaken on the mining lease extension site (170 hectares) and the site verification, endorsed by the Office of Environment and Heritage, indicates that no BSAL is present.

2. Loss of Land for Agricultural Production

The loss of 78 hectares to the overburden emplacement area will still allow the rest of the land to be used for beef cattle production. The rehabilitation of this site for a posting mining grazing land use is noted.

3. Rehabilitation

Although the AIS claims that the reinstalment of this disturbed area will be of the same land and soil capability it is noted that more rehabilitated land will be allocated

to Class 5 land rather than Class 4. Whilst there will be a reduction in land of higher quality the mine rehabilitation work should result in greater agricultural productivity provided the Company complies with its stated methodology and applies its research findings. Rix's Creek is actively engaged in rehabilitation programs including work with the Australian Coal Association Research Program using biosolids on rehabilitated land. The mine has established 375 ha of land across the mine site. The results of the grazing trial on rehabilitated land involving NSW DPI at other mine sites shown to increase beef production also supports the approach at this mine site.

Hence the attention to the rehabilitation of land to agriculture as described in the AIS should go some way to ameliorating any production impacts.

For further information please contact Mary Kovac, Resource Management Officer (Dubbo Office) on 6881 1250 or at mary.kovac@industry.nsw.gov.au.

Comment by DPI Water
DPI Water has reviewed the EIS for the Rix's Creek Mine Extension Project SSD6300 and provides the following recommendations. Detailed comments are provided in Attachment A.

Groundwater

The broad impacts of the project are likely to be within acceptable bounds given the location in this brownfield mining area, however the information and management measures should be improved to allow for proper understanding and management of the impacts of the project.

- As required under the Aquifer Interference Policy (AIP), an independent review of the groundwater model is required to ascertain in the expert's opinion if the groundwater model 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; and
    - Independently reviewed, robust and reliable, and deemed fit for purpose.
- A number of data & information gaps are noted in attachment A, and these are requested to be addressed prior to preparation of the Water Management Plan. This information should be provided within (or attached to) the Water Management Plan.

Water Licensing

- The proponent must provide a consolidated water licensing table, listing all water licenses and approvals under the *Water Act 1912* and the *Water Management Act 2000* (WMA) for both surface and ground water (hard rock and alluvial) related to the site. Table 15-4 in the EIS could be expanded to achieve this.
- The consolidated license table should correct errors in the licensing tables presented in the EIS. These errors are detailed in Attachment A.
- The proponent must confirm the quantity of the increased volume of water to be taken from both the alluvial and hard rock water sources as a result of the

proposed expansion, and demonstrate that sufficient licensed entitlement is held or can be obtained to account for the maximum predicted take. The proponent would need to apply and obtain an increase in entitlement from the porous rock aquifer to address the peak predicted take of groundwater from this water source

- The proponent must quantify the loss of run-off as a result of the loss of catchment detailed in Table 15-3 and must demonstrate that the loss is accounted for via an appropriate Water Access Licence.

Diversion of Stonequarry Gully

Insufficient information has been provided to allow DPI Water to assess the impacts of the proposed diversion of Stonequarry Gully. The following recommendations are made in relation to the proposed diversion:

- The proponent must undertake an impact assessment of the proposed diversion of Stonequarry Gully. This must include assessment of impacts on water quality and quantity, dependent ecosystems, hydrology and geomorphology.
- The proponent must provide proposed diversion design, and must demonstrate that the diversion is appropriately designed to mimic natural hydraulic, hydrologic, geomorphic and ecological functions of the water course.
- The above assessment should be conducted in accordance with standard hydrologic and geomorphologic assessment and design standards, including Rutherfurd I. D., Jerie K., Marsh N. (2000) *A Rehabilitation Manual for Australian Streams*. Cooperative Centre for Catchment Hydrology. Land and Water resources Research and Development Corporation Canberra.

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

Yours sincerely

Mitchell Isaacs
Director, Planning Policy & Assessment Advice
7/12/2015

Attachment A

Rix's Creek Extension project (SSD 13_6300)
Response to exhibition of Environmental Impact Statement
DPI Water – Detailed Comments

Groundwater

These points described here are requested to be addressed in the development of the Water Management Plan, should this project be approved.

General Comments

1. There is uncertainty about how groundwater is hydraulically connected between the various pits and underground workings. Specifically it is not understood via which aquifers (or via weathering, fracturing or faults) and which part of the old underground mine workings, groundwater is flowing. There is therefore uncertainty as to how groundwater will behave during:
   a. Pit 3 expansion and attainment of final void depth
   b. rehabilitation by filling of mine voids
   c. once mining ceases and re-equilibration occurs.

2. Further clarification and details should be provided as to how underground dewatering of the underground works (via a single production bore screened over all aquifers) and maintenance of the water level in the North Pit at 78m AHD, results in no seepage into Pit 2 from the underground workings.

3. The proponent has stated that:

"the Permian coal measures form confining aquifers at the end of mining"

It is not fully understood what the Proponent means by this as it was not described. It should be clarified if all aquifers on site would be unconfined due to the final void depth causing all confined aquifers on site to drain, despite infilling, and if they are suggesting this will be a permanent situation.

4. The Proponent should improve the description of the aquifers and aquicludes on site according to the detailed stratigraphy. The Proponent tends to combine all groundwater into a two aquifer conceptual description of either Alluvials or consolidated Permian rock coal seam aquifers The Proponent does not consider multiple, confined water levels in their conceptual model. This is despite providing evidence for a multiple aquifer and aquiclude conceptualisation with confinement that is not restricted exclusively to the coal seam aquifers within the Permian rocks.

5. The proponent provided borehole log information for only 5 monitoring bores (1 bore has since been destroyed by mining). There are other bores on site and during model calibration other sites were calibrated against, but these were not described nor were their spatial locations provided. Further detail should be provided.

6. In general for a site of such complexity, additional groundwater monitoring bore sites are recommended. Information should be provided about temporal monitoring of pit water levels. Further information on water quality monitoring from the site, and analysis for organic water chemistry should be provided to form a baseline standard.

7. The proponent in their report refers to the discharge of unknown volumes of tailings water to the south. This information cannot be considered to be insignificant if it provides uncertainty to

the site water balance and the discharge is towards the Rix's Creek Alluvials or Hunter River, and should be considered in greater detail in the Water Management Plan and site water balance:

"The tailings dam embankments comprise undisturbed ground to the north, east and west and uncompacted mine spoil to the south. The mine spoil does allow some seepage to the south, which is unmeasured and hence a source of uncertainty to the site water balance."

Comments on Modelling

1. Many of the report conclusions and outputs were based on the modelling outputs and not on real field derived data. The vast majority of the modelling output figures, including contour maps, hydraulic conductivity maps, drawdown impact maps and calibration hydrographs were illegible and could not be used in the review. No units were provided for hydraulic conductivity maps and a table.

2. The model was not calibrated. A scaled root mean squared error (SRMS) of 16% was achieved. The Australian Groundwater Modelling Guideline recommends ~10%. The calibration hydrographs were not legible so no analysis of the calibration was performed by DPI Water.

3. The model was not independently peer reviewed prior to submission. A review should be required, along with implementation of any findings of the reviewer through revised modelling and incorporation within the Water Management Plan, prior to commencement of the project.

4. The method for calculating recharge relied on several assumptions in creating an artificial average rainfall dataset. A multiplication factor was applied to the rainfall datasets and it is uncertain what the resulting data set represents. The multiplication factor was not justified with a description of whether it was accounting for overland flow, transpiration or error in the spatial and temporal rainfall datasets. Further consideration is requested in the Water Management Plan.

5. The method for calculating evaporation should be further justified or refined. A Pan Factor was applied to the top layer of the model but no justification for doing so or for applying certain values was provided. Pan evaporation rates applied, to the top layer of the model are usually only justified if constrained to be within the top 10 cm of the model. Evaporation decreases highly non-linearly with depth to evaporation extinction depth.

"Evaporation was incorporated into the model using the EVT module and was applied to Top Layer only. The evaporation rate (Class A Pan) was obtained from long-term monthly average of the BOM Station Scone SCS (No. 061089) with a Pan Factor of 50% across the model domain. An exception was during the recovery simulation where the Pan A Factor was set at 70% over the extent of the final void."

6. There is uncertainty if the adopted parameters for Van Genuchten's and Brooks-Corey are representative for the soils found on site and there is little detail about the how these equations were applied within the model, and this should be considered further.

7. A general head boundary condition was applied to layers 3 and 4 of the model based on a linear extrapolation from bore GW080963. A conductance of 100 m3/day was applied to this fixed head. This feature provides an infinite supply of water into the model and it is uncertain whether this approximation is hydrogeologically justifiable in representing the long-term impact of mining activity in the south-west corner of the model domain. The effects that the feature may have on the model domain in maintaining water level elevations is unknown without inspection of the model.

8. The calibration dataset type should be better described and it is unclear where the calibration points are situated as no legible map has been provided.

9. The monthly stress periods that were adopted in the model overly simplify the complexity inherent in groundwater/surface water modelling and it is more usual for the daily time step to be utilised which has a stabilising effect on the model.

10. In Section 8.7.3 it was stated that, the model predicted inflow to pits, was calibrated against unmeasured, anecdotal observations. It is uncertain how this can be used to justify calibration.

11. It is recommended that the reviewer consider given the current model calibration how meaningful the results, reporting groundwater contribution to Rix's Creek, are.

12. An uncertainty analysis was performed by using the 10th percentile and 90th percentile of the rainfall applied over a 24 year dry period and another 24 year wet period. It is uncertain how relevant an analysis of uncertainty this provides given that:

a. the fixed head applied in the model has not been hydrogeologically justified.
b. recharge and evaporation have not been represented in a physically meaningful manner and applied at monthly time steps with both these values temporally and spatially averaged over the 24 year periods.
c. a multiplication factor that minimises the impact of rainfall has been applied, and
d. the model is poorly calibrated to only a few bores.

13. There is uncertainty why the model experiences such instantaneous, rapid increases and declines in inflows into the pits as shown in Figures 8.11; 8-16 and 9.1 and discussed in Sections 8.7.3; 8.8.2 and 9.2.1 respectively. Clarification is sought from the proponent to show that these artefacts are indeed related to the progressive implementation of the mine plan, pit development and back filling and are not related to model instability.

14. In regard to figures 8.19.5 and 8.19.6. These are the only legible drawdown figures, which depict drawdown in the Hebden seam, presumably confined, as this seam is the lowest stratigraphically elevated coal seam aquifer. However in Section 8.8.2 - Prediction Results, the text describes this drawdown as being in the uppermost water table and does not refer to the Hebden seam whatsoever. Clarification should be provided by the proponent.

15. Again in regard to figures 8.19.5 and 8.19.6. Clarification of uncertainty is sought regarding the shape of the drawdown contours. There is uncertainty about whether the steep contours observed on the western side of the Hebden seam drawdown figure are simply not an artefact of the applied fixed head boundary condition. If this is the case than the 2 m drawdown contour could extend past the boundary of the mine site and could impact on the assessment against the NSW Aquifer Interference Policy if the fixed head was removed.

"From Figure 8.19, the predicted decline in the uppermost water table is more than 50 m within the active mining area. However, at the boundary of the site the predicted decline in the uppermost water table is less than 2 m the site at all extracted time stamps."

16. Table 8.15 and Table 8.16 refer to the, "prediction model", "null case" (no extension to Pit 3) and the "cumulative impact null case" (no Mine) models. It is not clear what constitutes the prediction model and how it differs to the other two models.

Comment on off-site impacts

1. In the discussion on inflows into Integra pits as a result of Rix's Creek operations it is stated:

"From Table 8.16, the predicted difference to inflows at Integra due to continuation of Rix's Creek Colliery is negligible. The explanation of this finding is due to the hydrogeological divide between the two sites"

It is unclear why the Proponent suggests that such a divide exists and clarification is sought utilising real field data. Furthermore in Section 4.6.2 Local Hydrogeology it was stated that:

"The Integra Mine is extracting coal measures within the Rix's Creek syncline and represents significant dewatering of the coal measures up hydraulic gradient of the Project. This operation is considered to create a groundwater sink for the majority of the southerly trending groundwater within the coal measures".

However the cross-section provided (Figure 3) shows coal seam aquifers dipping towards the south. It would be expected however that if impermeable layers are present as overburden between the coal seam aquifers, that groundwater would continue to flow towards the south, down dip, against an impermeable base. Clarification is therefore sought regarding the location of the groundwater divide.

2. Further detail should be provided of the impacts to or by
"Surrounding developments with potential to impact on the hydrogeological system within the study area are depicted in Figure 1.1, and include:

- *Integra South Pit and its Western Extension. This development is located immediately to the north of Pit 1. The Integra Pit accesses coal from the Pikes Gully to Upper Hebden Seams*
- *The Ashton Coal Underground Mine. Located to the north-west of the mine and on the eastern side of Glennies Creek*
- *Ashton access coal from the Pikes Gully to Lower Barrett Seam."*

Recommendations for addressing Groundwater Issues

With regard to the AIP 'minimal impact considerations', the following is recommended:

- A number of data limitations were identified with the model leading to concerns with robustness of the model predictions for water take. An independent model review as required under the AIP was not submitted. The model has not yet been deemed 'fit for purpose' and warrants further improvements for a project of this size.
- Proponent to provide a site water balance for the entire site that includes the detailed hydrogeology, creeks and pits and accounts for the partitioning of rainfall into recharge, evapotranspiration and overland flow.
- The proponent to provide estimates of water flows into each of the pits post 2038 from individual water sources and account for ongoing evaporative losses.
- It is recommended that proper aquifer pump testing (not slug tests or rising head tests) of sufficient duration and that include monitoring at nearby bores, be conducted in each individual aquifer in order to confirm the hydrogeology.

With regard to aquifer conceptualisation, the following is recommended:

- Provide a hydrogeological conceptual model as a series of surfaces and including sufficient legible hydrogeological cross-sections showing all the pit, top and bottom elevations and water levels and include the underground mine workings, to understand groundwater flow at the site. Provide details about changes to the flow regime as the mine plan progresses and hydraulic gradients change.
- Provide a detailed hydrogeological description of each individual aquiclude and aquifer on site that is aligned with the known detailed geological stratigraphy.
- Supplement the monitoring network by drilling additional nested bores (with site supervision and logging by a suitably qualified and experienced professional hydrogeologist), between the pits to various depths, to understand the groundwater flow within each individual aquifer of the multiple aquifer system:
    - between Camberwell Pit and Pit 1

- between Pit 1 and North Pit
- between North Pit and underground workings
- between underground workings and Pit 2
- between Pit 2 and Pit 3
- between Pit 3 and Pit 1
- between Pit 3 and North Pit
- between Pit 3 and Camberwell Pit

The locations of monitoring sites and depths to be discussed with DPI Water.

- Provide groundwater contour maps for each of the individual various aquifers.
- Provide a detailed bore log for production bore 20BL170864 and all other bore logs from site not provided with the EIS application and including their surveyed spatial coordinates.

With regard to the groundwater model, it is recommended:

- The proponent to implement future improvements to the groundwater modelling by incorporating data from future drilling and monitoring of bores. It is recommended that a physics based calculation of the partitioning of rainfall into overland flow, recharge infiltration to the water table and evapotranspiration be performed. Alternate modelling codes could be considered for this purpose. It is recommended that future modelling extends the western and southern boundary of the model to the Hunter River.
- That the updated model be submitted to a suitably qualified independent reviewer.
- Provide recharge maps showing aquifer outcrop (subcrop) within existing pits to understand how water is expected to move between pits and to inform monitoring bore locations.
- Perform quarterly groundwater quality (including organic chemistry) for an initial 12 months and monthly water level monitoring at all monitoring sites (including recommended nested bore sites and all dams and pits plus including underground mine workings). It is recommended that water level loggers be installed within bores and a single barometric pressure logger to also be installed.
- Proponent to install an A Class evaporation pan and rain gauge on site.

Water Licensing

Licensing Table
Water licensing information is not clearly presented in the EIS. It is recommended that the proponent include a consolidated licensing table, listing all water licenses and approvals under the *Water Act 1912* and the *Water Management Act 2000* for both surface and ground water (hard rock and alluvial) related to the site. The table should identify the licence/approval number, linked licenses/approvals, entitlement, water source and licensed purpose. Table 15-4 could be expanded to achieve this.

The following errors in Tables 8-1 and 15-4 should also be corrected:

- Licenses 20SL049786, 20SL048955 and 20SL050160 are listed in Table 8-1 in the EIS however these licenses have been converted and replaced by *Water Management Act* licenses and approvals as per the table below:

Prior License	Replaced By Work Approval	Linked to Water Access Licence
20SL049786	20WA209902	20AL209901 (300 units, Singleton water

		source)
20SL048955	20WA209900	20AL209899 (150 units, Singleton water source)
20SL050160	20WA207389	20AL207388 (5 units, Glennies water source)

It is therefore requested that the prior licenses be removed from the project documentation as they are no longer current.

- Table 8-1 in the EIS refers to "Licenses 11917 – 11919, 11084, 17992, 19024 and 19027". It is requested that the term 'licenses' in relation to these be replaced by the correct terminology "Water Access Licence" or 'WAL" to ensure accuracy of information.
- Water Access Licence WAL19035 (20AL209919 linked to 20CA209920) has been omitted from Table 15-4.

Diversion of Stonequarry Gully

Insufficient information has been provided for DPI Water to assess the impacts of the proposed diversion of Stonequarry Gully. The EIS states incorrectly that the proposed diversion would require a Water Supply Works Approval under the WMA from DPI Water. It is noted that the proposed diversion should be detailed in the full project application and therefore covered by a Planning Approval (if granted). This negates the requirement for a Water Supply Works approval under the *Water Management Act 2000* pursuant to s89J of the *Environmental Planning & Assessment Act 1979*.

The EIS should assess the impacts of the proposed diversion, including assessment of the impacts on water quality and quantity, dependent ecosystems, hydrology and geomporphology. The proponent must also provide concept design of the proposed diversion, demonstrating that the proposed diversion is appropriately designed to mimic natural hydraulic, hydrologic, geomorphic and ecological functions of the water course.

End Attachment A