

APPENDIX 9: GROUNDWATER IMPACT ASSESSMENT



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Re: Newcastle Sand Cabbage Tree Road Sand Quarry – Proposed Modification

Background

Williamstown Sand Syndicate Pty Ltd (WSS) operate the Cabbage Tree Road Sand Quarry, an approved and operational sand quarry on 4 lots of land located at 398 Cabbage Tree Road, Williamstown), approximately 30 km from the Newcastle.

Williamstown Sand Syndicate Pty Ltd (WSS) are seeking a proposed modification (MOD4) to the Development Consent for the Cabbage Tree Road Sand Quarry (SSD-6125). WSS are the owners of the quarry operator Newcastle Sand.

Development Consent (SSD-6125) was granted by the NSW Independent Planning Commission on 9 May 2018 for construction and operation of the quarry subject to a series of conditions.

Potential impacts to groundwater associated with the quarry include effects on groundwater hydrology and groundwater quality because of quarry removing vegetation and sediment and potentially from intersecting the water table.

Operational limitations on excavation depths have been placed on the quarry within Schedule 2, Condition 6 of SSD-6125, which states that the operator “must not undertake quarrying operations within 0.7 metres of the predicted maximum groundwater level”.

Project Modification

The proposed modification seeks to extend the approved quarry boundary in a westerly direction. The modification would result in increasing the approved extraction area by approximately an additional 7ha, extending into Lot 9 DP 239608 with small changes to boundaries of Sectors 8, 9A and 9B. It is estimated that the modification would permit the additional extraction of 500,000 tonnes of high-quality sand resources suitable for the construction industry. If approved, the modification would require an amendment of the Consent to reflect the amended development boundary and associated conditions relating to the Biodiversity Offset Strategy (BOS).

In addition, the proposed modification proposes:

- Minor widening of the connecting road between the northern and southern areas.
- Amend the boundary of the onsite proposed Stewardship Site, by allowing small extensions of the boundary and also the abandonment of areas previously approved for quarrying.
- Clarification of the operational methods to include using excavators to extract material and load it onto dump trucks, with dump trucks serving as the primary method for transferring sand to the processing plant, replacing the previous use of front-end loaders and conveyors.

Existing controls on the Cabbage Tree Road Sand Quarry will largely remain consistent with the existing approval, including:

- Retention of the existing excavation limits set at 0.7m above maximum predicted groundwater with final landform at 1m above maximum predicted groundwater levels.
- Haulage rates of sand remain as previously approved.
- Operational hours remain as approved.

- Processing methods remain as approved, with potable town water used in the washing process.
- All existing management plans are proposed to be updated to reflect the change in the extraction area but will remain otherwise consistent.

Minimum Excavation Levels (MEL)

The elevation of the quarry floor is determined by being greater than 0.7 m above the maximum predicted groundwater level, during operation, and rehabilitated to 1.0 m above this groundwater level after extraction.

The estimated maximum groundwater levels previously presented by Watershed (2019) provided a logical and still relevant basis for estimation of potential high groundwater levels based on four decades of sub regional observation data. The estimated maximum groundwater levels developed by Watershed utilised:

- Hunter Water Corporation (HWC) and site groundwater levels.
- Numerical modelling (MODFLOW modelling described in Umwelt 2015 and 2016).
- Comparison and correlation of the 2014-15 data available from the on-Site bores with the HWC records.
- Additional interpolation of maximum groundwater level observed at the HWC bores (rather than the 95th percentile). As noted in Section 2.3, record rainfall levels in March 2020 provided conditions for maximum groundwater levels to be encountered.

The proposed extension area extends up to 350m to the east of the currently approved Southern Resource Area of the Project (Figure 1) in parallel with the modelled groundwater contours. The proposed minimum extraction level is calculated using the same methodology as the currently approved quarry area. Figure 1 also shows the Minimum Extraction Level for currently approved and proposed extension area.

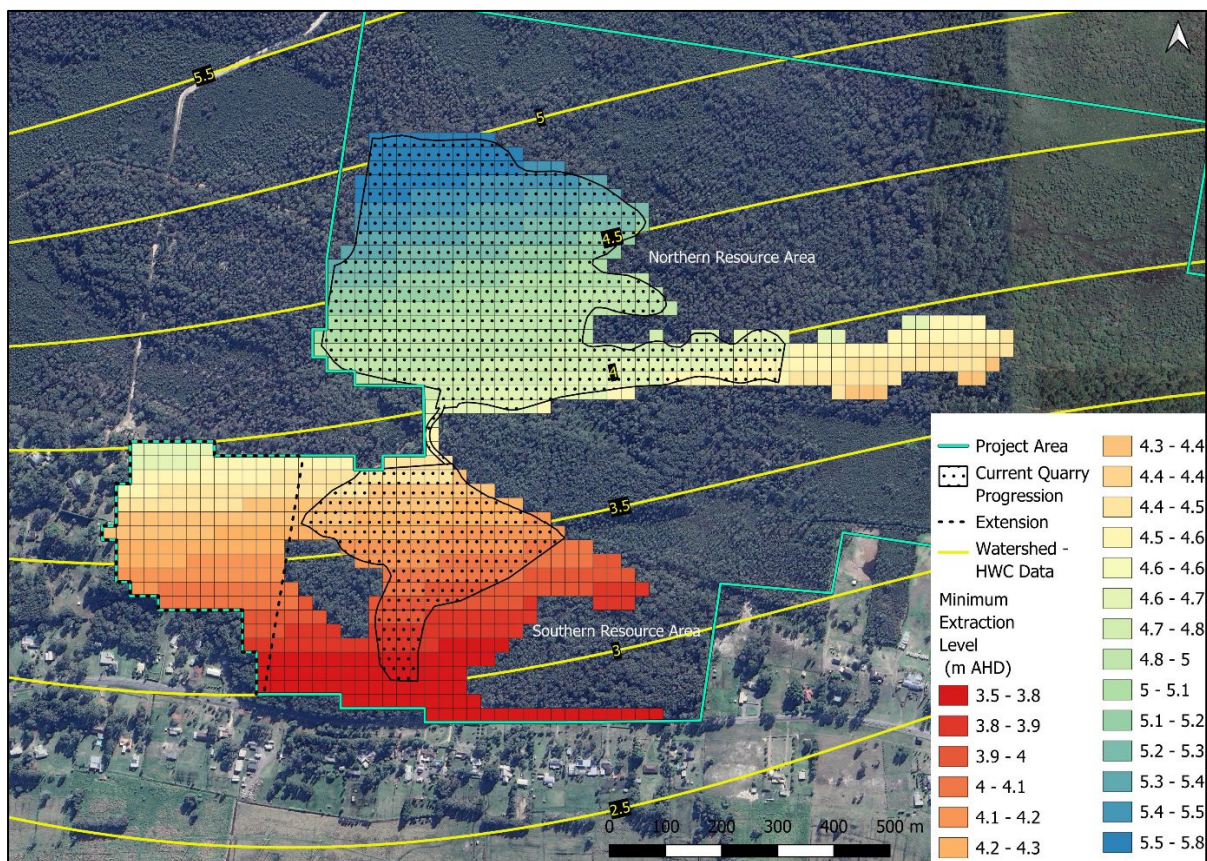


Figure 1: Minimum Extraction Level for approved area and proposed extension

Existing Observations / MEL Performance

The MEL was developed on a combination of modelled groundwater levels which were further adapted using additional HWC groundwater level records. This regimen has generally performed as intended with minor short-term exceedances occurring during climate / rainfall extremes.

Monitoring to date under the existing monitoring practices has shown that the highest variation from model predictions has been associated with groundwater in the northwest of the extraction area. Specifically, at the northern edge of Project area and outside limits of the Northern Resource Area (BH11). Typically, where the surface flow path is longer, i.e. higher up in the catchment area, where there is less relief from the extraction area to the surrounding lands.

This has resulted in elevated groundwater levels when surface water ponding has occurred outside the extraction area, and that ponded water has taken time to drain. This occurred in late 2022 following three years of high above average rainfall including 2020 rainfall totals were at 80th percentile, 2021 at 95th percentile and 2022 at 90th percentile of historical rainfall from Williamstown RAAF Base BoM data.

The extension area is a dune formation previously mined by RZM with considerable relief to the south, east and west of the extraction area, with the centre of the resource area at 14m AHD, with the landform elevation reducing to less than 4m AHD within 100m of the resource boundary. Within the Southern Resource Area, the MEL has performed as intended.

Monitoring – Groundwater Levels

A network of groundwater monitoring bores exists on site and number of these bores will be decommissioned due to quarry operations / progression at some point during excavation. This has already occurred with BH1, BH3 and BH12. Additionally, the proposed extension will require monitoring to provide assurance that the MEL management plan is effectively administering the excavation levels.

To provide effective monitoring to the proposed extension area and replacement for bores removed in the current operational environment, it is recommended that three additional groundwater monitoring bores are included. Proposed locations are shown in Figure 2 and include locations:

- BH_A
- BH_B
- BH_C

These proposed locations are subject to changes based on operational requirements.

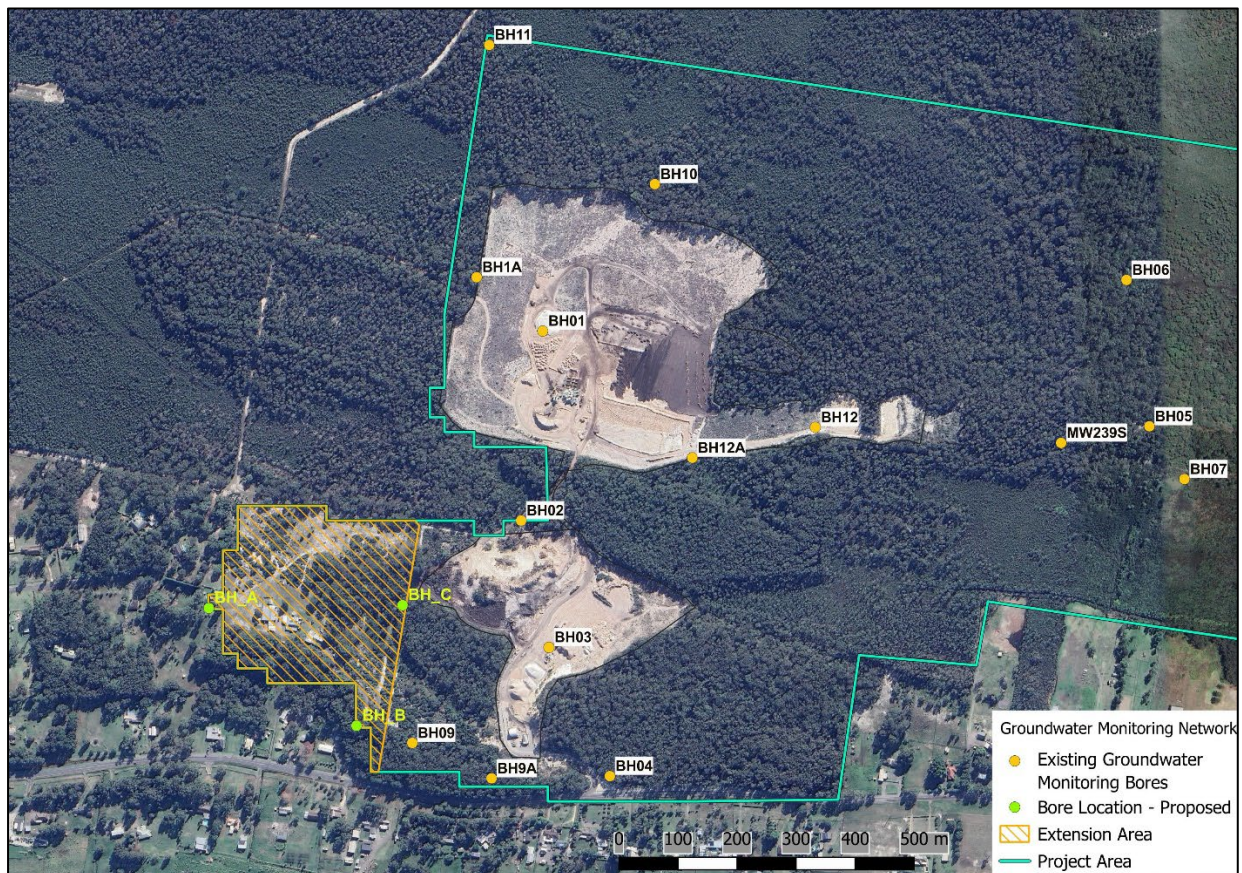


Figure 2: Groundwater Monitoring Network

Regards

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