Department of Planning and Environment

Our ref: MP08_0143-PA-32

Belinda Pignone
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Hanson Construction Materials Pty Ltd
Level 18, 2-12 Macquarie Street
Paramatta, NSW, 2150

17/05/2024

Subject: Revised groundwater assessment

Dear Ms Pignone

I refer to the revised groundwater assessment (dated February 2024) submitted in accordance with condition 23, Schedule 3 of the consent for the Bass Point Quarry (MP08_0143) seeking the Secretary's approval to undertake quarrying operations between 0 m and -10 m AHD.

The Department has carefully reviewed the document and commissioned an independent peer review. The peer review ultimately concluded that the revised groundwater assessment was adequate given the low-risk environmental context, however made recommendations for improving the groundwater modelling for future revisions of the assessment.

Condition 23 of Schedule 3 also requires a review of the Water Management Plan for the project to reflect the findings of the revised groundwater assessment. The Department notes that a revised Groundwater Management Plan and Killalea Lagoon Management Plan (which are sub plans of the Water Management Plan) have been submitted for approval, however the Department's review of these plans has been on hold pending finalisation of the revised groundwater assessment.

Subject to the Secretary's approval of the revised Water Management Plan, the Department is satisfied that the revised groundwater assessment meets the requirements of the relevant conditions of consent.

Accordingly, as nominee of the Planning Secretary, I grant approval to undertake quarrying operations between 0 m and -10 m AHD, subject to the following conditions:

- Quarrying operations below 0 m AHD must not commence until the revised Water Management Plan is approved by the Secretary.
- Future revisions to the groundwater assessment must incorporate the recommendations in **Attachment A**, with reference to the independent peer reviews included in **Attachment B** and **Attachment C.**

You are reminded that if there are any inconsistencies between the assessment and the conditions of consent, the conditions prevail.

Please ensure you make the document publicly available on the project website at the earliest convenience.

If you wish to discuss the matter further, please contact Jarrod Blane on 02 8275 1831 or jarrod.blane@dpie.nsw.gov.au.

Yours sincerely

Jessie Evans
Director, Resource Assessments
Resource Assessments

As nominee of the Planning Secretary

Attachment A

Matters to be addressed in future revision of the groundwater assessment

1 Model Design

The model design must be tested for the effects of uncertainties in terms of a River bed feature that assumes more physically realistic River bed properties, such as a reduced thickness and a higher permeability to represent the predominant peat, silt and sand properties, based on the actual log information.

The application of spatially variable and highly parameterised uncertainty analysis (parameter optimisation) methods is required in future, especially including to the sediment units underlying Killalea Lagoon, so that the latest best practice methods are applied to the model updates and the effects of uncertainty are not underestimated.

The current assumption of a clay thickness of up to 18m under the south-eastern end of the Lagoon is invalid, as it is not supported by the log information. Further, it has not been tested for sensitivity/uncertainty. It is possible that there would be little material impact on the predictions of drawdown under the Lagoon and leakage from the Lagoon, but that has not been established by the assessment. This is a key issue for future updates to address.

Refer to section 3.2 of the independent peer review in Attachment B for further details.

2 Model Performance

Model updates are required to achieve calibration performance criteria consistent with best practice guidelines and to address issues such as outlined below.

The model scaled RMS metric of 16% remains unacceptable, exceeding the maximum criterion of 10%. The scatter plot used to calculate the sRMS metric reflects the flat trends apparent in the modelled time series plots (ie. modelled levels change very little, resulting in horizontal trends in the scatter plot and flat trends in the time series, whereas the measured levels show dynamic/ seasonal ranges of 0.8 to 1.5 m).

The scatter plot and sRMS metric uses data from 12 bores, but time series plots for calibration are presented for the first 5 bores only, which are located on the west and south side of site, which indicates poor spatial coverage across the site. To demonstrate conformance with best practice modelling guidelines, the model calibration performance assessment must use all available data, even from bores that are no longer operational. The report should present this data in the sRMS metric, the scatter plot, time series plots and contour plans of modelled groundwater level with spot heights of measured levels and/or maps showing head residuals (difference between modelled and measured).

Despite the moderately low impact risk context, substantial performance improvements to conform with guideline criteria are required to demonstrate that the effects of uncertainty are not underestimated, and thus to inform assessment of compliance with the approval conditions. This has yet to be achieved or demonstrated, other than to extend the calibration across the period of monitoring data from 2003 to 2022. However, even that did not include bores that are no longer operative, nor did it include all bore data in the performance assessment.

Refer to section 3.3 of the independent peer review in Attachment B for further details.

3 Water Management Issues

Data has not been provided on the water volumes relating to pit excavation activities, although maps are presented showing pit excavations and dewatered and/or flooded pits over the period 2006-2023. Such water volume data is crucial to constrain the model calibration to volumes as well as the standard groundwater level data, because this helps reduce model non-uniqueness. While statements that 'Volumetric data of pit filling and dewatering does not exist' may be strictly correct, such data could be generated from pit water levels and the LiDAR surveys conducted. Data from the site water balance would be suitable even if there are no metered volumes available.

Condition 24(a) of Schedule 3 to the project approval requires a '*Site Water Balance that includes details of …. water management on site, including groundwater inflows to the quarry voids and site discharges.'* As water volume data does not exist, it appears that not only is the water management activity consistently non-compliant with approval conditions, but the key water volume data that could help validate the model performance is not being collected. This then results in the modelling methodology being non-compliant with a key best practice guideline requirement to minimise model non-uniqueness.

The acquisition of data on water volumes is now very important for model validation as the quarry floor extends below 0 mAHD.

Refer to section 3.4 of the independent peer review in Attachment B for further details.

4 Model Confidence Level

The 'model confidence level classification' set out in the Australian Groundwater Modelling Guidelines is an outmoded qualitative characterisation that is currently being revised.

A basic sensitivity analysis only has been conducted, rather than applying more effort to ensure that the effects of uncertainties have not been underestimated.

While the basic Class 1 modelling design and execution may be deemed acceptable in principle for the moderately low impact risk pathway of drawdown under the lagoon. Other effects, such as seawater intrusion impacts, have not been adequately addressed, and the potential climate change effects on sea level changes have not been modelled.

The report does not make the simple but robust point that a projected 0.5 metre sea level rise would have a very minor effect (1.25%) on the maximum 40 metre hydraulic gradient from the coastal boundary to the deepest pit excavation. Hence there would be little effect on flux changes, especially in the context of a low permeability aquifer.

Refer to section 3.6 of the independent peer review in Attachment B for further details.