OUT20/2802

Gen Lucas
Planning and Assessment Group
NSW Department of Planning, Industry and Environment

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Dear Ms Lucas

Angus Place Extension Project (SSD-5602)
Amendment Report

I refer to your email of 10 March 2020 to the Department of Planning, Industry and Environment (DPIE) – Water about the above matter.

DPIE - Water and the NSW Natural Resources Access Regulator (NRAR) provide advice and recommendations for the Amendment Report in **Attachment A**.

Of particular note in the advice is the need for the proponent to provide details on the Water Access Licenses (WALs) for both surface and groundwater that are required to account for the project's proposed water take, and for these WALs to be reviewed by DPIE – Water and NRAR.

Any further referrals to DPIE – Water and NRAR regarding this matter can be sent by email to: landuse.enquiries@dpi.nsw.gov.au.

Yours sincerely

Mitchell Isaacs
Director, Office of the Deputy and Strategic Relations
Department of Planning, Industry and Environment: Water
21 May 2020

ATTACHMENT A

Advice to DPIE Planning & Assessment regarding the Amendment Report for the Angus Place Extension Project (SSD-5602)

DPIE – Water and NRAR provides the following advice and recommendations.

1. Water Licencing

1.1 Pre-determination Recommendation – Details of surface water and groundwater licences

The proponent is to provide details on the Water Access Licences (WAL) (both surface water and groundwater) obtained to account for the proposed water take, which must be reviewed by NRAR and DPIE - Water.

A meeting between the proponent, DPIE – P&A, NRAR and DPIE – Water to discuss water licencing requirements is recommended.

Explanation

The proponent should describe the WALs and units held to offset the impact of the project activity, and this information must be reviewed by NRAR and DPIE - Water.

If these WALs are already linked to a current mine, the proponent must identify the ongoing take of water due to those activities and demonstrate if residual shares are available to cover all existing and proposed activities.

If the project intends to account for water take against a WAL that is not held by the project (not under Angus Place Mine), then the project must provide details on the shares and the conditions of access to this water to clearly demonstrate that all water take can be appropriately accounted for.

Groundwater Impacts

2.1 Pre-determination Recommendation - Groundwater monitoring program

The proponent should commit to the expansion of the groundwater monitoring program for increased representation along the Wolgan River, with a focus on the Tier 1 and Tier 2 lineament interception area, if at all possible. A minimum of one year baseline conditions should be captured prior to commencement of extraction works.

Explanation

The Wolgan River being the main watercourse overlies a major structural lineament which is mapped in connection with a Tier 2 lineament. This Tier 2 lineament directly connects with the mining footprint. Whilst no mining is proposed directly beneath Wolgan River and Wolgan swamps, a more significant hydraulic connection via lineaments remains a possibility. It is recommended expansion of the groundwater monitoring program take place for increased representation of the vertical profile measuring aquifer depressurisation beneath and along the Wolgan River, with emphasis to be in proximity to lineament interception if possible. Ideally, a minimum 2 years of baseline data is requested prior to mining to facilitate development of performance measures leading to accountability if exceeded. Improvements in the water monitoring program to capture baseline conditions should be pursued as a priority prior to commencement of extraction works.

2.2 Pre-determination Recommendation - AIP 'minimal impact considerations' (water users)

The proponent should demonstrate how the project can operate without detriment in water security to registered water users consistent with both the AIP requirement and water sharing plan cease to pump rules. The AIP requires the return of baseflow losses to a river attributed to an aquifer interference activity when river flows are at levels below which water users are not permitted to pump.

Explanation

Impacts to registered users are predicted to be minimal (level 1 category as per the AIP). On-going water census monitoring as part of a WMP can be undertaken to validate this impact. Category 2 impacts to Temperate Highland Peat Swamps on Sandstone (THPSS) are predicted. The THPCC are listed as 'High Priority' GDEs in the Water Sharing Plan for the Water Sharing Plan for the Greater Metropolitan Region Groundwater Source 2011. They are also listed as an Endangered Ecological Community under the EPBC Act. No mitigation to achieve a category 1 impact as required under the AIP is proposed. Instead, the proponent proposes to implement a Biodiversity Management Plan and a Swamp Offset Strategy is presented under the NSW Biodiversity Offset Scheme and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Environmental Offsets Policy.

It is not within DPIE Water's remit to accept or refuse the Swamp Offset Strategy but acknowledges the legislative process. Mitigation and remediation remain a proposed course of action under the AIP.

2.3 Pre-determination Recommendation - Baseflow losses

The proponent should clarify the discrepancy between annual estimates of baseflow losses to swamps which tally to 262 ML/yr and the licensable baseflow loss estimate of 97 ML/yr presented.

Explanation

Daily baseflow losses to swamps total 262 ML/yr (ref: Table 5.6 Groundwater Assessment), which is considerably more than the peak licensable baseflow loss estimate presented as 97 ML/yr. The discrepancy should be clarified.

2.4 Pre-determination Recommendation - Water quality

The proponent should provide a more detailed discussion around subsidence impacts and any observed changes in water quality (both groundwater and surface water), drawing upon evidence from the existing impact areas. This should lead into an improved discussion on the spatial and temporal extent of baseline data for the proposed project and the QA/QC procedures.

Explanation

The discussion on water quality impacts is overly simplistic without supporting evidence to substantiate the conclusion of minimal impact. It is also questionable if the minimum 2 years baseline data has been collated over a representative spatial and temporal scale consistent with the AIP requirements. To support the notion that mining has had and will continue to have minimal impact on water quality, DPIE - Water seeks a more detailed discussion around subsidence impacts and any observed changes in water quality (both groundwater and surface water) drawing upon evidence from the existing impact areas. This should lead into the discussion on the baseline data set spatial and temporal extent. Quality assurance and validation in data representativeness to be included in the assessment as it was noted that no alkalinity or a charge balance error is shown for the water quality parameter suite reported in the EIS.

Groundwater Model

3.1 Pre-determination Recommendation – Commitment to model improvement

The proponent is required to commit to further developing the groundwater model in the future to improve the performance and prediction abilities. Broadly, it is requested that the proponent to commit to:

- continuing their groundwater monitoring programme, use the data in future model updates and enable access to the data to DPIE-Water as required;
- updating the model and modelling report in two years' time (to address various aspects such as comments provided by the third-party model reviewer, Dr Merrick); and

- regular updating of the model (every three years thereafter).

More detail on **consultation and specific requirements** of the model is provided below (as post determination recommendations).

Explanation

DPIE – Water acknowledges that the model presented in the Hydrogeological Model Report (HMR) as a fit-for-purpose tool for predicting mine inflows, groundwater level drawdown effects, water level changes in surface water courses and swamps, changes to baseflows, and water take licencing requirements in the project area. However, there is scope and need to improve the model performance and prediction abilities in the future.

3.2 Post Determination Recommendations – Consultation, review and specific requirements

In relation to consultation, planning and review, provision of information and specific model requirements, the proponent should:

- Arrange a meeting/workshop in two months' time between the proponent, the third-party model reviewer (Dr Merrick) and DPIE-Water hydrogeologists/modellers to discuss the exact requirements for the first future update of the model, which is required in two years' time.
- Present a plan for model updating/refinement to DPIE-Water for approval in six months' time.
- Verify the model using data from the last five or ten years, i.e. calibrate the model without data from the verification period and compare predictions to real data over the same period. The results of this exercise are required to be shared in a report with DPIE-Water and other relevant stakeholders. Model verification must be part of the first model update, which is required in two years' time.
- Require the proponent to update the HMR in two years' time. The new report must avoid problems in the current version, including structure, textual errors, and graphics quality. The report must also consider better representation of effects like presenting uncertainty effects in transects (cross-sections).
- Future versions of the model must:
    a. explicitly represent known lineament, which may require the model to be calibrated using a coupled zone/Pilot Point approach
    b. include development headings and mains roadways
    c. incorporate groundwater extraction from bores in the area
    d. consider the development of local-scale models to represent swamps individually and/or in groups
    e. More detailed water balances, e.g. using MODFLOW ZONEBUDGET consider alternative conceptualisation options, including the eastern General Head Boundaries (GHB) and considering representing water courses using river cells and MODFLOW package (RIV) rather than drain cells (DRN).

Explanation

The assessment of the effects of the project on groundwater, surface water and related systems (swamps) is based on sophisticated numerical groundwater modelling that is reported in the HMR and a swamp water balance model. The swamp model is loosely coupled to the groundwater model. It has not been included in this review.

The groundwater model is well conceptualised, designed, calibrated and used to assess parameter predictability (model sensitivity) and model predictive uncertainty. It mostly adheres to relevant best practice guidelines and benefits from the feedback provided through progress review. The reported modelling work generally responds satisfactorily to the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC) comments on previous models.

The proponent apportions the mine dewatering take between groundwater and surface water sources based on groundwater modelling. The modelling suggests that dewatering of the proposed extension is expected to slightly reduce surface flows. Dewatering the proposed extension is also expected to impact on a few Temperate Highland Peat Swamps on Sandstone (THPSS) that are listed as an Endangered Ecological Community under the *Environment Protection and Biodiversity Conservation Act 1999*. The model predicts that there will be decline in the water-table level in each of the THPSS in and near the 1000 Panel Area, except the Wolgan River Swamp Upper Swamp and Wolgan River. The HMR suggests that previous modelling by CSIRO (2013 and earlier) underestimated the groundwater level drawdown magnitude at the area under and near the THPSS. The model predicts that the water-table levels beneath the THPSS will not fully recover 50 years post mining.

The HMR does not list groundwater users (bores) in the area and does not simulate extraction from bores. The proponent did not use the model to assess drawdown effects on bores.

The proponent has developed a swamp water balance model in response to IESC comments on previous modelling assessment of the mines' effects on the swamps. They are urged to consider the development of local-scale models to represent swamps individually and/or in groups as an alternative to the adopted swamp water balance approach. These numerical groundwater models can be built using the existing model and the regional to local modelling technique.

The model PEST Pilot Point calibration methodology is suitable to represent spatially continuous change in hydraulic properties (heterogeneity). However, it is not suitable as implemented in the reported model to represent abrupt changes in hydraulic properties like that introduced by structural features (lineaments). The effects of lineaments like faults on groundwater flow pattern and changes in it has been a concern to IESC. It is suggested that the proponent must update the model as it has been developed but adding zones that represent known lineament, i.e. calibrate the model using a combined Pilot Point/zonal parameterisation approach.

The HMR is not very clear with regards to setting the external boundaries of the model domain. It makes brief reference to an '*earlier unpublished versions of the model, whose domain extended much further to the east.*' The HMR notes that the larger model was used to set the reported model's eastern General Head Boundaries (GHB). The reported modelling does not include any sensitivity or uncertainty analysis relating to the conceptualisation of the external model boundaries. Dr Merricks' review does not comment on the larger-scale model. However, he notes that changes to the conceptual model are possible and should be considered.

The model produces bulk water balance estimates, whereas more detail is required. For example, groundwater discharge into drain cells is lumped for all drain model cells, including mine void spaces, seepage faces, ephemeral watercourses and swamps.

The HMR is useful and informative. However, it requires revision, including proofreading and enhancement of graphics. In particular, Chapter 4 requires restricting, and possibly division into conceptual and numerical models' chapters and removal of some content into an appendix.

The independent reviewer rightly notes that '*as with all groundwater models, there is no unique solution.*' However, the reviewed model successfully replicates historical observations and, therefore, is considered suitable to predict future behaviour of the system. Different conceptualisation of the model will alter the predicted ranges of effects and may affect model parameter values. The independent reviewer justly believes that the values of some of the parameters in the calibrated model are higher than they should be, leading to overestimating mine inflows. He also notes that mine development headings and mains roadways have been excluded from the model in the expectation of minimal inflows, contrary to observations in other coalfields. It could be that if these void features are included, the model can be calibrated with lower parameter values.

Surface Water Impacts

4.1 Pre-determination Recommendation – Commitment to management of impacts

The proponent must make commitment to devise objectives to any monitoring and remedial measures to protect or remediate damage occurring to upland valley swamps and watercourses within a minimum 600 metre distance from the footprint of longwall blocks associated with the 1000 longwall area.

More specific details related to this are provided as post-determination recommendations below.

4.2 Post Determination Recommendation - Controlled Activities

All proposed surface disturbance activities are conducted in accordance with the Guidelines for Controlled Activities:

https://www.industry.nsw.gov.au/water/licensing-trade/approvals/controlled-activities

Explanation

The project is proposing flexibility for the location of infrastructure throughout the life of the project. All works that occur on waterfront land are to develop management plans to identify and mitigate potential risks and ensure the works are completed in accordance with these guidelines.

4.3 Post Determination Recommendations – Management of impacts

- Trigger Action Response Plans should be developed in consultation with DPIE – Water:
  a. to develop risk assessments and appropriate management responses, including any necessary remediation and rehabilitation of impacts to overlying or adjacent watercourses or THPSS upland valley fill swamps,
  b. for unexpected flow loss based on analysis of baseline (i.e. pre-subsidence) streamflow data, post-subsidence streamflow data and contemporaneous data from control sites. This is to apply catchment flow modelling to form baseline and variability in flow stage from rainfall events during and following mining subsidence,
  c. for unexpected loss of pool water holding capacity based on analysis of baseline (i.e. pre-subsidence) pool water level data, post-subsidence pool water level data and contemporaneous data from control pool sites. Pool water balance modelling should be developed in the analysis particularly during unusual climatic/hydrological conditions
- Monitoring of streamflow, pool water levels and water quality should continue for a minimum two years following cessation of longwall subsidence related movement in a watercourse or following completion of any stream/pool remediation.

  Monitoring data would be reviewed at regular periods over this period. Reviews would involve assessment against long term performance objectives which would be based on the pre-mine baseline conditions or an approved departure from these objectives. This should include additional flow, ecological response and water quality monitoring in the Wolgan River and Carne Creek.
- Annual stream condition monitoring should be implemented at key locations along water courses that overly or are within 600m of the proposed extraction area.

  Monitoring should include, but not be limited to, a combination of photographic monitoring and site observation to identify influences of sedimentation or scouring. Areas identified as potentially sensitive to subsidence and change in stream dynamics should be subject to monitoring of scarp heights and head cut height and progression. The monitoring program should be designed in consultation with the Department of Planning, Industry and Environment – Water Division, and pre- and post- subsidence reports submitted to the Department for assessment.

Explanation

The Angus Place colliery causes impacts to overlying groundwater and surface water systems through subsidence effects. Uncommon, high value Groundwater Dependent Ecosystems termed Terrestrial Highland Peat Swamps on Sandstone (THPSS) overly the planned footprint of activities and are impacted.

The Angus Place colliery assessment relies on an offset process to deal with highly likely environmental impacts to valley fills and hanging swamps that for part of the riverine network. An offset procedure identified in Appendix I of the Amended Report does not appear to address impacts to the watercourses associated with the THPSS upland valley fills connected to the Wolgan River and Carnes Creek.

Avoidance of impacts to the larger watercourses is proposed: the uncertainties inherent in subsidence of watercourses requires long term monitoring and response measures to be effective.

END ATTACHMENT A