

# Submission Cover Sheet

Fingerboards Mineral Sands Project Inquiry and Advisory  
Committee - EES

# 649

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**Request to be heard?:** Yes

**Full Name:** Professor Helena C. Parkington

**Organisation:**

**Affected property:**

**Attachment 1:** Parkington\_Submi

**Attachment 2:**

**Attachment 3:**

**Comments:** See attached submission.

Fingerboards Mineral Sands Project Inquiry and Advisory Committee  
Department of Environment, Land, Water and Planning  
State Government of Victoria.

29<sup>th</sup> 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.

I am expressing these views from two perspectives. First, some concerns are based on my many years of biomedical research at the highest levels as a Professor of Physiology at Monash University. My research has been funded continuously, without any breaks, for 39 years by the National Health and Medical Research Council (NHMRC). These are my personal views and not those of the University or the NHMRC. Secondly, for the past 35 years I have been a landholder with a beef cattle enterprise that is located in Glenaladale within a few kilometres of the proposed mine. I am therefore highly familiar with many of the issues associated with the mine. For the reasons expressed below, I firmly believe that the Fingerboards is a highly inappropriate location for an open cut heavy metal sands mining operation.

#### **Health issues:**

Over the last 15 or so years, a research field that has grown rapidly is the study of early life origins of adult onset of disease. In other words, trauma/insult to the fetus or in early childhood sets the individual up for diseases that become manifest in later life. For example, someone who does not grow well in the womb and is born small has a much greater risk of dying from cardiovascular disease in their 50s. This is very pertinent for the proposed mine at the Fingerboards:

1. Contaminated dust: As discussed below, dust from the proposed mine site is likely to be a major issue. This dust will include heavy metals, radioactive forms of elements, and silica particles. These agents are likely to be ingested in several different ways: i) by breathing the dust into the lungs, and/or ii) by eating food such as vegetables that have been contaminated with the dust and/or iii) by drinking contaminated water, which is highly likely given the reliance on rainwater tanks in the area, or on the town water supply for which a major reservoir is only four kilometres away downwind of the proposed mine site. Heavy metal contamination of dust inside houses and schools is being increasingly recognized as a major issue, particularly concerning ingestion by young children <sup>1</sup>. The more immediate and direct consequences of these agents in impairing health have been known to varying degrees for many years, particularly for lead and mercury. However, in more recent years the detrimental health effects of other heavy metals on health have been increasingly appreciated. These include brain damage, mental disorders, cardiovascular disorders, kidney injuries, and risk of cancer and diabetes <sup>2, 3</sup>. Young children are more adversely affected, with harmful consequences including mental retardation, neurocognitive disorders, behavioural disorders, respiratory problems, cancer, cardiovascular diseases, lower birth weight (with implications for adult-onset of disease, discussed above), lower Apgar scores, lower lung function, and

lower anogenital distance (indicating endocrine/reproductive/sexual disruption)<sup>4-7</sup>. Brain development can be significantly impaired due to heavy metals, and recent studies implicate heavy metals in the development of attention deficit/hyperactivity disorder (ADHD) and some cases of Autism Spectrum Disorder (ASD)<sup>4, 5, 8, 9</sup>. The consequences can be dire for the individual for their lifetime, for their family members, as well as society in general who has to bear a significant component of the health costs. Indeed, support for autism is by far the largest component of Australia's National Disability Insurance Scheme (NDIS). Significantly, school buses that carry secondary school students as well as the more vulnerable primary school children pass through the proposed mining area, thereby exposing the children daily to dust contaminated with harmful elements. Notably, the long term consequences on later-life diseases arising from exposures as a fetus or during early childhood, have received very little attention. Such consequences could well include the development, or earlier development of disorders such as Alzheimer's Disease, Parkinson's Disease, epilepsy, and cognitive impairment. These disorders are a major burden on the health budget. Long after the 20 year lifetime of the proposed mine, society, but not the Proponent, could well end up continuing to pay a significant price in health and social costs as a result of short term perceived gain.

2. Stress: The significant stress arising from the 9/11 attacks in New York City gave rise to many biomedical scientific studies on the consequences for the health of those who were fetuses or in early childhood on 9/11 and their later brain development, and the resulting increase in disorders such as ADHD. The longer term consequences are yet to play out. The proposed mine is strongly opposed by many in the local community and also further afield, attested to by the many thousands of petition signatures. Indeed, the East Gippsland Shire Council passed a motion in December 2017 that expressed opposition to the mine. The proceeding of the proposed mine would most likely increase stress levels in the community that could result in neurodevelopmental disorders in the young and impaired mental health in the less youthful. This would be exacerbated by the significant numbers of large transports, particularly B-Double trucks, on the roads, as well as by the noise from the proposed mining and processing. The presence of dust that is known to contain harmful elements, in and around homes and in rainwater tanks, would be an added source of stress. One just has to listen to parents of young children in the Port Pirie area to appreciate the stress that the fear of heavy metal contamination in and around homes puts parents under.

### **Impact on the horticultural industry**

Another significant issue with contaminated dust from the proposed mine is its likely impact on the horticultural industries in the area, that is, vegetable growing on the Mitchell River river flats in the Woodglen and Lindenow areas. The proposed mine would encroach to within 500 m of the vegetable growing areas on the river flats. Significantly, these vegetable areas are downwind and downhill of the proposed mine site. It strains credibility to consider that dust from the proposed mining operations and transport would not be a major problem. In open-cut coal mining regions, residents living nearby have been reported to have to frequently sweep their verandahs etc to keep the dust down. Worryingly, the Proponent is basing their dust suppression approach on that used on coal mines, as discussed by the independent reviewer (p. 5)<sup>10</sup> This reviewer also noted that the proposed mine requires a Level 1 (high risk) assessment (p.2), yet only standard dust mitigation measures are proposed (p. 10)<sup>10</sup>. Furthermore, some of the Proponent's conclusions are based on mathematical models. However, as discussed below, such models rely heavily on assumptions, and the modelling

has been found wanting by the independent peer reviewer<sup>10</sup>. That the Proponent did not include dust data for the period of late summer to early autumn, that is, the dustiest time of the year, casts further questions over the Proponent's conclusions regarding dust.

Since the vegetable growing areas are downwind of the proposed mine site, wind-blown contaminants from the mine would likely settle not only on the vegetables, but also on the soils. Plants are able to accumulate heavy materials, not only via their leaves, but also by soil-to-crop transfer via roots and tubers<sup>11-13</sup>. Washing vegetables will therefore not remove these bioaccumulated contaminants.

Contamination of the vegetables with heavy metals and radioactive elements poses a health risk through ingestion. Furthermore, it would downgrade the quality of the produce at best, or mean its unsaleability. In the longer term, such contaminating dust would seriously damage the "clean and green" reputation of East Gippsland in general. Perceptions play a significant role in the desirability of products. The likely result would be the loss of employment and income for many who rely on the vegetable growing for their livelihoods. Since decontamination of the soil to remove the heavy metal and radioactive elements would not be economically feasible, the consequences would last long after the proposed mine had gone.

The Proponent claims that the proposed mining operation could co-exist with the horticultural industries on the river flats below the mine. In support, the Proponent includes a report (Technical studies: Horticulture) whose brevity and superficiality challenge its credibility. The conclusions are mainly based on an assessment that dust would not be an issue. However, their conclusions are based on mathematical modelling that has been found inadequate by the independent peer reviewer<sup>10</sup>. Furthermore, various measurements involved with dust assessment were considered by the independent peer reviewer to fall short of requirements.

The Proponent cites a carrot farm in north-western Victoria to support their claim of co-existence. There are a number of issues that preclude the carrot farm as supporting their contention of coexistence.

- i) The mine referred to was on a very small scale compared with the mine proposed for the Fingerboards.
- ii) The edible part of carrots is in the ground and therefore not directly in contact with windblown dust, unlike the leafy green vegetables grown on the river flats near the Fingerboards.
- iii) There was no indication of wind direction.
- iv) No evidence has been presented that the carrots were tested for contamination. As discussed above, soil-to-crop transfer of heavy metals and radioactive elements can be a significant issue.
- v) There are no dates on the two images to indicate the time frames involved.
- vi) There are no comments by the carrot producer to indicate that they found the arrangement satisfactory.
- vii) It is difficult to judge the quality of the rehabilitation, including uneven subsidence, based on the images that were included in the report.

Apart from horticulture, other primary industries would also be affected by wind-blown contaminants. At least three dairy farms lie within 2 kms north of the proposed mine site, as well as a number of beef cattle enterprises within a few kilometres in all directions. Soils would be contaminated, as well as the pastures, either directly from dust landing on the pastures or indirectly following soil-to-plant transfer. Ingestion of such pastures by livestock could result in contaminated milk and meat.

Given the recent strong scientific evidence on how readily horticultural products and other plants can take up contaminants such as those that would be released by the proposed mine, it should be incumbent on the Proponent to make an overwhelming case for their existence in addition to the existence of the horticultural industry. They have fallen dramatically short in this regard.

### **Food security**

Food security is becoming an increasingly important issue for a number of reasons.

- i) The urban expansion that is occurring in many major cities around the world is encroaching on and thus reducing the areas that have traditionally been used to grow food.
- ii) Increasing air and water pollution and the resulting contamination of foods is significantly reducing the quality of food that is available. It was recently reported that a nationwide survey found that 19% of China's agricultural soils have been contaminated with heavy metals to varying degrees (see <sup>13</sup>). It would be prudent if Australia avoided going down this path, particularly in regards to its best soils such as those along the Mitchell River river flats.
- iii) Population growth at the world level is placing increasing pressure on the remaining agricultural land.
- iv) Climate change with its associated increase in extreme weather events is having a significant impact on food production. The recent drought in Australia reduced grain production sufficiently to increase the costs of grain-based foods, while the national cattle herd was reduced to its smallest size since 1992. Since the climate for south-eastern Australia will continue to deteriorate for at least many decades to come, we should do all within our powers to maintain our best, most productive soils and their associated industries, such as along the river flats, to ensure continued production of high-quality foods for our own consumption and also for export.

The Mitchell River river flats are a highly fertile and productive region that have a well-established and highly profitable vegetable-growing industry. The highly fertile soils are complemented by a water supply in the form of the Mitchell River that is usually adequate for irrigation of the vegetables. Such a combination is a rarity in Australia and should be treasured. To jeopardize for the long term a gem such as this by the close proximity of a mine and its associated contaminating dust and thirst for water, would be a significant disservice to the nation.

### **Economic viability, early mine closure, and rehabilitation**

Rio Tinto was the company that showed the initial interest in the Fingerboards as a site for the extraction of heavy metals sands, and they were the first company to have a number of test holes drilled in the Fingerboards area. Thus, Rio Tinto were sufficiently interested that they invested time and money in exploration in the area. However, despite, or because of, their drill samples, they chose not to pursue mining at the Fingerboards. As a result, the option for this passed to another company, Metallica. Metallica subsequently also chose to not pursue the mining of the heavy metal sands in the Fingerboards area. The option then passed on to the Proponent. That a large, well-resourced company such as Rio Tinto, or a mineral sands company such as Metallica, chose not to proceed with a mine raises the possibility that the mine was considered to be of dubious economic viability, if not outright unviable.

While it is recognized that some mining companies fulfil their social, legal and environmental obligations concerning mine rehabilitation, all too often, as indicated by a litany of media headlines

and other reports, mining companies are infamous for abandoning mines in states of poor or no rehabilitation, either deliberately or through economic circumstances. This can be achieved deliberately by processes that can include mines being put into “care and maintenance” for indefinite periods, companies using up their cash reserves, or selling mines cheaply to smaller companies, or expanding a mine instead of closing it. In some cases, mines have been open long enough to cause significant environmental damage, but not long enough to have made much of a contribution to economic development and jobs, let alone rehabilitation of the mine site. Redbank copper mine in the Northern Territory is a prime example. As is usual, the bond was woefully inadequate to cover rehabilitation costs. The more recent requirements by governments for much larger bonds are steps in the right direction, but the bonds still fall well short of that which is required and certainly do not reassure communities who often have to pick up the tab financially, socially, and for their health.

The proposed mine faces significant challenges in the form of climate change. With temperature records being broken with an extraordinary frequency, the recent drought being one of the worst on record, and a bushfire season by far the worst ever experienced, the climate is changing at an alarming rate. Over the projected 20 year lifespan of the proposed mine, the climate is projected to become appreciably hotter and drier with droughts that are more frequent and more severe. This raises a number of significant questions over the functioning of the mine regarding dust suppression and water availability.

- i) The Mitchell River has been known to stop flowing during a major drought. If, or more likely given climate change, when this happens again, who will have precedence over access to the little water available in the river, the vegetable growers, or the proposed mine?
- ii) If the proposed mine were to run low on water, would the proposed mine keep operating and try to save water by reducing dust suppression?
- iii) If the proposed mine were to run out of sufficient water for any operations, what would happen to the mine site? Future severe droughts are likely to persist for longer than the recent one, and therefore could persist for a number of years. Would the mine be left in a state throughout such years in which the heavy metals and radioactive elements were exposed to the weather and thus be susceptible to being blown by the wind and be deposited on the vegetable growing or livestock grazing areas? Of significant relevance is that the proposed mine area has a high to very high likelihood of wind erosion <sup>14</sup>.
- iv) Under what unfavourable conditions would the mine site be shut down and rehabilitated?
- v) If the prices for minerals were to fall sufficiently for the mine to be economically unviable, would the mine be shut down and rehabilitated, or left indefinitely with the heavy metal sands exposed to the weather?
- vi) If the proposed mine were to shut down prematurely due to difficult weather and/or financial considerations, who would pay for the rehabilitation? Mining companies are notorious for evading their obligations in this regard, and the bond payable by mining companies is unlikely to cover the cost of rehabilitation. Would the mine site remain an open festering wound in the landscape? It is noted that the Proponent, Kalbar Operations, only has a share value of \$300,002 dollars, clearly a pittance with which to fulfil obligations such as rehabilitation if the mine fails before production occurs.

### **Mathematical modelling**

A number of the conclusions by the Proponent and their consultants are based on mathematical models, in some cases by necessity and in other cases for convenience rather than doing actual measurements. A temptation by many who use mathematical modelling is to view the outcomes and

conclusions from the models as facts. The Proponent presents a number of critical conclusions in this vein. However, it must be emphasized that models do not produce facts but theoretical conclusions that usually depend strongly on the assumptions that underlie the models. Assumptions and model simplifications can often be chosen to be least unfavourable, if not outright favourable. It is noted that the independent peer reviewers for dust and also for water noted a number of limitations in the modelling by the Proponent and their consultants. These limitations significantly weaken the Proponent's conclusions concerning the major issues of dust and water.

It is noted that the Proponent tried to validate their water runoff model using observations from a 36 mm rainfall event in June 2019 (E.1) <sup>15</sup>. The year 2019 was one of the driest periods in the area on record during which the soil became so dry that, in 2020, it took many 100s of mm of rainfall for the ground to become sufficiently damp that some water eventually began to flow into dams rather than be absorbed by the soil. It is surprising that the Proponent would even attempt to use this sort of data in their modelling and/or as model validation. Not surprisingly, they concluded that runoff from local catchments would only form a small part of the mine water balance (7.1) <sup>15</sup>. However, 100 mm of rain, which can easily occur during an East Coast Low, on the total catchment area of 1,675 Ha gives 1.675 Gigalitres. Six hundred mm falling over a year gives 10.1 Gigalitres. A run-off of 10% <sup>16</sup> would still give a considerable volume of water. Thus, the percentage run-off compared with soil absorption would make an enormous difference to the mine water balance and the sizes of the dams that would be required.

### **Independent Peer Review**

They who pay the piper call the tune, so Proponent-paid consultants are unlikely to give unfavourable reports. Thus, the use of independent peer reviewers by the Government is to be applauded. However, the small size of the Australian scientific community in any particular field of expertise means that independent peer reviewers may feel the need to temper their reports rather than provide a more robust critique. The gold standard in peer review is the anonymous peer review report. Anonymous reviewers, chosen for the expertise, are used widely around the world by leading funding bodies and scientific journals. Such funding bodies include Australia's peak funding organizations such as the Australian Research Council (ARC), our National Health and Medical Research Council (NHMRC), as well as major overseas funding bodies such as the Medical Research Council (MRC) of the UK, and the National Science Foundation (NSF) of the USA. Anonymous peer review is also used by all leading scientific journals from *Nature* and its stable of journals, and *Science*, on down through the impact factors.

### **In Conclusion:**

The Proponent seriously understates the impact that the mine will have on the local community, particularly on the vegetable-growing industries on the downwind, very nearby river flats and on the health of the local population. The Proponent fails to make an overwhelming case that justifies the project despite the negative impacts it will have on a number on the nearby agricultural industries and on the health of those living and working in the surrounding areas.

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Yours sincerely,

Professor Helena C. Parkington