ENVIRONMENT & NATURAL RESOURCE SOLUTIONS

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Att: Andrew Reeves <blissettgroup77@gmail.com>

SUBJECT: GROUNDWATER MITTIGATION MEASURES – CHALYBEATE SPRING, RAINBOW ROAD, MITTAGONG.

Introduction

Environment & Natural Resource Solutions (ENRS Pty Ltd) were commissioned as independent groundwater consultants by TBG Construction Pty Ltd (the Client) to review options for groundwater mitigation measures for a proposed residential development at 1-5 Rainbow Road, Mittagong (herein referred to as the Site).

ENRS understands the project comprises a proposed basement construction with dewatering anticipated for approximately 3 months during the 18 month construction period.

ENRS previously conducted groundwater sampling and isotope studies of groundwater at the Site and the project has been the subject of several geotechnical investigations and a Dewatering Management Plan by JK Geotechnics which should be read in conjunction with this letter.

Objectives

The objective of this letter report was to review options for groundwater mitigation measures to supplement to the DMP (JK Geotechnics, 2024).

Mitigation Measures

The DMP includes a monitoring and reporting plan with mitigation measures described as response actions for matters including groundwater volumes, levels and water quality. The plan provides for some variability in groundwater seepage and inflows due to the variability of the rock structure such as defects and joints with modelled dewatering rates between 460-2,230 L/day or 0.2-0.8 ML/year.

The following additional Groundwater Mitigation Measures are provided for increased groundwater volumes:

- Monitoring: Site manager to maintain monitoring register with daily inflow and dewatering rates. If dewatering rates reach 70 percent of the DMP rate (1,784 L/s) or are increasing at an elevated rate, excavation works must stop and the the project geotechnical engineer and hydrogeologist should be notified. Subject Matter Experts (SME) to provide updated site specific work methods based on inspection results.
- Supervision: Progressive inspections by the site manager of the excavated rock faces to document structural features and points of groundwater seepage, ie fractures, cracks, joints, and porous layers. If groundworks intercept significant structures with enhanced groundwater seepage or free flowing groundwater, stop excavation works and notify the project geotechnical engineer and hydrogeologist. Subject Matter Experts (SME) to provide updated site specific work methods based on inspection results.

- Dewatering: Pending outputs from inspection reports. SME to develop remedial works methods and enhanced dewatering plan to manage inflows, including but not limited to:
    - Dewatering – install additional boreholes to intercept groundwater inflows, and facilitate dewatering to reduce inflows in the excavation zone;
    - Grouting – Reduce inflows to the excavation by sealing structures in the rock. SME to develop site specific grouting methodology informed by the angle, size and distribution of discharge features. Conventional methods include injecting cement bentonite grout or polymers into a network of drill holes at the discharge area, to fill voids within the rock structure. Several experienced contractors are available in the local area, as required. Final methods to be informed by the site conditions, drilling angles relative to discharge features.
    - Interim Controls – Where further dewatering is required for interim management pending installation of bores or grouting operations, a larger capacity sump pump may be employed in conjunction with DMP mitigation measures.

The measures outlined in this letter aim to supplement the project dewatering management plan for the proposed construction works. The Dewatering Management Plan provides a robust framework for mitigating potential groundwater-related issues. We recommend the site works continue to be managed by the project geotechnical engineer to update the mitigation strategies as works progress and site conditions evolve. This report must be read in conjunction with the ENRS standard Statement of Limitations.

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