OUT21/2186

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Dear Ms Anderson

Bobs Farm Sand Mine Project (SSD-6395)
Response to Submissions (RTS)

I refer to your email of 22 February 2021 to the Department of Planning, Industry and Environment (DPIE) Water and the Natural Resources Access Regulator (NRAR) about the above matter.

DPIE Water and NRAR have significant concerns about this project in its current form. We recommend that the project be modified to limit extraction to a height that maintains at least a 0.7 metre buffer above the groundwater table with the final landform to be a minimum of 1 metre above the groundwater table consistent with other approved projects of the area.

Given the insufficient evidence provided by the proponent to manage similar water quality and outcomes observed at the nearby Rutile Zircon Mining Pty Ltd (RZM) project, DPIE Water believes that this proposal carries a significant water quality risk without an effective demonstrated preventative or remedial plan which could be difficult to implement as well as costly. The proponent also may not be able to acquire the necessary groundwater entitlement to offset the licensable take associated with operating a dredge.

DPIE Planning & Assessment should consider the risk that approval of this project in its current form would set a precedent for other subsequent dredging projects leading to more significant water quality degradation issues.

Detailed information and recommendations can be found in **Attachment A.**

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

Yours sincerely

Mitchell Isaacs
Chief Knowledge Officer
Department of Planning, Industry and Environment: Water
12 April 2021

Attachment A

Detailed advice to DPIE Planning & Assessment regarding the Bobs Farm Sand Mine Project (SSD-6395) – Response to Submissions

The proponent has provided an RTS Report, Hydrogeological Assessment and Management Plan and Acid Sulfate Soil Management Plan. These documents do not provide DPIE Water with confidence that water quality risks can be managed. This attachment provides detailed advice regarding our concerns.

1.0 WATER QUALITY

Potential water quality impacts are the primary concern associated with this project proposal. A Hydrogeological Assessment and Management Plan forms part of the proponent's RTS and discusses groundwater quality considerations.

It assesses acidification risks by applying a flow chart of risk factors to rank outcomes into four classes – A to D with D the only class considered to present potential acid producing conditions. The method was applied to 21 samples analysed for net acidity. The conceptual model assumes that, regardless of the net acidity result, there is minimal acid risk within the dredge pond pit area given that an acid sulfate management plan is to be initiated. For areas outside the dredge pond pit, risk is classified as negligible unless there is a predicted water level drawdown outside of the pit extent, the sample acidity result is over 20 mole H+/tonne and the sample was taken at or below the current water table.

The results for 21 test holes are presented in Table 18 of the RTS with 15 of the 21 samples within the pit extent and thereby classed as negligible risks outright. For the six samples outside the pit extent, two reported acidity greater than 20 mole H+/tonne with only one (assigned a category D) posing a moderate risk. With only one of 21 samples/sites assigned a moderate risk rating, the RTS concludes the project does not pose a water quality acid risk and limiting extraction to above the water table is not required.

An examination of the lithological profiles shows that the majority of the samples tested for net acidity were taken from light brown and yellow/white sands, marginally above the transition into the underlying grey marine sands. The grey sands that are more likely to contain pyritic material are shown to be present in all lithology logs for Bobs Farm, however sampling depths were mostly above 1 mAHD and therefore are not representative of the marine sands that occur to -15 mAHD which are planned to be mined.

DPIE Water is concerned that the fines rejected back to an oxygenated pond will contain concentrated pyrite, organics and possibly radioactive material. Oxidation of this pyrite leads to the release of metals and the organics and the generation of a sludge at the base of the pond. The pyrite distribution is likely to be random, heterogenous and predominantly dispersed within the deeper grey sands layer that have not been robustly assessed. The Bobs Farm proposal to extract the deeper grey sands, separating the fines and returning the fines to the dredge pond is a substantial water quality risk.

These concerns are founded on lessons learnt with the former RZM sand dredge operations located in proximity to this project proposal. The RZM project extracted ore between 1972 and 1999 with deep mining operating from 1990. Towards the end of mining in 1996, a data assessment and hydrochemical impact report was prepared (Coffey 1996 - Report No 1) along with a management strategy (Coffey 1996 -Report no 2), and an ongoing monitoring and management plan (Coffey 1998). Report No 1 describes the drivers for unforeseen water quality impacts and potential management options.

Key findings of the Coffey assessments include:

- Low level concentrations in trace metals and sulfate existed pre-mining

- Pyrite is dispersed heterogeneously and predominantly in the deeper grey sands
- There was an average 100-fold increase in iron and sulfate concentrations following extraction within deep mining areas
- Elevated manganese and arsenic also occur with elevated iron.

The RZM Management Strategy (Coffey 1996 – Report 2) argued that the naturally high content of shell grit provides buffering capacity to neutralise the acidity and that iron and other dissolved metals would precipitate with the overall impact being temporary. The on-going monitoring program (Coffey 1998) shows that natural buffering does not cause significant decline in acidity and dissolved metal concentrations. Few of the RZM management zones ever achieved the set release criteria where iron and sulfate concentrations recovered to an acceptable low level relative to pre-deep mining conditions.

For RZM, the mitigation practices of lime dosing to manage pH levels in the pond was also evaluated and found to be cost prohibitive. Overall, the inferred natural buffering and acid management plan failed, and a contamination legacy remains.

Returning to the current proposal, the acid sulfate soil test holes do not inform on acidity potential from the deep grey marine sands that are proposed to be mined. Bobs Farm acid sulfate soil risk categorisation presented in the RTS is not supported and not consistent with the evidence for the nearby historical RZM dredge operation. There are several adjacent sensitive receptors including an endangered ecological community (EEC), the Hunter Water Corporation North Stockton Catchment Area (Drinking Water Reserve), and the Worimi National Park. Given their proximity and high aquifer permeability rates, these sensitive receptors could be impacted within a few years of operation.

DPIE Water has significant concerns if the project progresses to approval without modification to maintain a buffer above the water table.

2.0 BASELINE DATA

DPIE Water is concerned about potential water quality impacts including: iron, arsenic, manganese, chromium, lead, copper, zinc and aluminium.

The RtS describes nine monitoring wells across the site, four of which were installed to facilitate the RtS. Four rounds of groundwater quality sampling at MW1-MW5 occurred between 2014 and 2015. Two rounds of groundwater quality sampling occurred at all monitoring wells in 2020. Water quality sampling reported in Appendix F shows major ions and nutrients results for a number of sampling events, however testing for the parameters of concern noted above has not occurred. In addition, the ion balance for a number of samples is well outside the quality assurance bands, indicating data validation has not occurred.

The baseline data set is less than the two-year requirement set by the Aquifer Interference Policy (AIP) (given the risk of harm to a reliable water supply) and doesn't capture the parameters of concern or potential seasonal variation. The limited temporal range and stresses hinders the ability to establish representative performance measures that could hold the proponent accountable to impact changes should a change in water quality result. The relationship with either natural climate or anthropocentric impact could be questionable due to limited assessment completed to support the EIS and RTS.

3.0 GROUNDWATER MODEL

A two-layer numerical groundwater model was developed to inform the impact assessment and is presented in Annexure 9 of the RtS. The model was categorised as a Class 2 model with the outputs predicting minimal change in water levels. A slight lowering in groundwater levels is reported due to the open lake water body.

The mass water balance statistic of 1% was reported however other aspects for assessment against the groundwater modelling guidelines were not made transparent in the model report with

the reader referred to Appendix D. Appendix D presents limited further detail. A calibration graph is shown with only 10 water level observation points to support a reported Class 2 model. An independent assessment of the model against the modelling guidelines is required.

4.0 GROUNDWATER ENTITLEMENT

The site is located within the Stockton Groundwater Source under the *Water Sharing Plan (WSP) for the North Coast Coastal Sands Groundwater Sources 2016*. The Stockton Groundwater source has the following allocations for aquifer water take activities:

Search Results

Access Licence Category	No. of WAL(s)	Total Share Component	Total IDEC (Daily flow shares)	Cumulative AWD	Cumulative AWD Unit	Share Component Unit	Water made Available (ML)	Usage YTD (ML)
AQUIFER	36	1237.5	N/A	0	0	ML per share	0	0

The proponent has not provided adequate detail on the amount of groundwater take resulting from the project and how they will obtain water entitlement within the Stockton Groundwater Source.

It should be noted that there is no return flow policy at this point in time and the operation needs to account for all water take including water returned to the open pit.

Post-development take

The new hydrogeological assessment and management plan details the total maximum groundwater take as being 404.6 ML/year, see Table 21 (RTS, Annexure 9, p60) below for a breakdown on water take requirements. The proponent describes 'post-development' as the period when maximum water take will occur in the final stages of the sand extraction when the extraction pit and lake is near completion and dredging activities are ongoing.

Table 21: Groundwater take calculation.

Component	Post-Development Groundwater Flow Budget (ML/Year)
Evaporation	355.2
Groundwater Extraction for Dredging Losses	45.1
Groundwater Extraction for Dust Suppression	2.5
Groundwater Extraction for Truck Washdown Losses	1.7
Total Groundwater Take	**404.6**

However the similar Stockton Sand Quarry Dredging project nearby has likewise made an application to produce 750,000 tonnes of sand per year. They have applied a 2:1 ratio formula for estimating the water taken together with the sand removal – that is, 2 tonnes of water for every tonne of sand. Hence, at a production rate of 750,000 tonnes of sand taken from a dredge, the estimated annual take of water is 1,500 ML. We note that the Surface Water Assessment in the Bobs Farm proposal documents a peak take of 10.6 ML/day which equates to 2.2 GL over 209 days. This information however is in contrast to the peak take described in the above Table 21 of 45.1 ML/year.

There are other components that also need to be considered when estimating total water take including:

- evaporation losses at 1382 mm annual evaporation from the pond
- product moisture being (approx.5%) within the dredged sand
- screen spray for processing
- dust suppression and truck washdown losses (4.2 ML/year – as presented in the RtS)

The report details the applicant already holds a licence containing 40 ML/year entitlement. We believe that the proponent will require additional entitlement greater than the estimated 365 ML/year documented in Table 21 to account for peak annual water take.

The proponent has assumed that gaining additional share components for water take when the project reaches the water table is feasible either through application to WaterNSW (whereas it should be NRAR), or through trading with other licensees. The WSP long-term average annual extraction limit is 14,000 ML/year indicating there may potentially be some controlled allocations available in the future although this would be decided by DPIE Water. The proponent is not guaranteed to receive the required allocation for the project via the competitive controlled allocation process.

The proponent has not adequately detailed it can obtain water entitlement in this water source and is relying on receiving future-controlled allocations to make up the required water entitlement which is as yet not satisfactorily defined. Relying on controlled allocations in this water source is a risk to the project, given the demand for water in this water source for similar sand quarrying activity and the uncertainty that can surround controlled allocations.

Any licensable water take requiring a meter needs to be using a meter that is compliant with the NSW non-urban water metering Policy - https://www.industry.nsw.gov.au/__data/assets/pdf_file/0017/312335/nsw-non-urban-water-metering-policy.pdf.

5.0 RECOMMENDATIONS

- DPIE Water has significant concerns about this project in its current form. We recommend that the project be modified to limit extraction to a height that maintains at least a 0.7 metre buffer above the groundwater table with the final landform to be a minimum of 1 metre above the groundwater table consistent with other approved projects of the area.

Should assessment of the project continue:

Prior to Approval

- Arrange an independent review of the groundwater model that supports a class 2 categorisation as required under the AIP.
- Undertake a spatially adequate (both lateral and vertical to the proposed quarry depths) two-year baseline monitoring of water levels, a comprehensive water quality suite and acid sulfate soil investigation.
- Revise the dredge sand to water pump ratio and other operational water requirements and provide details to support the estimated volumes of take.
- Develop a licence acquisition strategy to account for all take of water inclusive of take associated with the dredge and a commitment to operate within the legal framework. The proponent must comply with the regulatory licensing requirements of the *Water Management Act 2000* for water take. This strategy should include water entitlement for all stages of the project including post completion of the mining e.g. the ongoing evaporation losses needs to be accounted for with water entitlement.

Post Approval

- Prepare a comprehensive monitoring and trigger action response plan (TARP) prepared in consultation with DPIE Water.
- Agree to a security bond to manage acid sulphate conditions, groundwater remedial works, longer-term monitoring, reporting requirements and compensation package for where remediation is ineffective.
- Develop and implement a plan for the installation of meters on all extraction bores or any pump extracting from open water bodies that intercepts the water table.

- All take of water from groundwater and/or surface water sources (including induced groundwater inflows) must be appropriately licenced under a water access licence (WAL) prior to the take of water commencing.
- Any licensable water take requiring a meter needs to be using a type that is compliant with the NSW non-urban water metering Policy - https://www.industry.nsw.gov.au/__data/assets/pdf_file/0017/312335/nsw-non-urban-water-metering-policy.pdf

End Attachment A