OUT20/5863

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Dear Mr Nevill

Tarrawonga Coal Mine Modification 7 Life of Mine Modification (MP11_0047-Mod-7)-Modification Report

I refer to your email of 14 May 2020 to the Department of Planning, Industry and Environment (DPIE) Water and the Natural Resources Access Regulator (NRAR) about the above matter.

The following advice is provided by DPIE Water and NRAR. Please note Crown Lands, the Department of Primary Industries (DPI) – Fisheries and DPI - Agriculture all now provide a separate response directly to you.

The proposed reduction in open cut extent which removes the requirement to mine within the Upper Namoi alluvium and to realign Goonbri Creek is supported as this reduces a number of key impacts. However, DPIE Water and NRAR have identified a number of issues which require consideration. We note that some of these matters will need to be addressed whether the project is modified or not. This is noted in Attachment A. In summary:

- An area of major concern is the risk of highwall collapse and flooding due to the location of the open cut against the Namoi Water Source Zone 4 boundary. DPIE Water and NRAR require further explanation from the proponent as to options considered and how any risk to the water source will be mitigated.
- Further analysis is required to better account for water take and to confirm that entitlement is available.
- The Boggabri, Tarrawonga, Maules Creek complex (BTM) model (AGE 2018 and subsequent versions) should be used to better understand the impacts of the project.
- The cumulative impacts of the whole BTM complex against the minimal impact considerations of the NSW Aquifer Interference Policy.

Please note Attachment A for further detail.

Any further referrals to DPIE – NRAR & Water can be sent by email to:

landuse.enquiries@dpi.nsw.gov.au.

Yours sincerely

Mitchell Isaacs
Director Office of the Deputy and Strategic Relations
Water
21 July 2020

Attachment A

1.0 Post mining risk from the final void

The Upper Namoi Zone 4, Namoi Valley (Keepit Dam to Gin's Leap) Groundwater Source is a high value water asset. The Modification presents mining up to the edge of the alluvium with a final void placed abutting the mapped boundary of the groundwater source.

There have been coal mine highwall failure events in the NSW Hunter Region. In response, DPIE Water (predecessor DIPNR) developed guidelines to manage such risks, including application of a buffer of 150 metres ([1] Ref: DIPNR 2005) to help address this issue. Whilst these guidelines have been superseded by the Aquifer Interference Policy, the discussion about flooding and fracture propagation highlights the risk of approving mining abutting a high value water asset which is the Namoi Alluvial Groundwater Source.

If approved, there remains a long-term risk relating to flooding potential within an area of structural instability extending out from the highwall and final void into the hardrock that underlies the alluvial/colluvial deposits of the Namoi Valley (Keepit Dam to Gin's Leap) Groundwater Source. Flooding events create hydraulic loading within the area of instability that connect the pit void with the Namoi alluvium. There is also likelihood for increased water quality transmission between final void/mine spoil material with the alluvial aquifer.

DPIE Water is concerned about these long-term risks. A better understanding of this risk can be gained by undertaking further analysis as requested below which would improve model predictions and provide a more informed position on the hydrological connection between the mine lease and alluvial aquifer. This will provide guidance on appropriate mitigation including possible consideration of a further setback of the open cut boundary from the Upper Namoi Zone 4 boundary.

Recommendation

Prior to Project Determination

- The proponent undertake further analysis as requested in section 2, below, to inform mitigation options. Proponent to advise on options including consideration of a further setback from the water source, and how any risk to the water source will be mitigated.

2.0 Accounting for water take and groundwater impacts

Water usage

Figure 26 of Appendix B indicates the requirement for water supply from off-site sources each year of the mine life with average annual requirements varying from a minimum of 63ML in year 3 and up to a maximum of 384ML in Year 11. Year 1 will require an additional 250ML. The dependency on the supply from the Vickery extension project or other viable supplies is critical to this project. Site water demands are dominated by dust suppression of the haul roads which averages 786ML/yr. The report indicates water will be sourced from other Whitehaven mines or other water licence holders. Confirmation of the ability to access this water has not been provided therefore this remains a risk to the project regardless of whether the project is modified.

Increased leakage from Goonbri Creek

The Groundwater Assessment (Appendix A; s8.2.1) notes that there will be an increase in infiltration from Goonbri Creek into groundwater of 50 cubic metres/day. This is an issue whether the project is modified or not. This will need to be accounted for and entitlement obtained from the relevant surface water source.

Volume of groundwater take in the Gunnedah-Oxley Basin MDB Groundwater source

The predicted inflows during the life of mine ranged from 58 ML/year to 99 ML/year for the Modification. During the recovery period, the total inflows into the void pit increase to 270 ML/year. 80% of that inflow is predicted to be sourced via the backfilled spoil. The report advises that 30 - 52 ML/year is required to be licenced or offset post mining because the residual inflow to the void pit is due to recharge/discharge from mine spoil material.

The diversion of groundwater flow towards the pit void including that from mine spoil is water take for the purposes of *Water Management Act 2000* where an aquifer is defined as a geological structure or formation, or an artificial landfill. As both the pit and placement of backfill mine spoil have both intercepted and imprinted on the groundwater system flow dynamics from that which operated pre-mining, the proponent will be required to fully account for the predicted 270 ML/year post mining take. This will be an issue even if the modification does not go ahead.

Potential bore field in the Gunnedah-Oxley Basin MDB Groundwater source

The report notes that if the annual pit inflows are lower than the WAL(s) entitlement, the remaining licensed volume could be extracted via advanced dewatering. DPIE Water advises that the proponent must have the potential impacts assessed and resolved before residual units can be used for this purpose.

The predicted groundwater impacts on water dependent assets including registered users and baseflow losses during the active mine life does not include advanced dewatering in the model simulations. The possible use of a borefield to draw any residual volume of entitlement held under WALs, must be subject to a water dealing impact assessment as described in the Water resource plans Fact Sheet. If the proposed bore field is a preferred option, DPIE Water encourages the proponent to address this as a priority as the project may otherwise be delayed as a result.

The impact and take prediction needs to be revisited through the groundwater numerical model. This will confirm whether level 1 or level 2 Aquifer Interference Policy considerations are relevant.

Upper Namoi (Zone 4) Alluvium

The groundwater assessment reports take from the alluvium into the lower strata to be less than one ML/year (s8.1.5 and s7.3 (Appendix A)). This would be considered negligible. However water entitlement will need to be acquired to account for this water take. DPIE Water queries this prediction because:

- The project abuts a contact boundary with the alluvium along the south eastern edge of the pit;
- the eastern boundary of the open cut runs along the Namoi Valley (Keepit Dam to Gin's Leap) Groundwater Source boundary;
- a zone of structural deformation typically extends out from the highwall due to blasting and stress release leading to an increase in Kx/Kv permeability conceptually considered to extend within the porous rock underlying the Namoi Valley (Keepit Dam to Gin's Leap) Groundwater Source.
- The proponent's own conceptual model indicates recharge from the alluvium to the coal seams being intercepted by the mine.
- Vibrating wire piezometer hydrographs identify depressurisation is occurring already within the adjacent hardrock beneath the alluvium. This depressurisation appears to be progressively propagating to shallower depths, e.g. TA 65. As the mine footprint advances to the east it is expected that further depressurisation will occur adding to the extent of the downward flux from the alluvium.

- The location of the observation sites used for model calibration do not appear to capture alluvial bores located in proximity to the historical highwall that would be relatable/transferable to the TCM Modification setting.

Without a hydraulic barrier along the alluvial boundary and with the observed depressurisation in the bedrock underlying the alluvium, it is unclear why the model output reports no groundwater flow from the alluvium. The adjacent Maules Creek Mine which hosts similar lithology but with a much greater buffer distance from the alluvial aquifer reports passive take from the Upper Namoi Zone 4 of 51 ML (2018/2019 Annual Report).

Uncertainty analysis reports up to 25 ML/year of baseflow losses in creeks in connection with the alluvial aquifer, contradicting the nil take of water from the alluvium. The predicted baseflow losses have not been accounted for against any nominated WAL(s) or reported as take within mine inflow calculations. It is unclear how the proponent will account for passive losses and if such baseflow losses relate to losses from the alluvial aquifer.

No impediments to groundwater flow are conceptualised within the model design. Further prescriptive detail is required before DPIE Water accepts the groundwater inflow predictions for the porous and alluvial sources. Any conceptualisations that limit the movement of groundwater from the alluvium should be presented. Localised scale maps of the model design along the eastern boundary is required for assessment.

Further to this, it unclear in this instance why the amalgamated Bogggabri, Tarrawonga Maules Creek complex (BTM) model (AGE 2018 and subsequent versions) has not been used in this assessment. DPIE Water recommends that the licencing requirements re-estimate (including baseflow reduction and post-mining) for the Tarrawonga Mine be done using the amalgamated BTM model.

Recommendations

Prior to Project Determination

- Confirm that the maximum water demands required from off-site sources can be obtained from a reliable and authorised supply. Noting where additional sources are required this may require additional impact assessment, approvals and the need to acquire additional water entitlement.
- Confirm that entitlement is available from the relevant surface water source to account for the increased leakage from Goonbri Creek into groundwater.
- The proponent should account for the full predicted 270 ML/year post mining groundwater take into the void pit including water sourced from the pit spoil area.
- A water dealing impact assessment is required prior to any take from the borefield if it eventuates. This should be resolved prior to determination. The impact will be assessed against the groundwater trade assessment criteria and there is no guarantee that the full volume would be available.
- The surface water baseflow losses be accounted for against WAL(s) and reported as take within mine inflow calculations.
- The groundwater model requires more details and should be consistent with the groundwater conceptual model and site observations. We recommend that the proponent use the BTM complex numerical model. In particular, further prescriptive detail should be presented to demonstrate the limiting factors in flow between the hard rock and alluvial water sources. This should include a break down of the water budget inflows/outflows for model layers with a focus on the alluvial water source made transparent. The Kx/Kv and specific storage values and parameter range applied as part of the uncertainty range reported against appropriate scale maps showing the location of the pilot point calibration

nodes against lithology. Reconciliation of observed take and model predictions is also required.

- Undertake an independent peer review of the groundwater model as required under the Aquifer Interference Policy. The above recommendation should be specifically considered as part of this review.
- Present and discuss the comparative impacts and licencing requirements estimates (including baseflow reduction and post-mining) for the Tarrawonga Mine using the BTM model output.

3.0 NSW Aquifer Interference Policy

The Tarrawonga Coal Mine is part of the broader Boggabri, Tarrawonga, Maules Ck complex to which the water impacts, water sharing and infrastructure assets are distributed. The impact of the Modification against the minimal impact considerations of the Aquifer Interference Policy is only reported for the Tarrawonga Coal Mine alone and needs to be reported as a cumulative impact.

Where the potential for a cumulative impact beyond the 2 metre impact threshold to a registered water user exists, a commitment of liability to impacted parties needs to be presented, whether it be the operators of the Boggabri, Tarrawonga or Maules Creek Mine. This will remain an issue regardless of whether the modification is approved.

Recommendations

Prior to Project Determination

- Report the cumulative impacts of the whole BTM complex against the minimal impact considerations of the AIP.
- Develop a TARP and make good plan where the potential for cumulative impacts beyond the 2 m impact threshold to a registered water user are found for the whole BTM complex.
- Once the licensable take for both groundwater sources and surface water sources resulting from the aquifer interference are resolved, a condition of approval should limit the take of water to the peak predicted volumes for both the active and post mining stages.

4.0 Upper Namoi Valley Floodplain Management Plan

The relocated flood bund is outside of the Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019 (Upper Namoi Valley FMP). The proposed new site access road and intersection from Goonbri Road however is partially within the Upper Namoi Valley FMP in the vicinity of Goonbri Rd. Insufficient information has been provided to confirm if the impacts from these works are within the assessment criteria for the Upper Namoi Management Zone C of the Upper Namoi Valley FMP.

Recommendation

Prior to project determination

- Clarification is requested that the proposed new site access road and intersection meet the assessment requirements for the Upper Namoi Management Zone C of the Upper Namoi Valley Floodplain Management Plan.

5.0 General matters

The reduced disturbance area for the open cut pit has resulted in reduced potential for surface water impacts and water capture via rainfall/runoff. The impacts of the modification are therefore less than the previously approved project. Modifications to the surface water management system for both clean and dirty water catchments will need to be updated within the Water Management Plan.

The final landform proposal includes a number of drop structures (approx. 15) to convey water down the slopes of the northern and southern emplacements. Ensuring stability of these structures through adequate design and construction will be critical. A few minor drainage paths are also proposed, in addition to a larger drainage path running north south through the centre of the site.

Erosion and sediment controls are to be implemented in accordance with the Landcom (2004) guidelines which is supported.

The Tarrawonga open cut mine plan has reduced the approved disturbance area, avoiding intersection with Goonbri Creek. Removal of the creek from the mine area removes any need to impose geomorphic design to engineered structures surrounding the disturbance area.

Landscape reconstruction should incorporate drainage design to mimic drainage connection from the southern flank of the Leard State Forest. This should be included in the water management plan for the mining project.

The proposed water pipeline to the Vickery extension project is to include works within waterfront land. These works will need to be in accordance with the "*Guidelines for Controlled Activities on Waterfront Land* (NRAR 2018)".

Post Project Determination

- The proponent must update the Water Management Plan prior to commencement of activities. This will need to include detail on updated monitoring, metering, water take predictions, trigger response management and model verification programs. An updated site water balance, clean water diversion plan and erosion and sediment control plan will also be required. Dams on minor streams need to be constructed in accordance with relevant exclusions under Schedule 1 of the Water Management Regulation 2018 or be sized in accordance with the Harvestable Rights Policy. Where dams do not meet these requirements water entitlement will need to be acquired in the relevant water source.
- The proponent must ensure sufficient water entitlement is held in the relevant water source to account for water take prior to the take occurring, and that water take occurs in accordance with the rules of the relevant water sharing plan.
- Landscape reconstruction should incorporate drainage design to mimic drainage connection from the southern flank of the Leard State Forest. This should be included in the water management plan for the mining project.
- All works on waterfront land are to be undertaken in accordance with the *Guidelines for Controlled Activities on Waterfront Land* (NRAR 2018).