Submission Cover Sheet

Fingerboards Mineral Sands Project Inquiry and Advisory Committee - EES

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Request to be heard?: No - but please email me a copy of the Timetable and any Directions

Full Name: Dr Harold A. Coleman

Organisation:

Affected property:

Attachment 1: Submission_to_Fi

Attachment 2:

Attachment 3:

Comments: See attached submission.

Inquiry and Advisory Committee - Fingerboards Mineral Sands Project

Department of Environment, Land, Water & Planning

State Government of Victoria.

29th October, 2020

Dear members of the Inquiry and Advisory Committee,

I am writing to express my serious concerns over a number of important issues relating to the Fingerboards Mineral Sands Project for the reasons expressed below.

I am writing as someone who grew up on the family farm in Glenaladale, part of which is within 200 metres of the Fingerboards. Furthermore, for the past 35 years I have been an owner of a nearby property running a beef cattle business.

Dams:

Of major concern are the dams that the Proponent plans to construct, mainly to prevent water contaminated with heavy metals and radioactive elements from leaving the proposed mine site and contaminating the nearby gullies and Perry and Mitchell rivers. The proposed mine lies on the edge of the river gum coastal plain from where the land drops steeply down about 70 metres, either directly to the Mitchell River less than 500 metres away, or via very steep gullies that then flow into the Mitchell River. Twenty dams are listed, but, based on topographic maps and local knowledge, these do not cover all of the gullies that drain the proposed mine site, so the final number of dams would need to be greater than this to protect the Perry and Mitchell rivers. The Mitchell River is a Heritage river that flows into the Gippsland Lakes, where there is a Ramsar wetlands bird sanctuary protected by international treaties. There are two major issues that question whether the proposed dams would be adequate to prevent the contaminants from escaping from the proposed mine site.

1. Dispersive soils: The soils at the proposed mine site and its environs are notorious for being unsuitable for dam construction. The reason is that these soils are of the **dispersive** type. These soils disperse to form a **dissolved slurry** when in contact with fresh water, making them highly prone to erosion and often leading to tunnel and gully erosion [1, 2]. A government technical reference on dispersive soils states emphatically that **dispersive soils are inherently unsuited to dam construction**. Furthermore, the authors state that serious consideration should be given as to whether constructing a dam is necessary, and also to **the potential consequences of dam failure** before building a dam in an area containing dispersive soils [1]. With such soils, a rapid rate of first-fill significantly increases the chances of dam failure [1] (discussed below under 2. Weather). The authors also consider that issues associated with dispersive soils and their management are not adequately addressed in planning schemes or the processes involved in development approvals [1].

East Gippsland Shire Council has a planning **Erosion Management Overlay** that, until 2009, covered an appreciable area of Glenaladale, including much of the proposed mine site. In 2009, a major risk assessment of erosion was performed by the Department of Primary Industries on behalf of the East Gippsland Catchment Management Authority. This assessment resulted in the East Gippsland Erosion Management Plan [2]. As part of the Plan, priorities were developed for action in areas assessed as having High to Very High risks for erosion. As a result, this Plan led to a significant expansion of the Erosion Management Overlay, particularly in the Glenaladale/proposed mine site area. This expansion

of the Overlay was based on the erosion assessments for Glenaladale/proposed mine site area that show:

i) Tunnel erosion is the dominant erosion process in the Bairnsdale foothills, particularly in the Glenaladale area [2].

ii) The susceptibility, likelihood, and risk of tunnel/gully erosion is High to Very High in the Glenaladale/proposed mine site area (page 15, Fig 10; page 22 Fig 16; page 31, Fig 21) [2].

iii) The likelihood of occurrence of wind erosion is High to Very High in the Glenaladale/proposed mine site area (page 22, Fig 15) [2].

Around 15 years ago, the Department of Primary Industries embarked on a major exercise in the Glenaladale area to eradicate some of the major tunnel erosion that was occurring in the area. Sadly, despite this very determined and expensive attempt, tunnel erosion has re-appeared in the treated areas. The risk assessments for erosion together with practical experience of trying to deal with it, indicate that the soils in the Glenaladale/Fingerboards/proposed mine area, are very difficult to work with such that any major earthworks are fraught with considerable geotechnical risk. Indeed, dam construction promotes tunnel erosion [1]. This is highly pertinent to the 20 dams proposed by the Proponent.

A consequence of the dispersive soils and Erosion Management Overlay is, as we were informed when we went to have a modest-sized dam built, even small dams are required to have detailed technical engineering plans before approval will be considered in order to ensure dam integrity. This applies to land considered to be subject to high or very high "geotechnical hazard". It is therefore well-recognized that there is a significant risk with dam construction in the Glenaladale/Fingerboards/ proposed mine area.

Despite the significant risks with constructing dams involving dispersive soils, the dams proposed by the Proponent in Table 4-2 [3] include eleven dams with wall heights to the spillway of 12 m or higher, to hold hundreds of Megalitres of water. Dam 7 is proposed to hold 211 Megalitres with a dam wall height of 24 m to the spillway, for a length of 240 m. This would be a massive construction for dispersive soils, yet there is no mention of dispersive soils and the engineering and geotechnical hazards involved with such constructions. Failure of the dam with the rapid loss of 211 Megalitres could cause quite a flow with consequent damage to downstream infrastructure. As noted by the independent peer reviewer (section 2.1, p. 3)[4], detailed plans for the proposed dams are lacking. They also noted that the Proponent included minimal geotechnical and geochemical properties of the soils in the project area and the potential environmental risks [4].

2. Weather Considerations: One of the quirks of the weather in East Gippsland is the East Coast Low, in which a very slow-moving low-pressure system can become established and linger in the eastern section of Bass Straight. The result can often be at least 100 mm of rain over several days in the Glenaladale/ Fingerboards/proposed mine site area. The State Emergency Services (SES), which has to deal with the consequences of these rainfall events, states on their web page that East Coast Lows can produce heavy rainfall on frequent occasions [5]. Significantly, during June 2007, four major East Coast Lows occurred in succession with each one producing heavy rainfall. The last east coast low brought up to 300 mm of rainfall resulting in major flooding across the Council area [5]. In 2012, two east coast lows in quick succession resulted in major flooding throughout Central and East Gippsland. Climate change is likely to exacerbate the situation. According to a DELWP publication for East Gippsland, although there is an overall trend of declining rainfall, more of the rain that does fall will be in increasingly extreme downpours and this is likely to lead to an increase in the incidence of flooding [6]. These rainfall events raise two major concerns regarding the proposed dams.

i). Given the nature of the high susceptibility of the dispersive soils in the area to tunnel and other forms of erosion, such rainfall events raise major concerns about whether the proposed dams will fail. This particularly applies if the first-fill occurs very rapidly (see above) as would happen during an East Coast Low. I am very familiar with a large dam whose wall failed during its first-fill, which occurred during an East Coast Low, despite having an excellent spillway. That dam site is within 1.3 km of the proposed mine site and one of its proposed dams. With many of the proposed dams located in steep gullies above and feeding into the Mitchell River, there is therefore a considerable risk of a major contamination event involving heavy metal and radioactive elements pouring into the Mitchell River as a result of dam failure.

ii). Even if the dams remain intact through such rainfall events, there is a major risk of the dams filling to capacity and overflowing, thus enabling heavy metal and radioactive elements from the mine site to flow down the gullies to contaminate the the Mitchell River.

Mining companies are notorious for their major environmental disasters caused by dam failure, with Australian mining companies involved in prominent disasters. The collapse of the Ok Tedi tailings dam in Papua New Guinea, operated by BHP at the time, is considered by some to be one of the worst environmental disasters caused by humans. In Romania in the year 2000, a tailings dam collapsed resulting in cyanide and heavy metals contaminating major river systems including the Danube. The spill has been called the worst environmental disaster in Europe since the Chernobyl disaster. An Australian company was a partner in the mine. Although Australian companies were not involved in the recent catastrophic collapse of the tailings dam at Brumadinho in southern Brazil, BHP has been involved in another mine in Brazil near the city of Mariana whose tailing dam burst, killing 19 people and causing significant environmental damage. Closer to home, there have been a number of breaches and accidents at the Rio Tinto-owned Ranger mine in the Northern Territory. In Gippsland, the tailings dam of the Stockman's mine has been of concern for some years. One can readily find other Australian examples of environmental damage caused by leakage from mine dams. Overall, despite such issues going back many decades, mining companies seem inculcated with a culture whereby they seem incapable of implementing measures to prevent environmental contamination beyond the very minimum imposed by regulation, which has so often been proven to be inadequate. In many cases, dam failures could, should, and have been predictable, yet measures not taken or enforced to ensure that the likely events do not happen. The nature of the dispersive soils and the likelihood of major rainfall events make **environmental breaches of the dams** for the proposed mine at the Fingerboards **highly foreseeable events**.

Loss of groundwater

An issue which has not been given appropriate recognition in the EES is the significance of groundwater/springs in the Fingerboards area. During the severest of droughts in recent times, including the most recent, as well as severe droughts such as 1972/73 and 1982/83, water scarcity became a major issue that threatened the continuation of a number of farming enterprises. The saviour for a number of such farms were dams that are supplied by springs. Within 500 metres of the Fingerboards, and lying within the footprint of the proposed mine, are at least 3 dams that have never run dry, even during the worst droughts, due to the springs that feed them. Similar springs in the adjacent Limpyers State Forest and pine plantation have enabled the wildlife in the area to survive these horrendous droughts. Moilun/Stoney Creek, which lies only 1 km north of the proposed project area, has largely dried up during severe droughts. However, and fortunately for me as an owner of 1.7 kms of the creek, some water holes have never dried up, thus enabling my beef cattle enterprise to continue even during the worst and driest of droughts. These water holes are fed by springs, of unknown source. Given the relatively large area of the proposed mine, the presence of ground water

there, and its closeness to the creek, it is likely that the groundwater from the proposed mine makes a significant contribution to the permanency of the water holes in the creek. However, the characteristics of groundwater in the area are poorly understood, precluding predictable consequences of the proposed mine. Nevertheless, since the groundwater is so close to the surface in various places throughout the Fingerboards and surrounding areas, it would seem very likely that an open cut mine would destroy this source of water, and it is unlikely that rehabilitation could ever restore it. The Proponent states that the interactions between surface water and groundwater within the mine area are limited to seepage from creeks into the groundwater system during and following periods during which the creeks flow. They also state that creeks do not receive groundwater discharges (section 4.8) [3]. In other words, the Proponent does not acknowledge the well-established presence of spring-fed dams and creek water holes in the area. It is significant that the independent reviewer of water-related studies commented on the lack of consideration by the Proponent for non-registered groundwater users, such as those using and relying on spring-fed dams and non-registered bores [4].

References:

1. Tasmania. Department of Primary Industries and Water. (2009). Dispersive soils and their management: Technical reference manual. 1-40. https://dpipwe.tas.gov.au/Documents/DPIW_DSM_Manual_April2009.pdf.

2. Victoria. Department of Primary Industries. (2009). East Gippsland Soil Erosion Management Plan. 1-104. https://stfpbsprodapp01.blob.core.windows.net/amendmentfiles/e808b583-6c70-e811-a858-000d3ad117e3_bf462236-286e-47cd-a65e-3ff7c5ac0352_East%20Gippsland%20C108%20East%20Gippsland%20C108%20Supporting%20Document%20-%20Soil%20Erosion%20Management%20Plan%20Exhibition%20Gazetted.pdf.

3. EMM. (2020). Groundwater and surface water impact assessment Appendix A: Conceptual surface water management strategy and water balance. 1-86.

4. AECOM. (2019). Attachment I, Fingerboards Mineral Sands Project: Independent review of water related studies. 1-86.

5. SES. https://www.ses.vic.gov.au/get-ready/your-local-flood-information/east-gippsland-shire-council.

6. Victoria. Department of Environment, Land, Water and Planning. (2015). Climate-ready Victoria: Gippsland. How climate change will affect the Gippsland region and how you can be climate-ready. 1-8. https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0021/60744/Gippsland.pdf.

Yours sincerely,

Harold A. Coleman PhD