OUT21/4774

James McDonough
Planning and Assessment Group
NSW Department of Planning, Industry and Environment

james.mcdonough@planning.nsw.gov.au

Dear Mr McDonough

Hanson Tweed Sand Plant Expansion (SSD-10398)
Environmental Impact Statement (EIS)

I refer to your email of 14 April 2021 to the Department of Planning, Industry and Environment (DPIE) Water and the Natural Resources Access Regulator (NRAR) about the above matter.

Hanson Construction Materials Pty Ltd is seeking to expand the existing Hanson Tweed Sand Plant (HTSP) to access a sand resource of 30-35 million tonnes and provide production and transport of a maximum 950,000 tonnes of sand per annum.

DPIE Water and NRAR require the proponent to:

- Clarify the surface water take and confirm surface water/groundwater relationships
- Confirm the level of groundwater and surface water entitlement required and ability to obtain this entitlement,
- Prepare additional information to confirm adequacy of the groundwater model
- Address the minimal impact considerations of the NSW Aquifer Interference Policy relating to high priority groundwater dependent ecosystems and water quality.

Please note further detailed advice and our recommendations are in Attachment A.

Any further referrals to DPIE Water and NRAR can be sent by email to landuse.enquiries@dpie.nsw.gov.au. or to the following coordinating officer within DPIE Water:

Liz Rogers, Manager Assessments
E: liz.rogers@dpie.nsw.gov.au
M: 0428 428 600

Yours sincerely

Mitchell Isaacs
Chief Knowledge Officer
Department of Planning, Industry and Environment: Water
18 June 2021

Attachment A

Detailed advice to DPIE Planning & Assessment regarding the Hanson Tweed Sand Plant Expansion (SSD-10398)

1.0 Water Take and Licensing

1.1 Groundwater

1.1.1 Pre-approval Recommendations

The proponent should:

a) define the licensable take of water consistent with that described in the NSW Aquifer Interference Policy (AIP) (2012) and provide a strategy to obtain the entitlement.

1.1.2 Explanation

The existing project site is currently authorised by two approvals for excavations (30WA319538 and 30CA319526) and two water access licences (WAL38106 – 1 unit and WAL38097-108 units in the Tweed Brunswick Coastal Sands Groundwater Source of the North Coast Coastal Sands Groundwater Sources 2016.

The EIS is proposing the requirement to increase the water entitlement to 340 units to account for increased groundwater take due to the project. An additional 231 units is therefore required. The basis for determining the entitlement requirements is stated in Appendix 8 of Appendix C (Groundwater Assessment) which calculates the groundwater take based on a combination of the pore space in the sand extracted (318.86ML/yr), the groundwater retained in the product (14.32ML/yr) and the water extracted from the lake for dust suppression (6.858ML/yr).

Aquifer Interference Policy requirements

The above calculation does not appear to determine the water take requirements in line with the NSW Aquifer Interference Policy and further clarification is required.

The NSW AIP states: '*A water licence is required under the Water Management Act 2000 (WMA) (unless an exemption applies or water is being taken under a basic landholder right) where any act by a person carrying out an aquifer interference activity causes:*

- *the removal of water from a water source; or*
- *the movement of water from one part of an aquifer to another part of an aquifer*;'

The project has not accounted for the take of water via the use of a dredge. The dredge operation results in '*the movement of water from one part of an aquifer to another part of an aquifer'* regardless if water is returned to the lake.

Key areas to consider:

- the direct removal of the total amount of groundwater via the product or as a result of extraction,
- indirect water take from the aquifer via groundwater inflows into the pit which could be from the pit lake being at a lower level than the adjacent groundwater table as a result of lake level management or evaporation. This needs to be calculated over a range of stages of the project's life and in consideration of a range of climatic conditions to determine the potential maximum water take.
- There is no ability to reduce the water take requirements from the lake based on water returned to the extraction area after processing as there is no ability to recredit a water entitlement.

Estimation of take

There may be considerable risk that the project will not comply with the legal requirements set by the NSW Government within the foreseeable project timeframe. The proponent only holds an allocation of 109 ML/yr and under the AIP may not hold sufficient entitlement to account for the existing approved operation.

For example, our calculations estimate that the dredge may be pumping around 1,500 ML/year of water at peak production. This is based on the following:

- At optimal dredge efficiency, the proportional ratio of water to sand could be as low as 2:1 ratio but more likely around 3:1 or higher,
- a bulk density of 1.95 t/m^3 and a 6% return ratio of fines (stated in the EIS), to produce and transport up to 950,000 tonnes of saleable product per year which is approximately 500,000 m^3 of sand per year.

Metering dredge extraction volumes would refine this estimate.

The creation of an open lake generates evaporative losses which may further induce groundwater flow into the lake. These losses are considered to be '*the removal of water from a water source'* and will be assessed as licensable take.

To better describe the water balance including the influences of surface water behaviour on groundwater recharge and flow, the proponent needs to undertake further surface water analysis as described in recommendations of the Surface Water section (section 1.2) below. This information should be used to inform the groundwater model as described in section 2 of this advice so that predictions of water take are better understood.

Entitlement

A search of DPIE Water's water licensing database identified a total entitlement of 1220 units in the relevant Groundwater source (Tweed Brunswick Coastal Sands Groundwater source). This entitlement comprises 28 WALs with only three consisting of 100 units or more (totalling 908 units – 700, 108, 100), eight WALs are between 100 and 10 units (totalling 244) and 18 WALs are under 10 units (totalling 68 units).

Once the proponent has revised the groundwater model as discussed above then they can confirm likely entitlement requirements as required in the AIP. They will need to demonstrate their ability to acquire the entitlements via discussions/agreements with entitlement holders. Please note there is no evidence of an active trading market due to the fact that, over the last ten years, no permanent trades and only one temporary trade of 5ML (which took place this water year) have occurred.

We believe that the ability for the proponent to fulfil the regulatory and legal licensing requirements under the *Water Management Act 2000* will be reliant on the controlled allocations process. The proponent needs to provide a clear demonstrated strategy to show they can comply with legal requirements within the project's intended timeframe.

1.2 Surface water

1.2.1 Pre-approval Recommendations

a) quantify the annual volume of surface water take due to runoff from external catchments 2 and 3 for a range of climatic scenarios (wet, average and dry),

b) quantify the annual volume of surface water take due to flood events that result in water entering the lakes and water being captured above the standing water level of the lake, and

c) demonstrate sufficient entitlement can be acquired in the relevant water source to account for the maximum take. If insufficient entitlement can be acquired it is recommended that the proponent consider:

    i. alternate layouts to enable runoff water to be diverted around the site, either with diversions and/or with dams constructed under the harvestable rights of catchments 2 and 3, and

ii. redesign of the lakes outlet system to enable them to be detention basins during a flood event and that any water captured can be released immediately after.

1.2.2 Explanation

The EIS indicates that rainfall exceeds evaporation most of the time and that runoff/flooding from external catchments is going to contribute water to the site. This is predicted to result in a higher water level in the lake than the groundwater level for most of the time and increased recharge to the groundwater source. We believe that the surface water runoff contributions require further consideration from a licensing perspective as it may alter the recharge function.

The assessment has not clarified the volume of surface water take that is to occur in the lakes during flood events. It is anticipated this may equate to the volume stored above the standing water level of the lake up to the height of the weir during each flood event. NRAR recognises that the water level may be higher during a flood event if the water entered the freeboard zone, however it would return back to the weir height once the flood recedes.

The proposed expansion of the lake to the south in Phase 6 is to intercept diversion drains for external catchments (catchment 2 and 3) to the south east which will result in additional runoff entering the lake, rather than being diverted around the site. Appendix B of Appendix D1 of the EIS indicates Catchment 2 has a catchment area of 34.6ha and Catchment 3 an area of 68.2ha. It is not clear what the potential annual runoff volume is to be captured within the southern lake from these catchments, however it is recognised to be significant based on the predictions of increasing the median water level from 0.4mAHD to 0.67mAHD.

The project is proposing the take of surface water which is not to be returned to the surface water source during flood events and via the capture of runoff from external catchments 2 and 3. As the external catchments are a clean runoff area, if the water is captured in a Harvestable Right Dam consistent with the Farm Dams Policy or the water is diverted around the site it will not need to be accounted for in a water licence. If this is not implemented, sufficient entitlement will need to be held in the surface water source for the maximum water take. In a flood event the lake area has the potential to retain captured flood water between the standing water level in the lake and the spill level at the weir. This volume could vary depending on the standing water level height at the time of the flood, however it appears it could be between approximately 0.4 - 0.6mAHD and the weir height is 1.0mAHD. As the lakes are on minor streams, if they are operated as detention basins there is the ability to not account for the surface water capture. This would require all water captured during a flood event to be released back to the surface water source.

The site is within the Tweed Estuary Water Source (Tweed Estuary Management Zone) of the Water Sharing Plan for the Tweed River Area Unregulated and Alluvial Water Sources 2010. A search of the Departments water licensing database identified a total of 98 units held in WALs in the Tweed Estuary Management Zone. Trades are permitted into this water source subject to assessment. Limited entitlement availability and uncertainty on the assessment to consider a trade into the water source is likely to represent a risk if surface water entitlement needs to be acquired.

1.2.3 Post-approval Recommendations

The proponent must ensure:

a) sufficient water entitlement is held in a Water Access Licence/s (WAL) to account for the maximum predicted take for each water source prior to take occurring, and

b) that relevant nomination of work dealing applications for WALs proposed to account for water take by the project have been completed prior to the water take occurring.

2.0 Groundwater Model

2.1 Pre-approval Recommendations

The proponent should:

a) prepare a supplementary groundwater model report detailing how the model addresses requirements set out in the Australian Groundwater Modelling Guidelines (2012),

OR

b) submit an independent review of the groundwater model that reports adherence with Australian Groundwater Modelling Guidelines (2012) requirements and advise if the independent expert's opinion is that the model is considered 'fit for purpose.

2.2 Explanation

Potential water level impacts are predicted by numerical modelling. A MODFLOW three-dimensional finite-difference groundwater flow model was developed, however, there is no conceptual model and only limited information presented on the model setup, calibration, use and outputs. The available content is insufficient to complete an assessment of adequacy against the Australian Groundwater Modelling Guidelines (2012) and to resolve both the class category and whether the model is 'fit for purpose'.

The AIP requires an independent review of the groundwater model to accompany an impact assessment where development consent under Part 4, Division 4.1 of the *Environmental Planning & Assessment Act 1979* applies. This project seeks development consent under Part 4, Division 4.7 of the *Environmental Planning & Assessment Act 1979* therefore the AIP requirement for a complex modelling platform and independent review is not mandatory.

However, DPIE Water cannot determine if the model is 'fit for purpose' with doubts that steady state modelling is sufficient for a brownfield site with existing impact stressors and large evaporative losses.

This is important particularly for understanding the bounds of error in drawdown for assessment against the AIP 'high priority' Groundwater Dependent Ecosystem (GDE) minimal impact criteria discussed in further detail as follows.

3.0 Minimal Impact Considerations

3.1 Pre-approval Recommendations

The proponent should:

a) present a supplementary report addressing the 'minimal impact considerations' of the NSW Aquifer Interference Policy (2012) with consideration of all high priority GDEs, DPIE Water's observation on salinity and iron concentrations and potential impacts,
b) analyse and report on lake salinity risks post closure,
c) quantify the risk of water quality changes and their impact on GDEs, including the increase in soluble iron.

As an approval condition, DPIE Water recommends DPIE P&A request a security bond for where groundwater restorative actions do not achieve effective remediation of the State's asset.

3.2 Explanation

The EIS does not address the NSW AIP assessment criteria directly as requested in the DPIE Water submission to the SEARs. However, the EIS does provide information on GDEs, water quality and groundwater levels.

Groundwater dependent ecosystems (GDEs)

The EIS has identified GDEs using the Bureau of Meteorology (BoM) GDE Atlas. Low potential GDEs are reported along the southern boundary of the expansion area. Groundwater modelling predicts 0.5m drawdown at the BoM low potential GDEs. A small strand of high potential GDEs within the expansion footprint exists towards the northern boundary. The identified high potential GDEs will be removed subject to project approval.

The proponent's EIS has not referenced the Water Sharing Plan for the 'North Coast Coastal Sands Groundwater Sources 2016' to identify 'high priority' GDEs.

DPIE data shows 'high priority' GDEs located along the southern boundary of the existing extraction area. These GDEs have not been referenced in the EIS. The groundwater model drawdown contours presented in the Groundwater Assessment shows water table impact as a change from the already developed site conditions. The drawdown contours present no predicted change in water table at the

location of the 'high priority' GDEs identified in this review. The AIP GDE impact criteria is cumulative impact and impacts from the existing site development along with the project expansion must be considered.

Acid Sulphate Soils and Water Quality

The project operates within a known area of high probability acid sulfate material. Field testing pH results range from 1.2 up to 7.1 with an average result of 4.8. The proponent has undertaken water quality monitoring since 2001. An acid sulfate management plan requires returning PASS fines to the dredge pond at a depth below the water table to limit oxidation. The pH within the existing lake and groundwater is reported to have remained relatively stable.

The Acid Sulfate Soil Assessment makes two key statements:

"*No lime treatment of extracted sands has been required at the site owing to the sand resource's high ratio of acid neutralising capacity (ANC) compared to its acid generating potential (AGP)*".

and

"…*the existing approved approach to ASS Management will also be adopted for operations within the proposed expansion area. This methodology has proven successful over the life of the TSP operations with stable pH levels maintained in the lake and no evidence of the occurrence of acidic reactions in the in-situ material surrounding the lake*,"

DPIE Water acknowledges pH concentrations appear to be relatively stable since 2001. However, there is elevated and erratic fluctuations in iron concentration measured in the shallow groundwater observation bores peaking recently at just under 100 mg/L at one site. Several deeper observation bores are also showing erratic fluctuations in iron concentration in recent years.

Without a geochemical assessment to determine the cause of elevated iron concentration in shallow groundwater, DPIE Water disagrees that there is "*no evidence of the occurrence of acidic reactions in the in-situ…".* The iron fluctuations could be caused by evaporative processes, introduced from the oxidation of acid sulfate soil material, a combination of the two or another process. An analysis of ion ratios such as chloride to iron and chloride to sulfate may identify the process causing high iron concentrations. DPIE Water seeks further geochemical work to understand these processes and assess if project expansion will exacerbate the release of iron.

The iron concentrations in the shallow aquifer exceed Tweed River Water Quality Objectives, ANZECC Water Quality Guidelines and NHRMC Recreation Water Quality Guidelines for primary contact recreation. As no lime dosing has been undertaken to date, and the cause of elevated iron in the shallow groundwater is unknown, it is unclear if iron concentrations can be mitigated. The elevated iron concentrations compromise groundwater beneficial use with potential for ecological impacts to the enveloping GDEs along the project boundary and other water assets.

There is also evidence of high salinity (>15,000 mg/L) in deeper groundwater associated with sea water intrusion across the broader monitoring network. Low salinity groundwater occurs in the shallow sand aquifer. The extraction to a depth of -20m risks mixing of groundwater in the shallow and deep aquifers. The resulting lake water quality for salinity has not been predicted. Data shows a rising EC trend in the deeper observation bores indicative of a landward progression shift in the saltwater interface. The impact risk would increase as extraction progresses westward towards the tidal Tweed River.

There is a clear omission in the discussion about the mixing of deep and shallow groundwater and the resulting influence on lake water quality. There is no salinity performance measure reported for groundwater or surface water in the Soil and Water Management Plan. Whilst electrical conductivity is reported to be collected, there is no rationale presented for this omission. It is unknown if the lake is becoming more saline.

4.0 Monitoring and Management

2.1 Post approval Recommendations

The proponent should

a) accurately meter and monitor water take from surface and groundwater sources 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,

b) Update the Soil and Water Management Plan to reflect monitoring, metering and management measures to report on groundwater and surface water take and potential impacts to water sources due to the activity,

c) 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, and

d) comply with the rules of the relevant water sharing plans.

2.2 Explanation

A Soil and Water Management Plan (SWMP) has been submitted as Appendix E to the EIS. This plan is an update of an existing plan used for the site. The plan has been prepared to address soil and water related aspects at the site, including surface water and groundwater monitoring, acid sulfate soil management, and erosion and sediment control.

The proposed SWMP requires additional elements to enable adequate information to be able to report on and review the water take from the project. Key aspects to achieve this include monitoring of lake levels and groundwater levels, metering and modelling of water extracted from the lake and returned to the lake, all inputs and outputs from the lake such as evaporation, rainfall, flooding, return water and direct extraction. Triggers and response protocols are required to manage the site to within approved impacts and to within any water entitlements held at the site.

A comprehensive water balance for the site will be required to validate water take predictions and to inform any model updates and potential changes to licence requirements. This will need to include accurate metering of water pumped into and out of the site combined with modelled inputs and outputs where required. The groundwater level and lake level monitoring program will also assist in flagging potential changes to groundwater inflows from that predicted, which may require a review of impact and take predictions.

End Attachment A