



OUT21/1499

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Dear Mr Hodgkins

**Dubbo Quarry Continuation Project (SSD-10417) –
Environmental Impact Statement (EIS)**

I refer to your email of 8 February 2021 to the Department of Planning, Industry and Environment (DPIE) Water and the Natural Resources Access Regulator (NRAR) about the above matter.

Please find our recommendations and comments regarding licencing, controlled activities on waterfront land, surface water and groundwater management in **Attachments A and B**.

Any further referrals to DPIE Water and NRAR can be sent by email to:
landuse.enquiries@dpie.nsw.gov.au.

Yours sincerely

Liz Rogers
Manager, Assessments
Department of Planning, Industry and Environment: Water
25 March 2021

Attachment A

Advice to DPIE Planning & Assessment regarding the Dubbo Quarry Continuation Project (SSD-10417) – EIS

DPIE – Water and NRAR provide the following recommendations.

Water Take and Licencing

Explanation

Further information is required to consider the current proposal to authorise the surface water take by holding water entitlements. The volume calculated in the EIS of 136ML/yr is understood to be based on an average take estimate. As the proponent needs to hold sufficient entitlement to account for water take in all scenarios it is recommended this figure be reviewed based on wet conditions. A check of WAL43440 identified zero entitlement held in this Water Access Licence (WAL). The ability to acquire sufficient entitlement therefore needs to be demonstrated. This represents a compliance issue as this take is currently occurring and measures to address this need to be provided by the proponent.

The modelled assessment of groundwater inflows has identified the current inflows may range from 191ML/yr to 127ML/yr. As the current entitlement held at the site is 90 units this represents a compliance issue. Clarification is requested from the proponent on the actual groundwater take and measures proposed to address a non-compliance.

1 Pre-approval Recommendation:

- a. The proponent should clarify the project's existing water take. This is due to the water take volumes provided in the EIS indicate that current surface water and groundwater take exceed water entitlements held.

Where water take exceeds the entitlements held, measures need to be proposed to ensure compliance by licencing the water take from each individual water source.

2 Post Approval Recommendations:

- a. The proponent must report on water take at the site each year (direct and indirect) in the Annual Review. This is to include water take where a water licence is required and where an exemption applies. Where a water licence is required the water take needs to be reviewed against existing water licences.
- b. The proponent must ensure sufficient water entitlement is held in a WAL(s) to account for the maximum predicted take for each water source prior to take occurring.
- c. The proponent must ensure that relevant nomination of work dealing applications for Water Access Licences proposed to account for water take by the project have been completed prior to the water take occurring.

Surface Water Management

Explanation

The existing and proposed water management strategy to enable clean runoff from the eastern watercourse to enter the east pit is inconsistent with the best practice requirement to separate clean and dirty water. It is recommended further consideration be given to install clean water diversions to maintain this clean runoff to the downstream environment. The water management system and associated water balance would then need to be reviewed due to an anticipated significant loss of water to the system.

The proposed locations of sediment basins in close proximity to the creek banks near the Eulomogo Creek crossing are predicted to be inundated during a 20% Annual Exceedance Probability (AEP) and higher events. This is inconsistent with the Controlled Activity Approval (CAA) Guidelines which require such structures to be a minimum of 15m from a third order

watercourse such as Eulomogo Creek. The close proximity represents a potential erosion risk to the creek bank should they be destabilised during a flood and as they are predicted to be inundated during floods any held water would be released which may have water quality impacts.

It is recommended alternate designs be used for the safety berm of the proposed water course crossing of Eulomogo creek such as guard rails. This is to facilitate flows more effectively through the safety measure and hence minimise the flooding and erosion impacts predicted in the flood assessment. The impacts are understood to be due to the proposal for a 1.4m high safety berm which results in a 1.8m solid section above the culvert opening which causes the water to back up and for the water to be diverted around the safety berm during floods.

Based on a proposed plan of the crossing in Appendix B of the Surface Water Appendix, the proposed safety berms are aligned at an angle to the watercourse. This is likely to have the effect of directing flood flows towards the right bank of the creek, with potential for erosion and additional flooding impacts.

The flood study assessment states the road crossing is expected to be overtopped at the 20% AEP event (1 in 5 years) assuming the safety berms do not provide flood protection. We require clarification whether the flood impacts have been modelled with the berms being in place. If this is so then the predicted impacts may vary from what may occur.

Two culvert designs are proposed with both being 27m long and located within the creek channel. The key difference between the two designs is that one is pipe culverts, the other box culverts with the proponent preferring the pipe culverts option based on cost. In accordance with the Guidelines for Controlled Activities on Waterfront Land the box culvert option is preferred to pipes, and it is understood the modelled impacts are based on the box culvert option.

- The EIS states the proposed crossing is consistent with the CAA guidelines, however there are some inconsistencies:
 - EIS states the crossing will not change the hydrology of Eulomogo ck. Whilst it is agreed the same volume of water will pass the site, once the discharge exceeds the culvert capacity the timing of maximum peak discharge downstream and the localised flooding impacts will change.
 - EIS states the crossing will not impact hydraulics during flood conditions up to the capacity of the culverts, which is a 20% AEP. However some localised changes in hydraulics are expected as it is understood hydraulics at the outlet of the culvert (in flood and non-flood conditions) and the upstream flood inundation area would be altered.
- The change in velocity assessment due to the proposed crossing design is of concern primarily for the 1% AEP event. Figure 15 in the flood study indicates a notable increase in velocity near the entrance to the crossing on both banks and this continues downstream on the banks and floodplain edge for approximately 130m. The increase in velocity ranges from 1 to >3 m/s. This represents a potential erosion risk to the creek banks and floodplain.

3 Pre-approval Recommendations:

- a. Review the ability to install clean water diversions to enable clean runoff from the eastern and northern watercourses to be maintained downstream. Where this can be achieved the water management system and water balance needs to be revised.
- b. Where clean runoff is to be captured in the east pit from the eastern and northern watercourses, the volume to be accounted for needs to be revised based on wet conditions. The ability to acquire the necessary entitlement needs to be demonstrated.
- c. Relocate the two sediment basins proposed near the Eulomogo Creek crossing to be a minimum 15m from the creeks high bank.
- d. Review alternate options for the proposed crossing, particularly the safety berm to reduce potential erosion and flooding impacts. In accordance with the CAA Guidelines the objective is to maintain the natural hydrologic regime which includes not increasing velocities, floodplain flows or water levels. Where impacts remain, adequate mitigating

measures need to be developed. Pipe culverts are not supported for the proposed creek crossing.

4 Post-approval Recommendations:

- Works in watercourses need to ensure stability and natural ecological functioning. Works are to be in accordance with the Guidelines for Controlled Activities on Waterfront Land (NRAR 2018).

Groundwater

Groundwater Take and Impact Modelling / Analysis

Explanation

As this proposal is for quarrying, the AIP does not require the proponent to predict the impact using a robust peer reviewed groundwater model that is fit for the purpose. For this type of activity, the AIP requires “estimate based on a desktop analysis that is developed using the available baseline data that has been collected at an appropriate frequency and scale; and is fit-for-purpose”.

The proponent has not undertaken an analysis of groundwater impacts or potential groundwater taken on the base assumption that mining to a level above the water table ensures such impacts cannot occur. However, the proponent states:

“It is noted that there is insufficient data available to calibrate the water balance model. The characteristics of groundwater inflows into the pit and runoff volumes from the Eastern watercourse are poorly understood.”

More detailed conceptualisation and a longer period of water table monitoring is required before DPIE Water are willing to accept the proponent’s conclusions. Conceptualisation would benefit from the use of cross sections for example. While mining is expected to occur above the water table, the water level in the pit is not clearly understood, neither is the potential for induced flow from the different aquifer systems (alluvium, fractured rock) to the pit. It is understood that seasonal rainfall variations may have a significant influence on the water balance, however this is not addressed in the groundwater assessment.

More detail on Groundwater Take and Impact Modelling / Analysis is provided in **Attachment B**.

5 Pre-approval Recommendation:

- Provide a more detailed conceptualisation of the hydrogeology of the mine site including the development of cross-sections to allow a better visualisation of the pit elevation and water table, and to better understand the groundwater dynamics in the vicinity of the pit.

NSW Aquifer Interference Policy

Explanation

The proposal in its current form is not fully compliant with the NSW Aquifer Interference Policy (AIP). The proponent argues that an assessment against the AIP is unnecessary because the water table at the mine site is lower than the deepest proposed level of mine excavation, hence the water table will not be intercepted and there will be no water take.

DPIE Water is of the view that this has not been sufficiently tested by the investigations undertaken by the proponent to date given the extended below average rainfall throughout the monitoring period and the occurrence of some water table readings above the base of the proposed mine excavation level.

6 Pre-approval Recommendation:

- If water take is predicted (as a result of further investigations requested in recommendation 4), conduct an assessment against relevant AIP criteria to ensure “no more than minimal harm” will occur to neighbouring third party Aquifer users as a result of expansion of extractive activities.

Groundwater monitoring and Management

Explanation

The brevity of the period of groundwater monitoring and the small number of water level readings to date compromises confidence in the conceptualisation and findings of the groundwater assessment provided by the proponent. It is recommended that data loggers be installed in selected key bores, including 19-DQRC-18, to capture the groundwater dynamics induced by rainfall events, and record the peak height of the water table. All bores should be monitoring manually monthly for the period prior to project determination and for the first two years of mine operation, then reviewed.

The proponent has not provided a trigger action and response plan with regard to post closure monitoring. Groundwater is not mentioned in the Rehabilitation Management plan.

The applicant must develop a monitoring and trigger action response plan for groundwater levels.

A comprehensive water balance for the operations will be required to validate groundwater take and surface water take predictions and to inform the adequacy of licence requirements. This will need to include accurate metering of water pumped into and out of the pits and storages, combined with modelled inputs and outputs for parameters that are unable to be directly measured. Groundwater level monitoring will assist in confirming groundwater take by identifying the location of the groundwater table in relation to the pit levels.

7 Pre-approval Recommendations:

- a. Install data loggers in selected key bores, including 19-DQRC-18, to capture the groundwater dynamics induced by rainfall events and record the peak height of the water table. All bores should be monitoring manually monthly for the period prior to project determination and for the first two years of mine operation, then reviewed. The depth of the monitoring bores and screened intervals should also be reported.
- b. Develop a monitoring, trigger action and response plan for groundwater levels during operational phase and for post-closure and rehabilitation of the development. Conduct analytical modelling to determine an accurate volume of anticipated groundwater interception.

Other General Water Management Recommendations

8 Post Approval Recommendations

- a. A Water Management Plan be developed to document the water management infrastructure, proposed water use, storage and transfer, projected water take and licensing, water metering, monitoring and management/mitigation responses.
- b. The ability to accurately meter and monitor water take from surface and groundwater sources will need to be developed with ongoing review of actual versus modelled predictions. This will be a key component to confirm impact predictions, the adequacy of mitigating measures and compliance for water take.
- c. The proponent must comply with the rules of the relevant water sharing plans.

End Attachment A

Attachment B

Further Detailed Groundwater Take and Impact Modelling / Analysis Advice regarding the Dubbo Quarry Continuation Project (SSD-10417) – EIS

The proponent has proposed the following changes to their discharge regime that have material influence on the water balance for the project:

The water management strategy for the proposed operations applies the following measures to reduce discharges:

- *Groundwater inflows into new and existing pits will be minimised by:*
 - *allowing the East Pit to partially fill and by maintaining a pit water level that generally restricts groundwater inflows; and*
 - *not developing excavations in the Western Area Extent (WEA) and Southern Area Extent (SEA) below the interpreted groundwater table, avoiding any material groundwater inflows.*
 - *The East Pit will be used to store water pumped from pit sumps and sedimentation dams. This reduces the need for discharges during, and shortly following, rainfall events.*
- *Sedimentation basin overflows will be reduced by:*
 - *dewatering the basins to the East Pit within 5 days following each rainfall event; and*
 - *diverting water that is dewatered from the East Pit to downstream of the Settling Pond.*

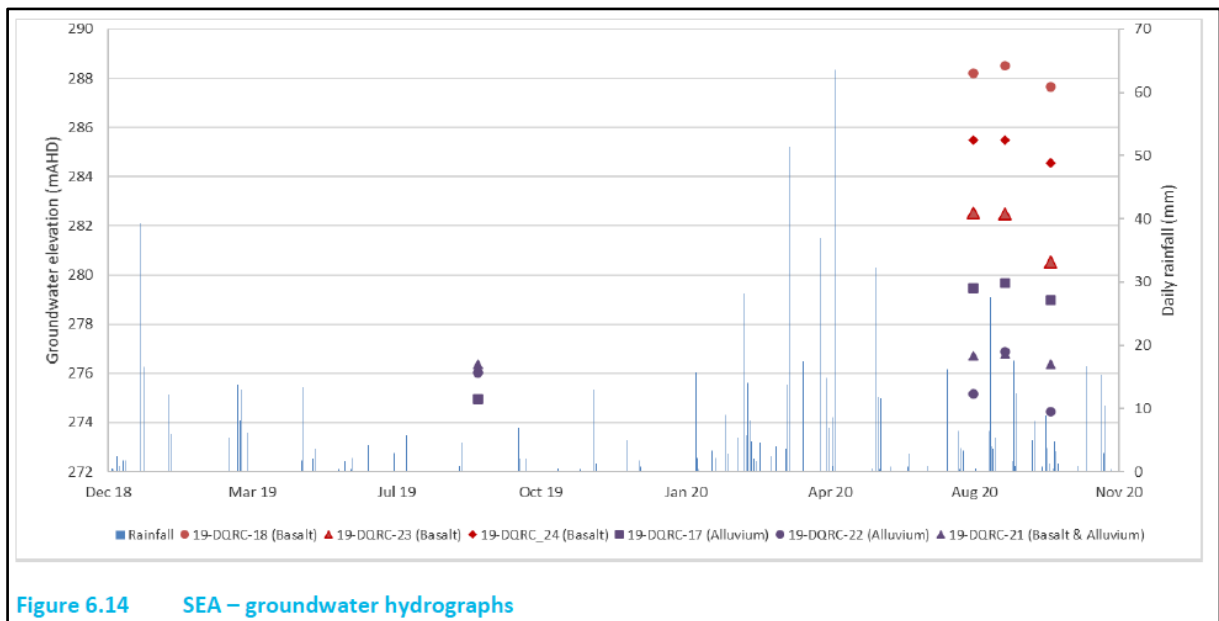
Estimated changes to groundwater inflows as a result of “allowing the East Pit to partially fill and by maintaining a pit water level that generally restricts groundwater inflows” are significant. Inflows are estimated to reduce from 181 ML in a median year, to just 19 ML. Insufficient evidence has been provided to support this conclusion.

DPIE Water are of the view that the proposal to restrict mine excavation to at least 1 m above the water table in the WEA and the SEA does not in itself mean that groundwater won't be interfered with as a result of extractive activity. The proponent has stated that the localised groundwater system is characterised as such:

“Areas of high flow are encountered where there is a high density of open and interconnected fractures. Recharge to these systems is primarily through infiltration from rainfall, runoff and surface water within the outcropping areas. However, inflow can also occur from downward percolation of groundwater from overlying permeable strata that coincides with layers of the sedimentary sequences that have sufficient permeability for groundwater exchange to occur.

There is limited information on the degree of connection between the Gunnedah-Oxley Basin sedimentary basement sequences and the overlying Tertiary and Quaternary strata. However, in areas where permeable sedimentary rocks underlie or adjoin the basalt and alluvial systems there is expected to be potential for groundwater exchange to occur depending on the relative hydraulic heads (DPIE 2019).”

The recharge mechanism described indicates that groundwater could potentially flow into the mine pits during and after rainfall events due to a combination of unsaturated flow and short-term increases in the water table. Groundwater level monitoring data is presented in **Figure 6.14** of the EIS and is reproduced below. It shows water levels in bore 19-DQRC-18 (screened in the basalt) at around 288 mAHD which is higher than the proposed base of the SEA of 286 mAHD.



The proponent needs to provide more evidence to support their assertion that the pits will not intercept the water table or take groundwater via unsaturated flow during rainfall events. The proponent must also provide more evidence as to how they intend to increase the catchment area of the Quarry operations by approximately 26 hectares yet reduce groundwater inflows from 181 ML to 19 ML.

If the proposal is to be approved, the incidental groundwater take as a result of extractive activities is required to be authorised by a water access licence with shares in the Gunnedah-Oxley Basin Groundwater Source, the Macquarie Alluvium Groundwater Source and the Lachlan Fold Belt Murray Darling Basin Groundwater Source. The access licence has to be secured in the open market or through future controlled allocation order.

End Attachment B