Before the Hearing Commissioners
appointed by the Grey District Council and
West Coast Regional Council

Under	the Resource Management Act 1991
In the matter of	Resource consent applications by TiGa Minerals and Metals Ltd to establish and operate a mineral sands mine, and associated activities on State Highway 6, Barrytown (RC-2023-0046; LUN3154/23)

Joint Witness Statement – Hydraulic Factors Influencing Geotechnical Assessment

5 March 2024

Introduction

1 This joint witness statement has been prepared to record the outcome of witness conferencing on hydrology and water-related matters arising from the proposed mineral sands mine and associated activities at State Highway 6, Barrytown (**Application and Application Site**).

2 Witness conferencing took place on 21st February 2024 between:

(a) Jens Rekker, Kömanawa Solutions Ltd, for TiGa Minerals and Metals Limited (**TiGa**);

(b) Cam Wylie, Resource Development Consultants Ltd (**RDCL**), for TiGa;

(c) Brett Sinclair, Wallbridge Gilbert Aztec New Zealand Pty Ltd for West Coast Regional Council and Grey District Council (the **Councils**);

3 Previous correspondence between the parties consisted of:

(a) Brief correspondence between Mr Rekker and Mr Sinclair in mid-January regarding Brett's role and involvement on behalf of the WCRC.

(b) A previous conferencing meeting between Mr Rekker, Mr Sinclair and Professor Brian McGlynn regarding the hydrogeology of the proposed TiGA minesite and the viability of water management at the site, which resulted in a Joint Witness Statement – Hydrology and Water, dated 2 February 2024.

(c) A previous conferencing meeting between Mr Rekker and Mr Sinclair on 21st February 2024 regarding water management at the site, which resulted in a Joint Witness Statement – Water Management Through Injection, dated 5 March 2024.

4 In preparing this statement, the expert witnesses have read and understood the Code of Conduct for Expert Witnesses as included in the Environment Court of New Zealand Practice Note 2023.

Matters considered

5 Matters discussed relate generally to the groundwater hydraulic processes arising from the management of groundwater pressures around the edge of the proposed pine footprint through the use of the water injection systems proposed by the applicant. These matters specifically include:

(a) The outcomes of the water injection trial documented in the report by Kōmanawa (2023).

(b) The differences between the observed effects of the injection trial and the effects of the likely design of a full site groundwater management system.

(c) Adjustments in the conceptual layout of a reinjection bore system based on the outcomes from the previous conference meeting between Mr. Rekker and Mr. Sinclair (21st February 2024).

(d) The potential for the proposed reinjection of treated mine water to impact negatively on the stability of the pit walls in areas where the proposed pit approaches neighbouring surface water bodies.

Matters not considered

6 Matters not considered include:

(a) The geotechnical characteristics of the various lithologies identified at the site.

(b) The proposed water management system for the site as a whole.

(c) Consent compliance criteria for the site.

Matters agreed

7 The water injection trial performed at the site and documented by Kōmanawa (2023) successfully demonstrated that injection of treated mine water is a technique that may be applied to minimise off-site groundwater drawdown arising from the proposed mineral sands mine. However, the injection rates and pressures applied during the trial resulted in upward leakage directly back to surface. Therefore, any proposed water re-injection system is likely to involve have lower injection rates and pressures to minimise the discharge of injected water directly back to surface.

8 The water injection trial demonstrated that groundwater pressures within the mineral sand ore deposit could be increased by more than 1 m at distances at least 16 m from the injection bore. This indicates that a line of injection bores can be designed to generate overlapping groundwater mounding effects with separation distances of approximately 32 m between bores. Reducing the injection rates and pressures from those applied in the trial would result in the need to reduce the separation distance between borders to achieve similar effects.

9 The minimum buffer area around the mine footprint, within which no mining excavations are proposed, is 20 m in width. The applicant proposes to install injection bores within this buffer area, where appropriate to manage off-site drawdown of groundwater end stream depletion effects. Conceptually, the injection bores would be installed close to any adjacent surface water body, to

minimise any movement of injected water from the bores back toward the open pit. The installation of a line of such injection bores should enable a mine water management operator to maintaining groundwater pressures beneath the adjacent to surface water body and thereby achieve the objective of preventing measurable water-body depletion effects. This concept is slightly different to the original conceptualization, which envisaged installation of the injection bores in the middle of the buffer zone.

10 Operation of a line of injection bores within the proposed buffer zone to prevent water-body depletion effects, as described above, can be achieved without raising groundwater pressures within the mineral sand ore body above the ground level along the edge of the pit, provided the bore spacing is appropriately designed. This outcome is consistent with the simulation of groundwater pressures in the slope stability modelling documented by RDCL.

11 The proposed cut height at the edge of the pit is approximately 7 m. The proposed mining operation would result in the placement of processed tailings as backfill along the edge of the planned pit no later than 6 weeks following the excavation of the pit at any particular point. The period of pit wall exposure to potential deformation at any specific point is therefore short.

12 The geotechnical modelling indicates that any potential slope deformations under the conditions described above would not extend far enough from the edge of the pit to impact on any water management systems installed along the edge of the adjacent surface water body or the surface water body itself.

13 The use of infiltration trenches to infiltrate treated mine water into the ground is not inconsistent with the groundwater pressures applied in the slope stability modelling documented by RDCL.

14 In summary, the proposed groundwater recharge system can be installed and managed in a manner consistent with the need to maintain pit wall stability, as documented by RDCL, while achieving the objectives of preventing stream depletion effects and off-site groundwater drawdown.

Dated 5 March 2024

Jens Rekker, Principal Hydrogeologist, Kōmanawa Solutions

Cam Wylie, Principal Geotechnical Engineer, RDCL

Brett Sinclair, Principal Hydrogeologist, WGANZ