

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 on State
Highway 6, Barrytown (RC-2023-0046; LUN3154/23)

Summary Statement and Rebuttal Evidence of Stephen Jeffery Miller

2 February 2024

Applicant's solicitor:
Alex Booker/Alex Hansby
Anderson Lloyd
Level 3, 70 Gloucester Street, Christchurch 8013
PO Box 13831, Armagh, Christchurch 8141
DX Box WX10009
p + 64 27 656 2647
alex.booker@al.nz

**anderson
lloyd.**

Summary of evidence

- 1 My name is Stephen Jeffery Miller.
- 2 I prepared a statement of mine planning evidence dated 19 January 2024. My qualifications and experience are set out in that statement of evidence.
- 3 I repeat the confirmation given in that statement that I have read and agree to comply with the Code of Conduct for Expert Witnesses in the Environment Court.
- 4 My role in relation to TiGa Minerals and Metals Limited's (**TiGa**) application (the **Application**) has been to provide technical inputs in relation to mine design, scheduling and operations planning for the integrated mining, processing and overall operations integration. I am the lead Mining Engineer of the mine planning works completed.

Summary

Project design process

- 5 Throughout the mine planning process, the project has been developed in response to a range of key design drivers including hydrology, noise, dust, native fauna impacts, visual interference, physical constraints of the Site, carbon emissions and the land use following mining completion. These factors informed, among other things, the Mining Disturbance Area (**MDA**).
- 6 Within the MDA, a Mineral Resource Estimate (**MRE**) was created from a resource estimate-based assay from samples taken from historical and recent drilled exploration holes. The key output from the MRE process is a three-dimensional block model that provides an estimation of the geological and mineralisation content of the Application Site.
- 7 The mine optimisation stage takes the MRE block model and, using modifying mining factors (dilution and recovery) along with processing factors (ore recovery), activity costs and forecast product sales revenues, determines the economic viability of the mineral resource across the MDA.
- 8 A number of alternative methods were considered, including dredge, open-pit, hydraulic and bucket wheel-based mining. Each was rejected due to having negative impacts on the key design drivers. Final selection of the proposed method was also influenced by it conforming to the key project drivers and having greater opportunities for electrification.
- 9 Advantages of utilising this process include minimisation of equipment, minimisation of material transport, ore being transported by non-dust creating slurry transport, no need for routine access to the bottom level of the mining void,

allowing all ore mining to occur below ground-level, management of onsite water and improvement in the final landform for drainage and land utilisation.

- 10 This process also allows for the active mining area to be minimised. Rehabilitation is progressive and is done as part of the short-term mining cycle and not left until mining completion. The rehabilitation plan is run concurrent with the mining operation limiting the exposed land.

Functional need to locate

- 11 While exploration works in the region have previously identified mineral sands deposits along the South Island West Coast in various locations, the MRE for the Coates Block has been done to a standard that creates certainty of that resource. I have completed a mine design for this area, on the basis that exploration and detailed mineral resource estimates have been completed to the JORC 2012 standard. The extraction method proposed and the mining schedule were selected as it would have the least impact on water management and wetlands.
- 12 Activities that will occur within 100m of wetlands are those which are immediately required for the mining extraction such as topsoil and overburden removal, ore mining, mining void rehabilitation, infiltration trenches and reinjection wells for water management. These activities are necessary to extract the targeted minerals and there are no viable alternatives that would reduce impact. Activities which could be located out of this area such as the processing plant, access road, mine water facilities have all been located out of this area.

Hydrological processing

- 13 One of the key components with the mine operations is the concept of maintaining separation between contact water and non-contact water. Non-contact water is defined as water that has no contact with the immediate mining operations (mine area plus processing area) while contact water has had some contact inside the mining operations area of activity. The non-contact water is not influenced by the mine and will flow through drainage channels to the Clean Water Facility (**CWF**) to be discharged to the wetland areas. The contact water will be contained within the mine's water management system.
- 14 The Central Drain will run from the southeast corner of the disturbance area down to connect with the CWF and is intended to remain as part of the final landform to improve the property water management. The drain will be set up with erosion control and limestone rock gabion baskets to control flow rate, dropout any remaining suspended solids and mitigate any suspended metals.

Submitter evidence

Ms Simister and Ms Waugh

- 15 I have read the concerns that Ms Simister and Ms Waugh raise regarding fixed and mobile lighting at night and the risks this poses to Westland Petrels. Outside of the processing plant area, the only plant operating at night are pumps circulating water from the mine area to the mine water facility and the processing plant, and returning tailings to the mine area. The tailings discharge area will be set up during daylight hours and the pump outlet will not be moved during the hours of darkness. A light system with shielding above and directed low intensity may be fixed to the tailings pump outlet, which will be switched off when not required. The pump outlet can be remotely monitored from the Wet Concentrator Plant control room inside the building with night vision technology. Only in the event of a pump failure would lighting be required at the mine area to attend to any maintenance requirements to keep the plant safe and operational overnight.
- 16 The lighting audit proposed in consent conditions will ensure that any lighting is appropriately designed to adhere to the Australian wildlife light pollution guidelines, including using amber lights, back shielded lights and minimal intensity focused designs to light the key area only.
- 17 Ms Simister also raises concerns about mobile lights. Because the processing plant machinery will be housed within a building, and there is no mining at night, mobile lighting on site at night would be minimal (if at all), and likely limited to a light vehicle attending to a pump failure or an urgent maintenance activity. Any such vehicles could also be fitted with amber lights or filters to reduce the blue wavelength as per the Australian guidelines.
- 18 Ms Simister raised concerns about lighting outside of the plant. The activities that require regular or continuous visibility are within the Wet Concentrator Plant building which is fully enclosed to prevent light emissions. Outside and adjacent to the building are process water storage and dosing equipment which does not require constant attention. These facilities will be fitted with appropriate shielded, low emissions lighting which is only required during dark hours operations if there is a failure that requires attention to maintain a safe, operational plant. Typical operational interactions are controlled from the control room within the building.

Dr Renwick

- 19 I have read Dr Renwick's evidence regarding greenhouse gas emissions. The Plant will not be diesel-powered, and will be electrified. This was not able to be confirmed as feasible at the time of the resource consent application, but has since been confirmed. As I stated in my original evidence, decarbonisation has been a critical part of TiGa's design brief for the project. The mining methodology maximises use

of electrified methods. The mining fleet is limited in numbers to limit fuel burn and electric powered units over diesel options have been adopted. For example, the input mining unit inside the mining void reduces truck haulage and secondary handling of materials with diesel loaders by replacing this with slurry transport via the input mining unit. Diesel alternatives have been explored but the viability of that option is limited for this project at this time. Identification of further options to reduce the project carbon footprint will occur in the detailed design stage (including opportunities to reduce power draw with alternative electric drives and optimisation of material movement), and throughout the life of the project.

Stephen Jeffery Miller

Dated this 2nd day of February 2024