Submission Cover Sheet

Fingerboards Mineral Sands Project Inquiry and Advisory Committee - EES

813

Request to be heard?: Yes

Full Name: Ms Sharon Clerke

Organisation: Mine-Free Glenaladale Inc.

Affected property:

Attachment 1:

Attachment 2:

Attachment 3:

Comments: submitted by email early this morning: Fingerboards.IAC@delwp.vic.gov.au

Community Submission

Proposed Fingerboards

mineral sands mine EES

Auspiced by

Mine-FREE GLENALADALE

PREFACE

We would like to acknowledge the Gunnaikurnai people and their elders, past present and future as the traditional custodians of the land.

The current situation has generated opportunities for friendships to be developed, knowledge shared and relationships to grow. We trust this will continue into the future and allow more opportunities for people to be “On Country”.

We thank the hundreds of people who have been involved in the preparation and writing of this submission. The care, passion and support shown in so many different ways has been heart-warming and humbling for a community placed under so much unnecessary stress for the past six years.

Our gratitude goes out to all of you.

Note: Images courtesy of Mine-Free Glenaladale unless otherwise specified

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EXECUTIVE SUMMARY

The proposed Fingerboards mineral sands mine project's Environment Effects Statement (EES) document is difficult to navigate. It is impossible for one person to read in its entirety in the time period provided, given that it is over 11,000 pages.

It is lengthy, verbose and repetitious. It contains contradictory information. Significant numbers of documents referred to in the EES are actually missing or the font is impossibly small to read.

It focuses on the proponent's perception of the positives of the proposal and also of the proponent's perceived negatives of the area and environment.

It pays lip-service to the genuine importance and value of our essential food-producing area. It also down-plays the negative, serious and irrevocable impacts the proposal will inevitably produce including: loss of livelihood; human and animal health impacts; environmental contamination and destruction; loss of water security; and massive loss of biodiversity, cultural heritage and social cohesion. The consequences have been unrealistically reduced by mitigation strategies that are mostly unjustified and highly inadequate.

The EES is underpinned by many incorrect assumptions. It neglects to consider the fundamental and essential implications of the Mt Ray bushfire and the severe three-year drought.

This has resulted in the limited on-the-ground studies' findings being misinterpreted. Many of these studies are cursory in nature, and/or have been conducted at the wrong time without taking into consideration seasonal variations and historical factors, influencing interpretations made by the proponent.

Soil test results and air quality monitoring in particular have suffered from inappropriate methodology. There has also been an unhealthy and unwarranted reliance on out-of-date desk top studies.

Where no existing Australian standards exist, world's best practice is to be adopted; that is, the USEPA. This has been ignored for a number of toxic compounds. No toxicity of the ore body has been presented which has major implications for many of the study areas. Without this information the risk assessment must be considered high until proven otherwise.

Several risk mitigation strategies presented are impracticable and therefore unworkable. There are far too many risk mitigation measures and plans mentioned that still have not been developed. This makes a valid risk assessment impossible. EES scoping requirements have not been satisfied in a number of areas as was confirmed by independent peer review.

The level of project management for this proposed mine is highly complex. The fact that is has taken nearly four years (several years longer than scheduled) to complete the EES is a reflection of that complexity and the high risks involved. That coupled with the extremely sensitive environmental location, with its very close proximity to major waterways and food/dairy/animal production areas raises the level of risk to extremely high.

It has been acknowledged by the mining proponent that due to the extent of excavation there will be a massive loss of biodiversity and unknown cultural heritage values.

Do the economics stack-up against such massive and irrevocable losses and environmental risks that will potentially have considerable consequences on local jobs and the economy?

Relations between the community and the mining proponent over the past 6 years have been so problematic that it is considered there is no social licence for this mine project to proceed. 85% of the directly impacted landholders who live within 3km of the boundary of the mine project are against the project. Not all of the land on the mine footprint has been secured. 60% of the sensitive receptors were not identified by the proponent, raising the major issue that the impact of the mine project has not been effectively assessed.

A mine of this nature raises serious risks as it would be operating 24 hours daily very close to where many people live, farm, work and children go to school. Mining companies require a social licence to operate and the community has not granted that licence.

The Government's record in relation to rehabilitation has been the subject of review by the Auditor-General in August this year. It is important to consider those findings which relate to inadequate monitoring, poor track record of rehabilitation and woefully inadequate bond setting and management. This does not give the community confidence that what is proposed to happen, will happen.

Specific subject areas of concern have been selected and are addressed in this document. Each area had its own team of dedicated people.

Our community submission is written and produced by members of the local and broader community, cooperating and working from a united standpoint based on long-term knowledge and experience of the area in all of its facets.

It comes from people who genuinely understand, have an enormous depth of skill and informed viewpoints. It is produced by a community that knows this proposal poses an unacceptable risk that cannot be justified or resolved.

INTRODUCTION

The strong community spirit within our area drove this submission. It was conceived by the community, contributions were made by the community and it was written by the community. Well over a hundred people played a part in the production of this document.

Community members have willingly contributed their valuable time, knowledge and expertise with great generosity. This includes those who will be directly impacted by the proposed mine as well as those who will be indirectly impacted. In addition there have been contributions from further afield in Victoria, Australia and overseas. Every one of these people are united by their concern and dismay in equal measure that such a risky and damaging proposal could be given credence.

Individuals, businesses and organisations have all contributed to our community submission. Young and older people from many and varied walks of life have provided valuable assistance. Local knowledge and experience was an enormously valuable asset, as was the assistance of many professional people.

People with a diverse range of experience and expertise were key contributors to this submission. These include, but are not limited to:

Food & Fibre Producers
- Agricultural, Horticultural, Oenologists, Beef, Dairy, Sheep/Wool, Hay/Silage and other crops...)

Agronomists
Agricultural Contractors
Agricultural Organisations
Hospitality establishments
Ecologists
Environmental Scientists
Engineers
Teachers & Lecturers
Medical Practitioners
Veterinarians
Architects
Administrators
Accountants & Book-keepers
Project Managers
Lawyers
Landcare Facilitators & members
Counsellors
Scientists
Social Scientists, and many, many more!

This concerted effort of so many was made in an endeavour to not over-look important details and risk factors that could have significant and untoward impacts.

Impacts would affect individual people as well as our communities, farm animals/pets, native flora and fauna, our invaluable water supplies and soils as well other varied, numerous and inter-related important factors. Factors that we believe would destroy our community, affecting our livelihoods, peace of mind, health, living conditions and not only our futures, but those of our children.

This community submission is written by those who care, who are concerned and who have read widely and researched extensively. It is driven by knowledge, expertise and experience.

The many people who wrote this submission are united in their understanding that this is a mine in wrong place; that the risks of the proposal will have unacceptable consequences on every aspect of our environment.

Our community submission was possible through the efforts, passion and local connections of Mine-Free Glenaladale (MFG).

Mine-Free Glenaladale

On 9 February, 2014 the community of Glenaladale was impacted by the Mt Ray bushfire. This burnt 6,738 hectares. Three homes, 900 head of livestock, hundreds of kilometres of fencing, pasture, fodder, sheds and machinery were destroyed.

About two weeks later the proponents of the proposed mineral sands mine, now known as Kalbar Operations Pty Ltd (Kalbar or the proponent) appeared in the district, wanting drilling access for their proposed Fingerboards mineral sands mine project. Rio Tinto and Metallica previously held an Exploration licence over this area, but following extensive drilling and assessment, forfeited their interest.

Our community saw a need to form a group that could provide a voice for the Community and to support each other to represent the residents, landowners and other local Communities within and beyond the district that would be impacted by the proposed mine.

Thus Mine-Free Glenaladale Inc (MFG) was established to be the Community's voice. It is not an anti-mine group. MFG acknowledges the need to extract natural resources and for products derived from them.

However, the location of the proposed project is a complex landscape already supporting long-term sustainable agricultural industries; a highly inappropriate place for a mine due to the potential for serious and irreversible local and downstream impacts. This proposed mine will negatively impact our land, our homes, our future, our legacy, our history and our children's future. There is a lot at stake.

MFG operates as an incorporated body that is solely volunteer-based; its focus and direction are driven by locals who either live in or live close to the proposed project. It has supported our stressed and distressed community over the past six years during which this proposed mine has been under consideration.

A mammoth effort has been made by MFG and the community through the background of an extended fire season and the Covid-19 restrictions. These situations have meant our community has been unable to meet to help each other, or to hold community meetings to assist and support people through the EES process.

As a group MFG has engaged, informed and educated the local and broader community as follows:

- Produces regular newsletters emailed and distributed to a broad audience base;
- Produces Community information updates giving general information about the mining proposal from the Community's perspective;
- Organises tours of the district showing the proposed area to be mined, adjoining landscapes, gullies, rivers, soil profiles, significant vegetation areas including the EPBC listed EVC - Plains Grassy Woodlands, endangered and rare flora and fauna, bird habitats, surrounding horticultural area both irrigated and dry-lands etc. whilst providing an opportunity for the wider region to discuss the proposal with locals (which contrasts to the proponent's tours which are of a limited area of flat landscape within the project area);
- Surveyed and petitioned the Community to determine whether there is a social licence for the mine to proceed;
- Organises community information evenings with invited speakers to discuss the mining proposal;
- Operates information stalls at Community events; and
- Maintains an active website and Facebook page (currently followed by over 2,457 people) that presents articles and information of interest to the wider community.

The proponent advocates their need for the mine on behalf of its shareholders. The wider community views the proposal through the lens of its long-term understanding of the land and its values, both for now and in the future, and is deeply concerned about the potential impacts and the risks they pose.

BACKGROUND

The Fingerboards intersection is at the crossroads of four adjoining communities, Fernbank, Upper Glenaladale, Woodglen and Walpa. As the site of the former sale yards for the local communities, it was extensively used as a social meeting place for families gathering there in their horse drawn wagons to travel together to Bairnsdale. It has a historical and cultural significance for the older residents.

It is still used as a meeting place for families, friends and colleagues and also as a rest stop for visitors to the area. During the Easter break it is a popular stop for visitors from Melbourne on their way to the Walnut Festival at Dargo, for 4x4 drivers, campers and trout fishermen.

The Country Fire Authority (CFA) uses it as a staging area, and gathers there for strategic deployment. It is also the designated local “safe area” in an emergency.

The Fingerboards is the gateway to the Mitchell River National Park. The culturally significant ‘Den of Nargun’ is one of the most popular tourist attractions in East Gippsland. The rugged upper stretches of the Mitchell River are a major attraction of this beautiful area, much loved by bushwalkers and White Water kayakers.

Figure 1: Anton-Morrison family early settlers

(Source: http://www.flickr.com/photos/theFingerboards/8127206253)

Figure 2: Fingerboards saleyards (Source: Bairnsdale Historical Society collection)

Following the 2014 fires, a Government initiative to assist and give something back to the impacted Community, in combination with the generosity of the adjoining landowner, saw the Reserve Area on the main intersection corner established. The Glenaladale Landcare group, the landowner and a large group of local volunteers worked hard to establish trees and native plants, creating an attractive recreation area for travellers passing through. Now with the threat of the proposed mine, further development has been halted.

Figure 3: (Source: Bairnsdale Advertiser July 17, 2017)

Glenaladale and surrounds possess that special feature of a rural community where higher levels of bonding and social capital exist. The Fernbank and Glenaladale Halls and their recreation and sporting facilities are social hubs, attracting team players from neighbouring larger towns as they preferentially enjoy the camaraderie and mateship a smaller Community can offer.

Both communities run organised events celebrating their history, early settlers and identities that make up this area. Community functions (such as Santa's Visit and Christmas Party at the Fernbank Hall) and regular functions and BBQs organised by the Glenaladale Cricket Club and Recreation Committee are open-invitation and the whole community is welcome.

Figure 4: Activities held at Glenaladale hall (Source: Mine-free Glenaladale)

After the 2014 fires many community events were held at the Glenaladale Hall to help alleviate the huge impact and stress placed on the Community. Impact on the Community from these fires resulted in the loss of three homes, sheds, hundreds of kilometres of fencing burnt and pastures and fodder reserves destroyed. Farmers faced the grim task of disposing of dead stock and putting down badly burnt cattle and sheep.

Figure 5: 2014 Glenaladale fire (Source: Johnston Collection)

Figure 6: Fencing, pasture and 200 round bales of hay – burnt (Source: Johnston Collection)

Three years of drought followed the fires. During this time farmers incurred exorbitant costs procuring and feeding fodder to keep stock alive, while continuing to reinstate burnt fences, replace infrastructure, and revegetate their pastures.

In 2019-2020 the East Gippsland region was again impacted by fires. Although they came remarkably close to the Fingerboards area, fortunately a change in wind direction prevented the fires from reaching the area.

However almost everyone had friends, family or colleagues burnt out by the fires close to Bairnsdale. With the usual generosity of spirit that exists in rural communities, locals spent many days assisting others clear burnt fences and donating and distributing hay, supporting those affected on their journey to recover.

Figure 7: Feeding cattle during 3 years of drought in 2019

(Source: Johnston collection)

The local Community is proud of the contribution of the horticulture and agriculture industries in the region and are very protective of the area's 'clean and green' reputational image. Residents recognise and appreciate the benefits of their pristine environment. Places such as the heritage listed Mitchell River with its clean clear water, the beauty of the Mitchell River National Park on their doorstep, the tranquillity of their panoramic surroundings, clean air and open spaces all make it a beautiful and productive location to produce food and fibre and enjoy the unspoilt landscape.

Figure 8: Agricultural area to be mined (Source: Johnston collection)

Figure 9: Bean crop growing on adjacent horticultural land (Source: Johnston collection)

Chapter 1: WATER

Figure 10: The Mitchell River

Contents

Executive Summary

The independent peer reviewer considered that the EES fails to provide details of the complex engineered structures required to manage water and tailings during the life of this mine, making it impossible to determine the likelihood of a catastrophic failure.

The mine will be situated in the headwaters of Providence Ponds, which will disrupt the shallow aquifers contributing to this unique and significant waterway system.

The proponent considers that they will need 3GL/year to operate. This cannot be reliably sourced from the Mitchell River during the winterfill period and the peer reviewer considered that their borefield may be unable to compensate for a large shortfall.

Previous tenement holders determined that 4.6-6.2 GL/year would be required for the operation of the mine, not 3GL as the proponent has allowed.

The proponent's calculation of 3GL/year is heavily dependent on their ability to recover and re-use 9GL of process water. If this capacity is over-estimated they will run out of water.

Their estimate of 3GL includes only 400ML for dust control; given the evaporation at the site during summer this will be completely inadequate for the purpose.

The complicated system of water management on site, necessitating the construction of large, temporary water management dams and creates a very high risk of dam failure if heavy rains occur.

Overview of concerns

The independent peer review report into water by AECOM 2019 (Vol 4, Attachment 1) highlights several deficiencies in the water investigations. They concluded that:

There was an absence of information on the design of key engineering structures such as Tailings Storage Facilities (TSF), diversion drains and dams to allow evaluation of the impact of these structures. The proponent's response was that these details were not expected under the scoping requirements. This reaction makes it impossible to determine the safety or otherwise of this engineering. The risk of leakage of water from any of these structures, or of dust from the fine tailings TSF as the tailings dry cannot be evaluated, so therefore cannot be dismissed.

The bore field setup that was modelled falls outside the designated bore field. (p10). If the proponent is unable to source water from the Mitchell this could lead to bore interference.

Groundwater modelling is considered to be oversimplified, with the possibility of perched aquifers above the base of the mine downplayed. Thus the model may significantly underestimate the impacts of the mine on groundwater mounding and effects on Groundwater Dependent Ecosystems (GDEs). The response was to disagree, as many of the proponent's bores did not strike water. However, Visualising Victoria's Groundwater (www.vvg.org.au) shows numerous shallow aquifers along the northern edge of the project area. Local farmers (R Coleman, G Johnson (pers. com) have dams which maintain water levels in the absence of surface run off. The "chain of ponds" characteristic of the significant GDE of Providence Ponds is seen in some of the small streams in the project area. All this would indicate that there are numerous shallow aquifers within the project footprint. The effects of disruption of these on the mine itself, farmers' stock water supply, and GDEs such as Providence Ponds and Saplings Morass are either downplayed or not considered.

Providence Ponds and the Perry River catchment "Chain of Ponds" are considered to be a unique and significant waterway system. 'Chain of Ponds' systems were once common across South-eastern Australia but are now very rare (West Gippsland Catchment Management Authority, 2017). The mine will impact a significant portion of the catchment of this system. The EES ties itself in knots trying to downplay this inconvenient truth. Firstly, the statement made (Main Report, Table 4.8 p37) that the Boisdale aquifer supports the GDE of Providence Ponds is not supported by reference and is contradicted by the EES itself.

Coffey Appendix A006, p51 further demonstrates the muddled thinking regarding Providence Ponds:

Providence Ponds is classified as a Type 2 GDE that is highly dependent on the surface expression of groundwater (Richard et al. 2011) and thus can be classified as a Class 1 GDE. This type of GDE relies on groundwater to support aquatic biodiversity by providing habitat and regulation of water chemistry and temperature (Richard et al. 2011) and thus is sensitive to the prevailing groundwater regime.

However, the available information on local groundwater indicates the depth to the regional groundwater system in the area is in the order of 30 m. (EMM, 2020b) This suggests that the ponds are not supported by the regional groundwater system. Instead, the likely presence of clayey horizons within the Quaternary sediments form shallow perched systems which support the ponds and the surrounding red gum community.

Instructively Coffey states: “Importantly, the Perry River and Providence Ponds are not considered GDE’s in the vicinity of the project area as they rely (either completely or partially) on shallow, perched groundwater systems that are disconnected from the more regionally extensive Coongulmerang Formation aquifer”. (Coffey International, 2020)

Is perched groundwater not actually groundwater? Stating that they rely on shallow, perched groundwater systems but are somehow not groundwater dependent ecosystems defies the most elementary logic. The problem for Kalbar is, as pointed out in the peer review, that if the mine goes ahead they cannot avoid disrupting these shallow aquifers.

Unlike other significant zircon resources in Victoria in areas, such as the WIM Avonbank resource near Horsham (WIM Resources, 2020) where the topography is flat and overburden shallow, the Glenaladale resource is situated on a plateau, intersected with deep gullies and overlying numerous shallow and deeper groundwater systems, with a considerable depth of overburden. It overlooks the Lindenow flats, one of Victoria’s premier vegetable growing areas. It is only 300 m from the Heritage Mitchell River, the largest unrestricted river in Victoria, the health of which is vital to the Ramsar Listed Gippsland Lakes. The climate is characterised both by extended dry periods and irregular very heavy rainfall events. This has necessitated complex engineering to attempt to prevent contaminated water or sediment leaving the site, and poses a risk of contaminated water reaching the underlying groundwater.

The 90ha temporary Tailings Storage Facility (TSF), with a capacity of 6.6 million cubic metres is to be situated on the watershed of the Mitchell and Perry Rivers. Because the base is to be compacted clay it is claimed that there will be no seepage. Sumps will be used to harvest water for re-use in ore processing. The upstream slopes will be stabilised with 3% lime (Main Report p3-23) to combat the known dispersive properties of the sodosols on the plateau.

These soils are prone to tunnel erosion (Main Report p11-5). On page 3-25 it is stated that an ‘east coast low’ could deposit around 240 mm of direct rainfall, which they calculate corresponds to 167,670m^3 of inflow to the TSF. However, 240 mm on 90ha is 216,000m^3 (216ML). It is to be hoped that they have allowed enough freeboard on the TSF to handle a storm of this magnitude.

Process water will be recovered where possible and re-used. Some process water is expected to infiltrate the Boisdale aquifer once tailings are placed in the mine. Except for Al and Cu these are not expected to pose a risk (Coffey International, 2020).

This conclusion is based on the results of analysis of the solubility of metals in the ore using the Australian Standard Leaching Procedure (ASLP). However, these leaching tests generally have very limited application as they only provide information about the leaching potential of solid materials under specific chemical conditions. (WA Department of Environmental Regulation , 2015)

The fine tailings, coarse tailings and mineral ore were chemically analysed by Envirolab, Certificate of Analysis 217289-B (Appendix A002 Appendix D Appendix D). Their analysis of metal concentrations (mg/kg) in the three substrates gave high concentrations of a number of highly toxic elements. Interestingly, Environmental Geochemistry International (EGi) (Appendix A002 Appendix D, 2020 Table 1) omitted to mention a number of these, including gallium, lanthanum, strontium, titanium, vanadium and zirconium.

TABLE 1: *Elemental compositions of tailings, heavy mineral concentrate and overburden samples*

Element	Material type	10t Bulk Sample *			Overburden **	
	Sample Description	10t Bulk Fine Tailings	10t Bulk Sand Tailings	Heavy Mineral Concentrate	Overburden Gravelly Clay	Overburden Sandy Clay
Antimony (Sb)	mg/kg	<0.5	<0.5	0.5	<0.5	<0.5
Arsenic (As)	mg/kg	37	4	11	3	6
Bismuth (Bi)	mg/kg	<1	<1	<1	<1	<1
Cadmium (Cd)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (Cr)	mg/kg	86	10	58	10	12
Cobalt (Co)	mg/kg	2	<0.5	<1	4	2
Copper (Cu)	mg/kg	18	2	12	3	5
Lead (Pb)	mg/kg	11	1.9	18	5	7
Manganese (Mn)	mg/kg	24	6	44	21	5
Mercury (Hg)	mg/kg	0.02	<0.01	<0.01	0.02	0.02
Molybdenum (Mo)	mg/kg	1	<0.5	1	<0.5	<0.5
Nickel (Ni)	mg/kg	5	0.7	3	5	3
Selenium (Se)	mg/kg	0.3	<0.1	0.4	0.1	0.2
Silver (Ag)	mg/kg	0.1	<0.1	<0.2	<0.1	<0.1
Sulfur (S)	%	0.01	<0.01	<0.01	<0.01	<0.01
Thorium (Th)	mg/kg	11	1	120	3	3
Tin (Sn)	mg/kg	2	<0.5	2	<0.5	<0.5
Uranium (U)	mg/kg	4	0.4	9	0.9	1
Zinc (Zn)	mg/kg	17	2	11	14	8

* Envirolab Services (WA) Pty Ltd (MPA Laboratories), Certificate of Analysis 217289-B - See Appendix D

** Envirolab Services (WA) Pty Ltd (MPA Laboratories), Certificate of Analysis 217492-B - See Appendix D

From: Envirolab Certificate of Analysis 217289-B

Metals - soil				
Our Reference		217289-B-1	217289-B-2	217289-B-3
YourReference	UNITS	Leach FT	Leach CT	Leach HM
Type of sample		Sludge	Soil	Soil
Date digested	-	13/11/2018	13/11/2018	13/11/2018
Date analysed	-	14/11/2018	14/11/2018	14/11/2018
Calcium	mg/kg	380	44	170
Potassium	mg/kg	770	180	84
Sodium	mg/kg	120	16	20,000
Magnesium	mg/kg	490	40	59
Phosphorus	mg/kg	110	20	240
Silicon	mg/kg	370	170	160
Silver	mg/kg	0.1	<0.1	<0.2
Aluminium	mg/kg	4,500	260	260
Arsenic	mg/kg	35	4.4	11
Boron	mg/kg	<1	<1	11
Barium	mg/kg	28	5.8	32
Beryllium	mg/kg	<0.5	<0.5	<1
Bismuth	mg/kg	<1	<1	<1
Cadmium	mg/kg	<0.1	<0.1	<0.1
Cobalt	mg/kg	1.7	<0.5	<1
Chromium	mg/kg	81	10	58
Copper	mg/kg	17	1.8	12
Iron	mg/kg	12,000	1,300	5,000
Gallium*	mg/kg	6.6	1.1	23
Mercury	mg/kg	0.02	<0.01	<0.01
Lanthanum	mg/kg	49	11	300
Lithium	mg/kg	2	<1	<1
Manganese	mg/kg	23	6	44
Molybdenum	mg/kg	1.2	<0.5	1.2
Nickel	mg/kg	4.0	0.7	3.1
Lead	mg/kg	10	1.9	18
Antimony	mg/kg	<0.5	<0.5	0.5
Selenium	mg/kg	0.3	<0.1	0.4
Tin	mg/kg	1.7	<0.5	1.7
Strontium	mg/kg	8	1	4
Thorium	mg/kg	9.8	1	120
Titanium	mg/kg	230	100	350
Thallium	mg/kg	<0.5	<0.5	<0.5
Uranium	mg/kg	3	0.4	9
Vanadium	mg/kg	130	17	83
Tungsten	mg/kg	<1	<1	<1

Metals - soil				
Our Reference		217289-B-1	217289-B-2	217289-B-3
YourReference	UNITS	Leach FT	Leach CT	Leach HM
Type of sample		Sludge	Soil	Soil
Zinc	mg/kg	16	2.3	11
Zirconium	mg/kg	14	2	2

The samples were then subjected to the ASLP, in neutral water for 24hrs. Most metals were largely insoluble under these conditions, so levels in the leach water were generally low. These results were reported in full by EGi (Table 3), and Coffey (Table 7-7). The reason for the omission of these elements in Table 1 is not spelled out but appears to be deceptive.

The relevance of the ASLP in determining the composition of the process water and leachate from fine tailings is open to question. Firstly, the process water will be reused as often as possible, which could lead to a steady increase in dissolved minerals in each cycle. Water in the fine tailings will be in contact with these minerals for weeks or months, giving far more time for minerals to dissolve.

The lime added to the upstream slopes is likely to increase the pH of the water in the tailings. Compounds of arsenic, chromium and vanadium, all highly toxic, are markedly more soluble in alkaline solutions than in neutral. (WA Department of Environmental Regulation , 2015) Hence the conclusion that drainage from tailings into groundwater is unlikely to be harmful is fraught.

Although the proponent has claimed that their TSF freshwater dam and process water dam will be sealed with clay, they have not demonstrated that suitable clay will be available. Even if this is the case, they are to construct 19 temporary water management dams (EMM 2020a, Appendix 006, Appendix A, Table 4.2).

Some are to contain run-off from undisturbed ground, whilst others will contain water which has been in contact with ore or processed water. They have been designed to contain a maximum of 95mm run-off. The proponent has allowed for the possibility of up to 240 mm falling during an ‘east coast low’, (p3-25) so these dams will be unable to contain a rainfall event of anything near this magnitude.

Up to 12 dams, with a capacity of 1440 ML will be operational at the peak activity of the mine. (Barton 2020a, Kalbar Dams Capacity xlsx, appended). They will rely on spillways to safely release water if capacity is exceeded (EMM 2020a p29). EEM has conceded that this is possible, and that mine contact water may be released to the environment. The risk of dam failure in dams constructed for a limited life, height to spillway up to 24m, and embankment length up to 830m is also a possibility which cannot be discounted.

It is conceded that these dams will leak. EMM (2020a)’s water balance model, (Appendix A006, Appendix A, Figures 8.1 to 8.3 and Figures C1 to C6) allows for up to 14 ML/year of seepage from mine contact water dams and 23 ML/year from undisturbed water dams. Should any of this leaking water find its way into dispersive sodic clay subsoil, the potential for dispersion and tunnelling is very high. A failure of one or more of these dams would lead to a sudden release of potentially contaminated water and sediment into what is likely to be a sensitive environment.

In addition to seepage from dams there will also be seepage from tailings and ore. EEM (2020a) have not included an allowance for water seeping from the mine floor. This seepage is expected to cause groundwater mounding in the vicinity of the mine.

Although the process water is expected to contain a number of toxic elements (Coffey p162) they consider that all except aluminium, copper and iron are associated with particles which will be filtered out as the water seeps to the aquifers, and hence are of low risk. The risk to Providence Ponds is rated as low (Main Report p9.77).This is unproven, especially given the potential for failure of a water management dam.

Water Usage

Water modelling

In Section 5, AECOM's review and assessment concluded, "…the quantity and quality of groundwater and surface water information considered as part of the assessment is that in a number of areas it is not sufficient to support the impact assessment under the Environment Effects Act 1978 and Project's Scoping Requirements. Furthermore, the review of the conceptual hydrogeological model suggests that although there is a good level of technical robustness, rigour and a high level of confidence in most interpretations a number of aspects are not fully defendable and bring into question the predicted impacts."

Surface water

The proponent has chosen to use rainfall data over a 117-year period (1900-2017) to work out the average mean for the project's surface water model, Section 6.1.1 p40, *"simulates water management scenarios using 117 years of historical rainfall, using daily time steps*." "Water is transferred across the site from water sources (e.g. rainfall and external water sources) to water storages and elements representing mining processes based on pre-determined rules and transfer rates."

However, when assessing rainfall data, the Victorian water sector uses the period 1975–present as the current climate baseline period for a better representation of rainfall and have been since 2017. *"DELWP recommended it in the 2016 Guidelines for Assessing the Impact of Climate Change on Water Supplies in Victoria, and it was subsequently adopted by water corporations in the 2017 Urban Water Strategies."* P43 (DELWP, 2020)

While DELWP's Long Term Water Resource Assessment report is recent, this information was included in the DELWP guidance used by EMM (DEWLP, 2016) as noted in Section 7 p61. This shows the flaws with and misleading extent of their rainfall data for considering climate change, for sensitivity analysis, and also to the potential to manage project impacts. The first recommendation of the DELWP (2016) report is "*when assessing climate change impacts on water availability it is recommended that water corporations use a 'current climate' baseline period from July 1975 to date."*

The proponent applied the model *"for the full 117-year simulation time."* They did not provide a comparison of the data for the advised period from 1975 to present data if alternative baselines were used as recommended. *"…This does not preclude the use of alternative baselines, but in cases where alternative baselines are adopted a comparison of the hydrological differences must be undertaken and reported."*

Section 7.3.3, using 117 years of rainfall data notes the adopted climate change scenario.

The climate data described in Section 3.2 was modified to reflect the projected change in climate. The following alterations were made:

the daily rainfall total for storm events with an AEP of 50% to 1% (24-168 hr storm) was increased by 5% per degree of warming (6.5%) as recommended in the DELWP (2016) guideline.

evaporation rates were increased by 4.7%;

annual rainfall totals were reduced by 2.3%; and

Mitchell River streamflow was decreased by 11%.

The modified climate data was applied to the water balance model at year 15 of the mine operations for the full 117-year simulation time.

The significance of a potential misrepresentation of actual rainfall data and surface water availability is reflected in Appendix A006 App A, Conceptual Surface Water Management Strategy and Water Balance, *"Rainfall and runoff are crucial parts of the Project Water Management System."* So, it is essential that predictive modelling is using correct input data with reliable parameters to give assurance and certainty to the project's estimation of surface availability and predicted runoff.

The following graph from DELWP's recent 2020 Long-Term Water Resource Assessment for Southern Victoria, Basin-by-Basin Results, P50, shows a clear lowering of the annual average mean when using data from 1975. (DEWLP, 2020)

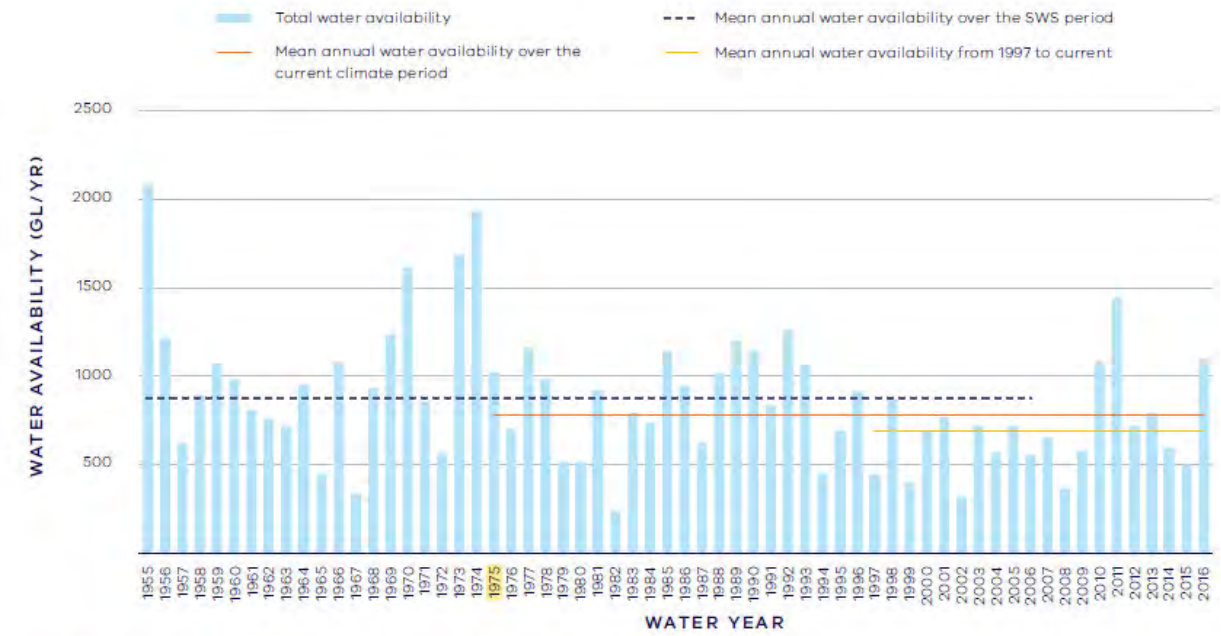

Figure 2: Surface water availability in the Mitchell River

Below is the proponent's 117-year rainfall data, EMM Section 3.2 p11, Figure 3.2. Whilst both graphs do not include the last 2 drought years it is clearly evident that the average mean, if measured from 1975, would be lower.

A summary of the annual rainfall totals for the site are shown in Figure 3.2 below.

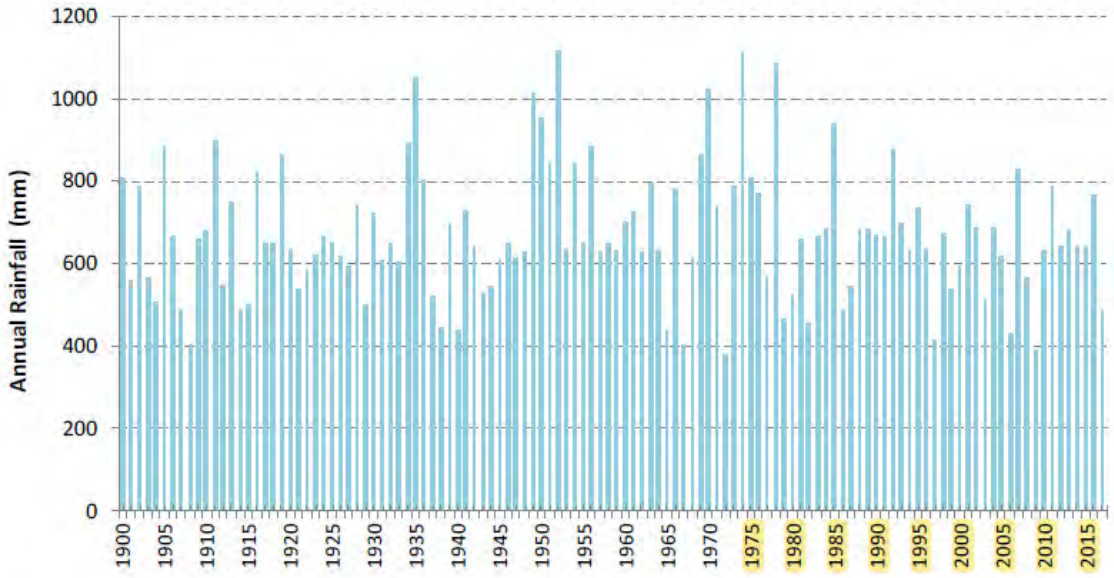

Figure 3.2 Annual rainfall Lindenow Station (Stn No. 085050)

Section 6, p 40 for Site water balance modelling, “Rainfall and evaporation are the key environmental variables applied to the model” and section 6.3.1 “Rainfall Historical rainfall data (1900 – 2017) from the Lindenow Station (Station Number 085050) summarised in Section 3.2 was applied to the model. Rainfall is a direct input into all water storages in the model and is also applied to the hydrologic model.”

Consequences of incorrect modelling

Therefore, the modelling cannot be relied upon if the rainfall data is misleading. All current estimates of stream flows and runoff are inaccurate and cannot be relied upon for storage, offset discharges, soil moisture conditions, evaporation and decommissioning of mining operations as reflected by the AECOM review, p12.

The water quality and water quantity effects appear to be small at this regional scale, but they depend very largely on the accuracy of the site water balance modelling by EMM. Any relatively moderate change in site surface water management could materially change the impact assessment, both locally and regionally.

The conceptual Surface Water Management Strategy and Water Balance (EMM, 2019) is a critical report as many other studies rely on the outputs of the water balance, such as:

- How much water is needed?
- Where will it come from?
- What happens to it onsite?
- How will it be discharged back to the environment?
- What effects will it have on downstream environments and users?

It is with this aspect where a project flaw could emerge. Any project modification (even relatively modest), or any change in assumption, will result in a significant change in the site water balance. As with the other surface water studies, "…Key issues are inputs – where the water comes from; …if anything changes, there would be a large project risk. In particular, the transfers between the WCP and sand tailings, WCP and MUPs, and WCP and fine tailings are all very large. The risk of this water movement changing does not appear to have been addressed, or any clear acknowledgement or strategy in terms of managing 'change'. This in turn raises an issue: **can the project be shut down safely if the economics or water resources are reduced or not able to be met in any one year**. This aspect has not been included in the impact assessment."

The proponent has exhibited considerable uncertainty regarding their ability to access their estimated 3 GL of water required for the project. Pye 2017 (Appendix A008) calculated pipe sizes and pump selection for what he stated would be a maximum flow rate of 25ML/day from the Mitchell River (p20).

At this rate it would take 40 days to pump 1GL. However the 350L/s specified is actually 30ML/day, which would take 106 days to pump 3.2GL Therefore there is a very high risk that the proponent will be unable to pump the full water allocation over the winter pumping period.

EEM (2020a) Appendix A006, Appendix A, Appendix B in their modelling assumptions used 25 ML/day as the maximum rate of transfer from the Mitchell. However, in describing their model (Appendix A006, Appendix A p75) they have increased the maximum intake to 37.5ML per day as they realised that historically there are many days within the winterfill period from 1st July to 31st October (123 days) when the flow in the Mitchell falls below 1400 ML and winterfill pumping is not permitted.

This higher rate will exceed the capacity of the system devised by Pye and will require complete re-design. Analysis of flow rates downloaded from https//data.water.vic.gov.au during the winterfill periods of 2018 and 2019 found that there were only 74 and 81 days respectively on which pumping would have been allowed (Glenaladale daily flow xlsx, Barton 2020b), appended. The proponent's proposed freshwater storage is 2.2 GL.

It is not stated where they intend to store Mitchell water in excess of this quantity.

It should be noted that the water from the Mitchell that the proponent is proposing to use is additional to that which has been made available to irrigators in the past. An argument could be made that, given time to plan and construct storages, greater employment and value could be created by making this water available to the horticultural industry on the Lindenow flats.

EMM (2020b), Appendix A006 Appendix B p65 checked the potential of the Latrobe Group aquifer to supply the proponent's water requirements by pumping a test bore at a rate of close to 1 ML/day for 4 days. After an initial rapid drawdown the water level stabilised.

It would require 3 such bores pumping continuously year-round to obtain 1GL from this aquifer. If the full 3 GL was required from the borefield this would require 8 bores. As pointed out in AECOM peer report this could lead to problems due to bore interference.

This aquifer is fully allocated; no further licences for extraction will be issued. It is not known whether the proponent would be able to purchase licences from existing users to enable them to access this water. This would certainly be a seller's market, and the proponent may be forced to pay a high price for water from this source.

Groundwater modelling & Independent Review of Water Related Studies

Appendix A Conceptual Surface Water Management Strategy and Water Balance V6

Appendix B Groundwater Modelling Report V9.2

Attachment (I) Water Independent Peer Review Report and Proponent Response

Appendix A006 AppA, 1.2.1 EES scoping requirements, V6, page 2 notes, "Develop a water balance model to quantify the project's demand (both quantity and quality) on groundwater and/or surface water resources, including volume to be extracted, stored and released during the construction, operations, rehabilitation, decommissioning and post-closure phases of the project. "

The proponent's rainfall data collation to input water balance modelling has already been assessed to be misleading for an annual mean estimation over 117-year period (1900-2017) in contrast to water industry data collation from 1975 to date as more representative of climate change.

Consequently, a greater amount of groundwater extraction to make up the water balance would be expected. This could cumulatively have a significant effect on surface and groundwater impact assessments.

So, it is fair to challenge the risk rating classification reference to Class 2 included in the following table, p 5, *section 3.1 Model Confidence Level Classification for Fingerboards Groundwater Modelling Independent Review by Hugh Middlemis from HydroGeoLogic, Attachment (I) Water Independent Peer Review Report and Proponent Response.*

Table 2 - Fingerboards groundwater model confidence level

Class	Data	Calibration	Prediction	Quantitative Indicators
1 (simple)	Not much / Sparse coverage	Not possible.	Timeframe >> Calibration	Timeframe >10x
	No metered usage.	Large error statistic	Large stresses/periods.	Stresses >5x
	~ Low resolution topo DEM.	Inadequate data spread.	~ Poor/no validation.	~ Mass balance > 1% (or one-off 5%)
	Poor aquifer geometry.	Targets incompatible with model purpose.	Transient prediction but steady-state calibration.	Properties <> field values.
	Basic/Initial conceptualisation.			No review by Hydro/Modeller.
2 (impact assessment)	✓ Some data / OK coverage.	Weak seasonal match.	Timeframe > Calibration	Timeframe = 3-10x
	~ Some usage data/low volumes.	Some long term trends wrong.	Long stress periods.	Stresses = 2-5x
	✓ Baseflow estimates. Some K & S measurements.	~ Partial performance (e.g. some stats / part record / model-measure offsets).	OK validation.	✓ Mass balance < 1%
	✓ Some high res. topo DEM &/or some aquifer geometry.	✓ Head & Flux targets used to constrain calibration.	Calib. & prediction consistent (transient or steady-state).	Some properties <> field values. Review by Hydrogeologist.
	~ Sound conceptualisation, reviewed & stress-tested.	✓ Non-uniqueness and qualitative uncertainty partially addressed.	Significant new stresses not in calibration.	Some coarse discretisation in key areas of grid or at key times.
3 (complex simulator)	~ Plenty data, good coverage.	~ Good performance stats.	✓ Timeframe ~ Calibration	✓ Timeframe < 3x
	~ Good metered usage info.	✓ Most long term trends matched.	✓ Similar stresses & periods.	✓ Stresses < 2x
	✓ Local climate data.	~ Most seasonal matches OK.	Good validation.	Mass balance < 0.5%
	✓ Kh, Kv & Sy measurements from range of tests.	Present day head/flux targets, with good model validation.	✓ Transient calibration and prediction.	✓~ Properties ~ field measurements.
	High res. topo DEM all areas & good aquifer geometry.	~ Non-uniqueness minimised, qualitative uncertainty justified.		✓ No coarse discretisation in key areas (grid or time).
	~ Mature conceptualisation.			✓ Review by experienced Modeller.

(after Table 2-1 of Barnett et al (2012) Australian Groundwater Modelling Guideline)

Middlemis claims that the conceptual groundwater modelling can have *'identified limitations'* but, overall, he determines the model presented provides enough confidence that *"Class 2 is a reasonable classification, confirming the model as suitable for impact assessment scenario modelling purposes."*

In the following Appendixes A & B, Middlemis provides comments why the conceptual modelling and uncertainly analysis is sufficient and even opines that the project is "a relatively low risk' which is entirely subjective and not backed up if a number of dams on the project site will be subject to ANCOLD guidelines.

Appendix A – Australian Groundwater Modelling Guidelines – Compliance/Review Criteria

	Review questions	NA or not known	'Deficient' or 'No'	'Missing' or 'Maybe'	'Adequate' or 'OK'	'Very Good' or 'Yes'	Comment / Objective Evidence re Fingerboards Project
2.8.2	Is the conceptual model based on all available, relevant data?					Yes	Key features well shown, but draft could be improved with annotations re water balance and aquifer properties.
2.9	**Is the conceptual model consistent with the model objectives and target model confidence level classification?**					Very good	Geology, hydrology and hydrogeology all considered, along with risk-based assessment of water effects on existing users and sensitive receptors (s.3) and with consideration of GDEs and potential exposure pathways.

Figure 11: Appendix A Middlemis Independent Review Page A-4

Is the modelling and uncertainty analysis methodology designed to provide information for decision makers on the effects of uncertainty on the project objectives (echoing the definition of risk in AS/NZS ISO31000:2009) and on the effects of potential bias?	Yes. Section 8 describes the deterministic predictive scenario sensitivity analysis that has been applied. This basic level of uncertainty analysis is suitable for projects with a relatively low risk context (arguably appropriate in this case).
Are the adopted conceptual model, complexity–simplicity balance and applied modelling package capabilities commensurate with the overall risk context and the model purpose of investigating the uncertainty/risk issues (i.e. based on the evidence available of engagement identified in item 1)?	Yes. A conservative approach has been applied to the model design and execution for the purpose of impact assessment with a focus on potential impact pathways to GDEs and sensitive receptors. Parsimonious approach to spatially uniform aquifer parameters, and sound model calibration performance.
Has the uncertainty assessment and modelling methodology been designed and implemented using all the available data? Detailed consideration of the hydrological stressors arising from the development and of natural stressors, including climate variability, and unbiased consideration of water-related asset values and causal pathways for potential impacts (direct, indirect and cumulative) should be provided.	Yes, adequately described in section 8 (Uncertainty Analysis) for the predictive scenario sensitivity analysis that has been conducted.
Have all reports been prepared in an open, honest and transparent way that is: • open to independent scrutiny and not prone to misinterpretation based on agreed and transparent model objectives • tailored to decision-makers' needs (focusing on messages relevant to their decisions) • presented in plain and clear language (precise, jargon-free, calibrated), with useful graphics.	Yes.

Figure 12: Appendix B - Fatal Flaws Checklist for Uncertainty Assessment, p. B-1

To understand fully what is *'model confidence level classification'* and what the *'identified limitations'* are would require researching further how the classification system for Australian Groundwater Modelling Guidelines (AGMG) are viewed.

Middlemis referenced his past work (Middlemis and Peeters, 2018)[1] "*for modellers to justify assumptions and choices in technical reports in a manner that is transparent and open to scrutiny"* which is a key guiding principle for effective uncertainty analysis. Yet the proponent did not use or access all available hydrogeological data, existing data is misrepresented, flawed and lacking transparency. Therefore, the conceptual model predicting impacts of mining to inform environmental impact assessments is not robust as it cannot be calibrated in the absence of appropriate data.

Some water will also be collected from rainfall in the water management dams, but this will be obtained **by intercepting runoff which would normally flow to the Mitchell or Perry River systems**. The proponent have **no licence for this water**, so have undertaken to return water captured outside the winterfill period to these rivers (Main Report Section 3.7.4.1, p 3.31) Hence this cannot be added to the water available for the mine operation.

Divestment by previous tenement holders

It is instructive that Rio Tinto Exploration (RTX), the original tenement holder over the Glenaladale Mineral deposit decided to divest the project on the basis that it was unlikely to meet the minimum criteria for a Rio Tinto mining project. (Bishop, 2013)

[1] See reference below

Oresome Australia Ptd Ltd, a wholly owned subsidiary of Metallica Minerals Ltd entered into a "Right to Explore and Option to Purchase Agreement" with RTX in August 2011. After a Scoping Study Report prepared on their behalf by RJ Robbins and Associates they also decided not to proceed with the purchase of the rights to the tenement.

Key findings from Robbins were that:

- The mine would cost $271 million to establish (2012 costs)
- It would cost $80 million per year to operate exclusive of royalties and taxes
- It would require 4.6GL, and potentially up to 6.2GL per year to operate. This did not include water for dust suppression.
- Although they would still be saleable, chromium and magnesium content would downgrade most titanium products, causing price reductions in the vicinity of 30%
- Uranium and thorium content would cause the downgrade of zircon produced, potentially by up to 20%.

It was considered that sufficient water was unlikely to be available, and on that basis Oresome decided that the project would not be viable and relinquished their rights to the tenement.

Flaws in modelling for required water

Given that previous investigations have decided that far more that 3GL would be required to operate the mine it is worth examining the rationale by which the proponent decided that only 3GL would be required.

The proponent (p3-28) stated that 300,000 litres per hour will be lost during processing, mostly in pumping coarse and fine tailings. Over a 24-hour cycle, 365 days per year, this equates to about 2.6GL.

This contrasts with EEM (2020a), who modelled water usage for years 5, 8 and 15 under a range of conditions. (Figures 8.1-8.3 and figures C1-C6). They consistently found that around 3050 ML/year was "entrained" in fine and sand tails, and in ore. This equates to 349,000 L/hr. Total usage and losses due to seepage, evaporation and environmental returns in a median year (Figure 8.2) were almost 4GL.

The water in excess of 3GL was assumed to come from rainfall and around 600ML of water already present in the ore as it is mined.

They have made **no allowance for evaporation from the mine void**. 12 GL/year (1.37ML/hr) is pumped from the mine to the WCP by the MUPs (Figure 8.2).

Therefore, the calculation that only 3 GL/year will be required is heavily dependent on the assumption that nearly 9 GL/year can be recovered from the ore concentrate and tailings storages. If this is overestimated the water requirement would rise dramatically. This may explain why Robbins had a much higher estimate of the water which would be needed.

Kalbar, Main Report, p3-31 have estimated that around 400 ML per year will be required for dust suppression. However, EEM, (Appendix A006 Appendix A, figures 8.1 – 8.3) calculated that 360-375 ML/year would be needed for dust suppression ***on the haul roads alone.***

If water recovery is overestimated the mine will run short of water for processing and dust suppression. There will be a strong temptation to use water in the water management dams, rather than returning these to the rivers, and in a dry year they are likely to run out of water.

Previous tenement holders Rio Tinto and potential purchasers Oresome elected to divest this project, in the case of Oresome because they did not believe sufficient water could be obtained.

Conclusion

If the proponent is granted approval to proceed with the mine, then finds it has under estimated the water requirement, or overestimated its ability to obtain the necessary water, they will have no option but to suspend production. If this results in the mine and associated large areas of exposed country being left unattended, this could create an environmental disaster for the region. There is also the potential for one of their dams to fail.

The errors in assumptions, data and conclusions are concerning. The risk of the proposal is too great to be permitted to proceed.

Appendix 1. Barton, NJ (2020a). Kalbar Dams Capacity.xlsx

EEM A006 A Table 4-2 p 30				Year																										
Water Management Dams				Number of dams in operation														Capacity Each Year(ML)												
Dam ID	Catchmen	Capacity	Runoff to	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	ha	ML	fill (mm)																													
2	132	125	95				1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	125	125	125	125	125	125	125	125	125	125	125
3	61	57	93	1	1	1												57	57	57	0	0	0	0	0	0	0	0	0	0	0	0
4	15	15	100			1	1											0	0	15	15	0	0	0	0	0	0	0	0	0	0	0
5	13	13	100			1	1											0	0	13	13	0	0	0	0	0	0	0	0	0	0	0
6	7	7	100			1	1											0	0	7	7	0	0	0	0	0	0	0	0	0	0	0
7	222	211	95	1	1	1	1	1	1	1	1	1	1					211	211	211	211	211	211	211	211	211	211	0	0	0	0	0
8	24	23	96				1	1	1									0	0	0	23	23	23	0	0	0	0	0	0	0	0	0
9	128	122	95				1	1	1	1	1	1	1					0	0	0	122	122	122	122	122	122	122	0	0	0	0	0
10	134	127	95				1	1	1	1	1	1	1					0	0	0	127	127	127	127	127	127	127	0	0	0	0	0
11	41	39	95							1	1	1	1					0	0	0	0	0	0	39	39	39	39	0	0	0	0	0
12	22	21	95							1	1	1	1					0	0	0	0	0	0	21	21	21	21	0	0	0	0	0
13	135	128	95							1	1	1	1					0	0	0	0	0	0	128	128	128	128	0	0	0	0	0
14	76	72	95							1	1	1	1					0	0	0	0	0	0	72	72	72	72	0	0	0	0	0
15	42	40	95							1	1	1	1					0	0	0	0	0	0	40	40	40	40	0	0	0	0	0
16	280	266	95							1	1	1	1	1	1	1	1	0	0	0	0	0	0	266	266	266	266	266	266	266	266	266
17	101	96	95				1	1	1	1	1	1	1	1	1	1	1	0	0	0	96	96	96	96	96	96	96	96	96	96	96	96
18	207	197	95				1	1	1	1	1	1	1	1	1	1	1	0	0	0	197	197	197	197	197	197	197	197	197	197	197	197
19	230	219	95											1	1	1	1	0	0	0	0	0	0	0	0	0	0	219	219	219	219	219
20	175	166	95											1	1	1	1				0											
Totals	2045	1944		2	2	5	9	7	7	12	12	12	12	6	6	6	6	268	268	303	811	901	901	1444	1444	1444	1444	903	903	903	903	903

Appendix 2. Barton, NJ (2020b). Glenaladale Daily Flow.xlsx

Pumping allowed on days when minimum flow exceeded 1400 ML

Quality Codes (QC)

2	Good quality data - minimal editing required. Drift correction
146	Interim rating table
255	No data exists

Site 224203 MITCHELL RIVER @ GLENALADALE Lat:-37.76358991 Long:147.3747776 Elev:0
Sourced from https//data.water.vic.gov.au

Datetime	Discharge (Ml/d) Mean	QC	Discharge (Ml/d) Minimum	QC	Discharge (Ml/d) Maximum	QC	Pumping Allowed?
01/07/2018 00:00	690.48	2	673.92	2	705.61	2	0
02/07/2018 00:00	707.02	2	671.33	2	738.37	2	0
03/07/2018 00:00	704.23	2	687	2	724.59	2	0
04/07/2018 00:00	681.1	2	658.47	2	702.93	2	0
05/07/2018 00:00	647.48	2	625.87	2	666.17	2	0
06/07/2018 00:00	631.45	2	620.96	2	640.77	2	0
07/07/2018 00:00	750.32	2	630.81	2	1554.31	2	0
08/07/2018 00:00	2017.98	2	1554.31	2	2201.38	2	1
09/07/2018 00:00	2147	2	2044.34	2	2222.23	2	1
10/07/2018 00:00	2012.23	2	1928.32	2	2054.23	2	1
11/07/2018 00:00	1834.5	2	1741.03	2	1928.32	2	1
12/07/2018 00:00	1651.53	2	1566.58	2	1741.03	2	1
13/07/2018 00:00	1493.33	2	1423.31	2	1566.58	2	1
14/07/2018 00:00	1352.36	2	1289.19	2	1423.31	2	0
15/07/2018 00:00	1228.36	2	1174.1	2	1289.19	2	0
16/07/2018 00:00	1128.51	2	1078.8	2	1184.26	2	0
17/07/2018 00:00	1043.55	2	1007.51	2	1078.8	2	0
18/07/2018 00:00	974.35	2	942.59	2	1007.51	2	0
19/07/2018 00:00	949.27	2	924.59	2	979.32	2	0

20/07/2018 00:00	973.22	2	957.78	2	991.78	2	0
21/07/2018 00:00	1611.54	2	991.78	2	2264.32	2	0
22/07/2018 00:00	2030.85	2	1886.08	2	2185.83	2	1
23/07/2018 00:00	1778.64	2	1658.62	2	1886.08	2	1
24/07/2018 00:00	1601.24	2	1538.05	2	1675.75	2	1
25/07/2018 00:00	1520.3	2	1489.84	2	1546.16	2	1
26/07/2018 00:00	1830.71	2	1505.79	2	2165.22	2	1
27/07/2018 00:00	2103.04	2	2034.48	2	2134.55	2	1
28/07/2018 00:00	1999.72	2	1947.29	2	2034.48	2	1
29/07/2018 00:00	1922.57	2	1862.89	2	1952.06	2	1
30/07/2018 00:00	2091.96	2	1844.48	2	2674.55	2	1
31/07/2018 00:00	2636.77	2	2521.39	2	2713.79	2	1
01/08/2018 00:00	2499.56	2	2460.54	2	2526.76	2	1
02/08/2018 00:00	2832.3	2	2471.77	2	3029.39	2	1
03/08/2018 00:00	2968.49	2	2862.86	2	3005.22	2	1
04/08/2018 00:00	2948.32	2	2764.79	2	4482.2	2	1
05/08/2018 00:00	5730.16	2	4482.2	2	5964.73	2	1
06/08/2018 00:00	5379.57	2	4958.29	2	5799.23	2	1
07/08/2018 00:00	4778.63	2	4702.56	2	4965.51	2	1
08/08/2018 00:00	4466.68	2	4189.76	2	4744.6	2	1
09/08/2018 00:00	4450.27	2	4157.29	2	4751.63	2	1
10/08/2018 00:00	4533.06	2	4274.9	2	4723.55	2	1
11/08/2018 00:00	4086.73	2	3959.46	2	4294.7	2	1
12/08/2018 00:00	4066.05	2	3940.63	2	4248.59	2	1
13/08/2018 00:00	4029.25	2	3865.86	2	4202.79	2	1
14/08/2018 00:00	3742.6	2	3608.05	2	3872.05	2	1
15/08/2018 00:00	3500.27	2	3394.58	2	3655.9	2	1
16/08/2018 00:00	3683.41	2	3401.12	2	4516.2	2	1
17/08/2018 00:00	4838.71	2	4516.2	2	4929.46	2	1
18/08/2018 00:00	4656.42	2	4441.61	2	4879.27	2	1
19/08/2018 00:00	4519.7	2	4387.83	2	4619.16	2	1
20/08/2018 00:00	4416.88	2	4367.77	2	4468.64	2	1
21/08/2018 00:00	4113.01	2	3896.91	2	4367.77	2	1
22/08/2018 00:00	3774.08	2	3649.04	2	3903.13	2	1

23/08/2018 00:00	3517.27	2	3381.52	2	3655.9	2	1
24/08/2018 00:00	3245.83	2	3096.53	2	3388.04	2	1
25/08/2018 00:00	2964.54	2	2833.78	2	3096.53	2	1
26/08/2018 00:00	2733.22	2	2630.18	2	2839.58	2	1
27/08/2018 00:00	2569.75	2	2477.4	2	2635.7	2	1
28/08/2018 00:00	2439.43	2	2339.3	2	2483.04	2	1
29/08/2018 00:00	2285.37	2	2227.46	2	2344.72	2	1
30/08/2018 00:00	2159.04	2	2099.15	2	2227.46	2	1
31/08/2018 00:00	2037.56	2	1971.2	2	2099.15	2	1
01/09/2018 00:00	1981.43	2	1923.59	2	2222.23	2	1
02/09/2018 00:00	2172.59	2	2094.13	2	2280.25	2	1
03/09/2018 00:00	2141.88	2	2099.15	2	2170.36	2	1
04/09/2018 00:00	2089.22	2	2034.48	2	2129.47	2	1
05/09/2018 00:00	2008.54	2	1933.05	2	2039.4	2	1
06/09/2018 00:00	1926.46	2	1881.43	2	1947.29	2	1
07/09/2018 00:00	2022.91	2	1881.43	2	2301.61	2	1
08/09/2018 00:00	4051.1	2	2301.61	2	4488.99	2	1
09/09/2018 00:00	4129.21	2	3915.61	2	4394.53	2	1
10/09/2018 00:00	3727.99	2	3553.87	2	3928.11	2	1
11/09/2018 00:00	3457.38	2	3355.51	2	3560.61	2	1
12/09/2018 00:00	3360.55	2	3284.67	2	3466.98	2	1
13/09/2018 00:00	3729.24	2	3466.98	2	3810.36	2	1
14/09/2018 00:00	3517.12	2	3265.52	2	3773.63	2	1
15/09/2018 00:00	3115.66	2	2963.22	2	3265.52	2	1
16/09/2018 00:00	2907.92	2	2822.2	2	2975.18	2	1
17/09/2018 00:00	2654.5	2	2471.77	2	2822.2	2	1
18/09/2018 00:00	2354.64	2	2191.01	2	2471.77	2	1
19/09/2018 00:00	2120.59	2	2000.22	2	2201.38	2	1
20/09/2018 00:00	2004.21	2	1956.83	2	2054.23	2	1
21/09/2018 00:00	1893.94	2	1781.03	2	1961.61	2	1
22/09/2018 00:00	1737.06	2	1662.89	2	1785.51	2	1
23/09/2018 00:00	1655.96	2	1595.48	2	1684.35	2	1
24/09/2018 00:00	1592.49	2	1562.48	2	1620.54	2	1
25/09/2018 00:00	1564.18	2	1538.05	2	1587.19	2	1

26/09/2018 00:00	1534.37	2	1509.8	2	1558.39	2	1
27/09/2018 00:00	1501.64	2	1446.55	2	1525.9	2	1
28/09/2018 00:00	1422.68	2	1396.52	2	1446.55	2	0
29/09/2018 00:00	1410.06	2	1377.59	2	1438.77	2	0
30/09/2018 00:00	1387.22	2	1358.84	2	1404.14	2	0
01/10/2018 00:00	1325.97	2	1285.6	2	1358.84	2	0
02/10/2018 00:00	1247.03	2	1218.56	2	1285.6	2	0
03/10/2018 00:00	1190.13	2	1167.36	2	1218.56	2	0
04/10/2018 00:00	1173.13	2	1143.14	2	1204.76	2	0
05/10/2018 00:00	1257.78	2	1170.73	2	1329.21	2	0
06/10/2018 00:00	1321.57	2	1289.19	2	1340.27	2	0
07/10/2018 00:00	1252.84	2	1204.76	2	1292.8	2	0
08/10/2018 00:00	1172.33	2	1136.24	2	1208.2	2	0
09/10/2018 00:00	1107.04	2	1085.45	2	1136.24	2	0
10/10/2018 00:00	1122.55	2	1102.2	2	1139.69	2	0
11/10/2018 00:00	1192.08	2	1125.96	2	1271.28	2	0
12/10/2018 00:00	1249.55	2	1197.9	2	1307.28	2	0
13/10/2018 00:00	1128.99	2	1049.23	2	1201.33	2	0
14/10/2018 00:00	1015.83	2	976.22	2	1052.48	2	0
15/10/2018 00:00	937.03	2	895.13	2	979.32	2	0
16/10/2018 00:00	877.04	2	854.99	2	895.13	2	0
17/10/2018 00:00	851.23	2	828.06	2	869.18	2	0
18/10/2018 00:00	888.29	2	834.11	2	939.58	2	0
19/10/2018 00:00	981.44	2	909.78	2	1036.26	2	0
20/10/2018 00:00	955.96	2	927.58	2	982.42	2	0
21/10/2018 00:00	934.4	2	903.9	2	960.83	2	0
22/10/2018 00:00	1041.86	2	921.62	2	1132.81	2	0
23/10/2018 00:00	977.78	2	909.78	2	1052.48	2	0
24/10/2018 00:00	852.32	2	792.46	2	909.78	2	0
25/10/2018 00:00	764.78	2	724.59	2	792.46	2	0
26/10/2018 00:00	709.59	2	676.52	2	732.83	2	0
27/10/2018 00:00	659.08	2	638.27	2	679.13	2	0
28/10/2018 00:00	614.53	2	577.72	2	638.27	2	0
29/10/2018 00:00	574.76	2	538.51	2	592.04	2	0

30/10/2018 00:00	527.78	2	509.87	2	540.77	2	0
31/10/2018 00:00	500.5	2	484.43	2	516.38	2	0
Days on which pumping available							74
Maximum Volume at 25ML/day							1850

Pumping allowed on days when minimum flow exceeded
1400 ML

2 Good quality data - minimal editing required. Drift correction

15 Minor editing. >+/-10mm drift correction

146 Interim rating table

255 No data exists

Sourced from
https//data.water.vic.gov.au

Datetime	Discharge (Ml/d) Mean	QC	Discharge (Ml/d) Minimum	QC	Discharge (Ml/d) Maximum	QC	Pumping Allowed?
01/07/2019 00:00	2780.53	2	860.65	2	3574.12	2	0
02/07/2019 00:00	2823.02	2	2542.91	2	3102.69	2	1
03/07/2019 00:00	2378.35	2	2170.36	2	2542.91	2	1
04/07/2019 00:00	2074.71	2	1923.59	2	2175.51	2	1
05/07/2019 00:00	1828.01	2	1706	2	1923.59	2	1
06/07/2019 00:00	1632.14	2	1538.05	2	1706	2	1
07/07/2019 00:00	1485.42	2	1404.14	2	1538.05	2	1
08/07/2019 00:00	1376.03	2	1310.92	2	1407.96	2	0
09/07/2019 00:00	1311.34	2	1271.28	2	1385.14	2	0
10/07/2019 00:00	1342.29	2	1246.49	2	1381.36	2	0
11/07/2019 00:00	1267.34	2	1242.97	2	1289.19	2	0
12/07/2019 00:00	1636.38	2	1253.54	2	2139.64	2	0
13/07/2019 00:00	3697.47	2	2139.64	2	7547.98	2	1
14/07/2019 00:00	7308.17	2	6438.84	2	7852.87	2	1
15/07/2019 00:00	5768.63	2	5329.67	2	6438.84	2	1
16/07/2019 00:00	5047.28	2	4681.62	2	5329.67	2	1
17/07/2019 00:00	4359.54	2	4028.98	2	4681.62	2	1
18/07/2019 00:00	3810.42	2	3621.68	2	4028.98	2	1
19/07/2019 00:00	3441.8	2	3189.68	2	3635.34	2	1
20/07/2019 00:00	3044.43	2	2857.03	2	3202.24	2	1
21/07/2019 00:00	2728.84	2	2559.12	2	2862.86	2	1
22/07/2019 00:00	2463.02	2	2333.89	2	2559.12	2	1
23/07/2019 00:00	2267.07	2	2149.85	2	2339.3	2	1
24/07/2019 00:00	2133.2	2	2099.15	2	2196.19	2	1
25/07/2019 00:00	2718.35	2	2191.01	2	2927.54	2	1
26/07/2019 00:00	2667.86	2	2569.97	2	2736.38	2	1
27/07/2019 00:00	2518.64	2	2410.44	2	2580.85	2	1
28/07/2019 00:00	2368.57	2	2269.62	2	2415.97	2	1
29/07/2019 00:00	2218.13	2	2119.33	2	2269.62	2	1
30/07/2019 00:00	2106.62	2	2084.1	2	2124.4	2	1
31/07/2019 00:00	2056.61	2	1966.4	2	2094.13	2	1
01/08/2019 00:00	1911.74	2	1849.07	2	1966.4	2	1

02/08/2019 00:00	1786.03	2	1697.32	2	1853.67	2	1
03/08/2019 00:00	1645.56	2	1566.58	2	1697.32	2	1
04/08/2019 00:00	1529.07	2	1462.19	2	1566.58	2	1
05/08/2019 00:00	1429.88	2	1373.83	2	1466.12	2	0
06/08/2019 00:00	1342.26	2	1289.19	2	1373.83	2	0
07/08/2019 00:00	1260.31	2	1208.2	2	1303.65	2	0
08/08/2019 00:00	1197.5	2	1160.5	2	1218.56	2	0
09/08/2019 00:00	1502.99	2	1160.5	2	2079.1	2	0
10/08/2019 00:00	2698.22	2	2079.1	2	3059.79	2	1
11/08/2019 00:00	2846.1	2	2702.54	2	2999.19	2	1
12/08/2019 00:00	2589.26	2	2432.62	2	2708.16	2	1
13/08/2019 00:00	2318.36	2	2175.51	2	2432.62	2	1
14/08/2019 00:00	2147.33	2	2069.13	2	2180.67	2	1
15/08/2019 00:00	2049.11	2	1985.66	2	2089.11	2	1
16/08/2019 00:00	1998.68	2	1952.06	2	2044.34	2	1
17/08/2019 00:00	1997.19	2	1947.29	2	2054.23	2	1
18/08/2019 00:00	2175.53	2	2049.28	2	2227.46	2	1
19/08/2019 00:00	2339.22	2	2191.01	2	2586.3	2	1
20/08/2019 00:00	3151.09	2	2586.3	2	3297.47	2	1
21/08/2019 00:00	3171.86	2	3102.69	2	3221.14	2	1
22/08/2019 00:00	3337.71	2	3096.53	2	3594.45	2	1
23/08/2019 00:00	3778	2	3594.45	2	3859.67	2	1
24/08/2019 00:00	3642.32	2	3414.22	2	3785.85	2	1
25/08/2019 00:00	3287.57	2	3090.39	2	3466.98	2	1
26/08/2019 00:00	2974.55	2	2787.66	2	3102.69	2	1
27/08/2019 00:00	2667.18	2	2510.68	2	2787.66	2	1
28/08/2019 00:00	2409.83	2	2269.62	2	2510.68	2	1
29/08/2019 00:00	2200.49	2	2089.11	2	2274.93	2	1
30/08/2019 00:00	2044.93	2	1933.05	2	2094.13	2	1
31/08/2019 00:00	1870.81	2	1772.08	2	1933.05	2	1
01/09/2019 00:00	1725.78	2	1658.62	2	1772.08	2	1
02/09/2019 00:00	1660.29	2	1628.95	2	1680.04	2	1
03/09/2019 00:00	1665.54	2	1603.8	2	1714.71	2	1
04/09/2019 00:00	1595.8	2	1558.39	2	1624.74	2	1
05/09/2019 00:00	1578.5	2	1542.1	2	1607.97	2	1
06/09/2019 00:00	1582.74	2	1538.05	2	1616.34	2	1
07/09/2019 00:00	1672.45	2	1562.48	2	1928.32	2	1
08/09/2019 00:00	2037.6	2	1928.32	2	2089.11	2	1
09/09/2019 00:00	1954.42	2	1849.07	2	2005.09	2	1
10/09/2019 00:00	1893.57	2	1844.48	2	1937.79	2	1
11/09/2019 00:00	1824.58	2	1749.87	2	1881.43	2	1
12/09/2019 00:00	1747.04	2	1680.04	2	1799	2	1
13/09/2019 00:00	1699.32	2	1662.89	2	1732.23	2	1
14/09/2019 00:00	1707.73	2	1667.17	2	1745.44	2	1
15/09/2019 00:00	1655.67	2	1599.64	2	1688.67	2	1
16/09/2019 00:00	1653.88	2	1587.19	2	1710.35	2	1
17/09/2019 00:00	2679.58	2	1688.67	2	3859.67	2	1
18/09/2019 00:00	3262.1	2	2939.4	2	3621.68	2	1

19/09/2019 00:00	2772.06	2	2569.97	2	2945.34	2	1
20/09/2019 00:00	2466.78	2	2333.89	2	2580.85	2	1
21/09/2019 00:00	2335.44	2	2285.58	2	2377.43	2	1
22/09/2019 00:00	2822.82	2	2371.95	2	3642.19	2	1
23/09/2019 00:00	3207.26	2	2827.99	2	3621.68	2	1
24/09/2019 00:00	2665.98	2	2516.03	2	2827.99	2	1
25/09/2019 00:00	2379.4	2	2196.19	2	2516.03	2	1
26/09/2019 00:00	2103.72	2	1971.2	2	2196.19	2	1
27/09/2019 00:00	1909.56	2	1821.64	2	1971.2	2	1
28/09/2019 00:00	1751.63	2	1671.45	2	1826.2	2	1
29/09/2019 00:00	1627.12	2	1574.8	2	1671.45	2	1
30/09/2019 00:00	1521.45	2	1442.66	2	1574.8	2	1
01/10/2019 00:00	1409.07	15	1347.68	15	1442.66	15	0
02/10/2019 00:00	1316.2	15	1260.61	15	1347.68	15	0
03/10/2019 00:00	1223.72	15	1170.73	15	1264.16	15	0
04/10/2019 00:00	1147.24	15	1105.57	15	1170.73	15	0
05/10/2019 00:00	1102.11	15	1082.12	15	1119.13	15	0
06/10/2019 00:00	1097.85	15	1068.88	15	1136.24	15	0
07/10/2019 00:00	1060.48	15	1026.62	15	1078.8	15	0
08/10/2019 00:00	1023.41	15	1001.2	15	1045.98	15	0
09/10/2019 00:00	981.87	15	948.65	15	1007.51	15	0
10/10/2019 00:00	944.69	15	918.65	15	957.78	15	0
11/10/2019 00:00	889.42	15	860.65	15	918.65	15	0
12/10/2019 00:00	831.48	15	813.09	15	860.65	15	0
13/10/2019 00:00	830.11	15	789.54	15	846.29	15	0
14/10/2019 00:00	801.36	15	783.73	15	816.07	15	0
15/10/2019 00:00	766.43	15	721.86	15	810.12	15	0
16/10/2019 00:00	703.8	15	689.64	15	721.86	15	0
17/10/2019 00:00	683.21	15	666.17	15	700.26	15	0
18/10/2019 00:00	664.53	15	655.92	15	692.28	15	0
19/10/2019 00:00	719.85	15	692.28	15	746.73	15	0
20/10/2019 00:00	677.97	15	638.27	15	727.33	15	0
21/10/2019 00:00	625.84	15	606.4	15	643.28	15	0
22/10/2019 00:00	587.56	15	565.98	15	606.4	15	0
23/10/2019 00:00	549.25	15	525.15	15	568.31	15	0
24/10/2019 00:00	514.55	15	497.03	15	527.36	15	0
25/10/2019 00:00	485.77	15	463.95	15	503.42	15	0
26/10/2019 00:00	454.9	15	442.15	15	472.06	15	0
27/10/2019 00:00	440.47	15	424.88	15	465.97	15	0
28/10/2019 00:00	478.16	15	463.95	15	497.03	15	0
29/10/2019 00:00	495.28	15	472.06	15	509.87	15	0
30/10/2019 00:00	450.08	15	428.68	15	472.06	15	0
31/10/2019 00:00	410.13	15	383.86	15	430.58	15	0
Days available for winterfill							81
Maximum Volume at 25ML/day							2025

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Chapter 2: SOILS

Executive Summary

The document is compromised by underlying incorrect assumptions. The foundation of poor assumptions has created inaccuracies and errors.

Given that the land must be returned to its former use, it is concerning that the soil has not been evaluated and studied with agronomic principles under-pinning the descriptions, studies and risk analysis.

Many important soil characteristics have not been discussed and thus their importance has not being documented. Soil testing has been inadequate, as has the description of the term topsoil.

The final landform described as the objective will not be stable except in the short term. The proposed solution of a thin layer of "treated" subsoil overlying a base of dispersive soil whose structure has been destroyed is nothing more than a 'band aid' and will result in untenable levels of erosion in the medium to long term. This will have disruptive impacts on the local agriculture and horticulture industries, water quality in the Mitchell and Perry Rivers and siltation of the Gippsland Lakes – with flow on effects onto the tourism and hospitality industries.

Why is there no acknowledgement, either in description or effect, of the two major climatic events of our area (fire and drought) and the subsequent impacts this has had on soils - in both the project and adjacent areas - over the past six years? Other climatic issues and their possible impacts have also not been discussed.

The lack of understanding in the EES of the significance and scale of tunnel erosion is seriously problematic. There has been no consideration of the Road Pillars. The consequences of mixing of tailings in the subsoil have not been fully addressed. The existence of tunnel erosion in gently sloping land within the proposed project area is not acknowledged, thereby rendering the proposed solutions ineffective.

There is a consistent theme of a lack of solutions to issues. The use of landholder consultation is fraught with danger and based on current experience is unworkable. Too many future "maybe" and/or "possible" mitigation resolutions and solutions presented for issues are still to be determined and/or researched.

The proponent has been preparing the EES document for four years and has failed to undertake the necessary research. What assurance is there that this research will be undertaken if a licence is granted; particularly when there would be severe time pressure to 'just get the project going'?

A reliance on the future development of mitigation measures that are currently unknown and with consequent uncertain outcomes ensures that the project's risk cannot be properly assessed. The risks are grossly under-stated.

This includes the use of the proposed rehabilitation bond calculator. This is based on a series of assumptions that are not congruent with the proposed project and would grossly under-estimate the cost of successful rehabilitation.

Introduction

Reports produced for an Environmental Effects Statement are intended to provide an assessment of known facts, results of trials and known impact factors to allow the determination of likely impacts and their consequences from the proposal. The report on soils is lacking in facts, trials and reasonable assessments of likely impacts and their consequences. The report as presented is subjective and cursory. Specific areas of concern are detailed in the sections below.

Cursory proposal lacking detail

While erosion is identified as a risk, no actual mitigation measures are specified. The phrases "…this will need to be investigated...", "... further research is required...", and "…to be developed later" crop up consistently.

Why has the proponent been working on the EES report for four years and yet failed to undertake any meaningful field trials or perform the research required? No assessment of the effectiveness of mitigation measures "to be developed" at some stage in the future can possibly be undertaken.

Risk factors within the report have been consistently under-estimated. "At this stage it is not anticipated that erosion will be a major risk …" One can only assume that this statement refers to the proponent's assumption? The local agricultural landholders with extensive, long-term knowledge and experience of the local soils are very confident that erosion will indeed be a certain and major risk. What will be done if the proponent's "anticipation" is wrong and erosion is, as local knowledge has determined, a major risk?

No meaningful targets have been set. What is the target Olsen P for 12 months after fertiliser application? What is the target for top-soil organic matter? What testing for soil biological activity will be undertaken? What will be the consequence should the proponent fail to meet these non-existent targets?

In section 11.5.1 it states "Species mixes for pasture areas should be developed on the basis of local experience and knowledge." [emphasis added]. This statement is problematic. Just from which local experience does the proponent intent to draw? Based on previous and current experience with "consultation" the knowledgeable locals won't talk to the proponent anymore.

The use of the word "should" renders the statement pointless as there is no commitment to, or enforcement of, "should". The same applies to the ubiquitous phrase "will be" and the various synonyms used throughout the document; for example 11.5.6 "Targets for rehabilitation and revegetation success will be developed…"

How can the community comment on, or the Inquiry Panel assess the impacts when the final objectives and methodology are not known?

Lack of understanding of agriculture

In many locations throughout the EES documents statements are made similar to that on page 27 (Landloch, April, 2020) *"These soils are clearly not suitable for agriculture,…".* There are approximately 170 years of evidence that refute this. Many generations of families have been successfully raised on productive farms within the proposed project area. This casts doubt on the report author's experience with agricultural soils, and consequently on any conclusions they draw from the soil unsuitability assumption.

In terms of David Snowden's Cynevin Framework (Snowden, 2020), decisions in an agricultural framework sector are made within the complex sector. This means that for a given scenario there are no clear cut "right" solutions. That is, a range of experts would come up with differing ranges of recommendations. Each producer develops an appropriate solution which conforms to their acceptable levels of risk, inputs, production, biodiversity goals and values. Options are first considered for practicality, and then trialed under field conditions. Decisions are made across a wide-ranging and complex spectrum of factors.

Across the EES document there has been adopted an extremely simplistic approach to risks and mitigation, without acknowledging or considering the complexity and interaction of the numerous factors involved. This effectively means that most of the report writers have unknowingly moved out of their areas of understanding. They have moved from the Complicated Sector (where a number of experts will generally agree on an appropriate course of action), into the Complex Sector (where experts often disagree on the appropriate course of action). Decisions made in complex areas using simplistic modelling are highly unlikely to produce desired results.

The recent COVID-19 crisis can be seen as being in the Complex Sector, as based on similar data government health experts have provided varying advice as to how restrictions should be imposed and managed. A simplistic solution to the COVID-19 crisis does not exist, and simplistic modelling and decision making is not appropriate.

Irrigation & Dams

The author states that "Intensive agriculture/horticulture is present to the north-east of the project area, on the deeper and more fertile soils of the floodplain of the Mitchell River, but not within the project area", page 28 (Landloch, April, 2020). Firstly, what and where is the proponent's definition of "intensive grazing"? Secondly, why was this inappropriate assumption made?

Intensive grazing on irrigated pasture occurs at both the Eastern and Western ends of the proposed project area. At the Eastern end is a beef and wool/lamb producer irrigating his land with water pumped from the Mitchell River. At the Western end of the project area is a dairy, grazing pastures irrigated from dams they have constructed.

Both these properties demonstrate that, with appropriate management, soils within the proposed project area are capable of supporting highly productive and intensive forms of agriculture.

Using the intensity of agricultural grazing as a gauge of profitability is a misleading measure. Studies have shown that debt is the biggest risk factor in agriculture, followed by climate and then markets (Hutchings, 2013). The nature of decision making within the agricultural sector is complex, as it must take into account the balancing of a myriad of factors and also a keen understanding that management decisions have long-term impacts.

This is particularly important when recovering from the impacts of the 2014 Mt Ray bushfire and then the subsequent worst and longest drought in Victoria's history. Why is there is no real acknowledgement or appreciation of these events and their ramifications presented in the proposal?

A number of producers within the proposed project area have chosen to implement production models which retain profitability but reduce the level of risk by reducing inputs and stocking rates. Some of these production models utilise the principles of regenerative agriculture with the goal of restoring grassland and grassy woodland biodiversity, increasing soil organic content, restoring groundcover and increasing production through grazing management. "There is significant potential to simultaneously increase environmental health and biodiversity in grassy woodlands biome and improve financial and wellbeing for graziers" (Ogilvy Sue, 2018)

Soil testing inadequate

Biased sample area

Testing of the soils within the proposed project area was undertaken. Some of the methodologies of the sampling are disturbing. Most of the soil samples were taken in the North Eastern quadrant of the proposed project area, with the majority taken from the property of a "lifestyle" owner.

Unsurprisingly, this property displayed many signs and symptoms of a lack of management and a proper grasp of agriculture. On the basis of results from this particular property, generalisations appear to have been made for the entire project area, including those farms under high levels of management.

Section 5.4.1 refers to the "core sampling density." However this is only relevant if the sampling is evenly distributed throughout the area. In this situation the sampling is highly concentrated within one area of the proposed project and sparse in other areas. This results in generalisations and inaccurate data and produces meaningless results.

Why are soil test results that disagree with the averages gained from the North Eastern quadrant of the proposed project area apparently set as the 'benchmark' dismissed as "local variations"?

This would seem to indicate a lack of rigour in the testing and analysis, as more extensive testing may well suggest the "local variations" are more universal than is accepted in the document.

When soil tests are undertaken for agronomic purposes, a transect is walked across the selected paddock and samples taken at regular intervals. Between 20 and 30 samples are taken per paddock using a standardised sample corer (generally to a standard depth of 10cm) (Agriculture Victoria, 2020), with the sampling sites selected to avoid "extreme" sites within the paddock, e.g. high nutrient areas such as gateways, stock camps and water points.

Over the proposed project area this means that several thousand samples would be required – not the trivial 27 non-standard samples (of which 7 were rejected) [page 19] (Landloch, 2020). As the sampling sites were not selected in the usual manner, and the samples themselves were taken with very non-standard technique, there is considerable doubt as to the validity of the results.

Wrong test for available P

The report specifies the tests used to characterise the fertility of the soil, including testing for Phosphorus (P). Two tests were undertaken to determine levels of Phosphorus, a Total Phosphorus test and a Colwell Phosphorus test (Colwell P) to determine the level of Plant Available Phosphorus.

It is interesting that the Colwell P test was chosen as "In Victorian pasture soils, plant-available phosphorus is usually tested using the Olsen P test and results are presented in milligrams per kilogram (mg/kg) or parts per million (ppm)." (Agriculture Victoria, 2020). The Colwell P test has not been in standard use in grazing areas in Victoria for many years.

Throughout the report the author does not make much reference to the results of the Colwell P tests, but instead focusses on the Total Phosphorus test results. "Most phosphorus is tightly held by soil minerals and weakly available to plants, so testing for available phosphorus is more useful than total phosphorus" (Soil Quality Pty Ltd, 2020).

Total Phosphorus test results are unhelpful in determining soil fertility as the relationship between Total Phosphorus and Plant Available Phosphorus (as measured with the Olsen P test) is highly complex and dependent on a range of factors such as, but not limited to the: level of biological activity within the soil, forms of P historically applied, soil pH, level of standing dry matter, degree of cover with litter...

Agronomists do not make pasture species or fertiliser recommendations based on a Total Phosphorus test result. They will insist on a Plant Available Phosphorus test result; that is, an Olsen P.

Impacts of the 2014 bushfire and the extended drought have not been taken into account when interpreting the results. Both these events have significantly disrupted the mineral cycles and levels of biological activity within the soil, and would therefore impact on the results.

The lack of concern regarding the delay between the soil sampling and the laboratory analysis is both worrying and of major importance. "Because of the length of time that some samples were stored prior to sub-samples being taken and analysed, data potentially impacted by prolonged microbial decomposition (Organic Carbon and Total Nitrogen) were not considered in subsequent data interpretation." Page 20 (Landloch, 2020). This provides the reader with the impression that the delay was unimportant as organic carbon and nitrogen levels are insignificant, when in fact they are of considerable import.

The importance of soil organic matter and soil organic carbon is so high that the local Better Beef Network is holding an entire series of workshops over the next year to educate its members. One of the topics is "Increasing water holding capacity and drought resilience with soil carbon".

How can this unorthodox and lackadaisical management and analysis of the soil samples, which brings the other results into question, be acceptable? Is there a clear and documented chain of custody for the samples?

Definition of Top Soil

Throughout the Soils Report, top soil is referred to as the top 200-300mm of soil. This convenient definition for the proponent allows them to simply strip the top off the land. It is, however, a very inaccurate definition from an agricultural and soil science perspective. "The topsoil consists of the 'A' horizon(s), the subsoil consists of the 'B' horizon(s) and the rock consists of the 'C' horizon and/or an 'R' horizon. Sub horizons can exist within these broad groups." (Centre for Land Protection Research, 2001).

Within the proposed project area, as identified within the EES document, the A horizons are relatively shallow, approximately 50-100m thick. Most of the fertility, organic matter and biological activity occur in the top 25-50mm of the soil. The subsoil below this is relatively infertile and lacking biological activity and organic matter. Local farmers avoid tilling the soil deeply to avoid mixing this infertile subsoil with the fertile topsoil as it would reduce the overall fertility.

The proponent's consistent use of the term topsoil to describe the top 300mm of soil is inaccurate, misleading and has led to erroneous conclusions.

Impact of Organic Matter and vegetative cover

Limitations in the Available Water Capacity of the soil were identified within the EES report as a major limiting factor for pasture production within the proposed project area. This statement is repeated in many ways in various sections of the report, and is emphasised in Figure 30.

The statement is usually accompanied by another stating that this will be remedied in the rehabilitation process by mixing some fine tailings in with the top-soil to improve the Water Holding Capacity. These claims are of concern given that the level of soil organic matter (OM) was not measured.

“In all texture groups, as OM content increased from 0.5 to 3%, AWC of the soil more than doubled. Soil OM is an important determinant of AWC because, on a volume basis, it is a significant soil component.” (Hudson, 1994).

Not only is organic matter significant for increasing the water holding capacity of the soil, but the influence of other factors such as litter and vegetative cover in increasing soil biological activity and water infiltration and reducing run-off have not been considered. Run-off from the project area is assumed to remain constant [page 71 (Landloch, April, 2020)] despite the removal of top-soil and all the associated grasses and other vegetation.

Figure 30 (Landloch, 2020) is used to demonstrate the lack of the water holding capacity of the soil to support plant growth during the drier months. Figure 30 compares the daily pan evaporation rate with the monthly rainfall average. The data used is stated to be from the Bureau of Meteorology (BoM) Lindenow weather station. However the BoM Lindenow weather station does not report Pan Evaporation figures; it only reports rainfall. Where do the Pan Evaporation figures come from, and why are they not acknowledged?

Some of the properties within the proposed project area have been in the same families for many generations, in some cases since the 1850s. These families have long term rainfall records which show that there are major variations in rainfall patterns across the proposed project area. Reliance on the rainfall records for Lindenow is of doubtful relevance. It is interesting that reference is not made to the closer weather station on the Mitchell River at Glenaladale.

Evaporation is another case where the measurement (Pan Evaporation) does not provide an accurate indication of conditions within the soil. A major factor in Pan Evaporation is wind-speed. Trees, shrubs, grasses and litter all dramatically reduce the wind-speed at the soil surface and protect the soil surface from direct sunlight, drastically reducing evaporation rates.

Seasonal variations in soil moisture content are usual, expected and compensated for in a managed agricultural system. There are many strategies for managing periods of variable grass growth throughout the year across the seasons and also during unexpected climatic events and anomalies. These vary from the traditional forms of fodder conservation such as the production of hay and silage, drawing on supplementation to utilise dry standing feed and less palatable species, employing variable grass recovery periods, adjusting stocking rates as well as growing summer and winter active crops.

To suggest that the variations in soil moisture content at Glenaladale are too great to support agriculture is to imply that there are only one or two pockets of high rainfall across Australia where agriculture should be practiced. Glenaladale has one of the more benign climates and seasonal variability of the agricultural regions within Australia.

Reliance on finding solutions in the future prevents the assessment of impacts

In order to assess the impact of the proposal, detail of what WILL happen must be provided. Most of the suggested mitigation measures are either put forward as possibilities; that is, they may include, should or are possible solutions. Or else the proposal is that they are 'yet to be developed' and will be researched at a later date.

When does the proponent propose to perform this future developing and research? It is reasonable to expect that these details should be developed at this point in time as the EES process has been underway for the past four years. If a licence is granted the proponent will be under considerable pressure to generate income as quickly as possible – and will certainly not place a priority on "possible" solutions.

The impression is created that the proponent is uncertain as to how they propose to implement the project. Evaluation of the impacts and thus risk can only occur on the basis of a fully developed, appropriately researched and finalised proposal.

What does the proponent propose to do if the mitigation measures "to be researched" turn out to be impossible, impracticable and/or too expensive? How are the risks of these to be analysed and assessed by independent and knowledgeable persons?

How will the regulator enforce "possible" mitigation measures with no targets set to be achieved? How can rehabilitation be deemed to be successful when the development time for tunnel erosion is many years? Over what period are the "effects on land stability, erosion and soil productivity associated with the construction and operation of the project, including rehabilitation works;" measured?

Mixing Fine Tailings into top-soil

In order to increase the soil's water holding capacity, the proponent suggests that a proportion of the fine tailings be mixed with the top-soil. It is suggested that this "… will induce a degree of drought proofing" [page 49 (Landloch, 2020)].

Increasing clay content means that when the soil dries out it is harder, and more difficult to wet. This in turn leads to increased run-off flow over the soil surface during heavy rainfall events, and consequently more erosion.

The stockpiling of "top soil" results in a significant loss of organic material and biological functionality within the soil; this then reduces the water holding capacity and infiltration rates of the soil.

As referred to previously, the "top soil" referred to throughout the document is inaccurate and misleading. The proponent's use of the term topsoil refers to the top 300mm of soil, not the fertile and biologically active A horizon of the soil profile more accurately referred to as top soil. The mixing of subsoil with the genuine topsoil dramatically alters the soil properties and creates the need for amendment.

The proponent has ignored the high levels of toxic metals (Chromium, Vanadium, Tungsten, Thorium and Uranium) contained within the tailings shown in Figure 23 (Landloch, 2020) and Table 9 (Landloch, 2020), for which there are no HIL A levels. These are all airborne carcinogens. Where there are no appropriate Australian Standards then World's Best Practice must be adopted. This is usually accepted as those of the United States of America's Environmental Protection Authority.

Following mixing of these elements with the topsoil, any disturbance which creates dust will cause health impacts throughout the region. There is no mention of using alternative or more appropriate standards within the EES.

Solution not satisfactory = Unfit for original purpose

Unsustainable final landscape

In order to prevent Tunnel Erosion, the proponent is suggesting a number of mitigation measures that **may** be possible. The term 'may' is concerning as it does not produce confidence and/or surety that the suggested actions will be actually implemented, possible, effective and/or sustainable over the long-term. These 'may be possible' options are:

- Establishment of deep rooted plants
- "Treatment" of the top 1m of the subsoil
- Creation of a smooth landform to prevent water infiltration into the deeper subsoils.

The establishment of deep rooted plants (such as trees) to absorb water and prevent it infiltrating into the subsoils may eventually become effective, but only in a number of decades. How much erosion will occur before the trees grow?

Treatment of the still-to-determined depth of the 'top' of the subsoil is problematic for a variety of reasons. There is no assurance that this will occur, as the proposed treatment "requires research". IF a treatment is successfully developed, it is still not a viable and sustainable solution as it will not prevent water infiltrating into the lower subsoil.

Disposal of the tailings has been shown (Daniels W, 2003) to create an impermeable layer along which the water will flow. Soil cracking, wombats, rabbits and tree roots all will create holes in the "shell" of treated subsoil, allowing the water and dispersed clays to exit, creating tunnels.

Eventually these tunnels will develop to the point where they will "blow-out", producing a stream of highly turbid mud combined with any contaminants from the tailings with which they have been in contact. This event may not occur quickly; but experience from the previous local tunnel erosion remediation project shows it will happen.

The proposed "mitigation measure" is a band-aid solution to defer the issue until the proponent has left. The landholder and/or taxpayer would be left with the repair costs.

On the basis of a so-far non-existent soil treatment the remainder of the solution relies on leaving a perfectly smooth landscape to avoid ponding, thus preventing water seeping into the subsoil and creating the conditions for tunnel erosion. The proposal suggests "… it is **likely** that the majority of fine tailings settlement will have occurred by the time rehabilitation works are carried out, and subsequent further settlement **may** not be large." [emphasis added] page 45 (Landloch, April, 2020), and that the landscape then be filled and smoothed over.

Locals know that the creation of a smooth landform with gradual slopes to prevent ponding and hence water infiltration into the deeper subsoils is not achievable. "…it is planned that rehabilitated slopes will not carry any water-retaining or ponding features, **thereby eliminating the key driving force for tunnel erosion to develop.**" [emphasis in the original], page 69 (Landloch, April, 2020). This "solution" is very clearly unsustainable in any time-frame.

What if local conditions cause the subsidence to take several years, rather than the 12 months suggested? How is the landscape going to be maintained in a condition which prevents ponding? There has been no consideration of wombats and how much damage they cause. Will farmers be banned from taking vehicles into the area – because vehicles create tracks which cause ponding? Will all forms of animals be denied access because they create impressions in the ground which create ponding? What happens in several decades when the planted trees finally grow and then start to fall over?

The terms "likely" and "may" do not inspire confidence. Experience from the Douglas Mineral Sands Mine is that further settlement can be large. A landowner there has described how he found he was unable to use his boom-spray on "rehabilitated" paddocks due to the high levels of settlement. What will the proponent do when they find these statements are in error? What are the impacts and consequences for the landscape, rivers and Gippsland Lakes should these "possible" solutions not be effective? The risk cannot be appropriately evaluated now on a future "may".

If the subsidence is complete within 12 months and if the proponent returns to smooth out any ponding areas, the "rehabilitated" landform will still not be stable or sustainable. Wombat holes and rabbit warrens create ponding, vehicle traffic creates ponding, trees falling over create ponding, and livestock traffic and resting create ponding areas. The landscape described would require an unsustainably high level of on-going maintenance and be totally unsuitable for the land's prior agricultural usage.

Road Pillars

Roads are an aspect of the project that will have major implications for erosion. The roads and the construction of the corresponding impermeable "Road Pillars" will create the ideal conditions for erosion. It is interesting that the proponent plans to use the Haunted Hills Formation Gravels for the Road Pillars given they have acknowledged they are dispersive and "No compaction trials have been carried out to determine shear strengths of reworked and compacted gravels" [page 82 (Mining One Consultants, 2020)].

Rainfall and dust suppression water run off impermeable road surfaces. The road run-off (and any other surface run-off) is concentrated by the impermeable road pillars and infiltrates to the dispersive subsoil. When the water encounters a lower impermeable layer, such as tailings, the water then flows along the impermeable layer until it finds a route to release the hydrostatic pressure (e.g. ground cracking, tree roots, wombat holes …).

The water flow then transports the dispersed soil, increasing suspended solids in the waterways and creating very deep tunnels. The dispersive soils will be at highly increased risk of erosion as their normal levels of structure and compaction will have been destroyed by the mining process. The kinetic energy of water forming these tunnels should not be underestimated – it will effectively have a pressure head of the depth of the mine, i.e. 40m head of pressure or approximately 400kPa.

This effect was demonstrated clearly during the East Gippsland Tunnel Erosion project. Tunneling exacerbated by a road culvert required excavation to a depth of 6m before it could be backfilled and treated. This instance of erosion consisted of two levels of tunnels, with subterranean "waterfall" linking the levels.

Tunnel Erosion within the proposed project area

The author of the report appears unaware that tunnel erosion occurred in the project area within a "swale" described as "unlikely to erode", and was treated as part of the local tunnel erosion remediation project. The tunnel erosion treatment, which comprised of the application of gypsum, use of an excavator to dig-out and refill the tunnels followed by the entire mini-catchment being deep ripped to a depth of 1.5 m, had a very limited level of success. This suggests that solutions to the issue of tunnel erosion are considerably more difficult, and vastly more expensive than the proponent currently believes.

Control of surface erosion

The author places a great deal of emphasis on the use of the Revised Universal Soil Loss Equation. This is a simplistic modelling of a very complex process. *"Although there has been widespread use of various factors from the revised universal soil loss equation (RUSLE) (Renard et al. 1997), caution is advised in the application of that model, as it gives average erosion rates for a slope only and gives no information on peak erosion rates that may develop at points along a slope. Other models are under development and trial, but potential users of any model should consider:*

- *whether the model has been validated and the level of accuracy demonstrated*
- *the availability of accurate and appropriate input data (preferably directly measured)*
- *the applicability of the model to the situation of interest."* Page 22, (Commonwealth of Australia, 2016).

None of the suggestions in the above reference appear to have been followed.

These precautions apply to all the models used throughout the EES, which have been influenced by lack of local validation, inaccurate input data and lack of consideration as to the applicability of the model.

Drought & Bushfire impacts have not been considered

Two key factors which have not been considered in the EES reports are the impacts of the 2014 Mt Ray bushfire and the most severe and longest drought (three years) ever experienced in both East Gippsland and Victoria. Both drought and fire result in the creation of bare ground and reducing vegetation mass, providing the impression of "poor" agricultural practice.

The author comments that "Visually, the soil/grazing system in, and adjacent to the project area does not appear to be achieving high productivity, with low levels of biomass and signs of overgrazing", page 50 (Landloch, 2020), but fails to put this lack of bio-mass into the context of the bushfire and the following drought – all within a six year period. The situation has been misunderstood and the landholders appear to have been considered responsible for nature's vagaries.

It should be noted that a key management strategy during drought is to reduce livestock numbers. This reduces the impact on the land from the stock, and reduces the fodder expenses for the land manager. Outside observers would only see the low stock numbers and reduced biomass, without understanding the context of the observation.

The 2014 Mt Ray/Boundary Track bushfire burnt through 6,700ha of land in approximately 2 hours; most of the land was privately owned. The majority of the proposed project area was impacted by the fire. In places the fire burned so hot that areas were extremely scorched, with perennial grasses killed and soil seed-banks destroyed. This has had an ongoing impact on the density and composition of pastures, which have taken a number of years from which to recover.

The impacts of the fire have been long-lasting and further complicated by the prospect of the proposed project. Landholders have been reluctant to replace expensive fences given the gut-wrenching possibility of having to watch them be bulldozed.

The sowing of perennial pastures is estimated to have a cost recovery period of seven years. The project's proponent has stated at public meetings every year since 2014 that the project will commence the following year. As well as further reducing the community's trust in the proponent, this uncertainty has been a clear disincentive to investing significant quantities of capital and time into the proposed project area.

Lack of effective consultation

Many of the solutions and mitigation strategies rely on consultation with landholders. There are a number of fundamental flaws with this strategy.

Most of the landholders have found consulting with the proponent ineffective and have given up. The proponent's interpretation of consultation is "we are going to do ...." and they have also provided misinformation on numerous occasions. For example "We will not compete with the vegetable growers for water", "There will be no dust" and "There are no shallow aquifers in the project area". All of these statements were made at public meetings.

Landholders' viewpoints have been ignored or trivialised. Lip-service is paid to the knowledge and experience of experienced local people. The proponent has failed to treat the landholders with respect. In some cases, and without justification, the proponent has threatened them with the Mining Warden and/or VCAT. There is no community confidence as to the use and success of consultation based solutions with the proponent.

What happens if the landholders express a view the proponent doesn't wish to hear? Are there any consequences for ignoring the results of the consultation? At what point does a landholder's viewpoint become "impracticable" or "too expensive"? Who decides what is "impracticable"?

What are the consequences if the 'consultation' doesn't occur or, as the local community has so frequently experienced, is poorly and/or unprofessionally conducted without providing the landholders with appropriate opportunities for input? Although innumerable complaints from landholders about the lack of and/or poor 'consultation' processes have been received by both DELWP and ERR, to date the regulators have been unable to modify the proponent's behaviour. The question has to be asked, why would the proponent therefore change its method/s of consultation?

There can be no confidence that consultation will be effectively carried out, particularly given the proponent's lack of success in this area to date. Without effective and professionally conducted consultation the entire process becomes both meaningless and unenforceable.

As many of the objectives for closure of the mine rely on a yet-to-be-developed 'consultation strategy', the impact of the proposed project in these areas is unable to be assessed.

Questionable statements

These are scattered throughout the EES documentation. Some examples are:

- The conclusion that "texture contrast soils are largely associated with plateau tops…" page 22 (Landloch, 2020) doesn't appear supported by samples.
- "Top soils throughout the project area are typically sandy, acidic and generally infertile." page 23 (Landloch, 2020) is not supported by our successful food production industries.
- "…rates and durations of fertilizer addition do not appear to have been high." page 25 (Landloch, 2020). On what basis has this conclusion been drawn and which properties are being referenced?

Many of these viewpoints are unsupported by data which ignore the context of the observation. These perspectives appear to be intended to cast doubt as to the viability of the existing food production industries and to minimise the apparent impacts of the proposed project. What they achieve is to throw doubt on the credibility of the author.

Weather/Climate

All the processes described in the soil treatment, progressive void filling and rehabilitation assume the weather will be clement. As local and long-term food producers of many generations, our collective experience and rainfall records demonstrate that the rainfall in East Gippsland is best described as a 350mm rainfall zone with random East Coast Lows making up the 650mm average per annum.

Local farmers are highly aware they are reliant on a thin skin of topsoil under which is a subsoil that literally becomes liquid when saturated. During wet periods agriculturalists and contractors avoid using heavy machinery on paddocks. They are aware that they are working on the "skin of custard", and if the skin breaks they will become seriously bogged. In some cases vehicles are left in place until the soil dries out, allowing the vehicle to then be recovered.

This has been known to take several months. Places where the "skin" has been broken take many, many years to heal and must be avoided in further wet periods. It is difficult to see how the proponent will restore the "skin" in this environment where they will be totally destroying the soil structure.

How will the proponent manage during the random periods of extreme wet weather? It is highly likely that the dispersive subsoil will flow into the mining pits and that plant and machinery will become bogged and/or inundated. Foundations and walls of dams and Tailings Storage Facilities will become weakened. In one mild East Coast Low event (only approximately 75mm of rain) in recent years, four professionally well-constructed farm dams failed in a single weekend.

East Coast Low events have been measured at the Fingerboards of more than 300mm in a single event, and can occur over a very short time-frame. Multiple East Coast Low events are also well known to occur.

These multiple events are more dangerous and problematic than single larger events, as dams fill and the soil becomes saturated during the first event; and then there is nowhere for the water to go except run-off during subsequent events.

It has become apparent that the proponent is not willing to accept their own expert advice regarding the dispersive subsoils. Recently the proponent ignored the 75mm of rain which had fallen in the previous few days and insisted on entry for exploration drilling - with predictable results. If the proponent is not willing to accept the advice of even their experts – how are they going to prevent or mitigate any impacts?

Rehabilitation Bond

The proponent states that a rehabilitation bond will be lodged in accordance with ERR's bond calculator. However the calculator is based on a series of assumptions which are not congruent with the proposed project:

- The terrain and climate are highly complex. Simplistic models are therefore not appropriate;
- The rehabilitation bond has not been field tested; it is a vague and generalised estimate.

The bond should be based on realistic quotes rather than an optimistic model. The model assumes that the rehabilitation bond would only be used for surface works, not major modifications of the soil profile at depth which is what the proponent is planning to under-take.

In the highly likely event that the "possible" mitigation measures to prevent erosion are unsuccessful, the only way to repair the damage would be to:

- Conduct research to find a solution that really worked
- Re-excavate the entire disturbed area
- Treat the dispersive soils with the amendment (if one can be found)
- Re-fill the excavated area
- Begin the rehabilitation process again

This entire process would be extraordinarily expensive with no surety of success. Techniques for restoring the large areas of the unique native vegetation within the project area have yet to be determined.

Costs therefore cannot be estimated, but would certainly be higher than a simplistic model based on mine turnover and area disturbed.

The proponent has only addressed the scoping requirement of “Efficient and environmentally sustainable mining of available resources” in a very limited context in the soils report. There are a number of highly valuable resources to be mined by this proposal related to soils that will be directly impinged upon and reduced by the proposed project. These include, but are not limited to water, soil fertility, soil stability, biodiversity, eco-system functionality, aesthetics and the community’s health and well-being.

Mining of soil fertility and soil stability is a very complex matter which has not been adequately addressed. The fundamental basis of the proponent’s proposal is that the current soils are “…not suitable for agriculture…” page 27 (Landloch, April, 2020) and that they can, at some stage in the future (possibly), find a treatment for the dispersive soils.

There are too many underlying assumptions and incomplete data and understandings of our complex soils. There are too many ‘if, buts and maybes’ as proposed mitigation measures. Tunnel erosion and dispersive soils are a major problems that the proponent has failed to satisfactory address. The instability of structures from liquefaction of the dispersive soils would have horrendous consequences. All of which throw doubt as to the safety and efficacy of the proposed project to the extent that an appropriate and realistic risk assessment is not possible.

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Chapter 3: REHABILITATION

Executive Summary

The rehabilitation reports contain insufficient detailed essential information upon which to safely and accurately assess the proposal. Erroneous assumptions, along with a lack of rigour and understanding applicable in other influencing areas (soil studies/ tests, water research and agriculture in particular) all flow-on into rehabilitation, thereby under-mining the conclusions and recommendations.

The rehabilitation information is disjointed with information distributed across many different sections. It contains both repetitive and contradictory information.

The level of risk is under-valued, under-stated and not properly addressed.

Residual impacts from the proposed inadequate rehabilitation of the proposed project will include:

- Loss of productive agricultural land
- Increased erosion – both surface and tunnel
- Destruction of established, mature and extensive native vegetation and fauna habitat (refer to the Biodiversity Report)
- Contaminated soils
- Contamination of the Heritage listed Mitchell River
- Contamination of the Perry River's chain of ponds, one of the best preserved in Victoria
- Deposition of large quantities of sediment into the Mitchell and Perry Rivers and the Gippsland Lakes
- Long term health impacts to local residents (refer to the Health Report)
- Destruction and contamination of shallow aquifers
- Long term detrimental impacts on directly impacted and nearby horticultural and agricultural businesses
- Long term harmful impacts on the tourism industry based around the high country, the Mitchell River and the Gippsland Lakes

These impacts are all unacceptable as they embody staggering costs to the environment, the community, businesses, employment and government.

Introduction

Rehabilitation outlined in the Fingerboards EES document is the proponent's proposed suggested method of remedying and repairing the various impacts and injuries to the landscape, environment and landholders from the development of the project. The risks inherent within their limited proposed actions are substantial.

"A rehabilitation plan documents potential risks to the environment and public safety, and how these risks could be minimised through progressive and final rehabilitation. Comprehensive and unambiguous rehabilitation plans are therefore the first step to effective rehabilitation. However, the rehabilitation plans we reviewed were not written with sufficient detail." [Page 6, (Victorian Auditor-General's Office, 2020)]. The plan included in the EES document is neither comprehensive nor unambiguous.

The frequency of 'yet to be developed,' 'this requires further research' and 'this will be determined later' statements about so many fundamental and important rehabilitation components that are not outlined as part of the proposed project are staggering. They are so numerous as to make a full, accurate and responsible risk assessment of the proposed rehabilitation impossible.

Sadly, the track record within the mining industry of successful rehabilitation is poor. No mine in Victoria has ever had 100% of its rehabilitation bond refunded. Our state abounds with situations of:

- mines left in "care and maintenance" indefinitely and/or for extensive periods
- companies being declared bankrupt and avoiding their rehabilitation obligations
- minimal rehabilitation bonds which reflect a miniscule percentage of the true cost of rehabilitation
- The Regulator failing to enforce progressive rehabilitation

The Victorian Auditor General's Report on mine rehabilitation is damning of the Regulator and of the industry. (Victorian Auditor-General's Office, 2020)

The proponent's rehabilitation plan is difficult to find in the documentation as it is positioned as a component of the Draft Work Plan. What little detail provided is described and/or outlined based on flawed assumptions, poor data and an optimistic premise that solutions will be found and implemented after the "Research will be needed" [p.29 (Landloch, April, 2020)], "will by developed by a research and development program" [p.64 and 85 (Landloch, April, 2020)] which will also fill "knowledge gaps" which occupy Section 7.14 (Landloch, April, 2020).

No-one, including the proponent, the community or the Impact Assessment Committee (IAC), can comprehensively assess the consequences of impacts when the proposed remediation measures are yet to be determined. How can the IAC be expected to advise regulatory bodies? How can the regulatory bodies then act when detailed remediation measures are not provided?

What will the proponent do if no suitable remediation measures are found as a result of further research? How will the regulators enforce that this further research is conducted? How will its findings be implemented?

A number of topics reveal some of the serious flaws in the proponent's rehabilitation discussion.

Agriculture

Much of the rehabilitation discussion is spent describing why soils within the proposed project area are "clearly not suitable for agriculture". [p.27 (Landloch, April, 2020)] There are approximately 170 years of evidence which demonstrate that this statement lacks veracity, commencing from First Settlement and by the many families of up to 7 generations who have farmed, and are still farming, in the area.

Questions need to be asked regarding how selectively the locations for sampling were chosen. How many of the managed farms (rather than lifestyle properties with absentee owners) within the project area were sampled? Why were standard agronomic soils sampling techniques not used? Why was there no discussion of the impacts of the Mt Ray bushfire and the severe, three year drought on soils? Why were the tests taken at such inappropriate times?

To support the "unsuitable for agriculture" claim there is a selective drawing on one work referencing the Dairy Industry on page 22 (Landloch, April, 2020) to show there will be a feed shortage over summer. There is no reference to the sections of the same work which detail well-established standard strategies for overcoming such a feed shortage. It is important to note that there are no dairy farms within the project area, although there are dairy farms in the local vicinity.

The author also draws on a work on rangelands [page 29 (Landloch, April, 2020). It needs to be pointed out that there are no extensive rangelands within 1,000km of the proposed project area. Interestingly the reference acknowledges that well managed rangeland do not produce the same levels of runoff than well managed areas.

The author fails to accept that some of the well managed areas within the proposed project area were successfully able to minimise erosion and maintain ground cover during the recent and most severe drought in Victoria's recorded history.

Throughout the report the author fails to acknowledge the complexity of managing soils; management, organic matter, soil microbiology all have roles. Improvements in soil organic matter and soil microbiology are achieved through appropriate land and grazing management, and lead to enhanced:

- Soil structure;
- Water holding capacity;
- Production;
- Biodiversity;
- Drought resilience; and
- Profitability

Rather than working with the natural systems to improve the soil, the proponent claims that it will remediate any and all soil issues by "developing" a "manufactured sub-soil" [p.2 (Landloch, April, 2020)].

Restoring fertility

The majority of the local soils' fertility is within the top 25mm. By stripping the top 300mm and then mixing it, the proponent will have irrevocably mixed the fertile component with the poorly fertile component.

Local farmers within the proposed project area do not turn the soil over to mix the subsoil and the topsoil; they know doing so significantly depletes fertility and organic content, and that it takes many, many years to rebuild the soils. The use of fertiliser, especially in the "possible" quantities stated, can provide a temporary response which is unsustainable; unless there is an appropriate level of organic matter in the soil and the underlying soil microbiological systems are fully functioning.

Food producing businesses cannot run farms with all the proponent's proposed exclusion zones and tree plantings everywhere. Productive land availability will then be reduced significantly, resulting in many economic and management ramifications on food producing capability. Farms within the project area will be unable to continue operating. The proposed destruction of old, well-established shade trees also triggers animal welfare issues as well as a whole raft of bio-diversity problems.

The lack of material content is demonstrated by not outlining soil fertility targets for the rehabilitated areas, and this raises a whole raft of questions. What and where are the soil fertility targets? Will these be different depending on the "negotiating power" of the landholder? How will these be measured, given that an inappropriate test was used in the soils report? What are the time-frames?

The approach appears to be that it will work simply by chucking some fertiliser around and walk away; the old 'She'll be right, mate.' Unexplained and non-defined measurable actions and targets are unscientific, impractical and very risky.

After denigrating the soils for agricultural production, the rehabilitation discussion then proceeds to state that many of the perceived issues can be resolved using standard inputs. These, and equally efficacious non-standard products are already utilised on a strategic basis according to a myriad of inter-connecting factors which appear to have not been considered and/or have been neglected to be mentioned.

Tunnel Erosion

Tunnel erosion is at least acknowledged as a potential issue within the proposed project area. However the scale of tunnel erosion (both in the past and the present) and its ramifications are inadequately recognised. The likelihood and consequences are significantly understated and the high risk probability unjustifiably minimised.

Reference is made to a report on a major tunnel erosion remediation project undertaken by the then Department of Primary Industries (DPI) on behalf of the East Gippsland Catchment Authority (EGCMA). It is extremely worrying that the remediation measures undertaken by the DPI are incorrectly stated.

For example, the author quotes the tunnels as being ripped to a depth of 1m. This creates the erroneous impression that the issue is of shallow depth and consequently simple to correct.

However in reality the main tunnels were first dug out and then back-filled with an excavator. In some cases this digging out was to a depth of 6m. Gypsum was then applied. After that process, the entire area was ripped to a depth of 1.5m.

When at this point it became clear that some areas were still tunnelling, up to two additional follow-up treatments were applied. That is, gypsum was applied and the ground was re-excavated, backfilled and re-ripped.

The situation today, around sixteen years after the original project commenced, is that there are instances where the rate of tunnel erosion is now significantly worse in the multiple treated areas than before the remediation project commenced. It is tunnelling both more rapidly and extensively.

The local agriculturalists within the project area, and many other farmers in the greater surrounding local area, are well aware that disturbance of the soil exacerbates the tunnel erosion problem.

It was reported in the rehabilitation discussion that only two tunnels were found on the project area. However there are more tunnels than this both within and just outside of the project area, some of which are substantial.

This active tunnel, and others like this within the project area, do not fit the author's landscape description; that is, tunnelling only occurs on steep slopes. The proponent's author stated at a public Community Meeting that he had never worked on tunnel erosion in hill country, and the rehabilitation discussion reflects this.

The DPI project leader (Peter Robinson) had worked on tunnel erosion remediation projects throughout Victoria. In a personal interview he stated that "The Glenaladale tunnel erosion behaves differently to the tunnels anywhere else in Victoria". (Personal Interview, Peter Robinson to F Coleman, 2001).

The local landholders are very familiar with this untamed beast and manage it.

In this instance the rehabilitation plan is largely lacking, based on erroneous assumption and poor data, and seems based on the premise that solutions will be found 'in the future' and that 'knowledge gaps' will be filled.

The future filling of these knowledge gaps with satisfactory solutions is not assured. Nor is it the case that the solutions found will in fact be acceptable, workable, reliable and enforceable.

There are no guarantees that the proponent will carry out the studies, or should they carry out the studies, that they will comply with any recommendations from the studies. The entire process would totally lack transparency, accountability and enforceability.

A further aspect of our area's dispersive soils not effectively covered in the EES document is the potential for liquefaction of the subsoil. Local farmers are familiar with the knowledge that vibration from operating machinery during a wet season causes the subsoil to become liquid. The consequences of the mining machinery triggering liquefaction of the subsoil during a wet season could be devastating in terms of human safety and impact on the environment. The impacts could include mud-flows into the mine void and structural failure of dams and the Tailings Storage Facility (TSF).

Surface shaping

The discussion of an even soil surface creates some interesting and difficult challenges that were not acknowledged, let alone addressed. How is the proponent going to ensure that when it rains the soil settlement occurs evenly? How does the proponent intend to prevent ponding given the impossibility of creating a smooth surface?

What is proposed to be done about drip zones around the canopy of the trees? What is the remediation action for when a tree falls over? This is a regular occurrence, particularly with the equinoctial gales the area is subject to in both autumn and spring, let alone the severe northerly winds.

How will the depressions made by cows and other large animals be addressed? Or the native animal trails? One of the biggest issues to compaction is digging wombats; how is this challenge to be solved?

Any use by machinery, livestock or wildlife will cause unevenness in the ground. This will then be creating the exact conditions for unevenness and tunnel erosion the report claims will be avoided. What is being discussed and recommended is a golf green scenario, rather than that of a working farm.

If the soil cannot be allowed to form low areas or depressions "… it is planned that rehabilitated slopes will not carry any water-retaining or ponding features, **thereby eliminating the key driving force for tunnel erosion to develop.**" [Emphasis in the original], page 69 (Landloch, April, 2020), then the proponent is admitting that they cannot rehabilitate the soil to its prior use.

Trees

The proposed use of trees to "mop up" sub-surface water in theory sounds good. It may possibly work if we wait long enough; somewhere in the region of fifty years or so, depending on the species?

It needs to be noted that the failure of trees to re-establish is an issue with rehabilitated mine sites. For example at a mineral sands site in Western Australia this was a major problem. The trees kept dying. The difficulty was eventually resolved by planting trees outside of the mined area. This was explained by a local farmer to a group of people who were taken on a field trip by the proponent to allay fears as to successful rehabilitation. Instead it had the opposite effect. (Ascertained at a site visit by J. Hine in 2019)

Only one active tunnel was observed by the author during his survey (singular), with another being located. How comprehensive was the author's survey? What areas were surveyed? How long was spent on-site? Were the area/s walked, or was it a drive-through survey?

Water

The reports refer to the need to avoid water concentration points. However there is no reference to, or discussion of, the Road Pillars. These are compacted walls of gravelly Haunted Hills Formation (HHF) overburden plus sand tailings.

Road Pillars will effectively form dams in the sub-surface drainage along the road-lines. Surface and sub-surface water flow will be interrupted at the roads, and drain down the face of the Road Pillars into the dispersive subsoil. This will create perfect conditions for tunnelling to occur.

As the Haunted Hills Formation Gravels have been identified as dispersive, the resulting tunnels could have interesting side effects on the roads, similar to those experienced by the Princes Freeway at Morwell (which was closed in 2011 for an extensive period due to tunnel erosion). Any form of drainage pipes through the Road Pillars will concentrate the water, exacerbating erosion. Page 70 (Landloch, April, 2020) states that HHF overburden and fine tails are both likely to disperse; so why is the proponent proposing to construct "Road Pillars" from them?

During the East Gippsland Tunnel Erosion remediation project one instance of tunnel erosion was identified as having been initiated by the increase in water flow due to the concentration effect of a road culvert. This tunnel required excavation and backfilling to a depth of over 6m, and was found to consist of two layers with "internal waterfalls" linking the layers.

The simplistic solutions offered by the proponent are not appropriate in this complex soil scenario and the risk of serious and irreversible consequences is extreme.

Rehabilitation of "temporary" water storage dams

The proponent has stated there will be up to 20 "temporary" water storage dams constructed in steep-sided gullies to prevent mine-contaminated water from reaching

the river. Where is the discussion and solution to the rehabilitation and decommissioning of these structures?

In response to questions posed at a public meeting regarding liners for the dams, V. Hugo (then CEO of the proponent) stated that the dams would be self-sealing. However, much of the gullies' sides will have been inundated with water for an extensive period of time. This will result in the killing off of all the vegetation and seed bank. The theory is that sediment blocks up the pores of the soil, making the soil water-tight or self-sealed.

This is ripe for guaranteeing immense levels of erosion and contrary to years of local experience. How does the proponent propose to rehabilitate the sides of the gullies given that these are too steep for machinery?

Surely they are not considering planting tube-stock into soil rendered impermeable? Where is the consideration and discussion of this important aspect? "To be determined later" is unacceptable.

This is a major risk and needs to be comprehensively assessed at this stage. On decommissioning, these temporary dams will be left in a very precarious situation. As temporary dams they may not be stable. This is an extreme risk, the consequence of which is a horrific scenario.

Tailings disposal

The rehabilitation technical report is very confused about the requirements for the disposal of tailings. In some areas it is very clear that the tailings will be disposed of deep below the surface of the ground in manners which seek to minimise leaching from the tailings.

In other areas of the report it discusses the option of creating manufactured subsoil by mixing tailings with subsoil to create a layer 0.6 - 0.8m thick between 200mm and 300mm below the surface.

The TSF is mentioned as being temporary, with the stored tailings being transported for disposal into the mine void after 4-5 years. The method of transporting the 3,000,000,000 litres of tailings has not been specified. Other mines have encountered extreme difficulties in transporting these materials.

There are no HIL A levels for a number of the toxic minerals found in high levels the tailings, including Tungsten, Titanium, Thorium and Vanadium, as shown in Figure 23 (Landloch, 2020). In this situation, World's Best Practice (usually the US EPA) applies. The proponent has not mentioned any alternative standards.

So what are the consequences of these scenarios?

- Deep burying of the tailings will create an impermeable layer against which tunnel erosion will form (Daniels W, 2003).

- Mixing tailings with the sub soils and top soil exposes the community and livestock to toxic minerals for which there are no HIL A levels in the standard, e.g. Tungsten, Titanium, Thorium, Vanadium …
- These are all carcinogens when ingested into the lungs as dust.
- Mixing fine tailings with the topsoil could lead to a soil which will set harder and be more prone to cracking during dry seasons, making it more difficult to wet when it rains.
- Fine tailings are likely to block the pore structure of the soil.

Shallow aquifers and farm dams/waterholes

Throughout the entire EES document the existence of a crucial shallow aquifer system in the proposed project has been ignored. In the rehabilitation report the depth to groundwater is consistently referred to a being below the bottom of the mining pit.

The Visualizing Victoria's Groundwater (VVG) website clearly shows the existence of this aquifer. It is situated well above the floor of the mining pit in most areas, and in some areas is extremely close to the surface.

The VVG map data is validated by the existence of farm dams and springs in the area that never dry up. During the recent three year drought (the most severe and longest drought in Victoria's recorded history) farms within the project area found these aquifer fed dams to be the only available sources of water as all other dams dried up.

The proponent's projections are that seepage from the TSF will cause mounding of the groundwater of 2m. This effectively means the groundwater is being contaminated with the water and minerals from the tailings.

Perry River

The Perry River is Victoria's best preserved Chain of Ponds. West Gippsland CMA has spent millions of dollars fencing the catchments and restoring habitat along the Perry.

The proponent describes the Perry "as a series of ponds which only occasionally flow". This description ignores the subsurface flow through the shallow aquifers along the Perry.

The Perry is a shallow aquifer with pools where the groundwater and surface water interact. Contamination and disruption of the shallow aquifers within the proposed project area will lead to contamination of the Perry River.

Mitchell River

The shallow aquifers within the proposed project area have a complex interaction with the Mitchell River. In wet periods the Mitchell River acts as a recharge zone and water infiltrates into the aquifers. In dry periods the shallow aquifers feed into the river, and

provide an important base for environmental flows. Measurements show there are consistently higher river flow rates at the Hillside gauge than at the Glenaladale gauge – even in periods where there are no other in-flows.

Disruption and contamination of the groundwater systems from the TSF, tailings disposal in the void, and the use of tailings in topsoil will leach through the groundwater system into the Mitchell; especially in dry periods of low flow. The impact of this leaching will be exacerbated by the reduced volume of water in the river. This poses unacceptable risks to our community and environment.

Rehabilitation of valleys

The rehabilitation of valleys is relying on the establishment of trees. Where is the understanding that this is a long time frame strategy? Where are the short-term and medium-term strategies?

The introduction of logs, cobbles and gravel is a proposal of little value. Into what is the introduction of significant plantings of native species being contempated? There is no mention of top soil. Natives won't grow in either cobbles or gravel.

Why is introducing rocks considered to be effective? Rocks become water concentration points, and lead to increased erosion. They also create turbulent patterns during flow events which increase the surface erosion risk.

Dams being created for a 1 in 100 year creek flow event are based on what data? The proponent has also not provided and used the flow figures for the creeks.

The proponent neglected to provided any local long-term rainfall figures. The local figures are higher than those gleaned from other areas via the nearest BoM stations; these are too far away and have different rainfall patterns.

Although careful monitoring is mentioned, there is no actual action outlined. What is the purpose of the monitoring? Who does the monitoring, how often, where and to whom is this monitoring reported? Are the landholders to be informed? If so, how is this to be done? What is the actual action or actions to be taken from this monitoring?

Control of Surface Erosion

The proponent is using a model which has not been successfully applied to grazing country. How can inaccurate statements, such as soil erodibility being largely unchanged as the same topsoil layer will still be present, be made? The original topsoil will have been removed and replaced with a mixture of the fertile and productive top-soil and the erodible and low fertility subsoil.

This will result in a soil which will erode considerably more easily than that of the pre-mine situation. There will also be a considerable period in which the soil is bare and hence vastly more erodible than fully grassed pasture.

The author places a great deal of emphasis on the use of the Revised Universal Soil Loss Equation. This is a very simplistic modelling of a very complex process.

"Although there has been widespread use of various factors from the revised universal soil loss equation (RUSLE) (Renard et al. 1997), caution is advised in the application of that model, as it gives average erosion rates for a slope only and gives no information on peak erosion rates that may develop at points along a slope. Other models are under development and trial, but potential users of any model should consider:

- *whether the model has been validated and the level of accuracy demonstrated*
- *the availability of accurate and appropriate input data (preferably directly measured)*
- *the applicability of the model to the situation of interest."* [Page 22, (Commonwealth of Australia, 2016)].

None of the suggestions in the above reference appear to have been followed.

Why does the equation not take into account the loss of soil structure and increased permeability of the soil due to reduced compaction from the mining process? A shallower slope will still be more prone to erosion than the original undisturbed slope.

The precautions listed above apply to all the models used throughout the EES, which have been influenced by lack of local validation, inaccurate input data and lack of consideration as to the applicability of the model.

Admission of the need to exclude of stock from valley slope areas is another situation where they are not rehabilitating to the previous use. Farmers will have land returned in a state such that that much of it cannot be used for food production.

It appears that the proponent is unaware that managed livestock grazing of grasses promotes tillering, which encourages thicker cover and more extensive root systems. These fine root systems in turn are the key to active soil biological conditions, which create soil crumb structure, increase water holding capacity and prevent erosion.

"It is planned that an on-site study using simulated rainfall and overland flows will be carried out to develop parameters for use in a landform evolution model (Willgoose et al. 1989; 1991), which will then be run to provide an additional and detailed assessment of the long-term stability of proposed final landforms." [p73 (Landloch, April, 2020)].

Why was this not undertaken prior to the publication of the EES? Undertaking the study after approval is too late. What if it shows unexpected results? How can findings be enforced? Who will ensure the study is conducted scientifically and without bias? Use of a faulty model and invalid assumptions mean that the conclusions are erroneous. This is of serious concern and an important serious risk issue.

Stakeholder Consultation

What form of mediation or resolution process will be used if the proponent and stakeholder do not agree? Will there be an independent adjudicator? The use of the Mining Warden would be problematic, as this position is part of an established system that has as its core and agenda to promote mining.

Stakeholder consultation, as experienced by the local community to date, has been ineffective and unprofessional. The myriad of complaints to both ERR and DELWP about the proponent demonstrate a lack of competence in this area. To suggest the use this as a "mitigation measure" is incomprehensible and quite frankly, offensive.

Rehabilitation Bond

The proponent states a rehabilitation bond will be lodged in accordance with ERR's bond calculator. However this calculator is based on a series of assumptions, which are not congruent with the proposed project:

- The terrain and climate are highly complex;
- Simplistic models are not appropriate;
- The rehabilitation bond has not been field tested; it is a vague and generalised estimate; and
- The bond should be based on realistic quotes rather than an optimistic model.

As the model assumes the rehabilitation bond would only be used for surface works, not for major modifications of the soil profile at depth, this is problematic and a major concern.

In the highly likely event that the possible mitigation measures to prevent erosion are unsuccessful, the only way to repair the damage would be exorbitantly expensive:

- Conduct research to find a solution that really works;
- Re-excavate the entire disturbed area;
- Treat the dispersive soils with the amendment (if one can be found);
- Re-fill the excavated area; and
- Begin the rehabilitation process all over again.

Techniques for restoring the large areas of unique native vegetation within the project area have yet to be determined. Costs therefore cannot be estimated, but would certainly be significantly higher than a simplistic model based on mine turnover and area disturbed.

Sedimentation

The major issues of both surface and sub-surface (tunnel) erosion have not been adequately addressed. Increases in either of these forms of erosion will lead to increased sediment inputs into both the Mitchell and Perry Rivers.

This will then flow on into the Gippsland Lakes. The Mitchell River is already a significant source of sedimentation for the Gippsland Lakes (Hancock G, 2007), and this situation must not be exacerbated.

Conclusion

The rehabilitation discussion does not address many of the significant and crucial issues as outlined above. There are some significant gaps in knowledge and experience in combination with a limited understanding of our soils and how they work; particularly with regard to agriculture which is the proposed mine site's present use and to which it must be returned.

There appears to be contradictory information, underlying assumptions and a great deal of 'we'll work out a way to deal with all the difficulties and problems later.' This philosophy is dangerous, particularly as the negative consequences of this proposed project from a rehabilitation perspective are significant and substantial. It is also contradictory to the requirements of a rehabilitation plan as specified by the Victorian Auditor General's Office (Victorian Auditor-General's Office, 2020).

In summary, it does not permit a proper evaluation of all the inherent and substantial risks in and of this proposal.

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Chapter 4: TAILINGS STORAGE FACILITY

Figure 13: Stawell tailings dam - similar size to proposed Fingerboards TSF

Contents

Executive Summary

The proponent has failed to adequately meet the requirements of the EES.

The tailings dam appears to be based on the upstream method which has been shown as unsafe unless in arid areas with no seismic activity – neither of which conditions exists in Glenaladale.

Given the unsuitability of the structure for the environment, and that the dam is upstream of public roads and communities, the risk of dam failure is high. Through their failure to test for suitability of the local materials for construction of the tailings dam, and their failure to consider the implications of the underlying dispersive soil, they are not able to give reassurance that their plans are feasible or practical or indeed safe.

Without comprehensive modeling and sufficient detailed analysis of the soil and its dispersive propensity, a comprehensice risk assessment cannot be performed.

By focusing on serviceability rather than stability the proponent has avoided discussing the risks imposed by the tailings dam in terms of its location, design and inherent risks of failure. They have relied on a self-rating of likelihood of failure as rare, despite not having conducted the basic modelling and testing recommended by GHD.

The proponent has also failed to adequately describe the nature of the materials contained within the tailings dam, including the increasing concentrations of toxic heavy metals and radionuclides.

They appear to be relying on seepage of contaminant laden water to reduce moisture content of the tailings and in doing so are putting interlinking groundwater and surface water – including Honeysuckle and Moilun Creeks then at risk of contamination. No modelling has been done on the effects on groundwater dependent ecosystems of the toxic seepage.

The reliance on the ALARP approach to risk management provides no comfort as it effectively allows the proponent to decide what to them is an acceptable risk given the finances available. This is a very dangerous tactic given the marginal returns from the mine and the business risks inherent in the project.

Despite their claims that the TSF is temporary, the EES indicates it will be a permanent structure. The risk of failure and the far reaching, and potentially permanent effects on such values as the Chain of Ponds, necessitates a substantial bond that covers post-mine maintenance indefinitely.

EES requirements

The relevant draft evaluation objectives include:

To minimise effects on water resources and on beneficial and licensed uses of surface water, groundwater and related catchment values (including the Gippsland Lakes Ramsar site) over the short and long-term,

To avoid or minimise potential adverse effects on native vegetation, listed threatened and migratory species and ecological communities, and habitat for these species, as well as address offset requirements for residual environmental effects consistent with state and Commonwealth policies.

To protect the health and wellbeing of residents and local communities, and minimise effects on air quality, noise and the social amenity of the area, having regard to relevant limits, targets or standards.

The proponent was expected to describe the physical and chemical characteristics of the tailings including specific aspects relevant to air quality as well as adverse changes to the background radiation levels in the vicinity of the project (including the radionuclide content of vegetation, surface water and groundwater);

The proponent was expected to discuss the technical feasibility and environmental implications of tailings management and to identify the composition of tailings and waste material, including radiological content and activity levels. They were also expected to describe methods and strategies to demonstrate the radioactivity of tailings and waste materials stays within environmentally acceptable exposure levels.

The proponent was expected to describe, amongst other things, the direct and indirect loss of vegetation or habitat quality and significant effects on biodiversity values resulting from hydrological change, hydrogeology, water quality (i.e. on water dependent ecosystems), contaminants and pollutants (including nuclides).

In those discussions they were expected to use appropriate methods, including modelling to assess the likely effects of the tailing's location and management on such things as:

- Potential for mounding and migration of groundwater from the backfilled tailings material along the mine path during operations, decommissioning and post-closure;
- Effects on groundwater and adjacent surface water;
- Potential for adverse effects on nearby and downstream water environments (including the Mitchell and Perry Rivers, King and Wellington Lakes, and Gippsland Lakes Ramsar wetland of international importance overall) due to changed water quality, flow regimes or waterway conditions during construction, operations, rehabilitation, decommissioning and post-closure.

  and

- Ore, product, overburden, tailings and mining by-products management, in the context of potential water quality impacts including those arising from sedimentation, release of radionuclides, other contaminants and pollutants, tunnel erosion, acid sulphate soils, acid/metalliferous drainage formation, and salinity.

Location of the Tailings Dams

Extensive series of watercourses in project area

Figure 2 below shows just how extensive the watercourses are in the project area. The Fingerboards area acts as a 'gravel aquifer' that seeps into the Mitchell River, resulting in significantly increased flows as it moves past the curve. The complex series of gullies to north and east of the diagram allow direct flows to the river in any rainfall event. The Mitchell flows to the Lake King in the Gippsland Lakes. To the west and south of the creeks flow Lake Wellington in the Gippsland Lakes via the Chain of Ponds and the Perry River.

The Tailings Dam is located at the highest point of the project area. Seepage (containing increasingly concentrated heavy metals and radionuclides) from the tailings dam is predicted to cause significant and far reaching mounding that will impact on perched or other aquifers and through to other watercourses.

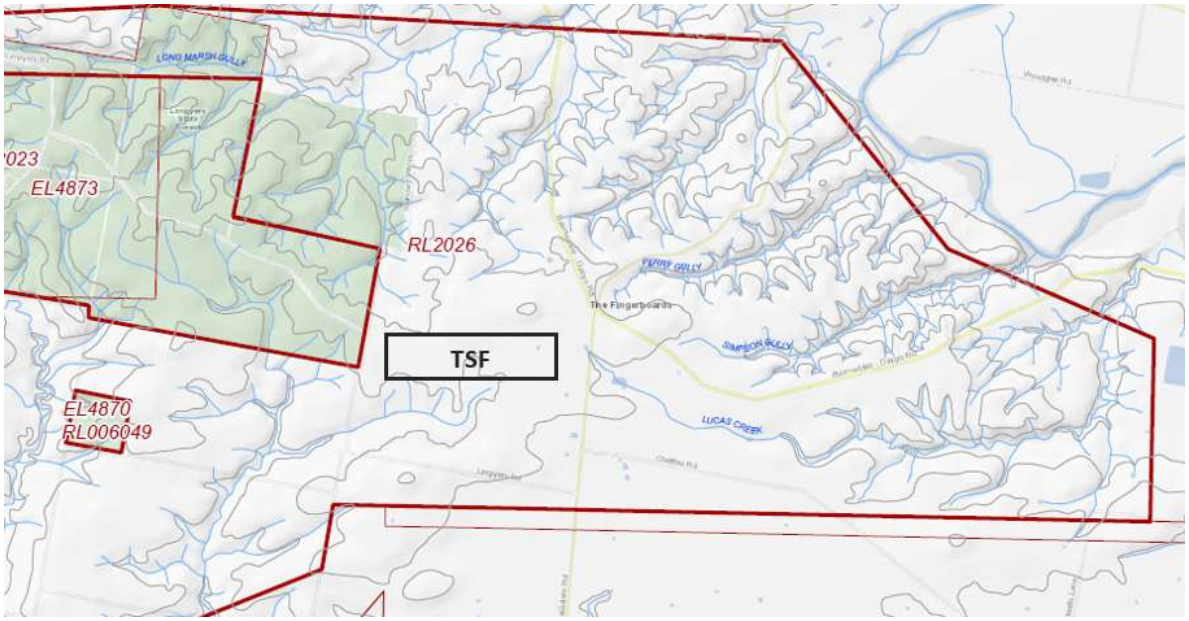

Figure 14: TSF and water courses

Location upstream of public roads increases risk

GHD's Geotechnical Starter Pit Report was very clear that dams should not be positioned upstream of public roads due to the increased seriousness of consequences. They go on to say that higher consequence dams 'require more stringent design, maintenance and surveillance' than lower consequence ones.

As Figure 3 shows the Fingerboards TSF has been positioned at the highest part of the landscape. Kalbar has not recognised the increased consequence; the EES does not propose adequate mitigations to address hazards. While the proponent might dismiss the risk as rare, that does not obviate the hazard.

The consequences of dam failure should have been independently modelled and a proper emergency plan included in the EES. Failure to do so means the community is not being made aware of the additional risks being imposed by the mine and have not had the opportunity to say whether they are willing to accept those risks.

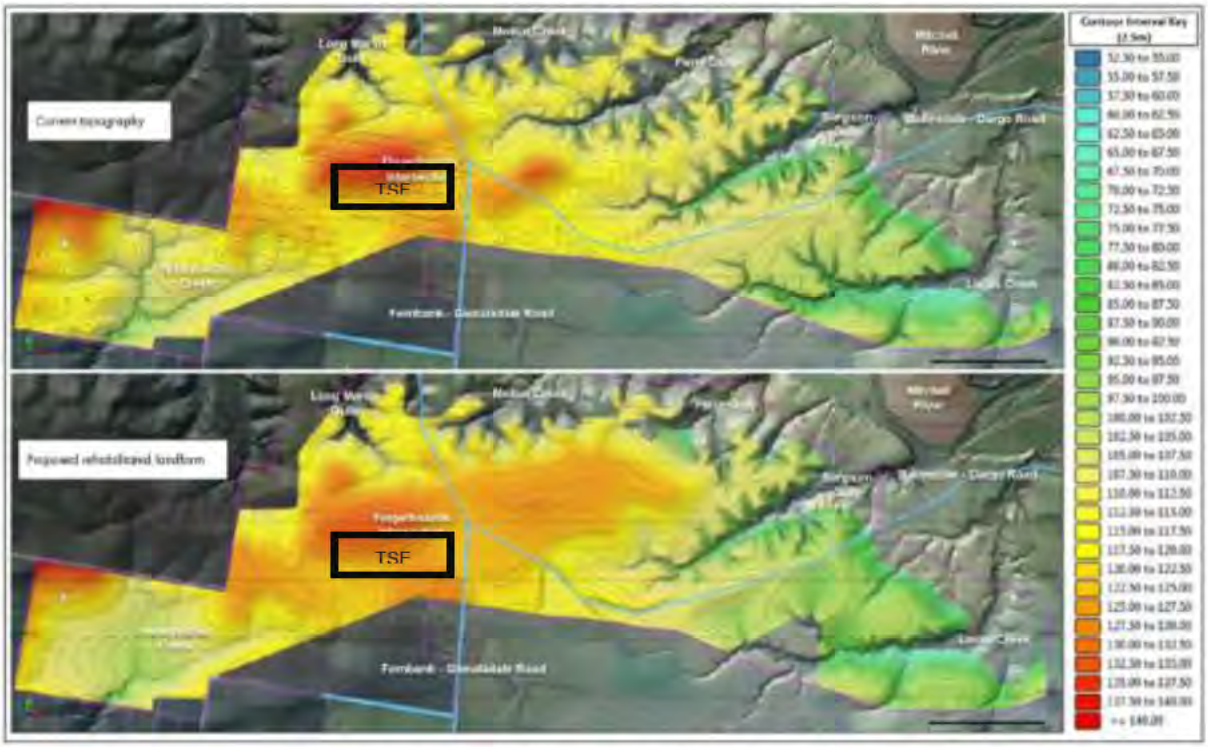

FIGURE 2-15 STUDY AREA TOPOGRAPHY EXISTING / REHABILITATED SOURCE: LANDLOCH

Figure 315: Topography of project area

'Serviceability not stability'

Alarm bells ring when one reads that in relation to such a potentially dangerous structure as the TSF, the proponent is advised by its consultant that people exaggerate the risks in mining and that the aim should be for serviceability not stability.

Furthermore they are told that people put themselves at risk every day, and provided with a list of examples of such risks as a justification for not striving for anything beyond what appears to be an 'acceptable' level of risk given the funds available for the project's needs.

"Another consideration of what constitutes acceptable risk is to aim to not expose the public to a level of risk greater than is commonly accepted, whether knowingly or not, in the normal course of their lives." (p27)

The reasoning leads to the consideration that **ALARP (as low as reasonably practical)** should be the aim rather than ALARA (as low as reasonably achievable) or World's Best Practice. (Mining One, 2020) They go on to note the inherent risks in everyday activities that people engage in for work or recreation.

There appears to be no consideration of the fact that while people choose what risk they take in their daily activities, most would no doubt not appreciate additional risks imposed on them without any consultation about their tolerance to that particular risk. It is a very different matter to take risks in going about your daily life (e.g. driving to work, going for a 20km hike) as opposed to having a risk imposed that adds nothing of value to your life.

The community has the right to expect a higher standard than this when it comes to the TSF.

Risk Assessment

The EES provides a risk assessment matrix based on semi-quantitative method drawing on likelihood and consequence. This is not reflective of how risks associated with TSFs should be assessed and is considered only appropriate for short term tactical decisions. (Tierney & Wesseloo, 2019)

BS Brown, Bruce Brown Consulting, is clear when acknowledging *cumulative risk*, which the generic EES matrix fails to capture. (Brown, 2019)

The most recent guidelines around geotechnical risks and considerations when constructing dams are from ANCOLD. The TSF clearly falls within this category as a Large Storage dam, as the ANCOLD website indicates. From this classification, technical requirements pertaining to design and operation of such dams are stated. This is due, in a large part, to the risk to those downstream should there be structural failure or mis-operation of the dam.

Guidelines were revised in mid-2019, well before this EES was released. The report from Mining One identifies using dated 2009 Read and Stacey criteria.

How can this be a reflection of thorough assessment and best practice when more up to date parameters are available?

The ANCOLD dams are extensive and expensive civil structures. By their own admission, the proponent has not engaged the services of suitably qualified consultants to consider the principles and philosophy of the TSF.

Nor have they obtained advice on the most economically feasible manner in which to construct the TSF, particularly in context of the issues with soil structure.

In addition, as mentioned below, Geotechnical assessment of bedrock and soil hasn't occurred on the proposed TSF site. A glaring oversight which immediately increases risk levels - regardless of the matrix used. (ANCOLD, 2019)

As incidences of dam failure continue, including TSFs, it would have been appropriate for Mining One to focus their parameters on the most recently available information.

The Mining One's (MO) report (Appendix A003) discusses Factors of Safety (FOS) and Probability of Failure (POF) around determining slope design. MO discusses "acceptable" factors, and variances to criteria for this. This is on a background of the MO assessment "concludes that serviceability, not stability, is likely to be the key consideration in managing geotechnical risk". (pg. i)

'Serviceability, not Stability' is enough to have the reader quivering; the focus of works seems more about accessing the ore whilst ensuring additional costs are balanced with the value of the product.

MO focus on 'ALARP' (as low as reasonably practicable) rather than 'ALARA' (as low as reasonably achievable). The MO report identifies the financial implications of ensuring greater aversion to risk, and boldly claims that to reduce a risk to very low levels, "an extremely high cost is required, which may then in turn induce further risks; for example, considerable earthworks or importing of materials .. ALARP … was developed, which is the point at which the cost involved in reducing the risk further would be greatly disproportionate to the benefit gained". (NOPSEMA, 2020)

Such a narrow perspective of ALARP, which condenses down to monetary issues, is the issue. And provides a framework for 'cost cutting' when safety is being considered.

A range of graphs provided by MO identify 'acceptable risks', around the likes of mountain climbing and parachuting (voluntary pursuits). They provide a hypothetical scenario to demonstrate ALARP.

This is a very different scenario to the construction of a TSF with its imposition of risks that are not elucidated, but are not necessary for normal activities.

Inadequate risk assessment

Risks in the EES appear to have been systematically minimised through a range of 'fit for purpose' modelling and mitigation measures which do little to provide reassurance of transferring theory to practice. Other risks that should been addressed have not been considered, for example the impacts of East Coast Lows.

TSFs in general are among some of the world's largest and most complex engineering structures. Failures occur in a range of economies but there are common themes. The consequences of failure can be profound and destructive at a level which defies comprehension.

In addition, the proponent appears to be **basing all assessments** on the risk of structural or other failure on the basis that the **tailings dam is only needed for 4-5 years.** This timeframe is highly ambitious given the complexities and uncertainties associated with the project. It also contradicts other sections in the report which indicate the facility will be permanent.

The quality and extent of information about the TSF and dam construction generally is insufficient and often conflicting. Areas of concern include, but are not limited to:

- Structural inadequacy of site soils
- Ignoring global standards for TSF construction
- Not modelling for TSF failures
- Dismissing criticisms in peer review reports
- Ignoring environmental Impacts of the TSF
- Ignoring known groundwater locations
- Inadequate assessment of effects on groundwater dependent ecosystems
- Failure to consideration effects on migratory birds
- Failure to consider dust from dewatered tailings (Masige, 2016)

An ill-conceived project in this location with ill-judged and poorly considered risks places the community and environment at extreme risk and fails to support the relevant Legislation and Guidelines at Local, State and Federal Levels.

“Underpinning these issues is the poor selection of materials targeted for use in construction of the TSF. No costings have been done for the importation of more suitable materials.

And even more concerning, Geotechnical drill holes to ascertain soil structure were not completed at the site of the proposed TSF.

Business risk must be considered

The proponent has failed to demonstrate a solid business plan for the project, a baseline requirement of the MRSD Act 2009. The purpose of the Mineral Resources and Sustainable Development Act 1990 (MRSDA) is to encourage ‘economically viable mining and extractive industries that make the best use of, and extract the value from resources, in a way that is compatible with the economic, social and environmental objectives of the State’.

Without financial costings, there is no clarity or assurances that the TSF will be built to highest possible standards (with associated add-on fees) or the site decommissioned and rehabilitated as outlined in the EES.

Any suggestion that this proposed project is of State Significance and must proceed 'at all costs', is unwarranted. The community's Economics Submission articulates the costing issues and the market variances. It also demonstrates the alternate and current supplies of rare earth mineral sands which prevent this project being cost effective to the proponent, investors or the State.

The identification of foreseeable financial risks associated with the project raises serious concerns about the recommendations to the proponent to follow the ALARP principle of risk mitigation. ALARP basically tells the proponent to do what it can afford to do to reduce risks, not what it should do.

The EES is flawed and inadequate at addressing the Ministerial Scoping Requirements and fails to align with effective and transferable risk identification. There is an absence of reality-based mitigation measures that will assure protection rather than enabling destruction.

This is in sharp contrast to the MRSD Act 2009 which clearly states

"The purpose of this Act is to encourage mineral exploration and economically viable mining and extractive industries which make the best use of, and extract the value from, resources in a way that is compatible with the economic, social and environmental objectives of the State."

And Section 2 (1) (b) (1) which requires that;

"risks posed to the environment, to members of the public, or to land, property or infrastructure by work being done under a licence or extractive industry work authority are identified and are eliminated or minimised as far as reasonably practicable…"

Insufficient information presented

There are numerous inconsistencies within individual reports and between the multiple reports of the EES documentation.

In the context of the engineering requirements of the TSF, and catastrophic consequences in the event of failure (at any time), this is unacceptable for the purposes of making informed decisions pertaining to the proposed project.

To have no details and discussions at hand is inconceivable, let alone the suggestion that the information will be provided at a later date. The proponent states Appendix E of the Work Plan (Surface and Groundwater) that the "work plan, including a full discussion of TSF dam failure assessment, will be submitted separately to the EES".

There is no discussion of TSF failure in the documentation – beyond the proponent's contention that the risk is low. This is completely unacceptable and fails to permit an appropriate risk assement to be conducted.

It fails to honour the 'commitment' to 'timely and transparent information' and clearly neglects to reflect the breadth of the Scoping Requirements which state "key elements, associated requirements for new infrastructure" are to be identified and explored.

Why is this important aspect being left left out of the EES? Why haven't TSF failures been modelled?

The community is being asked to comment on the project without the information necessary to ensure those comments are based on full knowledge of the risks. How is withholding such critical information from scrutiny in the public interest?

Tailings Storage Facility (TSF) information in the EES

The TSF represents one of the more significant engineering challenges of the proposal, with the consequences of design failure being extreme. The TSF will cover some 90ha of the site including walls.

Information within the EES is limited in detail. This is of major concern given the project is one of the most complex that has ever been seen in the mineral sands industry in Australia.

Whilst there's a diagram of a 'Typical tailings storage facility embankment cross section ' (fig 3.14, Chapter 3, 3-25), this is evidently derived from Wave International and does not represent previous work done by Kalbar or other facilities associated with mineral sands/rare earths mines across Australia. There is no suggestion in the EES that Wave International will be tasked with construction of the TSF.

In the context of the complexity of the overall site, with steep gullies, known dispersive soils, and located in the catchments of two significant rivers that support a number of other ecological, social, cultural and economic values and feed to the Gippsland Lakes, it would be reasonable for the EES to include a large amount of technical data pertaining to the TSF. Instead a 'borrowed' diagram representing 'typical' was produced.

Further diagrams are available in Appendix A003, Fig 1-2 (pg.2) which indicate the 'general arrangement layout of the site'. This diagram indicates the four (4) TSF cells, along with other infrastructure.

Inadequate geotechnical assessments

Underpinning this is the clear absence of geotechnical drilling at the site of the proposed TSF. (Geotechnical assessment A003 Fig 2-3 pg.9) The Proponent has failed to establish the bedrock structure, and neglected to undertake a test pit excavation as recommended in the GSD report. (A0004) How can it be plausible to construct such a massive (90 ha) containment area for toxic sludge, and not establish the soil composition at the site?

The Proponent has omitted to identify the TSF as a standalone domain, and references it under Landforms, Geology and Soils. However, this domain is not noted as requiring any other contributing studies Table 7.5 (pg 7-7) under the assessment framework. This seems to be an oversimplified and 'siloed' approach to the project.

MO is basing all assessments of the risk of structural (or other) failure with the TSF on the premise that the TSF will only be needed for 4-5 years. There is no consideration of the likely event that the timeframe may need to be extended.

It is unlikely that the fine tailings will be able to be dewatered enough to return to the voids is in question – at least not without excessive seepage of the toxic contaminants – heavy metals, etc. – to the underlying groundwater.

Use of inappropriate materials

There is a reference to utilising Haunted Hills Gravel to simply lift the TSF wall height. (pg.112-3) "The landform shown in Figure 7-2 shows a containment structure for fine tailings, within the landform, comprising HHF overburden, constructed in stages. The first stage will be constructed on sand tailings or overburden, then each lift will be on the previous stage, and partly on the tailings, as shown in figure 2 below."

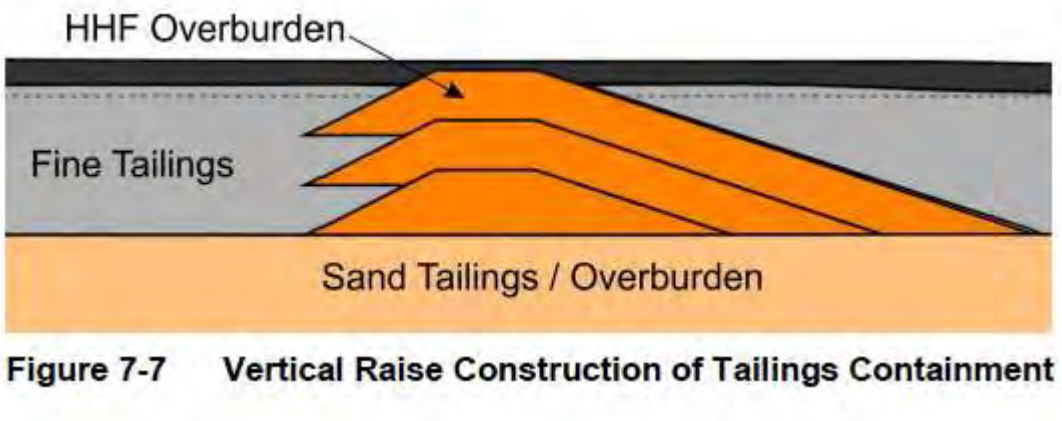

Figure 7-7 Vertical Raise Construction of Tailings Containment

Figure 16: TSF construction page 113 of Geotechnical Report

Given the cautions expressed in GHD's Starter Test Pit documentation about the quality and structure of materials from within the project area for this type of construction it is surprising that Mining One expects that 'the consolidated and drained sand tailings will form a suitable foundation for these impoundment structures".

Inadequate mitigations

While the proponent has not modelled the consequences of failure of the tailings facility, it is nonetheless surprising that the only indication of any possible checking on the design is that it be assessed by 'an experienced dam engineer'. Surely with the size of the structure, its contents and the potential for significant social and environmental damage if it fails, we can expect a more rigorous approach to the design and construction?

Mining One appears to take a very optimistic approach to overcoming the unique challenges that the Fingerboards project presents.

"All that may be required would be a design and construction process, which may include limiting the lift heights."

While they do go on to stress the need for management of water during construction, there is no indication in the EES documentation of how 'excessive filtration … into the landform" will be identified or avoided. Furthermore, the challenges that might pose have not been addressed in risk assessments associated with the TSF – including increased construction costs.

"*Surface water in natural drainage paths, rainfall, and run-off must be managed during construction to ensure that excessive infiltration of water into the landform does not occur."*

TSF may be permanent structure

The 'assurance' that the TSF is 'temporary' sits in contrast to other statements in the EES. On the one hand there are descriptions of how the TSF will be moved after a few years and on the other, diagrams showing how the tailings dam will be permanent. (see figure 3 below)

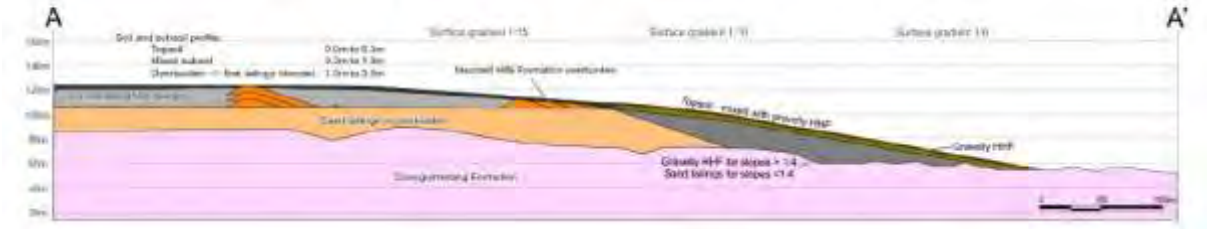

Figure 17: Geotechnical assessment page 109

Likely Effects

"Effects include direct, indirect, combined, consequential, short and long-term, beneficial and adverse effects"

While the scoping requirements do not address the definition of effects in full, it does recognize that effects can be profound and long lasting. Given the inherent dangers of tailings storage facilities it is reasonable to expect that the EES would provide full information about all the individual and cumulative risks of the TSF and provide clear evidence of intention to avoid those or at least adopt world's best practice to minimize them as far as possible.

Seepage of toxic materials

The notion that dewatering of the tailings will be undertaken to a level which would enable the material to be used as fill for mine voids seems rather optimistic.

The Workplan indicates an intention to allow deliberate seepage through the base of the TSF to get the fine tailings to a stage where ampherols can be used to dry them out further. The coarse tailings indicate that an unachievable 65% dewatering will be sufficient to enable them to be put back in the mine voids.

The tailings will contain increasingly concentrated quantities of toxic heavy metals and other contaminants – including flocculants which are ecotoxic to aquatic life. It seems inconceivable that the EPA would allow contamination to such values as the Chain of Ponds through deliberate seepage of pollutants.

The proponent's assessment of the benign nature of the tailings must be challenged. The fine tailings contain known contents that are toxic and hazardous (e.g. thorium, chromium, aluminium, arsenic, vanadium, lanthanum, etc.) In fact, even with the very limited assessment the proponent has done, the fine tailings are shown to have much higher levels of arsenic, Chromium, Copper, Thorium and Vanadium than all the other soil samples. ((Kalbar Operations Pty Ltd, 2020)

The concentration of these elements increases through multiple passes of the process water. The proponent has not done the full suite of analyses over sufficient samples to support the contention that the leachate is non-threatening to groundwater and groundwater dependent ecosystems. This makes it impossible to properly assess the impacts.

The proponent intends to use flocculants, which are non-organic, highly toxic and pose a risk to the environment. A study by Simin Khatibi, Missouri University of Science and Technology, in 2016 notes the challenges with TSF management, dewatering and use of Flocculants. Obtaining an almost dry substance from tailings is impossible.

Issues around pH changes created by the use of Flocculants are also raised. This presents complications when seeking to reinstate tailings into mine voids. When the chemical composition and heavy metal concentration of tailings is considered, leaching into the water table compounds these problems. (Khatibi, 2016)

Interference with groundwater dependent ecosystems

The claim by the proponent that the project is above the water table and not expected to be impacted by groundwater, (Geotechnical assessment p 104) is in direct contrast to the reality. The project area is known to contain a number of springs and dams that are groundwater fed – including one directly beside the proposed TSF site. These springs and dams are well known to locals, located across the project site and are relied on as water sources during dry seasons and extended periods of drought – such as that recently experienced by the people of East Gippsland.

It is difficult to understand how a potentially toxic tailings dam, that is designed to enable seepage, is not going to interfere with the ecology of these springs and dams.

Particularly when that seepage, due to the recycling of the process water, will include increasing concentrations of heavy metals and flocculants that are known to be ecotoxic to aquatic life. (e.g. Magnafloc)

The reality of erosion is outlined in A003 when Mining One discussed seepage. “Seepage of water from mine slopes, whether from perched water tables or infiltration of surface water, is expected to cause tunnel erosion which can lead to localised over-steepening and collapse. The fine silty sands of the ore zone are likely to be highly susceptible to tunnel erosion, as well as surface erosion from surface water run-off due to rainfall and water flowing over slopes.”

Despite the considerable amount of energy required for this process, the end result could still be a non-dry substance. If this is placed in a mine void, and topped with dry soils, it would still render the land unusable and with a high risk of subsidence or slippage.

There are no calculations or indications of how these tailings will continue to dry out (if indeed they can) and provide adequate land stability to prevent subsidence. And then there’s the issue of the arsenic and other heavy metals bound in the tailings. (Victorian Government, n.d.)

Should the tailings be stored in cells and then covered, the EES provides no details of means by which seepage and leak will be prevented, or the anticipated structural integrity of the cell in the centuries to follow. Nor does it provide any information about the logistics around moving the tailings, such as pump and power requirements and whether these are in fact practicable and affordable.

The EPA guidelines are clear with respect to the likes of arsenic in tailings. The EPA

needs to be satisfied that the ground water quality objectives are met and that there is no detriment to beneficial uses of groundwater, land or surface waters. (EPA, 2009) Along with these uncertainties, is the lack of credible costing data available.

Migratory birds

There will be other submissions which illustrate the negative effects of the project on biodiversity, flora and fauna. The TSF presents a unique risk to the migratory birds, who seek rest on waterways. In the context of the TSF slurry composition, birds which land on these waters are at heightened risk of contamination.

A range of legislative frameworks exist which and include a number of bilateral agreements which aim to protect and conserve the birds. Some of these agreements have been in place for over 40 years. (DAWE, 2020)

The risk to Migratory birds with the BHP Olympic dam (South Australia) is described in terms of increased mortality as recently as June 2019. (Migratory birds at risk if BHP continues use of evaporation ponds, 2019)

The EES fails to identify this as a risk, thus has not completed an assessment which notes all effects (as per the definition above). This would readily align with a failure to address Scoping Requirements.

Global standards for TSF construction

The level of concern which TSF generate is well founded, and it's rather disconcerting that the EES devotes so little to this structure.

"poorly designed or managed, TSF's lead to increased costs… and ongoing impacts to the environment and are a perpetual risk to public health and safety".

Tailing Storage Facilities are acknowledged through both academic research documents and the mining industry as complex structures which require specialized engineering skills for construction. A sustained and high-level monitoring system is then required to ensure effective and dynamic structural integrity review processes and interventions, which aim to prevent catastrophic failure.

Of note is that a TSF doesn't generate income for the mining company. It is an area of waste product that is unable to be sold and requires ongoing maintenance and monitoring costs. With that comes vulnerability to the economic situation of the operator.

The Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2013 (MRSDMIR) and the Mineral Resources (Sustainable Development) (Extractive Industries) Regulations 2010 (MRSDAEIR) both require a risk-based work plan to be lodged and approved before any work, including the construction or operation of a TSF, can commence under the licence.

Unfortunately, there appear to be no independent checks and balances on whether the proponent's assessment of risk is accurate

What assurances does the public have from reading the EES that the full details required have been submitted, particularly when current information is so limited?

What assurances does the public have that risk assessment and work plan for a TSF reflect the real hazards and not just arbitrarily assigned probability and consequence levels intended to avoid further and expert scrutiny?

Unfortunately, even though the International Council on Mining and Metals released a document in February 2019 that outlined new standards (including not having upstream tailings dam where there is known seismic activity), the standard is voluntary.

Whilst certainly not the only review paper sourced which outlines reasons behind TSF failure, as recently as 2019 Hindawi published a comprehensive study of reasons behind Tailing Dam failure. This open peer based science research publisher provides a worthy document as it enables a broad understanding of the complexities of the TSF, (Lyu, Chai, Xu, Qin, & Cao, 2019)

Upstream dams were by far the most likely to fail. The causes included a number that would be considered hazards for the Fingerboards TSF proposal. Unlike the proponent, the authors do not see failures as a rare event. In fact, they affirm that "tailings dams frequently fail, resulting in the discharge of significant quantities of tailings into the natural environment, thereby causing grievous casualties and serious economic losses."

They went on to assert "tailings dams are some of the largest structures built by geotechnical engineers. Nevertheless, on a global scale, incidents of tailings dam failures have occurred often … keeping tailings dams safe and stable is the most challenging task".

Of considerable concern, it was found that tailings dam failure is several times more likely than other conventional water-retaining dam. This should cause alarm to those considering the implications of the proponent's plans; particularly given that 4 local dams failed in the East Coast Low of 2016 in the proposed project area and it's immediate surrounding area.

The geography and soil composition are additional confounding issues, noting that due to dispersive soils and lack of suitable clays amongst other things, there are significant challenges in constructing even conventional water-retaining dams in the project area.

The article summarized data from 300 events of tailing dam failures.

Causative factors outlined for TSF failure include;

- Embankments constructed with soil, coarse waste and residual materials from the mining operations with heightened risk of instability of dam foundation.
- The increasing volume of wastewater as the height of tailings dam increases, particularly as flooding leads to the dam slope becoming unstable.

- Lack of reasonable regulations on design standards.
- The cost of monitoring the tailings dams is very high during mine operations and closure.

Problems with the proposed TSF

Structural inadequacies of the site soil and TSF design

The mine site is composed of a range of soil types, with Dispersive Sodosol (Sodic) being prominent. Steep gullies, rolling hills and plateaus and water seepage pathways (gravel recharge) are all within the area.

The process of erosion and other related issues is a matter of mechanics and physics, and in much the same way as gravity, has its own effects.

It is well understood that "when a sodic soil comes into contact with a non-saline water, water molecules are drawn in-between the clay platelets causing the clay to swell to such an extent that individual clay platelets are separated from the aggregate, this process is known as dispersion … tunnel erosion results from both chemical and physical processes" and is compounded by factors such as intense rainfall events, loss of topsoil through excavation and mechanical scouring, to name a few.

(Dispersive soils and their management, Technical Reference Manual Dept of Primary Industries and Water, Tasmania, pg.11)

Tunnel erosion

At a more local level, the Publication 'Tunnel Erosion in East Gippsland', by the Department of Primary Industries (2010) documents attempts at rehabilitation of a broad paddock area, which was not a steep gully. This is cited in the EES as a fine example of success in managing tunnel erosion. However, omitted is the high cost of the rehabilitation, the size of the project and description of the terrain. Further there is no mention of the vast quantities of Gypsum that was required, or that the experiment was unsuccessful.

"This report has established the soils are highly dispersive (15 tonnes of gypsum is needed to ameliorate the soil) and recommended rates (4 tonnes of gypsum per year) are unable to address this issue in one year. Therefore further investigations are needed to determine effective application rates and follow-up application of ameliorants after rehabilitation works are completed, would be beneficial and if so at what rates and at the same time ensuring they are cost effective in the long term for the landholders." (pg.7)

The TSF for this project is planned for an area known by locals for its propensity for erosion. However, without adequate and formal geotechnical drilling being undertaken at the TSF site, the proponent has no confirmed data around the structure of the soil on which to base plans for construction. This is a further flaw in the TSF proposal.

The hazards associated with attempting to excavate the type of soils in the area were clearly identified in GHD's report which, five years ago, recommended a test starter pit be established to determine the practicalities involved in mining the area and the suitability of materials within the project area for use in mining infrastructure (dams, roads and pits).

The GHD report (A004) struggled with lack of available data and field investigations. However, the report does acknowledge “dispersive soils are sensitive to water and highly erodible when exposed.” It is both surprising and disappointing that the proponent chose not to follow GHD’s advice regarding the test pit. Had that occurred, the community may have had some assurance of adequate testing given GHD’s integrity framework. (GHD , 2020)

Given the apparent forebodings GHD had about the proposal, the proponent’s determination not to do the most basic testing but instead to plough down the path of what may well be a completely impractical and uneconomic proposal is baffling.

The reality of erosion is outlined in A003 when Mining One discussed seepage. “Seepage of water from mine slopes, whether from perched water tables or infiltration of surface water, is expected to cause tunnel erosion which can lead to localised over-steepening and collapse. The fine silty sands of the ore zone are likely to be highly susceptible to tunnel erosion, as well as surface erosion from surface water run-off due to rainfall and water flowing over slopes.” It is of concern that the structural instability that will come from such erosive soils is not adequately considered in the design and location of the TSF.

Inability to ‘dry’ tailings

There is no real indication that any of the plans for filling voids with fine tailings are achievable. There is also no indication that the proponent will be permitted to allow seepage to the groundwater. The limited analyses show the tailings are far from benign. In fact, the geochemistry and mineralogical report indicates that the thorium levels are higher in the tailings than they are in the ore. It would be prudent to require far more extensive testing before accepting any assurance that the leachate is non-threatening to groundwater and groundwater dependent ecosystems.

The proponent intends to use flocculants, which are non-organic and highly toxic and pose a risk to the environment. A study by Simin Khatibi, Missouri University of Science and Technology, in 2016 notes the challenges with TSF management, dewatering and use of Flocculants. Obtaining an almost dry substance from tailings is impossible. Issues around pH changes with the use of Flocculants was also raised. This presents complications when seeking to reinstate tailings into mine voids. When the chemical composition and heavy metal concentration of tailings is considered leaching to the water table compounds these problems. (Khatibi, 2016)

Despite the considerable amount of energy required for this process, the end result could still be a non-dry substance. If this is placed in a mine void, and topped with dry soils, it would still render the land unusable and with a high risk of subsidence or slippage.

There are no calculations or indications of how these tailings will continue to dry out (if indeed they can) and provide adequate land stability to prevent subsidence. And then there’s the issue of the arsenic and other heavy metals bound in the tailings. (Victorian Government, n.d.)

Should the tailings be stored in cells and then covered, the EES provides no details of means by which seepage and leak will be prevented, or the anticipated structural integrity of the cell in the centuries to follow. Nor does it provide any information about the logistics around moving the tailings, such as pump and power requirements and whether these are in fact practicable and affordable.

The EPA guidelines are clear with respect to the likes of arsenic in tailings. The EPA needs to be satisfied that the ground water quality objectives are met and that there is no detriment to beneficial uses of groundwater, land or surface waters. (EPA, 2009)

Along with these uncertainties, there is the lack of credible costing data available.

TSF failures are too common an occurrence

TSF failure results in significant, profound and lasting impacts to the environment, community and mining industry. There have been many high-profile failures over recent years.

Mt Polley in Aug 2014 was British Columbia's worst environmental disaster. In 2015 a tailings dam in Brazil collapsed, contaminating 668km of river and reaching the Atlantic Ocean. There have been three so far in 2020 up until 25 Sept.

Given the common occurrence of TSF failure how can the proponent classify the risk as rare?

Whilst many were located in other countries, Australia had its own experience as recently as 2018 with the Cardia Gold Mine in Orange, NSW, fortunate to not experience greater damage and loss of tailings. Seismic activity had occurred in the days before. (Petley, 2018) It is well known that each disaster has its own constellation of causes with some arising from seemingly trivial errors.

One major problem is the "normalization of deviance." The phrase, coined after the 1986 explosion of the space shuttle Challenger, describes how engineers can be lulled into accepting a series of seemingly small risks that snowball into a catastrophe.

TSF failure must be modelled

The consequences of the TSF failing are recognized as potentially extreme; the proponent has estimated the likelihood as rare, despite the fact that the design appears to be unsuitable for the location, landform, soil types and hydrology. This assessment has enabled the proponent to avoid modelling the impacts of failure – an unconscionable situation given the potential seriousness and far reaching extent of such an event.

The community has the right to know to what it might be exposed in the event of a TSF failure.

It is unfortunate that the proponent does not appear to have heeded recent tailings dam failures like the 2014 Mount Polley disaster in British Columbia that shocked mining engineers around the world, the 2016 Brazilian dam collapse that killed 270 people, and even the 2018 Cadia dam failure in Australia.

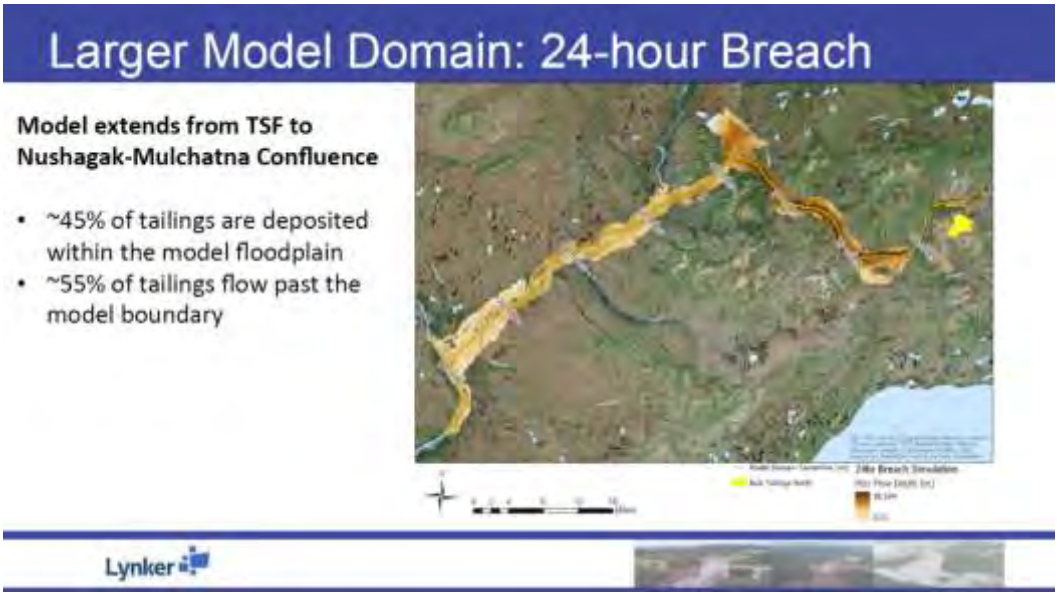

Figure 19: Hydrologic modelling of impacts of TSF failure (Wobus, Spies, Szafranski, Albert, & DePasquale, 2019)

What might cause failure

Relevant causes

The International Commission on Large Dams compiled a database of 221 tailings dam incidents (events potentially leading to failures) and failures (events in which dams stop retaining tailings as designed) that occurred from 1917 to 2000. A cursory glance indicates that a number of these mechanisms could apply to the Fingerboards TSF.

Failure mechanism	Number of tailings dam failures		
	Active dams	Inactive dams	Total
Overtopping	20	8	28
Slope instability	30	1	31
Earthquake	18	0	18
Foundation failure	11	1	12
Seepage in - Erosion	10	0	10
Structural failure	12	0	12
Erosion	3	0	3
Mine subsidence	3	0	3
Unknown	15	3	18
TOTALS	122	13	135

Figure 20: Causes of tailings dams' failures 1917 to 2000

Earthquake

With the limited life of the TSF listed in the EES as around 5 years, (even though other sections indicate that it will be permanent) what incentive is there for the proponent to adopt best practice which would enable a structure of great integrity which is capable of remaining intact for greater than this timeline?

The designs shown in the Geotechnical report indicate the intention to use the upstream method to construct and 'grow' the dam. Upstream tailings dams should not be constructed in areas higher than low seismic risks.

In the Geotechnical Report, section 3.3.1 App003, p38, Kalbar have rightly classified the area of East Gippsland as moderate seismicity. This is not reflected in the risk management report for the release of toxic tailings to the environment or public, rather the design is deemed appropriate if ground shaking occurred. A map from (GeoScience Australia) shows the related onshore fault lines to highlight this rating.

Figure 3-6 shows the project location in relation to Victoria's strongest recorded earthquakes. There has been insufficient geotechnical testing to see if the site chosen would support a tailings dam safely. Guesswork is not good enough. Avoiding discussing the risks does not make them go away.

Figure 3-6 Victoria's Strongest Earthquakes (Geoscience Australia)

Figure 21: Onshore fault lines

Water

Construction of upstream tailings dams should only occur in arid regions, with minimal amount of water requiring storage or **where rapid water accumulation is improbable. This is because of** the potential for large rain events to compromise dam wall integrity.

East coast lows are a common event in East Gippsland and will cause saturation. In addition, the Fingerboards area is known by locals who record daily precipitation to

invariably experience almost double the rainfall of areas only 3km north and south of the project area. The dismissal of the risk of saturation/liquefaction is therefore inexplicable.

Regardless of rain events, seepage will directly induce instability of the Tailings Dam and including internal erosion (a very real threat given the siting of the Fingerboards tailings dam). In fact, seepage has been shown to account for 20-30% of tailings dam accidents. (Zhang, et al., 2020)

With the TSF consisting of 4 cells, each still is around 22 ha (to give perspective, each is 176 Olympic swimming pools or around 11 x MCG ovals), it could be suggested that the failure of one cell presents reduced risk. However, in the absence of a design from a qualified and experienced geotechnical engineer, there is no indication as to how the TSF will remain intact should one cell fail. There is a real risk) of pressure changes against the walls leading to further collapse.

“Water plays a key role in the day to day responsibilities of a tailings operator and it is essential that a facility is designed to handle and control the required inflows and outflows as well as any unpredictable fluctuations (e.g. storms). Poor design of water management infrastructure and control methods can increase the risk of problematic situations occurring during the operating and closure stages (e.g. upstream inrushes, pipe bursts, low freeboard, seepage). During operation the plant will also demand a certain, and sometimes variable, flow of water that the surge capacity of the decant systems and reclaim/holding ponds have to cater for.” (Tailings.Info, 2020)

Governance

Governance is another concern and identified in reviews of failures.

“In many cases, it has been shown that the root causes of the failures have been a failure in governance, capital constraints, change management, independent reviews, construction supervision, operation, etc. The investigation of failures and reports to the public are almost exclusively focused on the technical cause with much less focus on what is often the underlying root cause. A number of international mining industry groups have recognised the lack of effective governance as being a major risk that could lead to TSF failures.

The Mining Association of Canada (MAC) and the International Council on Mining and Metals (ICMM) are two examples.” (Brown, 2019)

Given the absences of assurances from the proponent, what confidence can the community have that due diligence will be applied to this project and its infrastructure?

The absence of specific information in the EES remains problematic to informed decision making, and confidence that the proponent has addressed all Scoping Requirements.

When considering pivotal structures of complexity, there is no place for complacency

Structural instability

Problems associated with the inappropriateness of many of the project area materials for construction of dams has been discussed elsewhere in this and other sections of the community response. Concerns lie around the lack of adequate geochemical testing despite GHD's advice. The cost associated with importing necessary clay or buying recommended liners may tempt the proponent to take shortcuts or cheaper options in the interests of short term serviceability rather than longer term (and safer) stability of structures such as the TSF.

No room from complacency

Not only has the proponent failed to model for failure of the TSF, the EES gives no indication that it has planned a Tailings Management System (a visual assessment is not a system), and no indication that it has considered an emergency response plan should failure occur to ensure that lives are not lost and to minimize environmental harm. A laissez-faire approach is not acceptable with regard to this very serious issue

Notwithstanding Mining One's somewhat optimistic assessment about likelihood of a seismic event 'during the life of the project', the EES indicates that the TSF will be in place for many years beyond that.

What would the Fingerboards TSF failure affect?

The Project is located in the catchment of two river systems. The Perry River, managed by West Gippsland Catchment Management Authority feeds the Gippsland Lakes system.

The catchment is significant as it is one of only a few in Victoria with a chain of ponds formation across large sections of the waterway. In the Providence Ponds and Perry Catchment, the chain of ponds formation supports a diversity of plants and animals including the endangered Sandy Flood Scrub Ecological Vegetation Class.

Not only are the waterways remarkable in their own right, but the catchment is a hotspot for biodiversity including being an important area for Gippsland Red Gum Grassy Woodland and Seasonal Herbaceous Wetlands, it also has a direct impact on the Ramsar Listed Gippsland Lakes. (Dickson, 2017)

The Mitchell River also has its own unique features, and it too flows into the Gippsland Lakes system. The Mitchell River is very much recognised for its high conservation value, high level of naturalness of flows, relative intactness of the entire river system, and significance for the Gippsland Lakes. (Environment Victoria, 2020)

Both these river systems support a range of Agriculture, Horticulture, Tourism and other investments, which all rely on its flow. The landscape around the site, and along waterways, provides habitat and associated needs for a vast array of flora and fauna.

The Rivers also provide drinking water for the populations on Gippsland who have come to rely on the steady flow to ensure their water needs are met.

The collapse of the TSF has the consequence of releasing several thousand tonnes of mine product into the catchments. This would include tailings (containing toxic heavy metals) and mine water, which would then impact the Gippsland Lakes system. After that it would enter the Bass Strait and the ecosystem there.

Figure 22: World renowned silt jetties are part of the Gippsland Lands system

The economic and ecological impacts would be astronomical.

Where in the Risk Register is there recognition of this and how can the proponent state the risk of TSF is 'low' when there has been no modelling?

Why hasn't the proposed site been fully assessed from a geotechnical perspective?

Two of the values at risk of seepage of toxic contaminants from the TSF.

Below is one of the Chain of Ponds along the Perry system and to the right is the Mitchell River.

Figure 23: Mitchell River

Figure 24: Tailings in river network at Riskobe. The Samarco TSF contents travelled 637 km as there was river in recent times involvement

TSF failures in recent times have illustrated clearly that writing a statement on paper doesn't translate to actual logistical reality without due diligence, assertive and proactive risk management and a high-level understanding of all the issues.

Figure 25: Vale Company TSF failure 2019

Can the proponent fund a 'fit for purpose' 'fit for lifetime' TSF

From a financial perspective, there remain many unanswered questions and areas which the EES has not addressed.

When examining the TSF requirements, the proponent has indicated the intent to derive material for construction of dams from the Haunted Hills formation.

However, in 2015 the GHD Starter Pit Report (A004) introduces considerable uncertainty that there will be adequate quantities, and indeed quality of, materials required for dam In addition, the proponent appears to have given little attention to the challenges GHD identified as baseline with consideration for the site. In essence, the local soils and clays just aren't up to task for building structures such as the TSF.

These included identifying (pg.14) the "Construction with dispersive soils may present probable challenges … Coongulmerang Formation .. whose silty nature makes it particularly vulnerable to loss of strength on saturation … no testing has been carried out on the Quaternary sediments, based on local experience it is possible that these materials may also be dispersive ..Dispersive soils are sensitive to water and highly erodible when exposed… (Haunted Hills is) unlikely that this material will be suitable for the construction of dam liners…" (pg.15)"

This would require this clay being sourced off-site, and subsequently transported to the project area. And this would involve considerable additional expense.

Further to this, the proponent has nominated that a specialist company will be utilized to provide the design and construction of dams which are required to meet ANCOLD criteria. But there is no information around this, just a 'throwaway line' indicating that it is a consideration for the future. Given this project has been in planning for 6 years or more, one would think it reasonable that this level of expertise would already have been sourced.

The EES fails to articulate the proponent's overview around the design of the dams or the cost of construction. The reader is left with diagrammatic representations which, in the context of these issues at hand, including risk, fall well short of what is expected or required for a document as important as the EES.

What is remarkable is that such a significant mining proposal has advanced to the stage of the EES process without a more thorough understanding of one of the most significant engineered structures of the project.

Extreme risk of failure of the mine necessitates significant bond

The recent VAGO report exposing the problems arising from inadequate rehabilitation provision in Victorian mines is timely. The community has the right to expect that proper consideration be given to the full costs of rehabilitation of the Fingerboards mine.

The history of mining in Victoria shows the all too common event of project returns being far less than expected and mines being abandoned or put into indefinite care and maintenance. This is not fair on the 'host' community or region and is certainly not fair on the people of Victoria.

In terms of the EES risk assessment methods used by Kalbar, given the history across the state and the complex problems that must be solved for the mine to become profitable, the likelihood of project failure and the combined consequences (environmental, economic and reputational – for the government) are major. The risk is therefore 'extreme' and it behoves the decision makers to agree to a bond that reflects the seriousness of that risk. It is also necessary to apply a sunset clause to preempt the miner being able to on-sell the mine at a low price to avoid rehabilitation.

Rehabilitation bond must cover post-mine maintenance of TSF

Who will meet the maintenance or rehabilitation costs if the project fails to meet the financial goals of the company? What provisions have been made if placed into indefinite care and maintenance, or in fact, if it is abandoned, as has been a far too frequent occurrence in Victoria?

This situation was seen at the original Benambra mine which saw the State spending around $7million to stabilize the abandoned tailings dam due to failure to set an adequate rehabilitation bond to guard against such an event. It was far cheaper for Denehurst, the original miner, to forfeit the $375,000 bond than it was to rehabilitate the mine.

The taxpayer has recently spent hundreds of thousands more dollars on continued maintenance works on the site prior to another miner taking over the mine. (Earth Resources Victoria, 2020)

From the VAGO report and experiences across the State the risks of insufficient funds required to cover rehabilitation is almost certain and the consequences for East Gippsland are extreme.

Peer review and reports

Peer Review forms an essential component of presenting reports as credible and providing high level information to the EES.

Attachment I, the review by AECOM, identified a range of omissions which rendered the report inadequate for purpose at that time. It concludes (5.0) of the report : "it is not sufficient to support the impact assessment under the Environment Effects Act 1978 and Projects Scoping Requirements' and with relevance to the TSF "absence of design for key water engineering structures, which results in an incomplete understanding of construction, operation and closure risks"

This was responded to by the Proponent (2.1) within the framework of "to the extent practicable" and seems to use this as apparent justification as to why more detail isn't included.

Surely a project that has been proposed for as long as this one has would provide ample time for the proponent to firm up the details?

AECOM continue (pg.15) with the critical report stating "It has been concluded. that any significant increase to periods of inundation (from mounding) is likely to impact on ecosystem health and potentially water quality, however no apparent assessment on the implications of this aspect is included in the risk assessment and proposed management and mitigation measures".

The proponent review (2.4) is seemingly dismissive of the concerns raised around seepage and mounding impacting on structures, including the TSF. Whilst acknowledging issues with mounding and seepage, revised conceptualized modelling seems to magically minimize the risk. "…but the modelling does not indicate increased risk of impact to environmental receptors from groundwater mounding alone (EMM2019)"

The Peer Review with Attachment K is the one most relevant to Landform, Geology and Rehabilitation. A thorough document, within the constraints of the review criteria, the reviewer identifies gaps and deficits in the formulation of risks and Stakeholder engagement.

There is clear indication in the review of the need to monitor water seepage from the site, with the response from Coffey (Nov 2019 letter, 8.3) that "Until relinquished, Kalbar will be responsible for achieving and maintaining closure criteria including water quality".

'*Until relinquished' provides an opening for interpretation and no parameters, which is an ongoing theme within the Peer Review. What "closure" criteria?*

Inadequate consultation about the TSF

The proponent claims that the TSF and various risks and impacts have been raised throughout the 'Consultation process'.

At the proponent-led Community Consultation forums, including the Webinar on 25 July 2020, questions around the TSF and soil integrity were not answered, despite being submitted and time being available. This does not align with the principles of the proponent, as outlined on their website. "We strive to be timely and transparent in the provision of information to the community. From the inception of the project exploration to the present day, we have consistently engaged with all stakeholders openly and honestly." (Kalbar Operations Pty Ltd, 2020)

Inconsistencies within individual reports and between the multiple reports have been a hallmark of the EES documentation. In the context of the engineering requirements of the TSF, and catastrophic consequences in the event of failure (at any time), this is very substandard. It is also unacceptable for the purposes of making informed decisions pertaining to the proposed project.

The proponent states Appendix E of the Work Plan (Surface and Groundwater) that the "work plan, including a full discussion of TSF dam failure assessment, will be submitted separately to the EES". There is no discussion of TSF failure in the documentation – beyond the proponent's contention that the risk is low. This makes a fulsome risk assessment impossible.

It also fails to honour the 'commitment' to 'timely and transparent information' and clearly fails to reflect the breadth of the Scoping Requirements which state "key elements, associated requirements for new infrastructure" are to be identified and explored. Why is this important aspect being left from the EES? Why hasn't TSF failures been modelled?

The community is being asked to comment on the project without the information necessary to ensure those comments are based on full knowledge of the risks. How is withholding such critical information from scrutiny in the public interest?

Conclusion

This project offers little in the way of comfort and assurances to the community particularly in respect to the TSF. Basic issues not adequately addressed in the EES include, but are not limited to:

- Absence of geotechnical drilling at proposed site to determine location of bedrock
- Known erosive actions of dispersive soils cited as being planned for use in construction
- Impact of disturbing topsoil being to exacerbate tunneling and other erosive actions, which are based on physics of soil structure and pH
- Absence of design in EES, with broad reference by proponent sourcing a suitably qualified geotechnical engineer in the future, when there's been 6+ years for this to occur.
- Peer review identifying significant risks and gaps in data which have not been

addressed in EES

- Location of project itself and then the TSF with high risk of impacting waterways due to mounding/seepage with or without TSF failure compounding that exponentially
- Absence of costings for the TSF and associated works which aligns with the absence of a business plan put forward in the EEE.
- Cursory information around early closure of project with no evidence for risk mitigation in a 'walk away' scenario
- Issues with landform stability in the long term
- Climate change and the impact of that on TSF integrity not part of the EES and risk assessment
- Regard for migratory birds not considered
- Cataclysmic effects in the event of TSF failure on the economy and environment.

The EES is unsuccessful in addressing the Scoping Requirements of the Ministers directive

> *"For any engineer to judge a dam stable for the long-term simply because it has been apparently stable for a long period of time is, without any other substantiation, a potentially catastrophic error in judgment"*
>
> (Szymanski and Davies(2004): "Tailings Dams - Design Criteria and Safety Evaluations at Closure" - BC Reclamation symposium)

Chapter 5: HUMAN HEALTH

HUMAN HEALTH IMPACTS OF THE PROPOSED FINGERBOARDS MINERAL SANDS MINE

Contents

Executive Summary

The health report is limited to the impacts of selected substances to 'assumed' receptor populations and does not address the EES objectives in full. It restricts itself to the effects or airborne contamination on some populations and ignores many other impacts of the mine.

Since negative impacts on human health are such an adverse effect of the mine, people should be able to rely on the report. The report is prefaced with a full page of disclaimers and a warning that without knowing the scope it cannot be relied on.

By avoiding discussing the adverse health effects on workers in the project area, the effects of farmers who have been told they will be expected to 'co-exist' or 'co-manage' with Kalbar have been ignored.

Many impacts of the mine have been avoided in the health report and omitted completely or relegated to the socioeconomic report instead. For example, no consideration is given to the effects of construction activities, the mental health impacts of the mine through such things as loss of place and amenity, or the effects of noise on the well-being of receptors.

Unjustifiably low ratings are given to hazards and unworkable mitigations. Further, no consideration has been given to the indirect or cumulative effects of the hazards on health.

Much of the underlying information, for example noise monitoring and meteorological data to 'inform' risks of contamination, is faulty and results in significant underestimates of risk to all receptors. Models used to inform reports were incorrect or outdated (e.g. long-term water averages) and baseline information was selected allow the proponent to avoid responsibility for impacts caused by the mine (e.g. Traralgon ambient air quality and questionable water samples).

The consultants' reports relied heavily on unchallenged information from Kalbar in relation to such things as potential contaminants in dust. That information itself was based on very limited analyses from carefully selected sites. The decision not to complete NEPM Tier 2 and 3 assessments is therefore based on faulty input data.

Irrelevant case studies – where overburden depths are far lower than the Fingerboards - have been selected to try to give the impression that such things as air quality won't be problematic. The effects of noise on amenity, health and ability to conduct a farm business have been ignored. The decision to avoid further analysis of the potential for respirable crystalline silica cannot be justified in light of the available information about the overburden (including upper sands) and the limited analyses that have been done. Similarly the potential for direct or indirect polluting or contaminating effects of heavy metals and radionuclides

The risk assessments tables do not capture all risks and do not give appropriate assessments of impacts on receptors. Mitigations proposed are inadequate, unworkable and not timely. Monitoring itself does nothing to reduce the effect of the impacts on 'receiving' populations.

In short the impacts on health flagged in the scoping requirements have not been met in the Human Health report.

What is Health

"A state of complete physical, mental and social well-being, and not merely the absence of disease." (Marshall Day Acoustics)

Duty of care

The Minister's requirement that the EES include assessment of the "likely effects to the social cohesion, health and well-being of the communities in the vicinity of the project" has not been adequately addressed in the Human Health Risk Assessment report. (DEWLP, 2018)

Coffey Services International (Coffey) prepared the report as 'a baseline health risk assessment …exclusively and for the benefit and reliance of' Kalbar on the basis of Kalbar's instructions. Coffey state that the report cannot be relied on by third parties without them having a 'clear understanding of the terms of engagement'. (Coffey Services International, 2020). Unfortunately, the terms of engagement have not been divulged. Rather than addressing all the aspects of health that might be expected Coffey state that the risk assessment has been "limited to addressing the impacts of selected substances to a specific assumed receptor population."

The report ignores the many aspects of the mine that will impact negatively on people's health and wellbeing. It defines the "receptor population" as confined to an arbitrary radius of 5 km from the boundary of the proposed mine. It ignores the impact on the resident farmers and landholders who the proponent claims will be expected to 'co-exist' and co-manage the land within the project area. By its own definition of population at risk, it also completely ignores the impact on populations outside the 5 km radius, despite the evidence clearly indicating that they will be affected by airborne contamination throughout the year, the impact of the airborne particulates and radioactive material carried by high winds, truck noise, availability of water resources in the Bairnsdale region, and the potential for contamination of water catchment for the Gippsland Lakes

The 'receptor population' actually excludes the people at most risk from impacts of the mine – the farmers who Kalbar insist will be able to 'co-manage' and 'co-exist'

within the project areas while the mining is occurring. Coffey claim what happens with their workers' health outcomes is a matter for the company – however given they are saying farmers are expected to continue with 'business as usual' beside the miners, the health risks attributed to the project area MUST be taken into account for those within the mine boundary and nearby the mine, and every possible means adopted to eliminate those risks.

EES scoping requirements – Human Health and Wellbeing (DEWLP, 2018)

"The purpose of the EES is to provide a *sufficiently detailed description of the proposed project*, *assess its potential effects on the environment* and assess alternative project layouts, designs and *approaches to avoid and mitigate effects*."

"While the scoping requirements are intended to cover all significant matters the EES will need to address any others that emerge during the EES investigations, as well as address other issues relevant to key statutory decisions such as the mining approvals under the *Mineral Resources (Sustainable Development) Act 1990*."

Coffey claim the following 'draft evaluation objective' guided their response to the Human Health Risk Assessment of the proposed mine:

Amenity and environmental quality – To protect the health and wellbeing of residents and local communities, and minimise effects on air quality, noise and the social amenity of the area, having regard to relevant limits, targets or standards.

The final scope required them also to assess potential risks from radiation on human health.

Other aspects of the proposal that impact on human health are surface water and groundwater, and aspects that will affect the economic, spiritual and mental wellbeing of residents and the broader community, including such things as loss of loved landscapes, loss of aboriginal cultural heritage values, loss of community and loss of personal and property rights.

The Minister's requirements included a number of effects of the project that could impact on human health such as;

- effects on surface water and groundwater hydrology, quality, availability for other uses and the aquatic ecology of water environments; (this is taken to include effects on stock and domestic water availability and quality);
- effects on the land uses and landscape values of the site and surrounding areas, including the implications with respect to the Mitchell River National Park; (this is taken to include effects on wellbeing of detrimental and challenging changes to a familiar and valued landscape, and changes to capacity to effectively use local roads and infrastructure and to maintain community connections and cohesiveness);
- effects on land stability, erosion and soil productivity associated with the construction and operation of the project, including rehabilitation works (this is taken to include the effects on capacity to enjoy the continued amenity and productive capacity of the land given the changes affected by such things as installation of dams that prevent continuation of current usage);

- potential effects of project construction and operation on air quality and noise on nearby sensitive receptors (especially residents); (Given the effects open cut mines have on air quality post closure (e.g. WRK Iluka) this is taken to extend to effects during construction, operation and closure / rehabilitation / monitoring phases);
- both positive and adverse socio-economic effects, at local and regional scales potentially generated by the project, including indirect effects of the project construction workforce on the capacity of local community infrastructure.

Ministerial Guidelines for the EES (DSE, 2006)

According to the Ministerial Guidelines for the development of the EES the proponent should also describe in detail the 'no project' scenario as that provides the 'baseline for describing the potential environmental effects from a project …. and sets the current and anticipated conditions if the project did not proceed.

Relevant environmental effects for human communities include the social implications for affected communities as well as how changes to physical systems and ecological systems affect them. The Guidelines list a number of components of various systems that could impact on human health through physical, emotional or social well-being. These include;

- Physical; includes geological conditions, soil and geotechnical hazards, geomorphological processes, air quality, greenhouse gas emissions
- Ecological; includes ecosystem processes supporting biodiversity, ecological productivity and environmental quality
- Social effects; changes to social structure and networks, amenity and social well-being, social vulnerability, perceptions of aesthetic, recreational and other social values of the landscape or locality and attitudes to the proposed development.

Human Health Risk Assessment Report failings

Very low to Medium risk ratings not justified

It would appear that proponents have consistently rated risks to human health as moderate or below, as according to the Guidelines, they *only need to propose avoidance, mitigation and management measures if the risks to human health are 'high'*.

An EES needs to assess any physical hazards or statutory compliance issues related to human health that might arise from a project, such as noise or air emissions. Where there may be high levels of risk to health, the EES will need to propose risk avoidance, mitigation and management measures, including contingency responses, monitoring and reporting processes.

As risk assessment is to a degree a subjective process it is critical that the proponent's assessment of project effects on human health are properly scrutinised and evaluated and that attention be given to the cumulative effects rather than isolated exposures.

Cumulative and Indirect effects not assessed

The Guidelines do indicate that the Cumulative and Indirect effects of a project may need to be assessed if there is a risk of significant adverse effects. Cumulative effects include when the project in combination with existing activities in an area may have significant effects on the same environmental assets. Cumulative effects should also include whether a combination of aspects particular to the project would be expected to increase the likelihood and consequences of adverse health effects, e.g. effects of noise, dust, emissions and water contamination. The guidelines give the proponent an opportunity to provide a qualitative assessment if data or information isn't available.

The proponent is expected to include indirect effects that arise from inputs or as a consequence of the project if they are reasonably foreseeable and can be linked to the project and if they are significant enough to impinge on the acceptability of the project. They don't have to assess them if they can show the effects involve a low level of environmental risk or it is difficult to accurately predict potential effects through modelling. However, they must still include them if in combination with, or in addition to, other risks, they could foreseeably increase overall hazards and their consequences.

These clauses explain why the proponent has gone to great pains to try to show the effects of their project on the broader environment (including the rivers and lakes) as low, and the effects on the existing industries (including horticultural) as insignificant. It is only by assessing risk levels below 'high' that they can avoid the need for further mitigations or the conclusion that the project risks are too high to be tolerated.

No penalties for misleading information

The proponent has no legally enforceable obligation to tell the truth, and it appears no obligation to make good offsite impacts of their activities. Therefore, to protect those potentially impacted (including the environment and the local economy) a forensic assessment of the proponent's risk analysis is called for. To blindly accept the proponent's assessments puts the local community at risk.

Framework for Environmental Management does not address risks

A Framework for Environmental Management is to be included to show how environmental effects and risks will be managed. It is to include a summary of environmental management measures proposed in the EES to address specific issues, including key environmental commitments of the proponent to mitigate adverse effects and enhance environmental performance , how the effectiveness of those measures will be evaluated and reported on (including access to data) to ensure transparency and accountability.

No evidence justifying risk ratings

Along with the main report, the technical appendices must provide details of literature reviews; methodologies and results of field and laboratory investigations; methodologies and results of impact assessment studies (e.g. air quality modelling, user surveys), including estimates of the reliability of results; and description of sources of uncertainty. There should be cross-referencing between the main report and the supporting appendices. What is noticeably absent from the HHRA is any

indication of why the consequence levels were set as they are and how ratings were applied. Many other options for risk assessment inputs are available to project managers and it seems disingenuous to use National, State, Regional or Local scales randomly such that it could be construed as seeking to match the standards to the desired low or medium risk outcomes rather than to reflect the actual risk levels. In addition, it is asserted that there are discrepancies, anomalies and absences in the proponent's consequence categorisation that raise doubts as to its validity.

Self-monitoring is not mitigation

Adaptive environmental management uses monitoring results to guide management responses. Where adaptive management (responding to issues as they arise) is proposed as a method of managing key environmental effects or risks of a project, the EES will need to demonstrate the capability of the proponent to monitor environmental effects and respond within timeframes that will provide reasonable confidence of acceptable outcomes being achieved. Where a combination of 'static' or proactive and adaptive management techniques is proposed, their respective roles should be clearly explained.

Additional to these requirements it is reasonable to assume that information that indicates an actual health or amenity problem should be current and enable proactive or responsive action to be undertaken in an efficient and timely manner such that negative outcomes are avoided or minimised.

Traditional approaches both within Victoria and across Australia have left many communities feeling that the expectation of regulatory protections of human and environmental health is not matched by responsive and effective actions. Independent properly resourced and supported scrutiny is needed to ensure community health and wellbeing is protected.

Does not meet Ministerial Guidelines

The Guidelines state that the matters in the scoping requirements and any other relevant issues should be 'sufficiently investigated and clearly documented to enable informed responses by the public and by agencies'. Inspection of the 10,000-page EES document shows that this has not been the case and the limited time available to read and respond to it have undermined the public's ability to respond as effectively as desired – particularly as there are so many very important statements embedded within this massive document.

The Guidelines also state that 'Written submissions in response to an EES should document comprehensively all the views and information the submitter considers relevant to the assessment of a proposal'. It is difficult to do this justice given the burden imposed on the community and in particular the restrictions on meeting to share concerns during the pandemic.

Relevant legislation and regulations

The MRSD Act and Regulations, along with a host of other Federal, State and Local laws, policies, strategies and guidelines include clauses depicting purposes and objectives that clearly indicate an overarching purpose to protect human health and

ensure future generations are not disadvantaged by the short or long term impacts of the project. Table 1 below identifies just some of these.

Table 1: Legislation and regulations pertinent to Human Health:

LEGISLATION, REGULATION, STRATEGY, GUIDELINES, ETC.	**PURPOSE** **VISION**	**GOAL** **OUTCOME**
Mineral Resources and Sustainable Development Act 1990	The purpose of this Act is to encourage mineral exploration and economically viable mining and extractive industries which make the best use of, and extract the value from, resources in a way that is compatible with the economic, social and environmental objectives of the State.	(2) For the purposes of this Act, the principles of sustainable development are— (a) community wellbeing and welfare should be enhanced by following a path of economic development that safeguards the welfare of future generations; (b) there should be equity within and between generations; (c) biological diversity should be protected and ecological integrity maintained; (f) both long and short term economic, environmental, social and equity considerations should be effectively integrated into decision-making;
National Environment Protection Council (Victoria) Act 1995	Establishes NEPC and aims to ensure people are equally protected from air, water soil and noise pollution, no matter where they live in Australia.	
Environment Protection Act (2017) Amendment	Provides legal framework to protect the	Establishes standards for noise emissions and the

2020	environment of Victoria to achieve sustainable use and holistic environmental management	air, water and land in Victoria, the territorial sea along the Victorian coast to Victorian Rivers from oil and noxious substances Criminally enforceable, general environmental duty to understand all the risks to humans and the environment that your actions pose and to take reasonably practicable steps to eliminate or minimize them
Radiation Act 2005 Vic with Radiation regulation 2017	To protect the health and safety of all persons and the environment from the harmful effects of radiation	Protect people through processes of justification, limitation and optimization Interpretation should promote the Radiation Protection Principle
Water Act 1989 Vic	To ensure equitable, sustainable access to water resources whilst recognising and valuing the needs of the community (including Aboriginal People) and environment	8) This section does not authorise any act or omission that may— (a) cause any water to be polluted; or (b) obstruct the flow of any water in a waterway; or (c) erode or otherwise damage the surrounds of any waterway.
Commissioner for Environmental Sustainability Act 2003 *State of the Environment Report 2018*	change reporting on the state of the environment and embed it in government decision making processes. Over time, this approach will equip Victoria to account for the economic	encouraging decision making that facilitates ecologically sustainable development, Recognises the fundamental relationship between healthy ecosystems and human

	benefits of a healthy ecology based on an internationally accepted framework, SEEA	health
Victorian Public Health and Wellbeing Plan 2019 – 2023	: *Aims for Victoria to be free of the avoidable burden of disease and injury so that all Victorians can enjoy the highest attainable standards of health, wellbeing and participation at every age.*	Sets priorities which include Tackling climate change and its impacts on health Reducing injury in the community
Public Health and Wellbeing Act 2008	To produce the highest standard of public health by preventing disease, illness, injury, disability or premature death, promoting conditions for health, reducing inequalities in health	Local councils are required to protect, improve and promote public health and wellbeing within their municipality and prepare a municipal public health and wellbeing plan (MPHWP) every four years.
Occupational Health & Safety Act 2004 (Victoria)	To protect the health safety and welfare of employees and other people at work and ensure public is not put at risk through work activities	Sets key principles, duties and rights under the Act
Occupational Health & Safety Regulations 2017 (Victoria)	Updates guidelines and introduces new factors to be managed	Introduces new guidelines for management of hazards in mines - including, noise and carcinogens
East Gippsland Shire Plan 2017 – 2021 (revised 2019)	Our plan is to enrich East Gippsland's lifestyle appeal and boost growth by becoming Australia's most liveable regional area. We envision a dynamic and thriving	• protect the community, making sure the environment is safe and clean; • prevent things that cause harm to the community such as

	economy, a region that is a responsible steward of its environment and a region that is resilient. .	disease, noise and pollution; • plan for the future of the community; • represent the needs and desires of local communities to the wider community, other levels of government and other organisations;

What would be expected in the Human Health report

As human health is multi-faceted and complex, it is reasonable to expect the report to contain information about all aspects of health that the proposed mine might affect. It is important that the cumulative effects of risks to health be considered rather than isolate the individual hazards, such that the risks are not fully evaluated.

It is also reasonable to expect that the Human Health report prepared by the proponent or their consultant can be relied upon, and that it meets best practice guidelines for health risks – including those established by the NEPM.

However Coffey – the consultant – has prefaced the report with a full page of disclaimers and a statement that no third party can rely on it. Further, that without knowledge of the terms of engagement and the assumptions made by Coffey and the consultants they engaged to complete the report, it cannot be relied on.

Problems with the HHRA

Does not meet human health risk assessment guidelines

The assessment does not attempt to achieve guidelines set under the NEPM for assessing environmental risks to human health. The NEPM guidelines clearly state that worst case rather than averages should be used in making these judgements (enHEALTH, 2017)

They require consideration of the interaction of identified hazards and other agents in the environment rather than this assessment in isolation. This is a clear direction to consider cumulative impacts of all hazards associated with the mine.

The guidelines also state that stakeholder consultation should be built into the assessments. Stakeholder consultations in May 2019 consisted of Kalbar telling people they would have to wait for the EES to receive answers to many of their questions.

Particularly concerning is the persistent attempts to avoid going beyond the most basic Tier 1 screening that the guidelines require. Kalbar appears to pay such scant regard to the wellbeing of the people in this community and the environment that people as well as the flora and fauna rely on.

More attention should be paid to the hazards posed when a proposal can create such significant, enduring risks to the waterways and their capacity to provide ecosystem services.

The NEP guidelines state that the investigations and risk assessment should proceed until the level of information is appropriate for the decision making required. It is common for most risk assessments, regardless of which tier, to have a screening step and a detailed assessment step.

The precautionary principle has not been applied

"W*here there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.'* (enHEALTH, 2017)

The guidelines state that precautionary principle should be invoked when there is good reason to believe that harmful effects may occur to human, animal or plant health or to the environment.

Threats of serious and or irreversible damage are evident from this mine and should not have been downplayed or dismissed. An example is the Douglas mine where hundreds of acres of land have been quarantined from previous uses (e.g. livestock, cropping and residences) due to levels of contamination – including radiation, to see that the consequences are real, serious and enduring.

It seems that no onus has been placed on the proponent – via Coffey – to provide the information necessary for fully informed decision-making about this proposal to those most likely to be affected, and to those with the power to make the final decision and upon whom the ultimate duty of care will fall.

It is unacceptable to be able to avoid scrutiny by claiming risks are within Tier 1 criterion and therefore do not require further assessment.

The guidelines clearly state that the precautionary principle should be reviewed in light of availability of information and data that reduces the uncertainty. Nowhere does it give the proponent the right to avoid scrutiny of hazard.

Our environment, our community and our regional economy are at greatest risk from the hazards posed by this mine – we are both vulnerable and disadvantaged. As such, social equity demands a greater level of consideration of the risks we are facing, and far better mitigations to ensure those are minimised.

Unjustified decision not to complete Tier 2 and 3 assessments

Coffey explains that a Tier 1 assessment only requires 'available site-specific data' to develop a 'conceptual site model' and determine exposure pathways. They say the results of the Tier 1 assessment determine if a site-specific Tier 2 health risk evaluation and quantitative exposure model is needed.

It was not in the proponent's interests to find a Tier 2 assessment was needed.

Levels in excess of the HILs do not imply unacceptability or that a significant health risk is likely to be present. Similarly, levels under the HILs do not necessarily imply acceptability or that a health risk is not likely to be present if sensitive sub-populations are receptors or the assumptions for land-use scenarios are not appropriate. (NEPC, 2020)

Further the 'conceptual site model' derived from the use of HILs doesn't identify other potential sources of contaminants, which in this case include;

- The overburden and ore body associated with the mine and effects of processing and operations on surface and groundwater;
- Health risks (human and animal) associated with off-site migration of contaminants, e.g. to potable tank water or ground water;
- The effects on other land uses such as agricultural land;
- Risk to ecological receptors[2].

The HILs are supposed to account for the following exposure pathways and theoretically should cover such things as contamination of pasture and crops within 5km of the mine:

- Incidental ingestion of surface soil and dust
- Indoor and outdoor inhalation of dust
- Consumption of home-grown produce (including vegetables and fruit, but excluding poultry meat and eggs)
- Consumption of soil adhering to home-grown produce
- Dermal contact with surface soil and dust particulates
- Indoor and outdoor inhalation of vapours derived from soil.

The HIL levels reported by Coffey are based on soil samples. Soil samples are relevant to determining whether potentially contaminated land is suitable for residential or other uses. The use of these samples in the HHRA is problematic; the reports give no indication of the potentially toxic or otherwise harmful elements most likely to be transported in dust from a massive open cut mine, i.e. the overburden and ore. It should be about the effects of the mine-site on the health of the community, either directly or indirectly.

The guidelines state that "concentrations less than that of the HILs do not necessarily imply that a Tier 2 risk assessment stage is not warranted. HILs are not intended to indicate a clear demarcation between 'acceptable' and 'unacceptable' soil contaminant levels. The decision to proceed or not to proceed with additional data collection and risk assessment should always be considered with reference to the site-specific exposure pathways, the consequences of exposure, and the characteristics of the exposed population."

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[2] Schedule B7 to NEPM Guideline on Health-Based Investigation Levels p2

However, we need to go back even further than this to consider what Coffey was measuring in the HIL assessment. It was the topsoil, not the overburden and ore. Not including other sources of contamination results in an inadequate and misleading approach to determining human health risk.

Disclaimers abound

The Human Health Risk Assessment begins with a full page of disclaimers that detracts from any confidence that the information is reliable, truthful or applicable to the subject area.

It states that the report was:

- Prepared exclusively for Kalbar's benefit and reliance
- Limited to the scope set by Kalbar
- Unable to be relied on by third parties without knowledge of the scope of the contract.

Attempts to access the 'scope' from Kalbar or Coffey, or by appealing to the regulator, have ascertained no answers or information.

Coffey claims they are relying on their 'informants', giving them correct information and that they have made no independent verification of that information; therefore they take no responsibility for the damage experienced by the client or any other party because of conclusions drawn based on the information in it.

Furthermore, in their disclaimer they state that the risk assessment is 'generally consistent with the National Environmental Protection (Assessment of Site Contamination) Measure, amended in 2013, and the sources of information outlined in this report'. However, they do not elucidate which parts are consistent, which are not, and the basis for any decisions made either in relation to the topics studied or the risk assessments conducted thereon.

Coffey issued a disclaimer that they didn't check the validity of the information. This approach outlined elsewhere in the submission makes the EES as a whole lacking in credibility and certainly does not engender any confidence from the Community. The most fundamental reports are based on inadequate and flawed input data and information and often inappropriate modelling.

Assessment not based on evidence

The HHRA is said to be based on conditions encountered and information reviewed between Jan 2019 and Aug 2020 (but does not include any information relevant to the recent bushfires and pandemic). However, the report;

- Is not supported by any site inspections
- Is based on third party information
- Uses risk assessment methodology unsuitable for the purpose of a health risk assessment
- Has made no attempt to verify that the information been provided is accurate, complete and adequate
- Seeks to absolve Coffey of responsibility

- Puts the onus on the reader to advise Coffey of mistakes but the report wasn't made available to the community to review for error. (However when a previous version was presented at a community meeting, questions about the HHRA were greeted with 'you'll have to wait for the EES?)
- Does not incorporate the voice of the community. As the community has had no effective representation or voice in to the TRG, the community has had to rely on, but has been let down by, the TRG to protect the health and wellbeing of individuals and community members.
- Cannot be relied on by readers
- Withholds the information about the scope and instructions from Kalbar necessary to enable a proper assessment
- Makes assumptions about third parties without checking on the validity of those assumptions
- Can't be reproduced in part of whole without Coffey's permission so how is it to be quoted in the response?

Cannot be relied on by third parties

Critical to the report is the further disclaimer that it is 'not possible to make a proper assessment of (the) report without a clear understanding of the terms of engagement under which it was prepared, 'including the scope of the instructions and directions given to Coffey, and the assumptions by the relevant consultants who prepared the report'. Attempts to obtain that information from Coffey were unsuccessful. How is it that a report that the consultant themselves says cannot be relied on by third parties is permitted?

Furthermore, every other report that Coffey relied on to produce the HHRA contained disclaimers and limitations so casting doubt on the entire EES, and casts doubts on the competency of the proponent, the consultants used. Those disclaimers as they relate to the Human Health report are outlined in Appendix 1.

Does not meet DHHS guidelines for health risk assessments

Consideration of the Public Health Act

The Victorian Health Department says "*Environmental Health Risk Assessment should be undertaken when an activity or major project has the potential to affect people's heath and to inform risk management advice and actions."* They also state *"Guidelines for assessing human health risks from environmental hazards 2012*" are to be used in assessing human health risks. Human Health risk assessments are supposed to be based on the most sensitive (or vulnerable) people in the community to provide a 'worst case scenario' to inform the best decisions to manage human health risks.

Fails to meet obligations under EPA Amendment Act 2018 (Vic)

Amendments to the Environment Protection Act that introduced a new statutory objective to protect human health have been delayed, primarily because of COVID restrictions. The amendments introduce an environmental duty for all businesses to prevent pollution and reduce the risk of potential harm.

Had that Act been in play when the EES was produced the obligations on Kalbar may have been very different. The public could have had a far higher level of confidence that anticipated impacts of the mine would have been properly considered.

As it stands, it appears there has been no obligation placed on the proponent to even identify all those impacts let alone commit to reducing their effects.

Furthermore, any promises, conditions, commitments or guarantees made in the pre-approvals or approvals stage can be overturned by Earth Resources or the EPA by allowing a Variation to Workplan for which there is no opportunity for public input.

To ensure the community attracts the protections rightfully expected, no licencing or permitting decisions should be made until the amended Environment Protection Act comes into force.

Uses wrong baseline data

Baseline data has been selected in such a way that it allows the proponent to avoid accountability for any increases that might occur as a result of the mine. Such data collection relates to both the inadequate and inappropriate location of monitoring equipment, as well as unjustifiable selection of existing data.

Much of the modelling is inaccurate or incomplete, e.g. meteorological data. Two examples are noise monitors being placed where 'one-off' harvesting activities were occurring, and reliance on Traralgon data which is the second most polluted region in Victoria as a baseline for ambient air at Glenaladale.

In addition, the majority of studies reported by the proponent relied on unvalidated foundational data and information that was not checked for adequacy or accuracy by the consultants. The EES is a house of cards; it has built its justification for imposing the risks associated with the mine on data that is manifestly incorrect or inadequate and this is impracticable for making a valid risk assessement.

Cynical 'selection' of receptor populations

The studies focus on averages of population within 5km of the project boundary when assessing impacts on air contamination; and ignores those within the mine boundary who are expected to 'co-exist' with the miner by continuing to farm while the mine is proceeding. Impacts on those within the project area must be considered. Impacts on those along the transport route are also inadequate, incomplete and do not consider all effects on human health.

Perfunctory consultation on human health

Kalbar state that they consulted the community about human health concerns and provided feedback at a 'community information workshop' about the relevant technical studies on 15 May 2019. Questions were raised by the community about human health at a number of meetings and included such things as potential for dust contamination, effects of noise, increased risk of traffic accidents, increased risk of bushfires, concerns about radiation and heavy metals, concerns about water contamination on human, animal and environmental health and concerns about the effects of the multiple stresses associated with the project on mental health.

Coffey's responses were invariably dismissive and felt by many Community members present to be demeaning and devaluing. There was a refusal to discuss any matters in depth and the constant response was that 'it will be addressed in the EES'.

At those meetings the community's attempts to share relevant information and local knowledge were ignored. For example, when the consultants were made aware of the masking effects of the location selected for air quality monitoring their response was 'well we consulted with the EPA'.

The failure to appropriately develop base line information for prevailing winds throughout the year puts in jeopardy the ability of the community to claim harm from the mine's operations in the future.

For example, noise monitoring results provided in the report indicated that ambient noise at an extremely quiet rural location was higher than noise in the centre of Lindenow. We believe that the readings recorded in the EES were not in any way typical of this quiet rural community.

Similarly, it appears that the proponent is attempting to avoid complaints about noise in Lindenow South, through either the rail siding option or the 80 extra truck movements a day. This has occurred by including a maximum noise level consistent with the thrice daily train rather than reporting that as an anomaly to an otherwise relatively quiet town.

Given the extent of community concern and the number of issues raised at community meetings, the very limited focus on only a couple of areas in the Human Health Risk Assessment is asserted to be inadequate. Noise and mental health are just two other areas that will have significant, persistent and ongoing effects on the community.

Independent water and soil testing

As a result of the concerns around the use of misleading data, the community hired a specialist to conduct its own NATA accredited testing of water tanks, bores and dams with complete chain of custody. This was lodged with a firm of lawyers for future reference should, as has been evident from community experiences at mineral sands mines in other locations, the need arise.

The community is also undertaking its own NATA accredited soil and ore testing.

Claims about preparation of HHRA challenged

Table 2: Claims and counterclaims

Key issues raised	Kalbar response	Community concerns
Health, amenity and public safety		
Potential for wind-blown dust (including radioactive material) from the project to contaminate surface and groundwater, crops, horticulture, rainwater tanks and affect human health and amenity of residents.	As part of the EES, an air quality impact assessment was prepared to model dust deposition rates and assess potential impacts (Appendix A004). Modelling data was incorporated into technical studies, including those addressing radiation, horticulture, human health and surface water, to assess potential impacts to environmental values and human health. The air quality impact assessment was independently peer reviewed prior to being finalised and relevant comments were responded to in the revised report. In response to community and TRG concerns, a human health risk assessment was undertaken as part of the EES process. In May 2019, a community information session was held where the human health specialist (Coffey) presented the method and findings of the risk assessment. Community information sessions were held in April 2018, July 2018 and December 2019 to present the methods and findings from radiation (SGS) and air quality specialists (Katestone). During these sessions, community members were able to discuss	Many other studies relied on Air Quality modelling – if it was faulty everything fails Faulty equipment, unjustified input data, inadequate modelling Reliance on inadequate and insufficient geochemistry and mineralogy information due to limited sampling with no chain of custody, and ignorance of main contaminants in dust Grossly underestimated wind events Failure to assess risks to key populations, i.e. farmers expected to co-manage within the project area Peer reviewer scope was extremely limited but nonetheless found many inadequacies with the Air Quality report that were not properly addressed Presentation at community meeting began 1 hour and 50 minutes in to the meeting, lasting only 15 minutes; claimed all data was checked by the government (TRG;, that there are no pathways for the 'nasties' in mineral sands to get to the

Key issues raised	Kalbar response	Community concerns
	concerns with specialists and Kalbar staff. Project information sheets and presentations discussing dust, radiation and human health were published on the project website for public review.	community; that all the silica was 'weathered' so wouldn't be a problem; refused to answer question about mental health and said people would have to wait till the EES to find out more Information sessions on radiation were likewise unsuccessful Air Quality sessions unsuccessful, specialists would not or could not justify meteorological results Information sheets were glossies that have the effect of diminishing and undermining community concerns; information – especially about dust, is completely contrary to actual facts and local knowledge Air quality reports have not included effects of potentially toxic emissions from truck and machines at site. – they will be additional to Particulates, heavy metals, etc Inappropriate and irrelevant case studies about completely different mines, touted as best practice but those communities' experiences very different to what Kalbar is claiming

Concerns about noise emissions associated with the operation of the project and potential for amenity impacts.	A noise and vibration impact assessment was conducted by specialists as a part of the EES process to assess potential noise impacts and identify management measures to reduce potential impacts to sensitive receptors (Appendix A005). As part of the impact assessment, 11 sensitive receivers were identified within 1 km of the project area, including one within the project area. The EES proposes best practice mitigation measures to limit noise impacts and include using earth bunds to screen nearby residences from noise sources, avoid generating tonal disturbances (such as from reversing alarms) and scheduling the noisiest activities *wherever possible* during daytime hours to achieve quieter noise levels at night. Community information sessions were held in April 2018 and September 2018 to present the methods and findings of the assessment from the noise specialists (Marshall Day Acoustics) undertaking the noise studies. During these sessions, community members could raise concerns or issues with the specialists and Kalbar. All questions and answers recorded during the session were published on the project website for the community to review and comment on. An information sheet and presentation on project noise is available on the project website. The sheet provides answers to frequently asked questions	Monitors placed in locations and on selected dates make it appear that very quiet rural locations have background noise higher than townships. These inexplicably high results in several examples indicate they may have been timed to fit with such noisy farming operations such as harvesting of plantation Mitigations will not reduce the very disturbing and disruptive effects of tonal changes (e.g. haul trucks emerging from pits every 3-5 minutes) 24 hour noise interferes with ability to conduct farming activities, interferes with stock, animal handling (farm dogs have to be sensitive to noise to hear commands) There are more concerns about what the proponent didn't tell the community at those meetings than what they did 24-hour industrial noise is unacceptable in a quiet rural area Ignored relevant case studies that indicate how problematic noise from mineral sands mining will be to receptors' health and wellbeing and their ability to function effectively in their daily roles

	regarding potential noise impacts.	
Concerns that the project will increase the risk of bushfires in the local area.	Kalbar sought the advice of the Country Fire Authority in an on-site meeting in 2017 and was advised that the project would not affect the bushfire risk of the area and could potentially increase the width of the fire break. In response to community concerns, a bushfire risk assessment was prepared as part of the EES. The assessment was prepared by bushfire specialists (Eco Logical Australia) and the findings incorporated into the socioeconomic impact assessment (Appendix A013). Kalbar also contacted the Country Fire Authority in May 2019 to seek feedback during the development of the emergency response plan.	No consultation with the local fire brigades who rely on the Fingerboards as a meeting place and to fill up tanks when fire events occur (critical during Feb 2014 fires) The fire break comment is felt by the community as a cruel jibe at people who are dreading the moon-scaping of a loved landscape. It is hard to understand how Coffey could justify including it. Community has not been advised of the fire hazards on site. Kalbar cannot expect local brigades to risk their lives for fire on Kalbar site
Concerns were raised regarding the increased number of heavy vehicle movements associated with the operation of the project.	Kalbar has investigated alternate transport and traffic routes, including a dedicated project rail siding to reduce the number of, or eliminate, truck movements through local communities. The dedicated project rail siding is the preferred option for the project. All proposed and alternate traffic and transport routes were assessed as part of the traffic and transport impact assessment carried out as part of the EES process (Appendix A007). Community information sessions were held in April 2018 and September 2018 to present the findings of the traffic and transport technical studies to local communities.	Traffic and transport assessments were inadequate, uncosted and did nothing to give confidence in the process Unexpected announcements (without consultation with the landholders involved) about taking over people's farms, cutting them in half to divert roads, removing roads completely from public use add to stress and mental angst. Proposals especially along the Dargo road are dangerous and very likely to increase number of vehicle accidents Bairnsdale and Lindenow South communities are not

	In November 2018, Kalbar held project briefings with representatives from VicRoads and East Gippsland Shire Council to discuss findings from the traffic and transport impact assessment and proposed upgrades to haulage routes. In December 2018, a workshop was held with representatives from East Gippsland & Wellington Shire councils to seek input and advice on potential traffic & transport impacts within each shire.	even aware of alternatives being proposed and the increased risks to road userslocal and holiday. There will be deaths 150 extra cars & 80 trucks pose exponential increase in road damage and risk of accidents and deaths. Effects on health of emissions from so many extra vehicles have not been considered
Economic impacts		
Concerns were raised regarding the impact on property values adjacent to the project.	Potential impacts on property values were assessed as part of the socioeconomic and economic impact assessments (Appendix A013). Meetings between Kalbar and directly affected landowners, and landholders adjacent to the project area were held regularly throughout the EES process. In July and September 2018, an offer for a project briefing was extended to all 30 landowners within 2 km of the project area boundary. Meetings were held with 20 landowners at which various project-related concerns were discussed, including concerns about impacts on adjacent property values.	An economic impact on residents from uninvited miners is a major source of stress; due to the disruption of normal life but also because of the negative economic impacts. Value of neighbouring property prices has decreased but rates have gone up because Kalbar paid many times the value of the property it wanted on site. Reduced equity for mortgage and overdraft purposes as banks have devalued properties. Regular meetings were not held with adjoining (or even 'co-existing') landholders and many only found out about such things as road diversions, blocking dams, etc through other people or at public meetings when they were presented as a fait accompli

Studies 'informing' the Human Health Report

Water

Ground and surface water are dealt with in other parts of this submission however a number of points in the HHRA require particular comment due to the long-term implications for human health.

The community challenges the integrity of the development of baseline indicators, and suggests that these have been inflated or selectively chosen to give as much future leeway as possible should the mine result in a deterioration of environmental values. The results that Kalbar put forward are quite different to those revealed in the community's NATA accredited testing. This raises questions about the locations chosen by the proponent and the methodologies for collecting storing and transporting samples.

"The Groundwater and Surface Water Impact Assessment report (Coffey, 2020b) noted groundwater within the Coongulmerang Formation of the project area is characterised by concentrations of dissolved metals (i.e., arsenic, nickel, cadmium, copper and zinc) that are higher than commonly encountered in similar (but un-mineralised) formations. This result is not unexpected given the presence and composition of heavy minerals in the area, and the slightly acidic nature of the groundwater."

This statement is in direct contradiction to the results of independently conducted water testing commissioned by Mine-Free Glenaladale which indicated no elevations of heavy metals in groundwater fed dams in the project area or where the aquifer seeps out to the Mitchell River. (Mine-Free Glenaladale, 2018)

Radiation

It would surprise many that sites used for baseline radiation levels include Bairnsdale, 25 kms from the mine, and near a wombat hole in the Perry Gully. These locations do not reflect where local people (i.e. within 5km of the mine) live and work.

Inclusion of those locations significantly increased the average baseline radiation levels. Notwithstanding, because the highest were just within the maximum levels that would trigger further investigation, the consultant avoided continuing to a Tier 2 health risk assessment even though that might reasonably be expected given the nature of mineral sands mining. In fact, in the case of the Fingerboards mine, levels of thorium that have been noted as quite high compared to other such mines. (Kalbar Resources, 2015)

The conclusions drawn in relation to the many risks from this mine are difficult to reconcile with known facts. How can they claim that because there are no exceedances of Tier 1 screening criteria for drinking water and recreational use in baseline data (i.e. pre-mine conditions), the release of mine contact water won't increase potential contaminants (sediment, nutrients or heavy metals) above background levels, yet on the other hand the report mentions chemical contaminants and an increased sediment load caused by leached metals and radionuclides impacting on the quality of surface water. The report's contention is not consistent.

Air Quality

The proponent has relied heavily on an onsite monitoring station set in a location that is not fully exposed to the prevailing winds and which, much to the surprise of locals with decades of farming experience in that area, recorded all speeds below 20kph – the level required to raise dust. It was also reported that the equipment itself failed more than 22% of the time. The meteorological data used by the consultants to estimate deposition significantly under estimated windspeeds in the area (Appendix 10) and therefore significantly under estimated the effects of mining activities on all receptors – including the horticultural industry, the Mitchell River and the Woodglen Water Storage.

They found that dust deposition at sensitive receptors (houses) in the vicinity of the proposed mine was within acceptable limits but the report has used questionable data from the air quality reporting to claim that only 6.1kg of mine dust will land on roofs each year. They then put the onus on those impacted residents to manage the problem themselves.

Of particular concern is that the air quality consultant assumed that all mitigations would be in place to minimise off site impacts. This is a flawed assumption as Kalbar's modelling for water needs has not taken into account the amounts needed for many of those stated mitigations – including keeping pits and overburden damp and having enough water trucks to keep haul roads damp. (See MFG Water report). It is highly likely that there will not be sufficient water available to achieve off site control of airborne contaminants, and certainly on days of extreme hot winds from the west.

The conclusion that dust raised from the mine will be within acceptable limits relies totally on the success of mitigation measures described in Table 13 of their report (Appendix A009). However, as stated the water requirements to achieve those measures have not been allowed for in the conceptual water strategy and it is highly unlikely that they will be obtainable. If the miner was to obtain the additional water needed it would be at the expense of existing users – including irrigators and/or the 29,000 plus residents who rely on the Woodglen storage, and/or environmental flows.

It is highly probable that the dust raised through the mining will contain a number of carcinogens, including vanadium, zirconium and titanium, as well as significant quantities of respirable crystalline silica.

The Air Quality reports ignore references to the Environment Protection Amendment Act 2018 that creates a criminally enforceable general environment duty requiring businesses conducting activities that pose a risk to human health and the environment to understand those risks and take reasonably practicable steps to eliminate or minimize them. Unfortunately, if Kalbar obtains approvals before the Act comes into operation it could mean they are not required to meet those legislated health risk controls.

The air quality modelling did not account for the topography of the area. The site rises 130m and is directly upwind of the Lindenow Flats' vegetable growing industry.

There is no justification for the statement that dust deposition rates are expected to be lower than those in Table 3. (page 16). The mine will not only affect the future of a large sustainable industry which is critical to the East Gippsland region and on which other large and important industries are based, it will also affect more than 1,000 people who work on those flats during the main growing seasons, and the many people who live in the valley.

The mine required a Level 1 assessment with real time continuous 24-hour PM_{10} and $PM_{2.5}$ data for a 12-month period, analysis of crystalline silica ($PM_{2.5}$ fraction and heavy metal content (PM10 fraction) (where applicable). The PEM also required that meteorological data be collected or developed for modelling purposes from the same location prior to Air Quality Assessment commencing.

The conclusion that radiation and respirable crystalline silica are low risk and don't need monitoring does not meet standards that require industry to monitor these elements even if low level. In addition, the conclusion that the risks are low level is based purely on the assumption that dust levels can be contained to those low levels. This is not the experience of other mineral sand mines, and therefore is potentially negligent and likely to be able to be found so if the mine goes ahead

The Douglas Mine was approved almost 20 years ago, but even then required the following pollutants to be monitored; 24-hour PM10 and PM2.5, 1-hour Nitrogen dioxide (NO2) and Carbon monoxide (CO), Respirable crystalline silica (PM2.5 fraction), 24-hour total suspended particles (TSP), Radon, etc. (Lee, David, & Morgan, 2002).

Back then the EPA was concerned that the information provided by the proponent was enough to ensure that compliance with the SEPP (AQM) could be assessed, and that if the beneficial uses outlined in the SEPP couldn't be met the proposal shouldn't proceed. DHHS also recognised the health effects of fine particulate matter and emissions from combustion engines and insisted on extra control measures in houses where these were likely to be exceeded.

Submitters to the Douglas EES also pointed out the inappropriateness of using meteorological data from Mildura for air quality modelling, which indicated, against local knowledge and experience that more dust would be deposited in the west of the pit than the east. This concern was validated during the operations of the mine. It is a frustrating and all too common experience that decades of, and intergenerational 'hands on', local experience are ignored by miners and regulators who do not appear to value local knowledge. Unfortunately, it is local communities that have to live with the discomfort, ill-health and hazardous consequences of poor or unjustifiable decisions.

In summary, increases in knowledge about the impacts of pollutants, and improved global standards make it imperative that all potential sources of negative health impacts are identified and the appropriate assessment procedures applied to these. All steps must be taken to ensure they are either eliminated or reduced to the Maximum Extent Achievable.

Appropriate standards must be set for exceedances and their frequencies. Clear legally enforceable, proactive and reactive mitigations must be in place. Agencies must be are clear on their relative regulatory responsibilities. Monitoring locations must be sufficient in number, and appropriately located. Monitoring must be done independently and continuously and that the community is kept informed of those results.

Air Quality

Ignores construction effects and critical pollution sources throughout

The Air Quality report has completely ignored the dust and emissions created during these periods of mine construction and commissioning and the most impactful years – Years 1 -3. It has also failed to identify the effects of the massive on and offsite diesel emissions due to mining construction and operations.

How is it considered acceptable to ignore or hide the extent of impacts during the initial years of mine operations?

What conclusions can the community draw about the commitment and ability of Kalbar to manage impacts to human health, given the evidence of the EES demonstrates that they are starting from potentially false premises?

Misleading and irrelevant case studies

The case studies cited in the report are misleading.

Keysbrook

Keysbrook is a very different mine to that proposed at the Fingerboards.

The Fingerboards has many metres of overburden that will make it impossible to manage dust effectively. Materials that have to be removed and 'stored' to access the orebody include: the topsoil; dunal sand up to 10 metres thick in areas with higher elevation; the Haunted Hills Formation which is between 2 to 16 metres thick; and finally the layer of most concern, Upper Sands of the Coongulmerang Formation which is a 'fine, uniform, silty sand' up to 30 metres thick.

Maps in Kalbar's work plan depicting the first year of operations show up to 100ha of open overburden on the mine area. The water figures being touted, and the equipment identified, would indicate that the company has no capacity to keep those piles damp.

In contrast, the Keysbrook deposit has no overburden, and therefore did not expose nearby residents to the massive amount of dust and particulates that will impact on people and properties within many kilometres of the Kalbar mine.

Regardless, even without the massive amounts of overburden the potential for dust to create amenity and health risks was recognised in Keysbrook works approval which not only imposed a number of strict conditions, including that no visible dust cross the boundary of the mine, but also a penalty of up to $125,000 for each contravention. (Department of Environmental Regulation, 2013) Do such penalties exist in Victoria, and if so, have they ever been applied?

No Victorian Works Approvals contain the same disincentive to breach conditions and it is contended that the experiences of other communities demonstrate that mining companies take advantage of the weakness of monitoring and regulation in Victoria.

Conditions for Keysbrook include continuous monitoring during construction and commissioning and plans for managing results and monthly reporting during operations including actions taken to address breaches or community concerns.

Douglas

Not only was the Douglas mine in a completely different landscape to the Fingerboards (generally flat cropping country), the overburden was only a few metres deep and composed of very different material. The Douglas ore body itself was comprised of the coarser more valuable strandline deposit whereas the Fingerboards is comprised of much finer, silty sands that are many metres deeper.

The nature of the Fingerboards deposit makes it a far more polluting operation than Douglas. This is primarily because the orebody is dispersed much deeper through the landscape (the pits will be up to 50 metres deep), it is highly erodible and is far less enriched so much more must be dug up and processed to achieve the concentrate.

Notwithstanding the 'safer' location, the Douglas Case study raises its own issues as assurances made in the EES were not enough to stop the more than 1,300,000 kilograms of PM_{10} being emitted annually. This data was from only one monitoring location and would have been higher had the monitors been downwind of the mine as requested on numerous occasions by locals. (Douglas, 2016)

Management and mitigation measures that were put forward such as keeping the size of overburden and topsoil dumps to a minimum were obviously inadequate or insufficient to reduce dust impacts. In fact, there were many sightings of dust from the mine at fire towers at Mount Arapiles 60 km away which due to the red colour of the dust, the towers were able to ascribe to the mine.

Admits that depth of overburden increases dust emissions

However one point that is relevant to the Fingerboards proposal is the proponents of the Douglas mine stated in their EES that dust emissions during mining of the Bondi East deposit were expected to be about twice those of the Bondi one 'largely due to the greater depth of overburden in Bondi East' (Lee, David, & Morgan, 2002)

Unjustified reliance on proposed mitigations

Perhaps the most fundamental flaw in the proponent's EES is the assumption that all the mitigations proposed by Kalbar will be in place and effective in reducing polluting and contaminating activities. The assumption is fundamentally flawed because the proponent's own modelling shows they have not accounted for the water required for most of those mitigations – including keeping overburden piles damp and maintaining a water truck fleet and a schedule sufficient to minimise dust on haul roads.

Dust from the Fingerboards mine

"Mining operations are one of the most notable anthropogenic activities in terms of the quantity of dust and aerosol emissions… and the contents of potential toxic elements (PTEs). (Csavina et al., 2012).

Health effects of dust

Dust exposure can lead to a variety of health effects. For example, numerous studies link particle levels to increased hospital admissions and emergency room visits and to death from heart or lung diseases. Because both long (over years) and short term (hours or days) particulate exposure have been linked to health problems it is critical that monitoring is rigorous to allow for rapid reaction and response to excess emissions, and for modelling of weather conditions to be accurate enough to predict and proactively plan for conditions that could cause excess emissions.

The health effects of coarse particles include coughing, sneezing, sore eyes, wheezing or worsening of asthma, increased need for medication including antihistamines, bronchodilator inhalers and antibiotics. Coarse particles have also been associated with heart problems such as angina and heart attacks.

Fine particles are a major concern because they penetrate deep into the lung sacs and are absorbed into the blood stream and depending on the composition of the dust, can cause cancer, chronic obstructive airways disease, silicosis, liver, kidney and brain disease, and developmental delay and chromosomal abnormalities.

Effects of dust ignored in health report

The health studies do not give adequate attention to the effects of dust generally on human health. There is ample evidence from around the world that dust doesn't have to be less than 10 microns to cause problems. (Health N. D.)

Beyond the human health impacts (including on mental well-being), ordinary dust can cause visibility issues, deposition on roofs, contamination of water tanks and stock dams and impact on pastures. Anyone who has experienced the recent fires in East Gippsland or been caught in a dust storm is acutely aware of how much road safety is affected by reduced visibility.

Dust pneumonia is a very real problem that has been associated with areas subjected to frequent dust storms, such as the Mallee where denuded and exposed landscapes are resulting in increasing frequency and intensity of dust storms

The vast majority of dust from mining activities consists of coarse particles (around 40 per cent) and particles larger than PM10, generated from activities such mechanical disturbance of rock and soil materials by dragline or shovel, bulldozing, blasting, and vehicles on dirt roads. Particles are also generated when wind blows over bare ground and different types of stockpiles. These larger particles can have amenity impacts as well as health impacts. The size of the open cut will make it impossible to avoid these effects.

The claim that rehabilitation will be progressive is not credible. Even grass takes months to grow. Every miner in Victoria has claimed the same, none have achieved it and there have been no attempts by the regulators to enforce it. (It is a simple matter for a miner to get a variation to Work Plan to avoid the rehabilitation built into the original mining licence.) Given that even the world's leading mineral sand miners have not been able to meet commitments of progressive rehabilitation it would be a very optimistic regulator who would think that an inexperienced miner such as Kalbar will be able to.

The community will be left with effects of the dusty, dirty scar on the landscape – perhaps indefinitely.

Insufficient water to mitigate dust

Kalbar will not have sufficient water, so they will raise dust during the excavation. While in the bedrock (still sand and stable) dust generation will be moderate, however as soon as equipment starts to move over the ground (D11 – 30 tonnes) it will break the surface, pulverise the ore and then raise masses of dust – dust which will get worse with every pass of the machines.

The water concept plans haven't allowed for additional water to cope with the extreme effects of dry years on exposed surfaces such as haul roads, which can require dampening 30 times a day during summer.

As the site is elevated, wind speeds are higher, and pit voids create swirling effects that, without constant dampening down, are likely to also lead to salting that threatens massive, damaging and persistent dust clouds. And yet Kalbar have made no allowance, in their water conceptualisation for keeping those pits or pit walls damp. The community – our children and vulnerable people - the local environment and economy will suffer as the marginal nature of the mine is likely to lead to the avoidance of or inability to obtain the extra water required.

Even if the additional water (an estimated 2GL or more) was available, the costs of buying additional water trucks and hiring staff might make the mitigations financially unachievable. However, without those mitigations residents and workers (including those working for the horticulturalists) within at least 25 kilometres are likely to be adversely affected.

In addition Kalbar's water modelling relies on 117 year averages which are clearly outdated and overestimate the amount of water available now and in the future. DELWP's own long-term water modelling shows that averages from 1975 onwards would give more realistic figures. These are much lower than Kalbar is citing and indicate that their chances for meeting their (underestimated) water needs are very low. (DELWP, 2020) The Panel and the Ministers must recognise this reality in their decisions.

Faulty water modelling underpins the practical and economic viability of the proposed mine. The long-term implications for the community of East Gippsland are potentially no water, no horticulture, no tourism, no fishing, and damaged Ramsar listed lakes and waterways. In other words, the future of East Gippsland could be at the mercy of this single mine.

Failure to consider all types and sources of dust

Dust is any particulate matter that can become airborne.

The proponent has excluded airborne particulates (as defined by the World Health Organisation). This means it is not meeting its health and safety obligations. The mine will generate airborne particulates, as do all mineral sand mines, and the proponent will be legally required to monitor continuously for radioactive and carcinogenic elements.

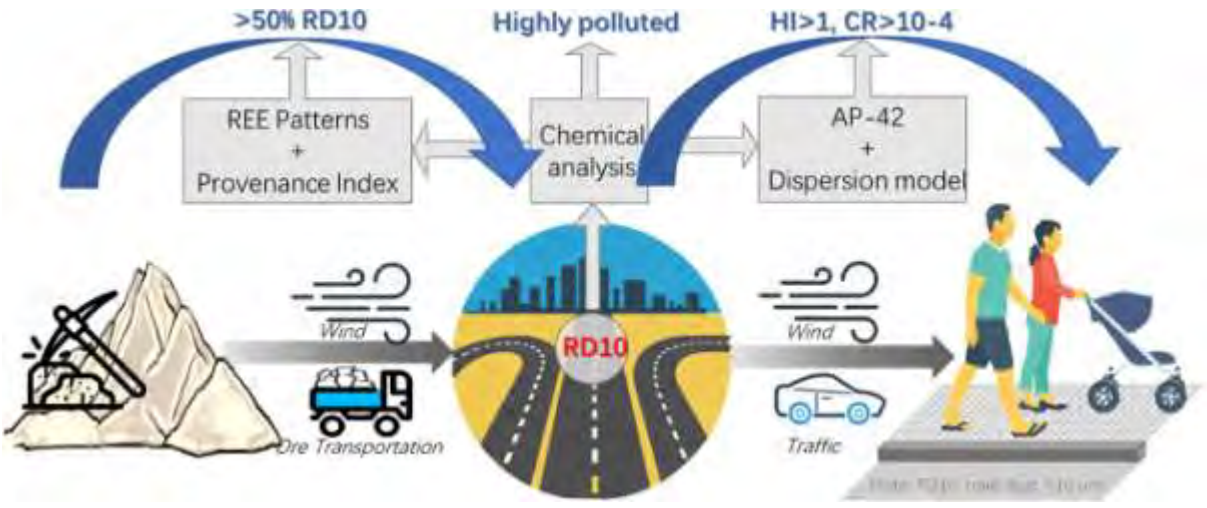
The WHO notes that the International Standardization Organisation considers dust to be “particles below 75 µm in diameter, which settle out under their own weight but which may remain suspended for some time” and the Glossary of Atmospheric Chemistry Terms to be particles “usually in the size range from about 1 to 100 µm in diameter, and they settle slowly under the influence of gravity”. (WHO, 1999)

Fingerboards mine pollutants

The report has ignored or overlooked a number of recognised pollutants in the dust that the mine could expose the community to. These include; Arsenic (inorganic), Cadmium, Chromium VI, Nickel and Bismuth which induce both non-carcinogenic and carcinogenic risk. Cerium (Ceric Oxide), Barium, and Magnesium induce non-carcinogenic risk, and Lead is thought to induce carcinogenic risk, respectively (Luo et al., 2012; US EPA, 2013). Other pollutants in the orebody that become extremely toxic when airborne include vanadium, lanthanum and gallium.

Road dust

Fine particles produced at mine sites are mainly from vehicle and mobile equipment exhausts. However recent studies show that models that treat road dust as soil, (such as the one used in the EES), lead to a significant underestimation of the inhaled amount of dust and highlight the importance of evaluating inhalation doses more accurately. (Tian, Liang, & Li, 2019)



Respirable Crystalline Silica (RCS)

The West Australian Department of Mines takes the issue of respirable crystalline silica (RCS) much more seriously than the Victorian Regulators at this point in time. Its most recent Safety Bulletin on the issue (WA Department of Mines, 2019) notes the three main forms of RCS (quartz, cristobalite and tridymite) and that exceedances at mine sites are common.

Factors contributing to RCS are;

Factors contributing to Respirable Crystalline Silica at mineral sands mines include;

- Mining, crushing and handling ores with high quartz content.
- Ineffective use of dust control measures to minimise worker exposure directly or from fugitive dust emissions from exploration and mining activities, including haulage roads.
- Over-reliance on personal protective equipment.
- Absence of sufficient information and training of the risks associated with inhalation of dusts, including how and when to use appropriate respiratory protective equipment.

Mineral sands mining and silicosis

Effective use of dust control measures is required to minimise worker exposure directly or from fugitive dust emissions from exploration and mining activities, including haulage roads. The same risk mitigations procedures are required for all persons on or near the mine site. The EES does not provide adequate demonstration of how the operator will achieve this.

Recent announcements in Victoria indicate a growing awareness of the dangers of silicosis, but an ignorance of dangers of it from mineral sands and other mining. The New Jersey Department of Health's Silica Surveillance program clearly demonstrated that silicosis is not just an issue for manufacturing as more than 14% of cases are associated with dry mining – and the majority of those are associated with sand mining. (Health N. J., 2013)

Our community is at risk from this disease, not only from the transport of silicosis in dust, but also from the silica raised by trucks along haul roads and to sidings.

RCS 'findings' unsupported by facts

The EES has dismissed concerns about RCS on the basis of Kalbar's advice and was only forced to look at other forms as a result of the Peer Reviewer's comments. Even then the response is inadequate. With such deep silty sands comprising the Upper Sands and the main orebody it is unacceptable that more has not been done to accurately assess the risks. This is particularly confusing to local people who were told by Coffey's consultant some years ago that silica is Kalbar's main concern.

-38µ particles

Dust per se is problematic enough but the limitations of analysis of samples and Kalbar's exclusion of fine tailings (due to their unrealistic assumption of ongoing dampness) and samples ≥ 38µ is misleading and relies on a series of control measures that can never be perfect, particularly in mining.

Which is why risk management must take into account worst case scenarios and prepare for them, implement measures to prevent them from occurring and then in the event that they do occur, have measures planned to regain control and minimise harm.

The EES excludes -38 um material from potential sources of dust on the basis that these will report to fine tailings that are expected to be kept damp, however this justification is not based on fact.

For a start, availability of water to keep tailings damp cannot be guaranteed now or into the future. Nor can even the existence of the company. As the WHO says "Damp materials are less likely to release airborne dust, but of course this does not apply if they dry up later.

Australia - and Victoria in particular - is littered with mines that have been abandoned or gone into care and maintenance for a wide range of reasons. The competition from the number of mineral sands mines in development in other more favourable parts of Victoria and Australia is a business risk that must be factored into decision-making as abandonment is a strong possibility. Should that occur there will be no maintenance of the TSF, as has been the case in all other non-working mines in Victoria.

Examples of damaging and deleterious dust impacts from mines across Victoria abound and NPI data shows millions of kilograms are emitted each year both during mining (Douglas and Kulwin/Iluka) and long after mining has ceased (WRT/Iluka) (Department of Agriculture Water and the Environment, 2020). Allowance must be made for continued watering of the pits to avoid dust pollution, and that allowance must extend to times of care and maintenance or if the site is abandoned. Any rehabilitation bond must include enough to cater for access to water, and payment of contractors to allow for the watering into the future until such time that the mine is fully rehabilitated.

Potentially Toxic Emissions (PTEs)

The mine will use extremely large amounts of diesel 24 hours a day, 365 days a year. Apart from disproportionately adding to Victoria's greenhouse gas burden, those emissions will negatively impact on not just the general amenity, but on the very health of the community. While diesel is being phased out in OECD countries due to the health impacts its use is actually increasing in Australia. With the amount of machinery and trucks operating 24/7 in the project area, Glenaladale will be subject to a significant pollutant that is currently almost non-existent.

The local community particularly, and any community on the transport path, will be exposed to significantly increased toxic emissions that have been associated with a range of severe health risks including increased risk of, and hospitalisations for: asthma; respiratory disease in children and adults; adverse birth effects; systemic inflammation; increased rates of influenza in children; increased risk of foetal growth restriction; and cardio-respiratory mortality. (Walter, 2020).

The EES has not factored any of these health implications into its EES, nor developed health risk controls.

Inappropriate baseline data

For the company to suggest that the baseline ambient air quality for Glenaladale be set at same level as Traralgon, which is one of the most polluted locations in Australia, is incomprehensible. Using such inappropriate baseline data will negate the ability to quantify increases in emissions in the Glenaladale area due to the operation of the mine. Air quality data can only be useful in baseline assessments if collected at the actual location of the proposed operation.

Will the choice of such an inappropriate baseline allow the company to deny responsibility for deteriorating air quality or monitoring results that indicate exceedances, or avoid an obligation to make good for those affected?

Standards should align with best practice – not aim to avoid responsibility

The Commonwealth Government is reviewing standards relating to a number of emissions including Nitrogen Dioxide, Sulphur Dioxide and Oxy O_3. Current standards have been recognised as grossly inadequate and an expert position statement coordinated by the Lung Health Research Centre and Environment Justice Australia made a number of recommendations including that thresholds of NO2, SO_2 and O_3 be lowered in line with international standards, and that the reporting metrics be changed and that compliance monitors be placed where there are hotspots. (Walter, 2020)

SO_2

It is recommending that the 1-hour standard for SO_2 be reduced from 200ppb to 75ppb, the 24 hours standards from 80ppb to 7ppb and the annual average from 20ppb to 10ppb

NO_2

It is recommending that the 1-hour standard for NO_2 be reduced from 100ppb to 40ppb and the annual average from 30ppb to 10ppb. It also recognises that annual averages do not reduce attributable health outcomes because they allow for so many damaging exceedances. The international reviews have found that there is considerable new evidence on the health effects of NO2, and that these effects are independent of other pollutants including PM. In Australian studies the strongest and most consistent associations between mortality and hospital admissions and air pollution are found for NO2. These effects are stronger than those observed for PM10 and PM2.5. Long term studies have found that exposure to NO2 is causally linked to respiratory outcomes including asthma incidence and reduced lung function growth. The review of the current literature strengthens the findings of the NEPM review (NEPC, 2011a).

O_3

In a review of the O3 standards in the United States, the USEPA concluded that there was clear, consistent evidence of a causal relationship between short-term exposure to O3 and respiratory health effects (USEPA, 2006). This finding was supported by the coherence of effects across a range of epidemiological, controlled human exposure and toxicological studies. These findings indicated that the effects of short-term exposure to O3 can impact on a range of respiratory health endpoints.

This ranges from respiratory tract inflammation to respiratory related emergency department visits and hospital admissions. There was strong evidence that short-term O3 exposures induced or were associated with statistically significant declines in lung function (WHO, 2006). An equally strong body of evidence from controlled human exposure and toxicological studies demonstrated that O3 induced inflammatory responses, increased epithelial permeability and airway hyper-responsiveness. These findings supported the outcomes of epidemiological studies which showed that short-term increases in O3 concentrations were consistently associated with increases in respiratory symptoms and asthma medication use in children with asthma, respiratory-related hospital admissions and asthma-related emergency department visits.

Revised standards for O_3 recommend that the 1-hour standard for SO_2 be reduced from 100ppb to 70ppb, the 4 hours standards from 80ppb to 60ppb and the 8-hour average from 70ppb to 47ppb

Other factors that must be considered

Radiation

When questioned about Australian Standards used to support their statements that radiation and heavy metals in the topsoil, overburden and ore body are within safe levels, Kalbar claimed these are the;

- Health Investigation levels (HIAs) for residential soils from the National Environmental Protection Measure 1999 publication for the heavy metals.
- ARPANSA – Australian Radiation Protection and Nuclear Safety Agency. Radiation Protection Series 15 – Safety Guide. Management of Naturally Occurring Materials (NORM), page 35 for radiation (Hugo)

Concerns have been raised about the likelihood of airborne dispersion of radioactive particles. Advice indicates this will be of most concern from the actual Heavy Mineral Concentrate. Chapter 3 of the Project description states that a ‘loading facility will be constructed adjacent to the WCP to stockpile the concentrates awaiting transport to a port via road and rail.

The volume of concentrate stockpiles will vary from 5,000 to 50,000 tonnes and will be continuously depleted and replenished as concentrate is removed for transport and new material is added from the WCP. The stockpiled concentrates are dewatered to less than 5% moisture to allow for safe and effective management and handling during transportation and shipping’.

It is critical that these stockpiles remain moist throughout the life of the mine and particularly if there are times when the mine goes in to care and maintenance due to low demand, increased competition or excessive production. Experience in other mine sites indicates touted mitigations are overlooked when full production ceases. The experience at the WRP mine has been of many millions of kilograms of particulate matter becoming airborne long after the mine had closed. There appears to be no attempt to mitigate that HMC dust and no attempt to protect people or animals from the harmful effects. (Hugo)

Radiation levels in HMC transport to port underestimated.

The proponent has told people the trucks (or rail carriages) will contain about 5% radioactive monazite yet they state that those trucks or carriages will not have to be placarded. They appear to be relying on an ARPANSA publication on radiation exposure from the transport of mineral sands. However that publication specifically referred to sands where monazite wasn't part of the load and in fact had been treated as a waste product after processing and returned to site. (Calytrix Consulting, 2008)

As with heavy metal contamination, the failure to adequately assess and make known the levels of radioactive substances in the overburden (Coongulmerang Upper Sands) means there can be no reliance on the company's claim that contamination will not be a problem. While radioactive substances are expected to be included in the Heavy Mineral Concentrate that will be shipped from the site, there is no indication of the actual levels throughout the Coongulmerang Formation (as these have not been tested and reported on).

Heavy Metals

Heavy metal deposition in soils is not factored in to the health risks even though this is a recognized impact of mining and the chemical form of the metals may make them bioavailable. (Wuana & Okeiemen, 2011) The studies do not recognize that 'soils are the major sink for heavy metals released into the environment by …anthropogenic activities' … and that they persist in the soil because they ….'do not undergo microbial or chemical degradation'.

Heavy metal contamination will affect any vegetation that is in the path of dust from the mine; including dryland pastures, vegetable gardens, native vegetation and even a significant number of farms on the horticultural Mitchell Valley flats.

Heavy metals and metalloids pollution of the environment remains a worldwide concern because of the negative effects that exposure to heavy metals can pose on various ecosystem and human receptors. Processing of ore bodies and disposal of mine tailings and wastewater are the main source of heavy metal pollution in metalloid mining.

Tailings dumps are the source of heavy metals that will spread to ecological receptors (flora and fauna, water resources, the surrounding environments (including atmospherically). They can be adsorbed into soil, taken up by plants, leached into surrounding water bodies and affect human health in a myriad of ways. (Wuana & Okeiemen, 2011)

Tailings dumps are also the source of major polluting events should the company go into liquidation and walk away from the site – a risk that has a high likelihood of occurrence given the marginal economic prospects with the mine.

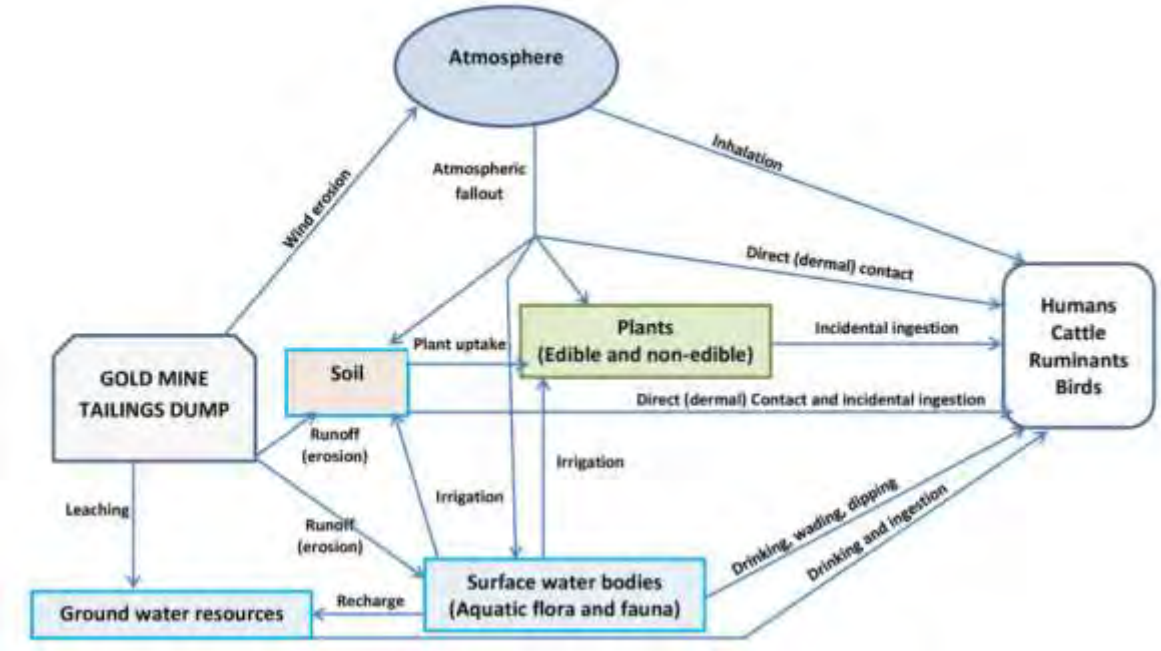
Figure 1 below illustrates the multiple pathways such exposure can occur from tailings dumps.

It is not just tailings dumps that pose a threat from heavy metals. Exposure of the ore body itself – in particular the low value Upper Sands which will within two years form the major part of the overburden due to the unviable costs of processing – have known and unknown heavy metals that pose a threat to human health, e.g. arsenic and vanadium. Because of the limitations of 'assays' presented to 'justify inaction', and the failure of adequate oversite by – or indeed capacity for such – in the Technical Reference Group, it is critical that the community obtain independent, NATA accredited assays done. Approval of the project without these in place and verified would be unforgiveable and given the approaches and appeals made by the community could give rise to civil litigation or class action should foreseeable harm result.

The Geochemistry and Mineralogy report relied on by so many 'consultants' claims that heavy metals and other contaminants won't be problematic. However, apart from a very minimal sample from the gravelly Haunted Hills Formation, no testing was reported of the overburden and in particular the Upper Sands which is not economic to process. This will be in quantities many metres deep and will cover too large an area to use standard watering mitigations to reduce dust. Experts failure to verify data is concerning, and failure to investigate the issues is now contrary to the law.

The community is aware that potentially harmful heavy metals and other elements are unlikely to create a hazard while sequestered in the ground – as they have been for millions of years. However, the moment they are excavated their form changes due to oxidation and other processes and these processes can occur within a very short timeframe.

Figure 26*: Fate pathway of emissions of heavy metals leading to exposure to humans and ecological receptors*



Independent NATA accredited tests of soil and water

An independently conducted analysis of a number of soil and water samples was recently conducted on behalf of one of the project area landholders. The results of the NATA accredited analysis have given rise to concerns about a number of heavy metals in the area that are highly likely to create environmental and health risks but appear not to have been identified or analysed in Kalbar's reports. It is proposed that further testing be conducted to indicate if other matters of concern may have been overlooked.

The tests complement a number of Mine-Free Glenaladale authorised NATA accredited water tests done on local tanks, dams, bores and the Mitchell River. Those provided very different information to that reported by Kalbar for similar values.

The data will serve as a very good baseline for identifying the effects of mining operations should landholders, residents and others experience problems suspected to be attributable to mining construction and operations.

One of the most significant issues for the community is that Australian HIL levels may be silent on a number of toxic and carcinogenic elements that are recognised by other world authorities. In the interests of world's best practice and to protect community and environmental health maximum levels set for all such elements should reflect the standards of the USEPA or similar internationally recognised bodies.

Minister's Requirements

The Minister acknowledged noise as a health and amenity issue in the Scope so it is surprising that Coffey has relegated it to the Socio-Economic section of the EES. (DEWLP, 2018)

The Minister required the EES to consider the

- potential effects of project construction and operation on air quality and noise on nearby sensitive receptors (especially residents);
- and the Environmental Management Framework to;
- include commitments to mitigate the effects and enhance environmental outcomes for noise, vibration, and emissions to air, including dust and greenhouse gases

Noise

Rural settings typically exhibit low ambient noise levels especially at night-time. The low ambient noise is likely to provide a perceived amenity value for residents choosing to live in rural areas.

Noise emissions generated from the proposal are a new noise source within a low ambient environmental setting and will be intrusive to residents surrounding the proposal. Also, noise travels further at night and is likely to create even more disturbance, particularly for those living within 5km of the mine site.

Intrusive and loud noises impact on amenity and health, particularly mental health. Most species, including humans, have thresholds where noise is acceptable and does not cause undue harm. Noise characteristics such as impulsive, modulation or tonality may be intrusive or dominant to receivers.

While airborne contamination has many immediate and long-term effects on the health of residents, it could be argued that noise is one of the most acute, disruptive, constant and crippling aspects of any mining activity – and in particular open cut mining.

Experience in other locations indicate that the effects are not properly acknowledged and in Victoria at least, there appears to be no effective regulatory approach to managing the impacts – despite them being so well known and despite them having a major impact on mental health.

Effects of noise ignored in the Human Health report

It is curious to note that Coffey did not include noise in the HHRA given the operation will be 24 hours a day, 365 days a year, will involve multiple earth moving machines, extensive areas of rocky and gravelly overburden, and 80 B-Double movements a day, as well as increased passenger vehicle traffic.

Some reference and acknowledgment of WHO guidelines on noise was made. Despite many problems with the Marshall Day Acoustic report on noise and vibration, Coffey stated that noise levels would not be higher than 41dBLeff and would not lead to such things as sleep disturbance. They also unrealistically ignored the noise from haulage on public roads saying that wasn't their preferred option.

This was despite Marshall Day Acoustics saying it would lead to maximum noise levels at dwellings along the route. Since there is a very high likelihood that the company will not be able to 'get' their preferred transport or haulage options, there should have been further consideration and modelling of the effects.

The decision to ignore noise from machinery is unacceptable, especially given that, having already referred to the Keysbrook mine in a case study, they would be well aware that MZI resources had its licence reviewed by the EPA because of constant intrusive noise for nearby residents.

The recommendations of that review included stopping night-time operations and stopping operations within 1,500m of residences. The Keysbrook noise problem is not a 'one off' and the EPA reported on 'the difficult and onerous task of managing noise compliance and public complaints from similar mineral sand mines, operating under comparable parameters, that were generating noise complaints (e.g. Iluka Resources' Waroona Mineral Sands Mine)'.

Keysbrook mine restrictions

WA is a more mature mining province than Victoria, and as such has far better regulations relating to noise. For example, the Keysbrook mine was supposed to be a 24/7 operation and the WA EPA allowed daytime noise no higher than 50dB and night-time noise much less.

Regardless those limits weren't achieved, and the EPA stepped in to exclude mining operations during the evening, night, on Sundays and public holidays. They were influenced by 'the difficult and onerous task of managing noise compliance and public complaints from similar mineral sand mines, operating under comparable parameters, that were generating noise complaints (e.g. Iluka Resources' Waroona Mineral Sands Mine) (WA, 2018).

South Gippsland windfarm

The people of South Gippsland are currently undertaking a Supreme Court case to attempt to get noise mitigations from a windfarm. (South Gippsland Voices, 2019)

Council found that 'nuisance' noise was being emitted by the Wind Farm, but that the residents had to take a case to court to try to get any intervention. The Wind Farm tried to get the council's decision quashed so it could show there was not cause for suit. The Court held the Council's decision was valid - thus the residents can continue with the case.

It is unacceptable that communities or individuals must resort to expensive, time consuming and stressful court action to achieve what government is responsible for - ensuring that industry meets its health and safety obligations.

Costerfield

An independent review into community concerns about the Costerfield antimony mine was commissioned by the Minister for Resources in 2015 (DEDJTR, 2016)

Noise was a common theme with the community identifying problems with inadequate monitoring permitted and unresponsiveness on the part of the mine to community complaints

Mental Health

Glenn Albrecht coined the term 'solastalgia' to describe the profound sense of loss experienced by communities who watch a beloved landscape destroyed. (Muller, 2020) Solastalgia describes the pain you feel from losing the solace of home, the loss of its beauty, the loss of the land and all it means and has meant for generations.

Imposing unwanted and potentially unviable mines on communities where people feel a deep connection to, and stewardship of the land, and value the environment and the peace and tranquillity of a rural lifestyle cannot help but lead to mental health issues.

CSIRO published a report into the impacts of mining on four Victorian communities in 2002. (Cheney, Lovel, & Solomon, 2002). In all cases the mines led to feelings of insecurity, a sense of not being heard and of being unfairly imposed on. Loss of control, loss of community and loss of amenity, lack of trust in miners and regulators, along with fear of repercussions, conflictual, hostile and broken relationships are a common theme, even among those who originally welcomed the mines. In addition, all communities suffered from increased dust and noise, increased local traffic and damage to local infrastructure.

Many resented the tokenistic nature of EES participation. It was seen to impose an unfair burden on the community time and resources and left the perception that deals were already done and all the community effort was little more than a cynical attempt at claiming engagement and participation.

The perception that deals were already done – no matter how little economic sense the mines made, heightened resentment and loss of trust in government. Compounding these is the knowledge that the community is left to wear the burden of a destroyed landscape if (and more likely when) the miners go into administration or put mines into care and maintenance indefinitely to avoid rehabilitation.

Our community does not have the resources to deal with any more of these burdens. Latrobe Regional Hospital – 135 km away is the main mental health provider.

We have lived with the chronic stress of an unwanted proposed mine in the area for over six years now. The lack of empathy and respect shown from the beginning (coercive and unconscionable efforts to get 'access' agreements for exploration drilling, hounding a frightened and vulnerable old man to sell his lifelong property cheaply) has been a major factor in a number of mental health related issues such as anxiety, depression and sleep loss.

Those issues are known to lead to poor memory and decision making; impairment of the immune system; increased susceptibility to infections; and to heart disease. If it weren't for the efforts by many to provide good social support there is no doubt this community would have been faced with some dire outcomes.

Every single aspect of this project affects the mental health of our community. Whether they are living within, adjacent to, or downwind of the project; whether they just use the area as a through road, or as a sporting venue, whether they use it recreationally through their cycling or motorcycling activities, or whether their interest is about the impacts on biodiversity, the environment or the social well-being that comes from cohesive communities, adequate housing, or fears about the loss of culturally significant heritage, and spiritual connection to country that has been in the lives of Aboriginal people for millennia.

The Noise and Vibration Assessment makes passing reference to the impact of excessive or unwanted noise on people but claims that some effects of noise on mental health will be dependent on the listener's perception and attitude and that their noise policies are only related to the direct physiological risks of sound. This is despite citing the WHO guidelines on noise that recognise health as incorporating physical, mental and social well-being and not just the absence of disease or infirmity. (Stewart, 2020)

Farmers within and around the project area have experienced considerable stress throughout the development of the project and those stress levels are unlikely to reduce. What is particularly galling is Kalbar's claim that it is the uncertainty of the current planning and approvals process that creates the uncertain environment and leads to stress. Stress has arisen from landholders feeling unacknowledged and unrepresented in the process and lacking opportunities to have their concerns heard, acknowledged and addressed by decision makers.

Many have felt coerced into allowing access with threats and actual summons to appear before the Mining Warden and threats of legal action. Many feel that the generational knowledge, love, and deep sense of stewardship of the land is casually dismissed by the proponent and the decision makers. And underlying all those concerns is the very real fear of the significant and irreversible damage that will be done to the land if the mine is to proceed.

Appendix 9 deals with effects on mental health of individuals and communities, including causing Chronic PTSD in more detail.

Inhumane response from Coffey

Coffey's response to the stress and impact on mental health that the project has created in its development and will create if it comes to operation seems to be 'they'll get over it'.

While they recognise that the stakeholder engagement process, the approvals process, and changes in amenity are sources of stress for people adjacent or within 10km of the project area they deliberately avoid acknowledging that stress is created by more than just changes in amenity. They have completely avoided linking mental health to other indicators that are noted in the Risk Report. Those indicators include amongst other things:

1. Effects on reduced flow rates in the Mitchell river on current users and their ability to continue with current activities, including dryland and irrigation farming, and supplies of domestic and stock water
2. Effects on, and costs to, current users of significant drawdown of the aquifer
3. Earlier and more stringent implementation of restrictions and water saving measures by EG Water
4. Impact on recreational use and tourism caused by increasing siltation and sedimentation
5. Effects on well-being of those who are deeply concerned about biodiversity impacts of the mine
6. The stresses for people miles around of living with significant increases in frequency and extent of dust deposition

Light Pollution

One of the pleasures of living in a rural area is the ability to see the night sky. Kalbar has talked about the mine running 24 hours per day, 365 days per year.

Light pollution is now considered to be one of the most chronic environmental perturbations on Earth. (Society, 2019) The Australasian Dark Sky Alliance website has data on the impact of light pollution - including on people and native animals, ... (Australasian Dark Sky Alliance, n.d.)

Light pollution has a wide range of negative effects on human health such as disrupting our circadian rhythms, disturbing our melatonin levels, and generally contributing to sleeping disorders. Disruption of these rhythms can result in insomnia, depression, cancer, and cardiovascular disease.

The effects on flora and fauna are becoming increasingly well-known and include such things as disruption to migration and reproductive cycles. (Raap, 2015) The Socioeconomic report pays little heed to the effects of these disruptions. It simply says light pollution could "alter the behaviour of animals in and adjacent to the project area' and might 'adversely affect wildlife and trigger detrimental behavioural and physiological responses.' The reports then go onto conclude that the likelihood of this affecting fauna species in the project or infrastructure area is negligible. No evidence or argument is provided in respect of this conclusion.

Even beyond the wildlife known to exist in and adjacent to the project area, the skies are pathways for many species (including bogong moths) and all the land concerned runs domestic stock and horses. Interruption to the circadian rhythms and reproductive cycles of these is almost certain to occur and will have a profound effect on the livelihoods of farmers depending on them for income.

This is yet another example of the complete disregard Kalbar have shown for the people whose lives will be negatively affected by the project. And it is another indicator of why people's physical and mental wellbeing have been so profoundly affected by this company throughout this development phase.

Restricting operations to daylight hours is the only mitigation that will be protective of all species as regards light pollution. It would also ensure a longer life for the mine and therefore a more enduring benefit to those involved.

Increased risk of traffic accidents

Firefighters in the CFA have been repeatedly informed that working a 12-hour shift disrupts cognitive and reflex responses more than a blood alcohol reading of 0.05%. Fatigue management is a keystone of DELWP's organisation of FFMV crews at fires.

The proposed project will have between 50 and 100 vehicles at the end of each 12-hour shift (twice a day) heading back to Bairnsdale with drivers whose judgement may be impaired through fatigue. What will that do to the road accident rate, and how many pedestrians and other drivers will be impacted by these fatigued mine workers? At only a 0.1% accident rate we would have an accident every 5-10 days.

In addition, an increase in heavy vehicles on roads not made for that use have multiple effects on road users including the stresses associated with delays as mining vehicles take over roads, the company creates diversions, diverted roads not of quality of those replaced, and destruction of road shoulders causing increased accidents , etc.

Blasting

Blasting at mine sites causes airborne contamination. While Kalbar claim they won't need to do any blasting because the deposit is 'free-digging' they have in other instances stated that the rockiness at depth of some soils precluded analysis for some profiles. The community has seen many examples of seeing commitments made during the EES process being readily overturned – without public scrutiny – by a Variation to Work Plan.

Blasting has massive implications for noise, vibration and dust. It has a direct immediate health impact as well as an indirect one brought about by changes to the ecosystem the community relies on. Unbreachable and enforceable conditions need to be established in the approvals and ensuing stages to ensure that appropriate mitigations are in place and no irreversible damage has been done to groundwater and other ecosystems.

General Occupational Health and Safety Issues

Given that Kalbar has long insisted that current landholders and farmers should be able to co-manage the land in the footprint or co-exist with the mine, the failure to include the footprint itself in the health risk assessment is a glaring omission. The Duty of Care owed to owners of that land is as high, if not higher, than that owed to Kalbar's workers and the contractors on the site.

Reports of OH&S requirements from other mine sites in Victoria add to the need to have cast iron requirements of Kalbar or whoever ends up operating the Fingerboards Mine. Of particular concern is the failure to ensure all site workers have adequate and effective PPEs, and that personal radiation monitors are worn by both operators and truck drivers. Company failure to provide exiting employees with results of radiation monitoring history is a significant omission at some mine sites in the Murray Basin. This must be monitored here in the Kalbar mine site to give assurance that Kalbar is meeting its legislated requirements.

Appendix 11 gives provides a detailed assessment of the legal and moral Occupational Health and Safety considerations associated with mineral sands mining.

If the project is approved any person on the project land will need to be provided with PPEs and monitored for inhalation, absorption of ingestion of toxic substances. They will need to be made aware of likely exposure to a number of carcinogens or suspected carcinogens such as thorium and chromates, a number of neurotoxins in diesel will need to be considered (especially as there as such massive amounts being used in relatively confined spaces).

There are a number of other important health considerations with arguably respirable crystalline silica being one of the most important. The nature of respirable dust particles can put bystanders at risk of inhalation exposure well beyond the project site. As shown in Appendix 10 meteorological conditions indicate that respirable particles will be a year round problem for anyone downwind of the mine – and in particular those pickers and farmers whose work has them in the vegetable fields year round.

Exposure to silica dust caused lung disease like silicosis and silico-tuberculosis and increases the risk of tuberculosis, renal disease and autoimmune disease. (Bhagia, 2012) That the air quality report has been accepted without full consideration of the real exposures facing people in and around the project area, is an indictment on those accepting it as adequate. People's lives are at risk here. Deliberate and cynical limitations on the scope of the independent reviewers' report meant they were not able to investigate let alone report on the reliability of the air quality report.

However, there are so many problems with the air quality report that reliance on it could well find the proponent in breach of a number of Acts including the updated Environment Protection Act which has criminalised failure to identify and act on these types of issues.

The OH&S Act requires atmospheric monitoring where exposure standards could be exceeded, which is clearly the case on this mine-site as despite the flaws in the Air Quality report it clearly shows exceedances for receptors outside the mine-site. Interestingly the Act provides for employees to be given the results of any monitoring if they may have been exposed to hazards substances. Therefore 'co-existing' farmers must be entitled to the same rights. That those records must be available for 30 years clearly indicates the long-term consequences of such exposures.

Community needs protection from known and suspected risks

How are the potential workers made fully aware of the risks inherent in mineral sands mining? This issue is not just about employees, but about anyone who has to work or live near the mine – particularly those who are expected to continue to farm, to 'co-manage' or 'co-exist', on the parts of their property that the miners aren't using.

Have there been any long-term studies into the incidence of silicosis in mineral sands miners in Australia?

Can Kalbar be trusted to identify and manage risks?

If a proponent expects the community to trust in its ability to manage the health impacts, it must show cause for that trust in the EES. It should not avoid acknowledging and adequately analysing known problems and it must disclose the real impacts they will knowingly be subjecting the community to.

There appears to be no affordable and effective way for an ordinary member of the community to hold mining companies accountable for the harm done by their operations.

Even in the EES process itself there is provision for ensuring that the proponent tells the truth in their documentation, but there are no mechanisms for establishing if that has occurred and no penalties if it hasn't. It appears that proponents do not even have to provide accurate and sufficient information to enable proper assessments by the community.

While the requirement for independent peer reviews of some key study areas was welcomed by the community, the limited scope of the appointments meant that those reviews did not provide the community with information on which to judge whether the consultants' conclusions and recommendations were valid and reliable.

There was no way of determining if the input data was correct and fundamental flaws such as incorrect meteorological information were unable to be revealed in the process. No matter how well the input data is manipulated or how strictly the guidance followed, the old adage 'Garbage In, Garbage Out' holds true.

Claims of progressive rehabilitation misleading

While Kalbar's concepts of progressive rehabilitation make for nice diagrams, they do not reflect the realities communities have experienced even with the most experienced mineral sands miners. For example, the Douglas mine's plans for progressive rehabilitation were altered with the first variation to work plan and the site, when mining had ceased, was a 14km long exposed scar on the landscape that, 18 years since construction began has still not been fully rehabilitated.

Nor do these diagrams and promises of progressive rehabilitation reflect the plans Kalbar have put forward in the Work Plan for mining the site or their instructions to GHD in relation to the Starter Test Pit. Those clearly indicate an intention to take a scattergun approach to the mine – cherry picking the easiest to get at, highest bearing bits of the ore body, regardless of how randomly these occur across the landscape. While this 'peacocking' approach is common in the industry it is not conducive to steady progressive rehabilitation and in fact has been one of the key reasons why mining companies put mines into permanent 'care and maintenance' when ore bodies get more difficult to access.

Assessing the reliability of the proponent's information

The volume of words and presentation of 'information' is overwhelming and would deter even the most scientifically minded panellist from delving into the input data. Did the Technical Reference Group have sufficient scientific capacity to understand what was being presented in the geochemistry reports or other reports? Did the members (or were they permitted to) recognise their own knowledge gaps, or seek to inform themselves of the veracity of the data being presented? It appears that some very fundamental issues such as incorrect wind speeds and water requirements have been missed in the process.

Why has the proponent the proponent not considered taht a single 10 tonne bulk sample taken from several different locations across the site, at different years, and without a complete Chain of Custody in place, is insufficient on which to base decisions that will have such far reaching consequences?

There is significant concern that there is no requirement for accuracy in the Kalbar EES process and no procedures for determining if proponents are telling the truth and no recourse for remediation if they are not.

Are the risk assessments and recommendations in the EES reports reliable? To what extent is people's health and wellbeing put at risk if they are not?

The soil, geology and landform studies are seriously flawed due to the reliance on inadequate and incomplete samples, as is the Geochemistry and Mineralogy report which claims that heavy metals and other contaminants won't be problematic, even though, apart from a very minimal sample from the gravelly Haunted Hills Formation, no testing was done of the overburden. A similar lack of data is evident for the Upper Sands which despite attempts to overlook the matter, are likely to be relegated to the status of overburden as it becomes deeper and increasingly less economic to process with the Marker Sands and ore body proper.

Inappropriate, unworkable and insulting mitigations

The proposed mitigations do little to ameliorate community concerns, particularly when the evidence from other mineral sands and other mines around Victoria patently demonstrate they represent unachievable claims.

Are there really any effective Environment Review Committee in Victoria? Do the relevant agencies have the commitment or capacity to attend regular meetings and ensure community concerns are acknowledged and dealt with in a timely manner?

Is existing monitoring of dust, noise and water in Victoria really adequate? Are effective frameworks for corrective action in place should levels be exceeded?

There is no indication the community reference groups exist elsewhere.

How is a community fund 'to support community events and initiatives that encourage social interaction such as sporting teams and community festivals' going to mitigate against trauma experienced already and expected if the mine proceeds – particularly for those who have no option but to live in the area. While 'sponsorships' might allow silencing of opposition to the mine it does nothing to ameliorate the impacts on those most deeply affected.

Some things are not replaceable

Removal of the Fingerboards Crossroads takes away a meeting place for travellers and tourists, community members and emergency services. That crossroad is a critical community and emergency response meeting place. It was the only safe place for fire responders to meet during the 2014 bushfires. In addition, the proposed road realignments mean the Glenaladale CFA brigade won't be able to access the water tank as easily or get to local events as quickly. Kalbar claims that the mine will increase the width of the fire break, which is a terribly inadequate and superficial response to this issue. The stress associated with that is an additional burden on people who are still recovering financially and emotionally from the impacts of the 2014 fires.

Tailings Storage Facility

The Tailings Storage Facility presents an ongoing risk to community that has not been addressed in the HHRA.

The fine sands tailings are unlikely to ever be dry enough to be deposited in voids and in fact Kalbar's rehabilitation plans indicate a permanent tailings storage facility. This is likely to seep to the Perry River forever. While this seepage may have little direct effect on human health it will affect the Chain of Ponds and the Perry – because of concentration of heavy metals and other contaminants and because of the ecotoxic nature of flocculants used in the tailings.

Allowing the tailings to dry sufficiently to be returned to the pit is likely to create the type of problems with toxic dust that the Stawell gold mine TSF experiences. Financial failure of the mine will lead to abandonment of the mine and leave the state with the expense of making it safe into the future as happened with the original Benambra mine.

Even if the mine continues to operate has there been any real geotechnical and other modelling done to predict what will happen if the TSF collapses? It is far from satisfactory to say this is unlikely to occur. There are far too many examples, particularly of TSFs constructed in the same way proposed as that of the Fingerboards mine.

What Kalbar claims in relation to the effects of the project on human health

The Human Health Risk Assessment only considers studies focused on contaminants in water and dust. These will be dealt with lower in this response but it is critical to mention there are many other impacts on human health beyond those mentioned. It is also important to note that Coffey appear to wrongly rely on the fact that baseline conditions are benign and so claims that conditions under mining will also be benign. This makes no sense in any context let alone a mine of this nature. In addition, their selection of baseline data is problematic at best.

Risk assessment approach is selective and inadequate

The Commonwealth Department of Health provides guidelines for Environmental Health Risk Assessment. Complexity of the exposure conditions, variability in the environmental agents and exposed populations, and any inherent limitations in toxicological data may limit the accuracy of numerical risk estimates. While a degree of quantification may be possible for some components, such as data collection and exposure assessment, it is important that all uncertainties are reflected in the EHRA outcomes. Further discussion of qualitative and quantitative risk assessment appears in Chapter 5.

The guidelines state risk assessments should be undertaken where “there is a plausible case that there could be an increased risk of significant health consequences for the human population from (an) activity”. A risk assessment can also be used to inform the selection of the safest option when assessing impacts of developments, especially where hazards are anticipated and ‘environmental changes that will increase traffic flow and may increase the risk of injury or air pollution’ or where changes impacting on environmental health factors that ‘may be permanent and irreversible’.

The guidelines also say that the risk assessment methods should be logical, complete, precise and acceptable (meaning views as rational and fair by those affected by it). There are many approaches Coffey could have taken in assessing consequences of hazards in their risk assessment. They did not follow the recommended approaches of doing risk estimates for populations with high, average and unusual exposure circumstances, those populations at around whom mitigating actions should be framed. By using a State-wide assessment of consequence rather than assessing the consequences for ‘exposed’ or ‘vulnerable’ populations such as those living adjacent to or within the likely dust deposition pathways.

Page 88 of the Guidelines talks about the importance of affected communities understanding the processes of risk assessment and risk management and having an input into the assessment through local knowledge of risks. The guide goes on to discuss the importance of trust in the relationship.

Choice of risk assessment matrix

Even the assessments of 'likelihood' of occurrence is selective and many other ratings could have been used and would have led to higher risk assessment and the requirement for a better range of mitigations.

Limiting Assessment to contaminant releases and ignoring other factors

Coffey says the purpose of the HHRA is to:

• Assess the baseline health risks to off-site populations for the identified contaminants likely to be associated with the project.

• Assess the potential health risks based on predicted project activities.

To do that they;

- Compiled data from the input studies
- From those did a baseline evaluation of health risks from selected chemical and radionuclide hazards
- 'evaluate' health risks to 'identified' populations as a result of project activities.

It is completely unacceptable that the HHRA did not look at health issues associated with noise and amenity issues along with any other issues that can have a significant impact on health as outlined in the body of this report.

Unjustified selection of area of assessment

Coffey claim the "HHRA is intended to identify contaminants that may be released to the environment as a result of the project's activities" but only look at some activities in the East Gippsland and Wellington Shires. They have ignored the impacts on alternative transport routes taken and the substantial infrastructure required for storage and handling of heavy minerals concentrate at either Corner Inlet (a Ramsar listed site), the Maryvale rail siding or the Port of Melbourne

Given all transport routes have many small towns and communities and given ports are managed by human beings – and not robots – the failure to include these in the risk assessments is unacceptable. (p4)

Problems with input studies

Coffey claims say they have also drawn on the findings of the following specialist's studies in developing the HHRA

- Kalbar Operations Pty Ltd. 2020. EES Geochemistry and Mineralogy Summary Report
- Katestone Environmental Pty Ltd. 2020. Stage Two Air Quality and Greenhouse Gas Assessment
- Landloch. 2020. Landform, Geology, and Soil Investigation
- Matrix Planning Australia Pty Ltd. 2020. Land use and planning impact assessment.
- RMCG. 2020. Fingerboards Mineral Sands Project Horticultural Impact Assessment.
- SGS Radiation Services. 2020. Radiation Assessment Report.
- Ventia. 2019. Kalbar Rainwater Tank Report.

- Water Technology. 2020a. Fingerboards Mineral Sands Landscape Stability and Sediment Transport Regime Assessment. April 2020.
- Water Technology. 2020b. Fingerboards Mineral Sands Surface Water Assessment – Site Study.
- Water Technology. 2020c. Fingerboards Mineral Sands Surface Water Assessment – Regional Study.
- Coffey. 2020a. Socioeconomic Impact Assessment.
- Coffey. 2020b. Fingerboards Mineral Sands Project Groundwater and Surface Water Impact Assessment.
- EGi. 2020. Geochem Testing of Fingerboard Tailings and Overburden - Preliminary Report.
- EMM. 2020. Fingerboards Groundwater Modelling Report In support of the Environmental Effects Statement.

Thorough review of all these reports has found significant problems as indicated by the hefty disclaimers each consultant feels obliged to include, along with stated limitations created by the 'scope' of the investigations and the failure to authenticate the input data used.

In many instances an adequate Chain of Custody for sample collection was absent, and in some a level of discomfort in the results being reported was indicated. For example, the ALS Certificate of Analysis of particulates includes a disclaimer that it is not NATA accredited to analyse PM10, but that it was reporting results as PM_{10} 'at the request of the client'.

In addition, like a house of cards, the very basic 'reports' that all others appear to rely on – Geochemistry and Mineralogy and Air Quality – appear to suffer from extremely limited and unrepresentative input data and flawed or inaccurate modelling.

Even the starter pit recommended by GHD has not been completed, and this raises questions as to the reasons why, and more doubts about Kalbar's activities.

How can a ~$200 million mine (plus all the unaccounted for costs such as rehabilitation), have got so far in the EES process without there being a clear idea of what the company is looking for and how it will achieve it? That exploratory drilling is still being conducted while the community is forced to respond to a 10,000 page document with minimal time to do it, and a tiny grant from government to help with legal costs, is extremely concerning.

What KOPL's Risk Register showed for the HHR

The community has the right to expect that, given all the health risks associated with the mine, the miner would do everything possible to produce a complete and honest assessment of those risks, one that reflects the realities of the impacts on the people who will be disadvantaged by their actions. And one which is shared with those disadvantaged and would willingly commit to doing everything in their power to remove those risks or, with agreement, reduce them to the maximum extent achievable.

Instead they have left the community distrustful of the company and fearful of what they will do to the area and how little regard they will have for affected people in the process.

For farmers in the area of the mine site it is like living in a constant state of hypervigilance, not knowing where the attack will come from next. The stresses are all encompassing and affect every aspect of people's lives; six years of living with anxiety and distress, and the absolute conviction that if the mine is approved there is nothing that will be done to stop them irreversibly and permanently destroying the area and all that it means.

Local knowledge appeasrs to mean nothing, decades of farming means nothing, love of country means nothing, generations of commitment mean nothing, the future of our children and grandchildren mean nothing.

Puzzling approach to risk assessment

It appears that in their haste the proponent has been unable to use the words 'almost certain' for the effects the project will have on the health and wellbeing of people adjacent to the project in relation to the effects of noise and dust. To say the consequences for those people are only moderate is demeaning, but perhaps not quite as demeaning as saying they will provide incentives for mine staff to attend local events or to participate in the fire brigade.

If the proponent shows so little concern for local health and wellbeing now, what chance is there for action if the venture is approved? Probably as much as shown in claiming it is unlikely that residents within 10 km being affected by dust but if they are it's only of moderate concern therefore the risk is low and nothing needs to be done to mitigate it. Even Kalbar's flawed air quality monitoring shows the risk is likely and to those residents the impact is more than 'moderate'.

How realistic are the mitigations put forward?

Many of the mitigations are adding insult to injury for local people. For example, how is moving the information board going to take away the loss of a loved landscape – not only the vegetation but the actual location? People are connected to the Fingerboards itself – not to the information board. How is posting information about dust and noise monitoring results going to reduce the likelihood of negative outcomes if there is not a cast iron commitment to real time monitoring and timely responses and actions to reduce the event of the effect? There have been far too many instances of mining companies polluting towns and affecting residents' physical, mental and economic wellbeing with impunity only because the monitoring regime is not appropriate, independently managed or enforced.

Environment Review Committees do not protect communities

These are promised for every new mine and time and again have proven to be an abject failure as they are not independent, are controlled by mining companies, do not have constant or consistent representation from departments who should be looking after community interests.

The Douglas experience has been one of years of ongoing frustration and stonewalling as the company continued to ignore community concerns, the coordinator refused to include items in minutes and follow up wasn't done on issues.

Given the track record of poor relationships between Kalbar and the community, made even worse with their approach to the release of the EES, it is wrong to think an ERC would work at the Fingerboards. Currently the the community has no confidence that any of the regulating agencies would act in the interest of the community no matter how much it was warranted.

Monitoring is not mitigation

The Air Quality Report gives an indication of how little faith the community can have in monitoring proposals put forward. For example, the suggestion that annual averaging is equivalent to monthly, fortnightly or 24-hour averaging is unprofessional and ignores the effects that a series of exceedances can have on the health of individuals. We have seen the results of such inappropriate and failed monitoring at Port Pirie (Culliver & Burns, 2020) and Port Hedland (Morgan, 2020) .

Similarly, Kalbar's mitigations make no attempt to be responsive to concerns. Nor do they indicate triggers that will lead to cessation of operations in unfavourable conditions. It seems to be too easy for to take short cuts in sample collections or to avoid proper 'Chain of Custody' requirements that are intended to avoid poor handling or tampering with samples during transport, and inadequate storage protocols. There are no obligations on companies to prove provenance of samples to ensure they come from where they are supposed to.

If the regulator does not possess or inform themselves of local knowledge it could be a very simple matter to approve monitors in completely inadequate locations such as upwind of mines that would allow avoidance of proper scrutiny of operations.

The regulators have a history of being unable to uphold their obligations to protect community health. Some examples include:

- A GHD 53V audit of a tailings dam at Stawell only occurring after many years of complaints from locals and then only when the department could not ignore the media
- The Costerfield antimony mine that had three reviews by Golder, the third of which was never published but after many years finally resulted in a roof being put over the crusher to stop some of the pollution.
- Woodvale Tailings Dam 63v EPA audit, after which the company incorrectly claimed, in media releases that they had completed most of the 31 recommended activities. The audit had never actually completed, the company had only completed one of the activities and no action was taken by either the EPA or ERR to enforce the others.
- Fosterville mine 2015 dispersing arsenic laden dust over neighbouring property, polluting dams and rainwater tanks and forcing the farmer to destock and eventually sell
- Ongoing difficulties for the community of Kanagulk to have concerns regarding the Douglas mine recorded, let alone addressed and refusal of some departments to attend ERC meetings.

Recommended monitoring

The independent reviewer made a number of recommendations with monitoring that unfortunately were not accepted by Kalbar. Instead the original recommendations remain and provide no confidence that Kalbar are serious in attempting to reduce the impacts of the mine on adjacent or 'regional' residents – in particularly as regards noise, air and water pollution.

The East Gippsland community should not have a level of pollution imposed on it that the Panel, the Minister, the TRG or indeed the mining company's family and friends would not be willing to accept at their own families' residence.

We should not be expected to sacrifice our health or the health of our children and grandchildren for the sake of such short-term gain which only equates to a limited number of temporary jobs, minimal money coming into the community, relatively low levels of royalties for State Government, only a remote possibility of company tax but significant windfall for company directors and executives.

Experience in other sites across Victoria shows just how easily companies can avoid their responsibilities. If this mine is approved it is imperative that OECD standard, enforceable monitoring is in place to record emissions in such a way that timely and effective responses can be made. Seven-day high volume monitoring does not allow that. Monitoring must be such that the company is held accountable for the impacts of the mine. Placing monitors in locations specifically chosen to avoid scrutiny is not good enough (e.g. beside a sheep yard or upwind of the mine).

The community respectfully reminds the Panel, the Ministers for Planning, Resources, Human Health and the Environment of obligations that come with your enormous power to adversely affect the health and well-being of our community. A common law Duty of Care exists that obligates the implementation, oversight and regulation of a monitoring program that provides real time information and allows the mining company and the community to take precautionary or defensive action when our health is threatened.

The Singleton community in NSW made a submission to the Senate in 2013 that outlined monitoring requirements necessary to protect against the ongoing ill effects of mining on air quality in that area. (SSHEG, 2013) That submission clearly sets out the type of monitoring practices and protocols that are relevant to the Fingerboards project and include;

- Thresholds lowered to OECD or USEPA standards
- A network of independently managed NEPM compliance monitors in appropriate places as determined by the local community to ensure they are capable of recording (as opposed to deliberately avoiding) emissions
- Monitoring data – both historical and real time to be made publicly available through a dedicated website (e.g. similar to the Latrobe Valley Information Networks but also recording diesel emissions)
- Standard to include compliance obligations and enforcement mechanisms
- A proper complaints resolution process that establishes clear lines of accountability for relevant agencies

- A monitoring and/or complaints resolution process that ensures the negatively affected community member(s) is not intimidated, coerced or bullied into silence by either the miner or the regulator.
- Embedding of the program into all work plans to ensure the commitments are not able to be avoided by simple variations to work plans.

Without these in place – and unable to be altered, weakened, removed or overturned by future Work Plan variations, the mine should not be permitted.

Appendix 1: HILs for soil contaminants

Table 2. Summary of health investigation levels for soil contaminants

Chemical	Health-Based Investigation Levels (mg/kg)			
	A	B	C[1]	D
Metals and inorganics				
arsenic[2]	100	500	300	3000
beryllium	70	100	100	500
boron	5000	40000	20000	300000
cadmium	20	140	100	800
chromium (VI)	100	500	240	3000
cobalt	100	600	300	4000
copper	7000	30000	20000	250000
lead[3]	300	1200	600	1500
manganese	3000	8000	9000	40000
methyl mercury[4]	10	30	14	200
mercury (inorganic)	200	600	400	4000
nickel	400	800	800	4000
selenium	200	1500	700	10000
zinc	8000	60000	30000	400000
cyanide (free)	250	400	350	2000
Polycyclic aromatic hydrocarbons (PAHs)				
benzo(a)pyrene TEF[5]	3	4	4	40
Total PAHs[6]	300	400	400	4000
Phenols				
phenol	3000	50000	45000	250000
pentachlorophenol	100	150	140	700
cresols	400	5500	4700	27000
Organochlorine pesticides				
DDT+DDE+DDD	260	700	400	4000
aldrin and dieldrin	7	10	9	50
chlordane	50	100	80	560
endosulfan	300	460	400	2000
endrin	10	20	20	100
heptachlor	7	10	9	50
HCB	10	20	15	85
methoxychlor	400	550	500	2700
mirex	10	20	20	100
toxaphene	20	35	30	170
Phenoxyacetic acid herbicides				
2,4,5-T	700	1000	900	5000
2,4-D	1000	2000	1400	9500
MCPA	700	1000	900	5000
MCPB	700	1000	900	5000
mecoprop	700	1000	900	5000
picloram	5000	8000	6500	37000
Other pesticides				
atrazine	360	550	500	3000
chlorpyrifos	170	400	300	2000
bifenthrin	600	900	750	4000
Other organics				
PCBs	1	2	2	8
PBDE flame retardants (Br1-Br9)	1	2	2	10

Appendix 2: National Pollutant Inventory – Sources of pollution at mineral sands mines (Australia)

Emission Source	Emission type	Section in this Manual
Emissions to Air		
Dust		
Mining		
Fuel combustion in mining equipment	Fugitive	5.3.1
Blasting	Fugitive	5.3.2
Dredging	Fugitive/Point	5.3.3
Hydrocycloning and wet concentrating	Fugitive/Point	5.3.4
Burning of cleared vegetation	Fugitive	5.3.5
HMC separation		
Dust emissions	Fugitive	5.4.1
Dryers	Point	5.4.2
Acid washing and leaching	Fugitive	5.4.3
Synthetic Rutile processing		
Dust from storage and handling of ore and coal	Fugitive	5.5.1
Reduction kiln	Point/Fugitive	5.5.2
Rotary Coolers	Fugitive	5.5.3
Separation	Fugitive	5.5.4
Aeration	Fugitive	5.5.5
Leaching	Point/Fugitive	5.5.6
Drying	Point/Fugitive	5.5.7

Spontaneous coal combustion	Fugitive	5.5.8
Gases from final product	Point/Fugitive	5.5.9
By-Product treatment and disposal		
Product transportation and handling		
Dust from product transfer	Fugitive	5.7.1
Combustion emissions	Fugitive	5.7.2
Spills	Fugitive	5.7.3
Maintenance activities		
Solvent degreasing	Fugitive	5.8.1
Welding	Fugitive	5.8.2
Surface coating/painting	Fugitive	5.8.3
Spills and incidents		
Storage tanks		
Fossil fuel electric power generation		
Stationary internal combustion engines		
Emissions to Water		
Runoff and erosion		

Discharge of treated waters
Spills to surface waters
Emissions to Land
Impoundment seepage
Spills and incidents
Surface applications

Appendix 3: NPI listed substances likely to trigger reporting at mineral sands mines

SUBSTANCE	TRIGGER TYPE	THRESHOLD CATEGORY	METHOD
Ammonia (total)	Use (processing reagent)	1	INV
Antimony & compounds	Use (ore and coal content)	1	DM, GF
Arsenic & compounds*	Use (ore and coal content)	1	DM, GF
	Fuel or power use	2b	INV, C
Benzene*	Use (fuel content)	1	INV, GF
Beryllium & compounds	Use (ore and coal content)	1	DM, GF
	Fuel or power use	2b	INV
Boron & compounds	Use (ore and coal content)	1	DM, GF
Cadmium and compounds*	Use (ore and coal content)	1	DM, GF
	Fuel or power use	2b	INV, C
Carbon monoxide*	Fuel or power use	2a	INV, C
Chromium (III) compounds	Use (ore and coal content)	1	DM, GF
	Fuel or power use	2b	INV, C
Chromium (VI) compounds*	Fuel or power use	2b	INV, C
Cobalt & compounds*	Use (ore and coal content)	1	DM, GF
Copper & compounds	Use (ore and coal content)	1	DM, GF
	Fuel or power use	2b	INV, C
Cumene (1-methylethylbenzene)	Use (fuel content)	1	DM, GF
Ethylbenzene	Use (fuel content)	1	DM, GF

Fluoride compounds*	Use (ore and coal content)	1	DM, GF
	Fuel or power use	2a	INV
Hydrochloric acid	Use (processing reagent)	1	INV
Hydrogen sulphide	Use (coincidental production)	1	DM, EC
Lead & compounds*	Use (ore and coal content)	1	DM, GF
	Fuel or power use	2b	INV
Magnesium oxide fume	Fuel or power use	2b	INV, C
Manganese & compounds	Use (ore and coal content)	1	DM, GF
Mercury & compounds*	Use (ore and coal content)	1	DM, GF
	Fuel or power use	2b	INV
Nickel & compounds	Use (ore and coal content)	1	DM, GF
	Fuel or power use	2b	INV, C
Nickel carbonyl*	Fuel or power use	2b	INV, C
Nickel subsulfide*	Fuel or power use	2b	INV, C
Oxides of nitrogen (NOx)*	Fuel or power use	2a	INV, C
Particulate matter (<10um)*	Fuel or power use	2a	INV, C
Polychlorinated dioxins and furans	Fuel or power use	2b	INV, C
Polycyclic aromatic hydrocarbons*	Fuel or power use	2a	INV, C
Selenium & compounds	Use (ore and coal content)	1	INV, GF
Styrene (ethenylbenzene)	Use (fuel content)	1	INV, GF

Sulfur dioxide*	Use (coincidental production)	1	DM, EC
	Fuel or power use	2a	INV, C
Sulfuric acid*	Use (processing reagent)	1	INV
Toluene (methylbenzene)*	Use (fuel content)	1	INV, GF
Total Nitrogen*	Discharge to surface waters	3	DM, EF
Total Phosphorus*	Discharge to surface waters	3	DM, EF
Total volatile organic compounds	Use (fuel)	1a	INV, C
	Fuel or power use	2a	INV
Xylenes (individual or mixed isomers)*	Use (fuel content)	1	INV, GF
Zinc & compounds	Use (ore and coal content)	1	DM, GF

* Substances included in Table 1 of the *NPI Guide*

Notes:

DM:	Direct Measurement	€	Direct measurement of NPI reportable emissions in the discharge
INV:	Inventory	€	stream (total N and P) , or characterisation of the material; Inventory or material use (chemicals, fuel), with NPI content of
GF:	Generic Factor	€	materials identified; Generic factor applies to default concentrations to be used in the
EF:	Emission Factor	€	absence of facility-specific data; Emission factor to determine content in discharge stream (e.g. total
			N and P);
C:	Capacity	€	Capacity applies to the storage capacity of a facility, maximum

			combustion rate, consumption of energy or potential maximum
EC:	Engineering Calculation	€	power consumption; and Engineering calculations may be used for a number of substances
			such as sulfur dioxide.

Please note that while the reporting threshold for a substance may not be triggered during one reporting period, it may be triggered in a following reporting period. It is important to review NPI reporting requirements each reporting period.

Appendix 4: Independent Peer Review and Proponent Response Information

The scope of the Environmental Resources Management Australia Pty Ltd (ERM) review of the Air Quality Assessment was based on the requirements of the Protocol from Environmental Management (Mining and Extractive Industries) and the State Environment Protection Policy (Air Quality Management) 2001 (SEPP AQM).

As with every other document in the EES, ERM produced a statement of limitations. These included that it was limited to identifying typical environmental conditions at the site and did not involve checking the accuracy of any data or information provided.

Therefore it was only checking the meteorological conditions not whether the emissions information provided either to or by Katestone was reliable. No assessment of actual contaminants was made. That information was obtained from Kalbar without checking on its provenance or validity.

P 2. PEM requires identification of indicators at individual sites be done prior to Air Quality Monitoring to ensure appropriate indicators are included in the assessment. The PEM requires identification and assessment of all indicators of concern and should consider all sources of emissions as well as the type of rock and soil. The NPI Emissions Estimation Technique for Mineral Sands Mining provides an excellent guide to the sources of pollution from mineral sands mine and the types of pollutants likely to be found in mineral sands mines.

A PEM Level 1 assessment was required because of the size of the mine and proximity of sensitive receptors. ERM note that the cumulative impacts of all sources must not pose an unacceptable risk to the health and amenity of local residents and that the beneficial uses specified in the SEPP (AQM) are protected.

The aim is to ensure emissions that remain after appropriate control practices, best practice of Maximum Achievable Extent are applied. The original Katestone report did not follow the PEM requirements and the revised one only the absolute minimum.

ERM	Katestone	
Says EP act incorrectly quoted by Katestone and that it establishes SEPPs and other to protect the environment		
Says the EPA Act 2018 makes a general environmental duty criminally enforceable – and should thus be followed		That it may not be in force when project assessed should not be an excuse for the regulator (who represents the government and its intentions) or the proponent to avoid it
PEM requires different data requirements for each level of assessment		
Katestone should have developed the meteorological date prior to Air Quality Assessment commencing		
First dataset was incomplete and Katestone updated – filled in gaps, concerned about approach used	Stochastic method and used autumn data	No indication of the missing dates, seasonal changes are quite violent, autumn is the mildest and least windy time of the year in the area. It would only have taken a 5 minute chat to a local to discern that. Seems odd that the 'fill the gaps' choice results in the most misleading results
Random assignment of $PM_{2.5}$ and PM_{10} values		
Ecotech not NATA accredited for methods used in background monitoring		
Katestone did not use the PEM required method for		

monitoring RCS and heavy metals, and didn't include quartz, tridymite and cristobalite in the analysis – should undertake additional sampling of RCS – needs validation on a low volume sampler continuous for 1 week		
Katestone claims, without evidence, that overwhelming majority of natural silica is alpha quartz – PEM requires all three types to be assessed		
Gaps in background dataset for RCS in late summer and early autumn		Filled in gaps claimed levels are lower, claims that topsoil, overburden and fine tailings samples show RCS is low – this is patently untrue – she used Kalbar information and they have been misleading about the overburden (excluding the upper sands that Oresome and Rio Tinto (and any other mineral sands company would call overburden.
Best practice – efficient techniques to give demonstrable minimization of emissions		
MEA – most effective to give at least as good as best practice from national and international perspective		
Class 2 indicators to go beyond best practice		

Class 3 indicators (RCS and radionuclides) require MEA		
Katestone used information from coal mines – should have used information from mineral sands mines – and not indication of whether those mines actually did employ best practice or MEA (not consistent with the PEM)	Claims they used Douglas to show summary of PM10 monitoring at key sensitive locations around the mine during construction, operation and rehabilitation.	Bad choice given the impacts on people and failure to monitor correctly and definitely did not result in MEA as all people within kilometres were effected by the fallout of the dust. Keysbrook misleading as no overburden there (and Douglas had on 6-8 metres overburden (including topsoil)
Does not explain how Keysbrook case study meets best practice	No response	
Katestone does not say what's needed for MEA – merely refers to standard practice and additional measure	See sections 3.4 and 3.5 – are they really best practice?	
No modelling was done to show effects of employing best practice or MEA	Used dispersion modelling of management measures to evaluate residual effects – claimed ceasing activities at certain times would give compliance	Douglas claimed the same and then refused to honour the commitments in practice. Told farmer they would have to pay the company $70,000 a day to stop operations
Used emission controls to meet the air quality standards which is inconsistent with the SEPP and PEM	Doesn't accept criticism – claims wait till get exceedances then review practices – still claims no exceedances	Relies heavily on assuming information about pollutants has been accurate and the meteorological modelling is reliable
Other substances beyond PM10 and PM2.5 & RCS should be considered (NPI EET); should identify all indicators of concern		

Should identify all sources of emissions		
Level 1 assessments require inclusion of mobile sources		
IF PEM doesn't include criteria for assessment should use Texas Centre for Environmental Quality Effects Screening Levels (TCEQ ESLs) (why not USEPA?)		
Katestone adopted TCEQ ESLs when there were Australian ones in place that were more rigorous	Objectives updated lead now 0.15 ug/m^3 over 3 months, Iron 150ug/m^3over 24 hours – incorrect as there were Australian ones that were lower and should have been used	
Katestone incorrectly states there is no deposited dust guideline – there is in the SEPP and adopts guidelines from other states – she should use Victorian and apply as a monthly (not annual) average	Katestone argues the point and considers an annual average is adequate to meet the 4g/m^2 requirement (max 2)	This is not good enough. Annual allows for far too many exceedances and too long a time between monitoring and response.
Range of indicators changed since initial draft but no justification of metals chosen or why thorium wasn't included		
Modelling to be undertaken for worst case scenario but no justification for why years 5, 8 and 12 were selected (other than for consistency with other reports)		

Need to model for construction as well as operations		Construction will be very dusty – many buildings, roads, 2.2gl freshwater dam, etc
Says need to adhere to assessment criteria at sensitive locations and state what practices will be put in place if they are exceeded - to include sporting grounds, CFA shed, school houses, horticulture		How did they decide what the sensitive receptors were
PRM – modelling to be undertaken cumulative effects of indicators for scenarios including construction activities during site development and operational phases		
AQ report claims they used the emission factors in the NPI EET for Mining and NPI EET for Combustion Engines and USEPA AP42 emission factors Should also have used all sources referred to in the NPI EET Manual for Mineral Sands Mining and Processing 2001		
Only modelled PM10 and PM2.5 in operational stage, not in construction stage – PEM requires it at all stages (claimed they'd estimated there'd be less dust then)		Claimed dust was left out of construction stage as it would be less than operations stage – must model it – what did she base the assumption on

Use wrong info for NPI EETs for Mining and Combustion engines – underestimated PM2.5 – needs to explain why the emissions factors are different		
Only used exhaust emissions from diesel generators in construction phase and didn't include vehicle exhausts		
Reporting of results must include background (as it is cumulative)		
Unclear how standard and additional controls meet requirements for best practice and MEA (Class 3 indicators) even if air quality criteria has been met		Any emissions of class 3 indicators (e.g. RCS and arsenic) to be controlled to MEA
Have applied only standard dust controls – doesn't comply with PEM -		
Modelling to be revised to include minimization of emissions by application of best practice and MEA (required in SEPP and PEM)		
Requires real-time monitoring of PM10 and linking to reactive management strategy if particles reach levels over a short time frame		Need details of what is to be included for reactive strategies as even with additional measures air criteria have only just been achieved

As will emit heavy metals need strategy to manage impacts on tank water – no discussion about those impacts		
Need monitors at boundaries to measure deposited dust monthly (max 4g/m^2/month (no more than 2g/m^2/month above background)		

Appendix 5: Examples of Information/data of concern in reports

Chain of custody protocols were not in place to enable validation of samples

NATA accreditation is inferred in relation to reports where the original testing agency clearly states that it doesn't.

Consultants relied on information provided by Kalbar and made dangerous and far reaching recommendations (e.g. not to test further for possible AMD) without checking its validity. (EGi, 2020) (Kalbar Operations Pty Lty, 2020)

Burying important health related information – e.g. that quartz (RCS) is the dominant product in silt samples and has implications for air contamination and human health (Townend, 2017)

Claiming unattended noise monitoring was done continuously for 12-14 days (288-366 hours) but NL-31 unit only has a battery life of 10-27 hours and the manual recommends it not be exposed to dust, moisture or humidity

Claiming unattended continuous vibration measurements were done over seven days (168 hours) when the equipment used only has a battery life of 30 hours.

Timing (during peak production season) and placement of noise monitors (at bottom of steep hills where low gear required) distort and give false impressions of data to try to 'elevate' ambient or background noise.

Consults reporting substances as one thing when they are actually another. (PM_{10} instead of $PM_{2.5}$) ALS reports in the same appendix state that "EA143-PM10: The PM10 samples were collected using a dichotomous sampler and the resulting fraction is actually coarse particulates. This is the particulates in the size bracket PM10-2.5. PM10 Coarse is not covered under the ALS scope of NATA accreditation. Results have been reported as PM10 at the request of the client."

Appendix E of the Works Approval Application is entitled: "Example Laboratory Reports from the Ambient Monitoring Program." Examples chosen by whom, according to what criteria? How do you choose what to leave out?

Many charts and tables do not look original. (Lee T. , 2018) Many tests performed without adequate or NATA accreditation.

The report for Work Order EM1809434 also states that “Analysis as per AS3580.10.1-2016. Samples passed through a 1mm sieve prior to analysis. NATA accreditation is not held for results reported in g/m².mth”

Further adjustments were made to previously supplied information due to the incorrect use of formulas. There is no indication of when those corrections were made or if the studies relying on them were changed accordingly.

Updated information based on full 5 years weather data clearly indicates significant risk to receptors that won’t be ameliorated by standard measures.

Appendix 6: No recognition of compounding risks

Risk based evaluation is fundamentally flawed. It assumes that the risks and consequences are known and quantifiable, and breaks risks down into the simplistic scenario of "If this then that". In a complex environment the risks and consequences may not be known, and certainly can't be quantified.

The Japanese Fukushima Daiichi nuclear disaster was a scenario where the probability of compound risks (earthquake + tsunami), quantified as low probability, had totally unacceptable consequences. What makes the Japanese experience more incredible is that earthquakes usually trigger tsunami - so the compound probability was much higher than spruiked.

Think about how many linked compound-risks are associated with the proposed Fingerboards Project that could have Fukushima disaster type consequences: East Coast Low + tailings dam failure, East Coast Low + storage dam failure, tunnel erosion + saturated soils causing tailings dam or storage dam failure, drought + strong winds .....the list goes on. None of these feel "low probability" to locals because they have the experience and knowledge to recognise compounding situations.

Using a risk-based evaluation though they will only look at probability of an East Coast Low, probability of a Tailings Dam failure, probability of tunnel erosion - all through the highly optimistic lens of the proponent who doesn't care if things go wrong.

In the industry of mining, the ‘hazards in isolation’ risk-based method allows avoidance of recognition of cumulative risks.

Dave Snowden discusses the differences between simple, complicated, complex and chaotic situations in his Cynefin Framework. Clearly the Fingerboards project meets the criteria of both complicated and complex and should not be approached in a simplistic manner that is so patently open to abuse. (Chalbafan, Leigh, Pollack, & Sankaran, 2017)

Appendix 7: Expert Position Statement standards NO2, SO2 and O3

Expert Position Statement on health-based standards for Australian regulated thresholds of nitrogen dioxide, sulfur dioxide and ozone in ambient air.

RACP
Specialists. Together
EDUCATE ADVOCATE INNOVATE

This statement was coordinated by Clare Walter (Lung Health Research Centre) and

Doctors for the Environment Australia

Maxwell Smith (Environmental Justice Australia) in consultation with Ben Ewald,

Lung Foundation Australia

Eugenie Kayak and Ken Winkel (Doctors for the Environment Australia), Ekta

CLIMATE AND HEALTH ALLIANCE

The Thoracic Society of Australia & New Zealand
LEADERS IN LUNG HEALTH

Sharma and Paula Myott (Royal Australasian College of Physicians), Kelcie Herrmann and Judy Powell (Lung Foundation of Australia), Elena Schneider-Futschik (Lung Health Research Centre), Fiona Armstrong (Climate and Health Alliance), Robyn Schofield (Melbourne Energy Institute, Clean Air and Urban Landscapes Hub, University of Melbourne), Annabelle Workman (Melbourne Sustainable Society

Institute), Prof Louis Irving (Royal Melbourne Hospital and the Peter MacCallum Cancer Centre), and Prof Gary Anderson (Lung Health Research Centre).

Background

Given the overwhelming importance of clean air to health, the statement addresses the pending revision of national standards for the air pollutants: nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and ozone (O_3).

Our Recommendations:
1. Lower the thresholds of nitrogen dioxide, sulfur dioxide, and ozone, and alter the reporting metrics. The value and forms proposed are outlined in a table on pages 3-4.
2. The network of NEPM compliance monitors should be expanded to reflect particular risks from widespread source emissions and hotspots, such as traffic on major roadways.
3. Air quality monitoring data should be made publicly available through a coordinated national website, allowing access to real-time and historical data.
4. Air quality standards should include compliance obligations and enforcement mechanisms.
5. Strong health-based standards should be set now to protect health, with an exposure reduction framework in place for continual improvement of the standards.

Ambient air quality standards for Australia are set by agreement between the various state and territory environment ministers, in a process known as the National Environment Protection Measure, or NEPM. The purpose of the NEPM is to "minimise the risk of adverse health impacts from exposure to air pollution for all people, wherever they may live". The NEPM standards are advisory and not enforceable under law. Individual states and territories use the Ambient Air Quality (AAQ) NEPM standards as a guide to form their own enforceable standards.

Australia's first AAQ NEPM standards were adopted in 1998 for six criteria air pollutants; particulate matter, lead, carbon monoxide, nitrogen dioxide, sulfur dioxide and ozone. After 21 years, the standards for nitrogen dioxide, sulfur dioxide and ozone are under review. The standards for these pollutants are currently set well-above international best practice levels.

Nitrogen Dioxide (NO_2)

Nitrogen dioxide is formed from high temperature combustion, such as emissions from vehicles, coal-fired power stations and industrial processes. Nitrogen dioxide can irritate eyes, nose, throat and lungs, causes coughing, shortness of breath. Higher exposure causes illness and disease, impacting a wide range of organs including the lungs, heart and circulatory system. There is strong evidence for adverse effects in vulnerable groups including people with chronic disease, the elderly and children.[1]

Sulfur Dioxide (SO_2)

Fossil fuels contain traces of sulfur compounds, producing sulfur dioxide when they are burnt. The majority of the sulfur dioxide emissions come from coal-fired power generation. Exposure to sulfur dioxide can damage the lungs. People with impaired heart or lung function including asthma are at increased risk. Sulfur dioxide is involved in the creation of acid rain and secondary fine particle air pollution which causes cardiovascular and respiratory diseases, including cancer.[2] O^{zone} (O_3)

Ozone is a gas that is formed on hot sunny days when oxides of nitrogen react with organic substances in the air. Motor vehicle exhaust fumes produce as much as 70% of the oxides of nitrogen and 50% of the organic chemicals that form ozone. Ozone can impact the airways and lungs. People who are exposed to ozone can experience difficulty in breathing and coughing. Ozone can increase susceptibility to lung infections and aggravate lung diseases such as asthma, chronic obstructive pulmonary disease, and chronic bronchitis. People with asthma might have more attacks and athletes might find it harder to perform as well as usual.[3]

Health impacts: a summary of recent Australian evidence. (See table on pp.5-6)

Ambient air pollution contributes to over 3000 premature deaths each year in Australia.[4] Even at low concentrations, nitrogen dioxide, sulfur dioxide and ozone are impacting the health of Australians.

Coal-fired power stations and motor vehicles are the main sources of sulfur dioxide and nitrogen dioxide respectively, in Australia.[5,6] Diesel powered vehicles emit a much higher amount of nitrogen dioxide compared to petrol vehicles.[7]

The following studies have been conducted in Australia and published in the last decade, demonstrating statistically significant health impacts at pollutant concentrations below NEPM thresholds (summarised in table on pp.5-6).

Traffic related nitrogen dioxide is strongly associated with childhood asthma with effect sizes much greater than previous studies.[8,9,10] Increased susceptibilities have been noted in sub-groups such as younger children (between 0 - 4 years)[10,11] and carriers of specific genetic variants.[12] Nitrogen dioxide is also associated with increased risk of atopy[12] and, consistent with international evidence,[13] reduced lung function,[8,12] which can lead to lifelong adverse health effects and premature death.[13]

Adverse neonatal outcomes, including preterm birth, low weight at birth and foetal growth restriction are associated with maternal exposures to nitrogen dioxide, sulfur dioxide, and ozone.[14,15,16] Laboratory confirmed paediatric influenza has also been associated with ozone.[17]

Adverse health effects from nitrogen dioxide, sulfur dioxide and ozone are not limited to paediatric and neonatal outcomes. A longitudinal cohort of middle-aged Australians demonstrated positive associations between traffic-related nitrogen dioxide exposure and both current asthma, the incidence of new asthma, and atopy.[9,12]

Long term exposure to sulfur dioxide has been associated with cardiorespiratory mortality. The association persisted at low concentrations and was found to vary across the geographic area of Brisbane.[18]

Reducing air pollution in Australia

Air pollution 'hotspots' - both in urban and regional areas close to freight routes, busy roads, intersections, certain industry, mining activities and coal-fired power stations - result in some communities bearing a higher burden of air pollution health impacts and environmental injustice.[19,20,21,22]

In urban areas, vehicle emissions contribute up to 80% of nitrogen dioxide emissions.[5] Australia holds the lowest rank out of the 35 OECD countries for fuel quality.[23] While diesel vehicles are being phased out in many OECD countries due to the health impacts associated with diesel emissions, in Australia the proportion of diesel vehicles on the roads has increased.[24,25]

In response to the US Clean Air Act 1990, many US power plants installed wet flue-gas desulfurisation units (scrubbers) which can remove 99% of sulfur dioxide emissions.[26] Nitrogen dioxide emissions can also be dramatically reduced with the instillation of selective catalytic reduction.[26] None of Australia's ten largest coal-fired power stations have been fitted with these technologies. Yet internationally, many similar power stations have been successfully retrofitted with such pollution-reduction technology.[27,28]

Lowering the NEPM standards for nitrogen dioxide and sulfur dioxide, and making them enforceable, will require Australian vehicle and coal-fired power station emissions to be reduced in line with international best practice. This is an important step towards addressing the current air pollution related health inequities.

Air pollution related mortality costs the Australian public an estimated $16 billion per year.[29] In the United States, the cost benefit analysis of the US Clean Air Act for 1970 – 1990 has been estimated at a value of $US 22.2 trillion (health related economic benefits) compared to the implementation costs of $US 0.52 trillion.[30] In the UK, a study over four decades from 1970-2010, demonstrated that effective pollution control policies can bring substantial public health benefits.[31]

Our Recommendations:

Lower the thresholds of nitrogen dioxide, sulfur dioxide, and ozone, and alter the reporting metrics. The value and forms proposed are outlined in the table on p.4:

Table Key:	
Ppb	Parts per billion
RIS	Regulatory Impact Statement
99th centile	The value in a data set that is exceeded by 1% of data points
WHO	World Health Organization
Yearly worst hour	The highest value of the 8,760 1-hour values in a year. The 99th centile of hourly values potentially allows for 87 bad air days per year.
Daily worst hour	The 365 values for daily 1-hour maximum. The 99thcentile of daily worst hour permits 4 bad air days per year.

Standard (All units in ppb)	International standards	Current Australian standard	NEPM RIS proposal	Our proposal
SO_2 1-hour	US: 75, as 99th centile of daily worst hour Canada: 70, as 99th centile of daily worst hour EU: 124	200, as yearly worst hour, not to be exceeded.	100, as yearly worst hour, not to be exceeded.	60, as 99th centile of daily worst hour.
SO_2 24-hour	WHO: 7.6 EU: 44 UK: 44	80	20, no exceedances.	8, no exceedances.
SO_2 annual	Canada: 5 No standard in other jurisdictions.	20	No standard	No standard

NO_2 1-hour	WHO: 97 US: 100, as 99th centile of daily worst hour EU: 97	120, as yearly worst hour, not to be exceeded.	90, as yearly worst hour.	72, as 99th centile of daily worst hour.
NO_2 annual	WHO: 19 US: 53 EU: 19	30	19, no exceedances.	9, no exceedances.
O_3 1-hour	NZ: 70 Japan: 60	100	No standard	70
O_3 4-hour	No standard in other jurisdictions.	80	No standard	No standard
O_3 8-hour	WHO: 47 US: 70, as 99th centile of daily worst hour Canada: 63 EU: 56	No standard	65	47

(Victoria, Victorian Greenhouse Gas Emissions Report , 2019) (Victoria, Victorian Climate Science Report , 2019)

The network of NEPM compliance monitors should be expanded to reflect particular risks from widespread source emissions and hotspots, such as traffic on major roadways. Air quality standards should protect people wherever they live, including those close to coal-fired power stations and major roadways. To accurately reflect population exposure, the network of NEPM compliance monitors should be expanded to more effectively evaluate the exposure of vulnerable groups and populations living near major sources of air pollution. This includes urban roadside locations where people live, work and learn, including schools and childcare centres.

Air quality monitoring data should be made publicly available through a coordinated national website, allowing access to real-time and historical data. This should include records from daily monitoring of key pollutants, health alerts for the general public and at-risk population sub-groups, and regular modelling of dispersal from all major point sources, such as coal-fired power stations and major roadways. This is critical to provide individuals and communities with information about what they are breathing.

Air quality standards should include compliance obligations and enforcement mechanisms. A strong and proactive approach to air pollution prevention requires robust and well-resourced institutional arrangements capable of decisive policy intervention. This includes incentives and penalties that create a sufficient deterrent to prevent non-compliance. This is critical to provide affected members of the community a recourse for action when adversely affected by air pollution.

Strong health-based standards should be set now to protect health, with an exposure reduction framework in place for continual improvement of the standard, in order to “minimise the risk of adverse health impacts from exposure to air pollution for all people, wherever they may live." There is no rational basis for proposing a weak standard now and a tighter standard in future. An exposure reduction framework is required for continually improving the standards as new human and environmental health data becomes available.

Table of Australian Studies demonstrating statistically significant health impacts of nitrogen dioxide, sulfur dioxide, and ozone at concentrations well-below current and NEPM RIS proposed thresholds (published in the last decade):

Study and location	Findings
Knibbs et al. (2018)[8] Across 12 Australian cities	Small increases in nitrogen dioxide exposure are significantly associated with increased risk of asthma and reduced lung function in children (7 – 11 years). Mean NO_2 exposure 8.8ppb.
Chen (2018)[14] Brisbane	SO_2, NO_2 and O_3 associated with adverse birth effects (preterm birth and low birth weight) with the strongest effect observed for sulfur dioxide and ozone and trimester 3 exposure. Mean SO_2 1.84ppb. Mean NO_2 6.74ppb. Mean O_3 16.76ppb.
Bowatte (2018)[9] Cohort of Australians, originally recruited from Tasmania, now residing across Australia	NO_2 associated with Increased risk of both the development and persistence of asthma in middle-aged Australians. Mean NO_2 5.4ppb.
Bowatte (2017)[12] Cohort of Australians, originally recruited from Tasmania, now residing across Australia	Long term exposure to NO_2 associated with allergies, wheeze, and reduced lung function in middle aged. Carriers of GSTT1 null genotype are at increased risk. Mean NO_2 5.4ppb.
Perret et al. (2017)[32] Cohort of Australians, originally recruited from Tasmania, now residing across Australia	Positive association between NO_2 and raised Interleukin6 levels (marker of systemic inflammation). Mean NO_2 4.2 ppb.
Li et al. (2016)[15] Brisbane	Preterm birth associated with exposure to NO_2 and SO_2 directly prior to onset of labour. Mean NO_2 6.52 ppb. Mean SO_2 1.95 ppb.

Xu et al. (2013)[17] Brisbane	O_3 significantly associated with lab confirmed influenza in children 0 – 14 years. Mean O_3 15.3 ppb.
Perreira (2012)[16] Perth	Exposure to NO_2 in mid-late pregnancy is associated with increased risk of foetal growth restriction. Mean NO_2 23.04ppb.
Periera et al. (2010)[10] Perth	NO_2 exposure associated with increased hospital ED admissions for asthma in children. Children 0 – 4 years most vulnerable to the effects. Mean NO_2 6.79 ppb.
Wang et al. (2009)[18] Brisbane	Long-term exposure to SO_2 associated with cardio-respiratory mortality. Mean SO_2 5.4ppb.
Hu et al. (2008)[33] Sydney	SO_2 and high temperatures contribute to excess mortality in summers in Sydney. Mean SO_2 1 ppb.
Jalaludin et al (2008)[11] Sydney	NO_2, SO_2 and O_3 associated with ED visits for asthma in children. Results most consistent for 1 – 4 years age group. Mean NO_2 23.2 ppb.

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Appendix 8: Mental Health

EES SCOPING REQUIREMENTS -- HUMAN HEALTH

Minister's Requirement for this EES

Include potential effects of project construction and operation on air quality and noise on nearby sensitive receptors (especially residents).

Assessment of likely effects

Assess likely effects to the social cohesion, health and well-being of the communities in the vicinity of the project.

From ENVIRONMENTAL EFFECTS STATEMENT

Appendix A019 Human Health Risk Assessment

2.2 SCOPE

Evaluating potential health risks associated with predicted off-site conditions to identified populations as a result of project activities

EXTRACTS:

"Although a relatively conservative approach has been adopted, the uncertainties regarding the adequacy and quality of the data set and potential data gaps should be accounted for when considering the conclusions of the Tier 1 baseline evaluation. In particular, where uncertainties or data gaps are noted in Table 8.31, additional data collection should be considered prior to the commencement of construction, to refine the outcomes of this HHRA."

"The conclusions of the HHRA are based on the available data provided in the specialist assessments and other technical reports prepared for the project, the current project description, the limitations of the predictive modelling, and assuming implementation of the proposed management measures.

The risk assessment has been limited to addressing the impacts of selected substances, to a specific assumed receptor population under a defined exposure scenario, based on information available at the time of the assessment. The risk assessment approach presented does not consider a fully probabilistic estimate of risk, but presents conditional estimates based on assumptions regarding exposure and toxicity consistent with the internationally endorsed regulatory approaches. Further assessments would be required to assess risk where off-site uses vary from the assumed regional conditions noted and/or exposure settings used in this risk assessment."

RESPONSE

Despite the Minister's requirement that the Human Health Risk Assessment include assessment of the "likely effects to the social cohesion, health and well-being of the communities in the vicinity of the project" , this has not been adequately addressed in the report.

In the conclusion to Appendix A019, it is clear that this risk assessment has been "limited to addressing the impacts of selected substances to a specific assumed receptor population."

This "receptor population" is confined to an arbitrary radius of 5 km from the proposed mine. This completely ignores the impact of the proposed project on populations outside this 5 km radius, including the impact of dust and radioactive material carried by high wind, truck noise, availability of water resources in the Bairnsdale region, and the potential for contamination of water catchment for the Gippsland Lakes.

The 'receptor population' also excludes the very people at most risk from impacts of the mine – the farmers who Kalbar insist will be able to 'co-manage' and 'co-exist' in the project areas while the mining is occurring. Coffey claim what happens with their workers' health outcomes is a matter for the company – however given they are clearly saying farmers are expected to continue with 'business as usual' beside the miner, the health risks attributed to the project area MUST be taken into account and every possible means adopted to eliminate them.

The impact of these aspects of the proposed project on human health are dealt with in other sections of this response.

Despite the Ministerial requirement and the identified Scope of work under 2.2 of Appendix A019, the report has not addressed in any way the potential impact of the proposed project on the "social cohesion, health and well-being of the communities in the vicinity of the project."

Any consideration of these aspects of human health must include an analysis of the impact on the mental health of the communities affected by the proposed mine.

This aspect of human health is completely ignored in the Environment Effects Statement, despite this clearly being part of the Minister's requirement of the EES.

The proposed project is likely to have a significant impact on the social cohesion and well-being of nearby communities.

There are already reports of the severe detrimental impact on the mental health of landowners adjacent to the proposed mine. This has resulted from repeated approaches to landowners from Kalbar staff regarding acquisition of land, and the presumption by the project proponents that this proposal has an irretrievable momentum, regardless of the objections of the landowners and others opposed to the project.

The impact on the mental health of these landowners has been significant, giving rise to anxiety, depression, sleep disturbance, inability to function, deterioration of personal and family relationships and disruption to long-standing community friendships and associations.

In addition, the impact of mental health disorders on general human health is well understood. Mental illness is associated with increased risk of cardiovascular and respiratory disease, weight disturbance, substance abuse, diabetes and increased risk of accident and trauma.

The chronicity of this existing impact on local communities is consistent with a diagnosis of post-traumatic stress disorder (PTSD).

Post-traumatic stress disorder (PTSD) is a particular set of reactions that can develop in people who have been through a traumatic event which threatened their life or safety, or that of others around them. This could be a car or other serious accident, physical or sexual assault, war or torture, or disasters such as bushfires or floods. As a result, the person experiences feelings of intense fear, helplessness or horror.

Ref: www.beyondblue.org.au

Discussions with local landholders in the “receptor population” reveal the existence of post-traumatic stress disorder amongst this group already, even before the commencement of the mine operation.

The feelings of anxiety, depression and helplessness amongst this group are exacerbated by resentment of Kalbar’s activities in the Bairnsdale region to promote the company as a good corporate citizen through employment of a consultant to “engage with stakeholders”, and to support local sporting bodies and tourist activities with small financial contributions.

In addition, the uncertainty generated by changes to ownership of the Kalbar entity, the frequent changes in company names, and the replacement of senior administration staff within Kalbar has further increased the psychological impact of this proposal.

“ We don’t know who we’re dealing with”, “We don’t know how much overseas money is involved”, “We don’t know who is being offered large sums of money to purchase property,” “They are deliberately down-grading and underestimating the value of our vegetable-growing industry” are commonly-heard reflections from this group of landholders.”

This uncertainty has further exacerbated the PTSD suffered by this group.

It is arguable that the detrimental impact of the mine proponent’s activities over the past 6 years on the mental health of this group of landholders could justifiably give rise to a class action by this group seeking compensation for this impact on their health.

If this project is approved, it is likely that this impact will expand geographically to communities outside the arbitrary 5 km radius, as well as compound the existing impact on adjacent communities.

For example, the water storage that supplies the majority of domestic water to the towns of Bairnsdale, Lakes Entrance, Metung, Swan Reach, Nicholson, Paynesville and Nowa Nowa lies within 3.5 km of the proposed mine, in a north-easterly direction. The potential for contaminated dust from the mine carried by the prevailing south-westerly winds being deposited in this water storage cannot be underestimated.

This risk has been all but ignored by the EES and is not widely known by the East Gippsland community.

When this becomes known and understood by the wider community, regarding the threat of contamination of a fundamental human resource (reticulated water), this will inevitably have a huge psychological impact on the affected communities, giving rise to anger, severe anxiety, and exacerbation of a sense of helplessness and fear.

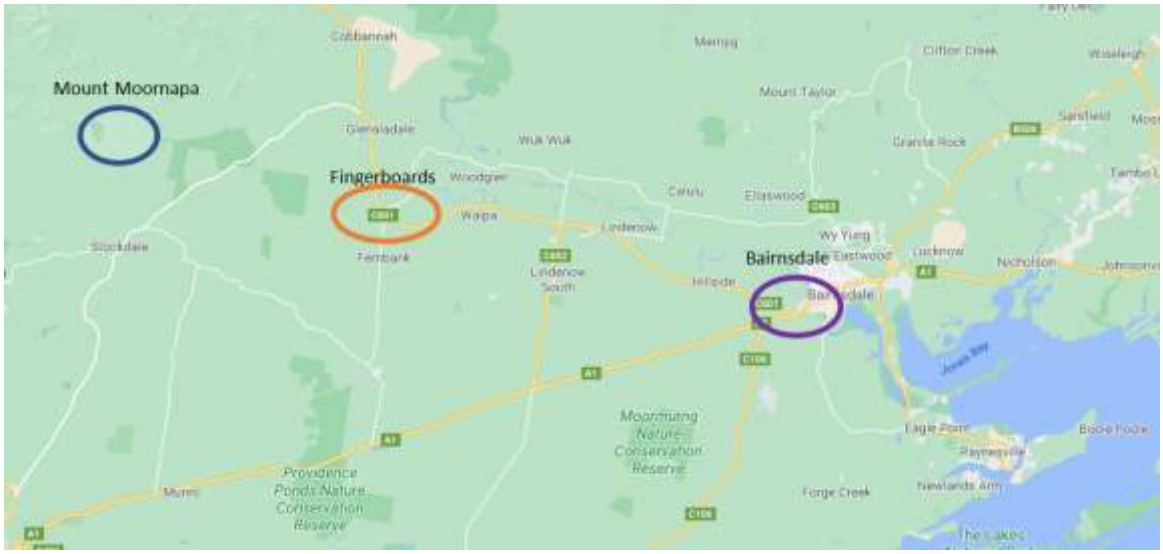
This is only one example of the risk to human health, particularly mental health, that has been ignored by this EES.

The “big picture” impact of this proposed project on the Lindenow flats horticultural industry, the amenity of the Gippsland Lakes as a major tourist attraction, and the possible contamination of the local domestic water supply are all likely to lead to loss of local jobs and loss of stable income for the region. This will further exacerbate the impact on the mental health of the East Gippsland community.

An objective risk analysis of this proposal illustrates the likely effect on the social cohesion, health and well-being of the “receptor population” as well as the wider East Gippsland community. The flow-on detrimental impact on the socio-economic fabric of the region is potentially devastating.

The sense of helplessness and loss of control in the face of decisions being imposed by “big business and government” has the potential for deterioration of the socio-economic status of the region, as a result of people leaving, fall in tourist numbers, increasing unemployment and loss of amenity of the region that has the reputation for being one of the most attractive parts of Victoria.

Appendix 9: Meteorological information



The following information challenges that put forward by Katestone in relation to meteorological activity, wind speeds and resultant risk of air contamination.

The information is critical to a number of aspects of the EES including the potential for contaminating events that could impact humans and the potential for contaminating events that may affect local businesses.

Table 3 below shows the effect of windspeed on distance travelled by particulates.

Wind speed	10 micron	5 micron
km/hr	km travelled	km travelled
4.99	0.89	3.54
9.98	1.77	7.24
19.96	3.70	14.48
39.91	7.40	28.97
60.03	11.10	43.45
79.98	14.81	58.10

Most winds are from the westerly direction (Figure 2 and Table 4). It can be readily seen that windspeeds over 40km hour will carry PM_{10} more than 7 km down the Lindenow vegetable flats and PM 5 particles further than Bairnsdale. (see Figure 2). When winds are higher than 60km per hour particulates will reach Paynseville.

Tables 4 and 5 show windspeed information for both Bairnsdale and Mount Moornapa from October 2019 to September 2020. Both indicate that windspeeds in excess of 40kph are very common and that speeds over 60kph can occur at any time of the year.

Figure 3 shows illustrates the distribution of those days through the year. It clearly shows that windspeeds over 40kph and 60kph are common throughout the year and are independent of the amount of rain.

The conclusion that can be drawn from this is there is no month of the year when people as far away as Lindenow won't be adversely affected by particulates and emanating from the mine. At the same time there is no month in the year when vegetable crops are going to be save from contamination by mine dust.

Those particulates could comprise airborne thorium, respirable crystalline silica or any of a number of hazardous elements. There is no chance of the mine being able to control the dust from the mine – and in fact their air quality report indicates they are not even acknowledging it will be a problem.

Given readily available information from a number of BOM sites it is difficult to understand how monitoring equipment at the Fingerboards failed to register the monotonously regular occurrence of windspeeds over 40kph.

Of as great concern is that the public has still not been made fully aware of what is in the overburden and upper sands that will pose a health risk.

Kalbar's water estimates do not allow for the constant dampening down of overburden and topsoil stockpiles necessary to avoid airborne contamination, or even if that is possible.

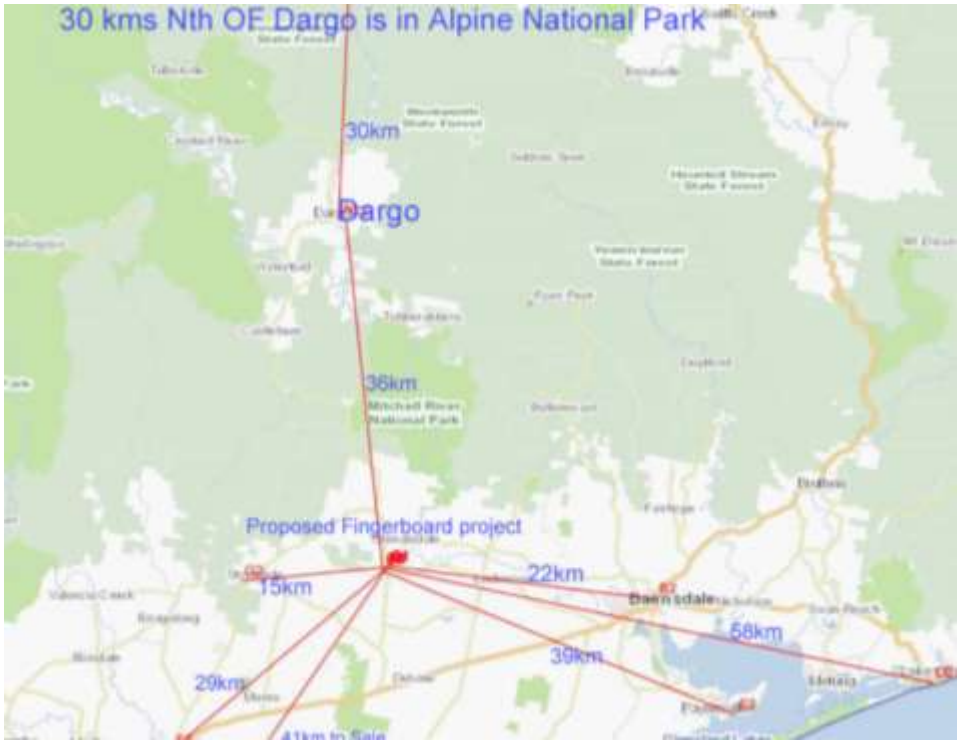


Figure 27*:Distances from project to key tourist locations*

Maximum wind gust data from nearby weather station 0ct 19-Sep20

Maximum wind gust data from Bairnsdale BOM weather station: October 2019 – September 2020

Daily Weather Observations for Victoria (A - B)

Aust. Gov. Bureau of Meteorology

http://www.bom.gov.au/climate/dwo/IDCJDW0301.shtml

Direction	Maximum	Observations	≥50 gust	% >50 gusts	
E	69		25	3	12
ENE	43		5	0	0
ESE	63		41	2	4.878049
N	46		4	0	0
NE	35		2	0	0
NNE	31		2	0	0
NNW	65		24	7	29.16667
NW	69		15	2	13.33333
S	57		13	2	15.38462
SE	41		34	0	0
SSE	44		14	0	0

SSW	65		21	6	28.57143
SW	98		29	18	62.06897
W	83		34	15	44.11765
WNW	81		24	10	41.66667
WSW	104		74	36	48.64865

Figure 28*:Windspeeds throughout the year.*

Direction of wind gusts

Table 3: Mount Moornapa meteorological information October 2019 - September 2020

Km/hr	No of days	Direction of gusts	Months
90-93	3	NNW(2), NW (1)	Sep, Oct, Nov
80-89	2	NW(1), WSW(1)	Aug, Nov
70-78	7	NNW(2), WSW(1), WNW(1), W(1), NW(2)	Apr, Sep, Oct, Nov
60-69	13	NW(4), NNW(4), W(2), WNW(1), WSW(2)	Jan, Feb, Apr, May, Sep, Oct, Nov, Dec
50-59	31	W(7), NNW(3), NW(3), SSE(1), SSW(1), SW(7), WNW(5), WSW(4)	Jan, Feb, Mar, Apr, May, Jun Aug, Sep, Oct, Nov, Dec
40-49	40	NNW(6), ESE(2), NW(4), S(1), SSE(1), SSW(2), SW(9), W(3), WNW(6), WSW(7),	Jan, Feb, Mar, Apr, May, Jun Aug, Sep, Oct, Nov, Dec
Days when wind is over 40kph		NNW(17), NW(15), WNW(13), W(13), WSW(15), SW(16), SSW(3), SSE(2), ESE(2)	All months except July (21 days figures missing) had winds over 40kph. Nov (6), Sep (5), Oct (5), are windiest months, Followed by Feb (3), Apr (4), May, Aug (3)

Appendix 10: Health Risks Associated with Mineral Sands

Introduction

Victorian legislation pertaining to Mineral Sands Mining that aims to protect the health and safety of employees and nearby residents (sensitive receptors) is limited. Whereas there is publicity strongly promoting mineral sands mining in Victoria.

The documents mainly used for this paper include: Safe Work Australia, "Guidance on the Interpretation of Workplace Exposure Standards for Airborne Contaminants" April 2012; the Occupational Health & Safety Act, 2017 (Victoria), and a Western Australian Industry Regulation fact sheet on Mineral Sands Mining or processing, 2018.

Health risks to employees and sensitive receptors

Exposure standards and monitoring

Exposure to substances in or near the workplace can occur through inhalation, absorption through the skin, or ingestion. Most exposure occurs through inhalation of vapours, dusts, fumes, or gases. The response of the body from exposure to substances and mixtures depends on the nature of the substance, the health effects they can cause, and the amount absorbed by the body.

The extent to which the person is exposed depends on the concentration of the substance or mixture in the air, the amount of time the person is exposed and the effectiveness of controls.

Substances or mixtures may cause immediate acute health effects, or it may be decades before the effects on the body become evident.

Exposure standards are the airborne concentration of a particular substance or mixture that must not be exceeded. Three types of exposure standard: 8-hour time weighted average; peak limitation; and short-term exposure limit.

Where monitoring of airborne contaminants is used to estimate a person's exposure, the monitoring must be conducted in the breathing zone of the person, i.e. via "personal monitoring". These samples are usually obtained by fastening a sampling device to the shirt or jacket lapel of the person.

Static sampling at fixed locations cannot provide personal exposure information, and their use must be limited to tasks such as assessing process control measures.

Fixed continuous monitoring is required to give early warning of leaks or other contaminating sources that could lead to exposures above the exposure standard.

Analysis of samples should be carried out by a NATA-accredited laboratory.

For some hazardous chemicals, health monitoring may also be required, including biological monitoring.

Specific Groups of Substances

Carcinogens. It can take many years, even decades, for a clinical diagnosis of cancer to be made following exposure, often long after cessation of exposure. (Category 1 – known or presumed human carcinogens; Category 2 – Suspected human carcinogens). Where substitution is not possible, engineering controls and PPE, with routine air monitoring, and sometimes health monitoring. Thorium is a class 1 carcinogen, chromates, radioactive elements, asbestos, titanium (in Ilmenite) – see list below

The OH&S Act States in S174:

Requirement to hold carcinogens licence

(1) A person must not perform work or carry out an activity involving a Schedule 10 carcinogenic substance at a workplace unless—

(a) the workplace is a laboratory; and

(b) the person—

(i) holds a licence to use a Schedule 10 carcinogenic substance at that laboratory issued under Part 6.1 (Licences); or

(ii) is an employee of a holder of such a licence.

S176 Statement of work with scheduled carcinogenic substance

(1) This regulation applies if a person has worked with a scheduled carcinogenic substance at an employer's workplace.

(2) The employer must give the person a written statement in accordance with subregulation (3) when the person ceases to work at the workplace.

(3) The written statement must contain the following—

(a) the name of any scheduled carcinogenic substance that the person worked with at the employer's workplace.

(b) the period during which the person worked with the scheduled carcinogenic substance.

(c) details of how and where records kept under regulation 175 may be obtained.

(d) a statement advising the person to have periodical health assessments and details of the types of tests that are relevant.

Sensitisers. some substances (e.g. western red cedar, toluene diisocyanate and formaldehyde, flour, grains, and some organic and inorganic chemicals) can cause an immune response in some people. Sensitisation is a specific immune response – skin rash, asthma. Can be fatal.

Ototoxic chemicals. Exposure to some chemicals can cause deafness, which is even more likely If also exposed to noise. These substances include toluene, xylene, n-hexane, organic tin, carbon disulphide, styrene, carbon monoxide, organic lead, organophosphate pesticides, lead, manganese, hydrogen cyanide, and mercury.

Mutagens, teratogens. Exposure to some chemicals can change genetic structure and lead to birth deformities. Include Radioactive substances.

Neurotoxins. These substances damage or destroy the tissues of the nervous system, especially neurons, but also grey matter, myelin and the dendrites or axons. Neurotoxicity can be acute or chronic, but the effects are often irreversible. Acute effects occur after a high exposure to a neurotoxin and are rapidly reversible once exposure stops. Chronic effects follow repeated low-level exposures and are due to degeneration of components of the structure of the nervous system. Symptoms of neurotoxicity include dizziness, euphoria, impaired coordination, sleep disorders and dementia. Examples of neurotoxins are lead, mercury, benzene and toluene.

Irritants. These can affect eyes, skin, or mucous membranes. Acid, alkali or other irritating particulates, especially mists.

Systemic toxicity. This is the effect of a substance on the body after absorption into the blood stream. The effects can be acute or chronic. It can occur through inhalation, absorption through the skin or ingestion. Include Arsenic, antimony, cadmium, lead, manganese, zinc

Ocular effects. Eye irritation, halo vision, or serious eye damage.

Simple asphyxiants. These are non-toxic gases which when present in high concentrations, lead to reduction in oxygen concentration by displacement or dilution. Confined spaces are a good example where this happens and leads to death.

Fibrogenic reactions in the gas exchange regions of the lungs due to the presence of materials such as asbestos and quartz

Rare Earth Minerals

A rare-earth mineral contains one or more rare-earth elements as major metal constituents. Rare-earth minerals are usually found in association with alkaline to peralkaline igneous complexes, in pegmatites associated with alkaline magmas and in or associated with carbonatite intrusives. Perovskite mineral phases are common hosts to rare-earth elements within the alkaline complexes. Mantle-derived carbonate melts are also carriers of the rare earths. Hydrothermal deposits associated with alkaline magmatism contain a variety of rare-earth minerals.

The following includes the relatively common hydrothermal rare-earth minerals and minerals that often contain significant rare-earth substitution:

aeschynite	cerite	stillwellite
allanite	fluocerite	synchysite
apatite	fluorite	titanite
bastnäsite	gadolinite	wakefieldite
britholite	monazite	xenotime
brockite	parisite	zircon

Monazite is a reddish-brown phosphate mineral that contains rare-earth elements. Due to variability in composition, monazite is considered a group of minerals. The most common species of the group is monazite-(Ce), that is, the cerium-dominant member of the group. It occurs usually in small isolated crystals. It has a hardness of 5.0 to 5.5 on the Mohs scale of mineral hardness and is relatively dense, about 4.6 to 5.7 g/cm^3. There are at least four different "kinds" (actually separate species) of monazite, depending on relative elemental composition of the mineral:[5]

monazite-(Ce), (Ce,La,Nd,Th)PO_4 (the most common member),

monazite-(La), (La,Ce,Nd)PO_4,

monazite-(Nd), (Nd,La,Ce)PO_4,

monazite-(Sm), (Sm,Gd,Ce,Th)PO_4.

The elements in parentheses are listed in the order of their relative proportion within the mineral: lanthanum is the most common rare-earth element in monazite-(La), and so forth. Silica (SiO_2) is present in trace amounts, as well as small amounts of uranium and thorium. Due to the alpha decay of thorium and uranium, monazite contains a significant amount of helium, which can be extracted by heating.[6]

Monazite is an important ore for thorium,[7] lanthanum, and cerium.[8] It is often found in placer deposits. India, Madagascar, and South Africa have large deposits of monazite sands. The deposits in India are particularly rich in monazite.

Monazite is radioactive due to the presence of thorium and, less commonly, uranium. The radiogenic decay of uranium and thorium to lead enables monazite to be dated through monazite geochronology. Monazite crystals often have multiple distinct zones that formed through successive geologic events that lead to monazite crystallization.[9]. These domains can be dated to gain insight into the geologic history of its host rocks.

Zircon is a mineral belonging to the group of nesosilicates. Its chemical name is zirconium silicate, and its corresponding chemical formula is $ZrSiO_4$.Because of their uranium and thorium content, some zircons undergo metamictization. Connected to internal radiation damage, these processes partially disrupt the crystal structure and partly explain the highly variable properties of zircon. As zircon becomes more and more modified by internal radiation damage, the density decreases, the crystal structure is compromised, and the colour changes.

Zircon has played an important role during the evolution of radiometric dating. Zircons contain trace amounts of uranium and thorium (from 10 ppm up to 1 wt%) and can be dated.

Zircons from Jack Hills in the Narryer Gneiss Terrane, Yilgarn Craton, Western Australia, have yielded U-Pb ages up to 4.404 billion years, interpreted to be the age of crystallization, making them the oldest minerals so far dated on Earth. In addition, the oxygen isotopic compositions of some of these zircons have been interpreted to indicate that more than 4.4 billion years ago there was already water on the surface of the Earth. This interpretation is supported by additional trace element data but is also the subject of debate. In 2015, "remains of biotic life" were found in 4.1 billion-year-old rocks in the Jack Hills of Western Australia. According to one of the researchers, "If life arose relatively quickly on Earth ... then it could be common in the universe."

Titanite, or sphene is a calcium titanium nesosilicate mineral, $CaTiSiO_5$. Trace impurities of iron and aluminium are typically present. Also commonly present are rare earth metals including cerium and yttrium; calcium may be partly replaced by thorium.

Titanite is a source of titanium dioxide, TiO_2, used in pigments.

Silicate minerals are rock-forming minerals made up of silicate groups. They are the largest and most important class of minerals and make up approximately 90 percent of the Earth's crust.

In mineralogy, silica (silicon dioxide) SiO_2 is usually considered a silicate mineral. Silica is found in nature as the mineral quartz, and its polymorphs.

In mineralogy, silicate minerals are classified into seven major groups according to the structure of their silicate anion:[4][5]

Major group	Structure	Chemical formula	Example
Nesosilicates	isolated silicon tetrahedra	$[SiO_4]^{4-}$	olivine
Sorosilicates	double tetrahedra	$[Si_2O_7]^{6-}$	epidote, melilite group
Cyclosilicates	rings	$[Si_nO_{3n}]^{2n-}$	tourmaline group
Inosilicates	single chain	$[Si_nO_{3n}]^{2n-}$	pyroxene group
Inosilicates	double chain	$[Si_{4n}O_{11n}]^{6n-}$	amphibole group
Phyllosilicates	sheets	$[Si_{2n}O_{5n}]^{2n-}$	micas and clays
Tectosilicates	3D framework	$[Al_xSi_yO_{(2x+2y)}]^{x-}$	quartz, feldspars, zeolites

Airborne particulates.

Airborne contaminants that can be inhaled directly and are classified on the basis of their physical properties either as gases, vapours or particulate matter. These are discrete particles that may be further characterised as dusts, fumes, smokes or mists.

The factors that determine the degree of hazard are:

The type of particulate involved and its biological effect

The concentration of airborne particulates in the breathing zone of the person

The size of particles present in the breathing zone

The duration of exposure (possibly in years)

The chemical composition and physical characteristics of the particulate determine the biological effect of the substance or mixture:

Particle Size: Inhalable dusts and respirable dusts

Inhalable dusts can enter the nose and mouth during normal breathing. They may be deposited in the respiratory tract. Inhalable dusts should be measured according to Australian Standard 3640. The inhalable mass fractions of inhalable dust are defined in ISO 7708. The Inhalable fraction of dust entering the respiratory tract may be further divided into respirable and non-respirable fractions.

Respirable fraction is composed of very fine dust which is able to reach the lower bronchioles and alveolar regions of the lungs.

- 2 microns has 97% respirability.
- 3 microns has 80% respirability.
- 6 microns has 20% respirability.
- 10 microns has 2% respirability.

Nuisance dusts (not otherwise classified)

High concentrations of dust can cause unpleasant deposition of dust in the ears, eyes and upper respiratory tract, and reduce visibility. Mechanical removal of them may cause injury to the skin or mucous membrane.

Continuous monitoring of dusts is required, in particular, dusts less than 10 microns in size, including all radioactive elements, Hg, Pb, titanium, silica.

The OH&S Act states in S 166 Atmospheric monitoring

(1) An employer must ensure that atmospheric monitoring is carried out in relation to a hazardous substance supplied to or generated at the employer's workplace if there is an exposure standard for the hazardous substance or any of its ingredients and—

(a) there is uncertainty (based on reasonable grounds) as to whether the exposure standard is or may be exceeded; or

(b) atmospheric monitoring is necessary to determine whether there is a risk to health.

(2) Subregulation (1) does not apply to a hazardous substance if health monitoring is required for the substance under regulation 169 and the health monitoring includes biological monitoring.

167 Provision of results of atmospheric monitoring

An employer must provide the results of any atmospheric monitoring at the employer's workplace as soon as reasonably possible to any employee who has been, or who may be, exposed to the hazardous substance that is the subject of the monitoring.

168 Records of atmospheric monitoring

(1) An employer must keep a record of the results of atmospheric monitoring for—

(a) a period (not exceeding 30 years) that is determined by the Authority; or

(b) 30 years, if no period has been determined by the Authority.

(2) In determining a period for the purposes of subregulation (1)(a), the Authority may specify different periods for different hazardous substances or different classes of hazardous substances.

(3) An employer must ensure that the record of atmospheric monitoring is readily accessible to any employee who has been, or may be, exposed to the hazardous substance that is the subject of the monitoring.

169 Health monitoring Part 4.1—Hazardous substances Occupational Health and Safety Regulations 2017 S.R. No. 22/2017 178

(1) An employer must ensure that health monitoring is carried out for an employee if—

(a) the employee is exposed to any hazardous substance—

(i) listed in column 2 of Tables 1 or 2 of Schedule 9; or

(ii) determined by the Authority to be a hazardous substance for which health monitoring is required; and

(b) the exposure of the employee to the hazardous substance is reasonably likely to have an adverse effect on the employee's health under the particular conditions of work at the workplace.

Notes: The purpose of the health monitoring is to monitor the employee's health for the purpose of identifying changes in the employee's health status due to occupational exposure to a hazardous substance.

Silica

Exposure to respirable silica dust, which is fragmented crystalline silica, can lead to silicosis, lung cancer, and COPD. As a result, OSHA has instituted regulations to reduce the permissible exposure limit (PEL) of respirable silica dust on construction sites. These new reduced PELs have been in effect since September 23, 2017, however they only protect machine operators. There are no regulations for bystanders or enforced protections for surrounding civilians. Unfortunately, the nature of respirable dust particles can put bystanders at risk of inhalation exposure far beyond the confines of the construction site.

Dust size is important in determining potential associated health hazards. Dust particles need to be smaller than 200 microns to become airborne and smaller than 10 microns to be classified as “respirable.” Respirable dust is able to penetrate the body’s natural defences and travels to the lungs which can lead to serious health hazards. Naturally, the size of the dust particle dictates how far it travels when airborne. Wind speed is another contributing factor to distance travelled: as wind speed increases, so does the distance travelled by the respirable dust particles.

Table 1: 10-micron particle

Wind Speed (mph)	Distance Traveled (miles)
3.1	55
6.2	11
12.4	2.3
24.8	4.6
37.3	6.9
49.7	9.2

Table 2: 5-micron particle

Wind Speed (mph)	Distance Traveled (miles)
3.1	2.2
6.2	4.5
12.4	9
24.8	18
37.3	27
49.7	36.1

Quartz, cristobalite, tridymite, fumed silica, coal dust (<5% silica) and soapstone all have exposure standards based on the respirable dust fraction.

Generally only the crystalline forms of silica are fibrogenic. Amorphous silica can be converted to crystalline forms (tridymite and cristobalite) at high temperatures (870 and 1470 degrees C respectively).

How far can airborne dusts travel

Respirable dusts containing silica and other toxic substances in a wind of 40kph will travel 7 kms if 10microns and 29 kms if 2.5 microns.

In 20kph winds, dusts of 2.5microns will travel over 14kms. In very high winds, these dusts can travel 50 kms.

Woodglen and Lindenow have primary schools. There are 80 residents within a few kms of the mine. The reservoirs containing drinking water are < 3kms from the mine. The vegetable growing is adjacent to the mine. The Mitchell River is also adjacent to the mine and will transport substances into the Gippsland lakes.

Kalbar have identified receptor populations as residential populations within 5km radius of the boundary of the project area; transport route residents adjacent to heavy mineral concentrate transport routes (into Bairnsdale); horticulture farmers in the Lindenow Valley, within 5 km radius; recreational users of waterways within 5km radius.

A 5km radius is inadequate, as the prevailing winds in the area are consistently high for much of the year, and dusts will travel 25kms in high winds.

Thorium

Inhalation of thorium dust particles is linked to lung and pancreatic cancers – measurable in urine, faeces and exhaled air.

Alpha particles can penetrate the skin of the face where epidermal thickness is only 10-40micron. Lens of eye is radiosensitive, and cataract is commonly seen in occupational exposure.

Exposure to radioactive elements can damage DNA (measurable as MicroNuclei). Research into a mineral sand mine in Sri Lanka showed MicroNuclei (MN) frequency among people residing near Lanka Mineral Sands mine is higher than that of those residing more than 25 kms away. This means there are chromosomal abnormalities in these people linked to the radioactivity of the mineral sands mined. Distance from LMS significantly and negatively correlated with MN frequency.

Industry Regulation fact sheet – WA government: Mineral Sands mining or processing, 2018, states:

Monazite, a rare earth phosphate is radiologically the most significant mineral, containing typically between 5-7% thorium and 0.1 and 0.3% uranium. It might be low volume product, comprising 0.5% of the total mineral sand production, but it preferentially concentrates in airborne dust because it is softer than titanium and zirconium bearing minerals. This is of particular concern during the processing of mineral sands because the minerals are subjected to a variety of vigorous physical treatment processes, such as screening and magnetic, electrostatic and gravity separation. Without the application of appropriate dust control technology, considerable airborne dust (and consequently radioactivity) concentrations may be experienced by workers who operate and maintain the separation plant.

During mining and the process of separating heavy minerals at the mill, radionuclides are accumulated in the monazite sands. Monazite is stored in the mounds leading to high amounts of radionuclides in the soil.

It is necessary to monitor the radionuclides washed down the river into the lakes – river sediments accumulate at river mouths leading to high activity levels – thorium 232, and potassium 40.

Thorium oxides have a very long half-life of clearance from the lungs. Thus bioassay measurements, apart from analysis of faeces, will reflect long-term chronic inhalation.

Mineral sands mining or processing premises may disturb or generate acid sulphate soils, and the propensity to involve acid sulphate soils should form part of the assessment.

Mineral sands mining and processing may result in concentration of Naturally Occurring Radiological Material (NORM). This can produce radiological risks.

Monitoring of ambient noise and dust levels may be required where there is a risk from mine operations on sensitive receptors. Where receptors are within close proximity and the determined risk of impact is high, continuous monitoring may be required in order to demonstrate compliance with prescribed standards and provide assurance of the effectiveness of noise and dust management at the site.

Monitoring of groundwater levels and quality may also be required where there is a risk of groundwater mounding and/or contamination from the seepage of residues from deposited mine tailings. Monitoring of groundwater quality (pH, total dissolved solids, total acidity, total alkalinity etc) may also be required where there is a risk of direct and/or indirect disturbance of acid sulphate soils.

The volume and quality of waste discharged onto lands or waters, including tailings, may require monitoring to demonstrate the quality of the discharge is environmentally acceptable and determine the annual discharge fee payable. Pollutants monitored can include, but are not limited to, total dissolved solids, total suspended solids, total titratable acidity, and sulphate.

Other Health & Safety Risks

Noise: EPA 2011

Noise from industry in regional Victoria (NIRV): Recommended maximum noise levels from commerce, industry and trade premises in regional Victoria (NIRV) is a non-statutory guideline published by the EPA. It provides recommended maximum noise levels ('recommended levels') for noise from industry. It provides a formula and examples.

NIRV's recommended levels do not have the force of law. Statutory instruments, such as a planning permit or notice, can be used to give legal effect to the recommended levels.

Considerations for amenity protection, sleep and land-use zoning - NIRV states that the recommended levels promote normal domestic use of the home and sleep at night. It also highlights that the level of protection for residents will vary with land-use zoning.

NIRV draws attention to cases where residential areas are adjacent to heavy business or industrial zones. This is because, in limited cases, the NIRV zoning levels are higher than those most recently recommended by the World Health Organization – Europe to protect sleep (for example, where residential premises are adjacent to an Industrial 1 Zone).

WHO Night Noise Guidelines for Europe, 2009. These guidelines are not applicable outside of the European Region but have been considered during development of NIRV. The guidelines recommend a night noise guideline target of 40 dB and an interim target of 55 dB (night, outside).

The recommended levels in these situations place some expectation on residents living adjacent to industrial zones to take reasonable steps to promote sleep. Taking these steps (such as arranging bedrooms away from the industrial area) would provide a greater degree of acoustic attenuation than generally assumed under the WHO guidelines, and would therefore provide a suitable degree of sleep protection for the situation. However, house layouts are set and living and sleeping arrangements not easily or economically achieved.

The NIRV recommended levels are commonly applied in quiet rural settings. In these environments new industry noise sources may change the local sound environment. Government regulators need to be aware of these changes. The recommended levels do not protect some locations, such as parks and reserves, from industry noise intrusion.

While the recommended levels provide reasonable protection, they are not set to preserve the existing ambient sound environment or attain inaudibility. Such outcomes would be in many cases unattainable for industry, or would otherwise be more stringent than necessary for reasonable protection of the 'beneficial uses' (see SEPP N–1 explanatory notes, Table 1 of these explanatory notes) of noise-sensitive areas.

Decisions to either oppose a proposal or explore lower-noise design would be made by the approving body. If a lower-noise design is explored, NIRV provides for criteria based on 'octave band' levels. These are expressed as a range (5–10 dB), as EPA anticipates that a proponent would engage the advice of an acoustic consultant to assess what noise control options and acoustic performance is achievable and feasible for the project.

The 'octave band' criteria control low-frequency noise from industry. This approach recognises that the spread of sound over large distances in a rural environment can be enhanced by wind or temperature inversion, and that this can be a particular issue with the spread of low-frequency noise at great distances. The 'octave band' criteria can be employed to minimise this intrusion.

The council can, through the planning process, request the applicant to address its noise contribution in light of the other existing and potential industry.

<u>The OH&S Act Part 3.2—Noise Occupational Health and Safety Regulations 2017 S.R. No. 22/2017</u>

74 states:

A determination under subregulation (1)— the employer

(a) must take into account—

(i) the level of noise to which the employee is exposed; and

(ii) the duration of the exposure; and

(iii) plant and other sources of noise at the workplace; and

(iv) systems of work at the workplace; and

(v) any other relevant factors; and

(b) must not take into account the effect of any hearing protectors the employee may be using.

34 Control of exposure to noise

(1) An employer must ensure that no employee at the workplace is exposed to noise that exceeds the noise exposure standard.

(2) For the purposes of subregulation (1), the employer must, so far as is reasonably practicable, eliminate the source of noise to which an employee is exposed.

(3) If it is not reasonably practicable to eliminate the source of the noise, the employer must reduce the exposure of the employee to noise so far as is reasonably practicable by—

(a) substituting quieter plant or processes; or

(b) using engineering controls; or

(c) combining any of the risk control measures referred to in paragraphs (a) and (b).

(4) If the employer has complied with subregulations (2) and (3) so far as is reasonably practicable and an employee is still exposed to noise that exceeds the noise exposure standard, the employer must reduce the exposure of the employee to noise, so far as is reasonably practicable, by using administrative controls.

(5) If the employer has complied with subregulations (2), (3) and (4) so far as is reasonably practicable and an employee is still exposed to noise that exceeds the noise exposure standard, the employer must provide hearing protectors to reduce the exposure of the employee to noise, so that it does not exceed the noise exposure standard.

(6) The employer providing hearing protectors under subregulation (5) must, when selecting the hearing protectors, consider—

(a) the nature of noise at the workplace; and

(b) noise levels at the workplace; and

(c) the duration of exposure to noise; and

(d) systems of work at the workplace.

Note

The nature of the noise at the workplace may involve consideration of the frequency component, impulse or other relevant matters.

Acidification of water, soil, air.

Acid sulphate soils and rocks can affect land use and development. Their classification and management need to be considered during the planning stage – before land is cleared, drained or construction works begin. Disturbance of acid sulphate soils and rock can adversely impact land, water, and ecosystems in the following ways:

• Environmental quality — affecting soil quality, surface and groundwater quality, and aquatic habitats.

• Agricultural practices — loss of rural productivity, loss of commercial and recreational fisheries, the cost of additional lime and fertilizer requirements and degradation of drainage systems.

• Engineering and landscaping works —– the corrosion of concrete and steel and the design of transport structures (i.e. road or rail), buildings, embankments, and drainage systems to avoid impacted areas.

• Human health — skin and eye irritation, contamination of drinking water and occupational health and safety risks.

The potential environmental impact of acid sulphate soils depends on a number of factors, including the following:

Exposure to oxidising conditions — acid sulphate soils cannot commence generating acidic discharges unless exposed to oxygen and water.

The volume, texture and sulfidic characteristics of the soil being disturbed — higher volumes of disturbance, greater porosity (i.e. sands), or higher percentages of sulphide often result in higher rates of acid generation and greater impacts.

Capacity for self-neutralisation — acidic discharges may be neutralised as they occur, depending on the content and nature of neutralising material present in the soil, including organic material and/or carbonates (e.g. fine-grained shell matter or lime).

The acid buffering capacity of the receiving environment — for example, some water environments. Acid buffering capacity of soil and water is often limited, so may not provide neutralising capacity in the long term.

The concentrations of aluminium, iron and other metals in soils or rock and the potential for acidic discharges to dissolve these metals

For more information consult the Victorian Best Practice Guidelines for Assessing and Managing Coastal Acid Sulphate Soils.

It is required that there be continuous monitoring of dusts, in particular, dusts less than 10 microns in size, all radioactive elements, Hg, Pb, titanium, silica; and

Regular assessment of sulphuric acid, SO2 – water, air, and soil.

Truck movements

80 Double-D truck movements onto the highway going into Bairnsdale. I.e. one every18 minutes. They will generate noise, dust, vibration and traffic disruption. They will slow down and bank up traffic into and out of Bairnsdale from the west 24 hours per day every day. If this option is the one implemented, there is proposed a round-about where trucks enter the Princes Highway.

Impact of vibration from mining activities and the truck movements requires assessment.

The mining process will require the use of flocculants. There is no description of the composition of the flocculants.

OH&S Act 2017, Victoria

Schedule 9—Hazardous substances—requirements for health monitoring

Regulation 169

Table 1—Hazardous substances (other than lead) requiring health monitoring *Column 1*	*Column 2* *Hazardous substance*
Item	
1	Acrylonitrile
2	Arsenic (inorganic)
3	Benzene
4	Cadmium
5	Chromium (inorganic)
6	Creosote
7	Crystalline silica
8	Isocyanates
9	Mercury (inorganic)
10	4,4'-Methylene bis (2-chloroaniline) (MOCA)
11	Organophosphate pesticides
12	Pentachlorophenol (PCP)
13	Polycyclic aromatic hydrocarbons (PAH)
14	Thallium
15	Vinyl chloride

Table 2—Lead requiring health monitoring Column 1	Column 2
Item	Hazardous substance
1	Lead

Schedule 10—Prohibited carcinogenic substances

Regulations 5 and 174 *Item*	*CAS number (given for information only)*	*Prohibited carcinogenic substance*
1	[53-96-3]	2-Acetylaminofluorene
2	Aflatoxins	
3	[92-67-1]	4-Aminodiphenyl
4	[92-87-5] including [531-85-1]	Benzidine (including benzidine dihydrochloride)
5	[542-88-1]	bis(Chloromethyl) ether
6	[107-30-2]	Chloromethyl methyl ether (technical grade which contains bis(chloromethyl) ether)
7	[60-11-7]	4-Dimethylaminoazobenzene (Dimethyl Yellow)
8	[91-59-8]	2-Naphthylamine
9	[92-93-3]	4-Nitrodiphenyl

Schedule 11—Restricted carcinogenic substances

Regulations 5 and 174 *Item*	*CAS number (given for information only)*	*Restricted carcinogenic substance*
1	[107-13-1]	Acrylonitrile
2	[71-43-2]	Benzene when used as a feedstock containing more than 50% of benzene by volume
3	[91-94-1] [612-83-9]	3,3'-Dichlorobenzidine and its salts (including 3,3'-Dichlorobenzidine dihydrochloride)
4	[64-67-5]	Diethyl sulphate
5	[77-78-1]	Dimethyl sulphate
6	[106-93-4]	Ethylene dibromide when used as a fumigant
7	[101-14-4]	4,4'-Methylene bis(2-chloroaniline)
8	[57-57-8]	3-Propiolactone (Beta-propiolactone)
9	[95-53-4] and [636-21-5]	o-Toluidine and o-Toluidine hydrochloride
10	[75-01-4]	Vinyl chloride monomer

GHS Edition 4, 2011 (Global Harmonised System of classification and labelling of Chemicals)

Germ Cell Mutagenicity

This hazard class is primarily concerned with chemicals that may cause mutations in the germ cells of humans that can be transmitted to progeny. However, mutagenicity/genotoxicity tests in vitro and in mammalian somatic cells in vivo are also considered in classifying substances and mixtures in this hazard class.

The term mutation applies both to heritable genetic changes that may be manifested at the phenotype level and t the underlying DNS modifications when known (including, for example, specific base pair changes and chromosomal translocations).

Reproductive Toxicity

This includes adverse effects on sexual function and fertility in adult males and females, as well as developmental toxicity in the offspring. Developmental toxicity includes any effect which interferes with normal development of the conceptus, either before or after birth, and resulting from exposure of either parent prior to conception, or exposure of the developing offspring during prenatal development, or postnatally, to the time of sexual maturation.

International Commission on Radiological Protection

Occupational Radiation Exposure

Occupationally exposed individuals are controlled within the regulatory framework of the country they work in, and in accordance with any local nuclear licence constraints. These are usually based on the recommendations of the ICRP. The International Commission on Radiological Protection recommends limiting artificial irradiation. For occupational exposure, the limit is 50 mSv in a single year with a maximum of 100 mSv in a consecutive five-year period.

The radiation exposure of these individuals is carefully monitored with the use of dosimeters and other radiological protection instruments which will measure radioactive particulate concentrations, area gamma dose readings and radioactive contamination. A legal record of dose is kept.

Examples of activities where occupational exposure is a concern include:

Airline crew (the most exposed population)

Industrial radiography

Exposures in extractive and processing industries

Medical radiology and nuclear medicine[31][32]

Uranium mining

Nuclear power plant and nuclear fuel reprocessing plant workers

Research laboratories (government, university and private)

Some human-made radiation sources affect the body through direct radiation, known as effective dose (radiation) while others take the form of radioactive contamination and irradiate the body from within. The latter is known as committed dose.

Health Effects

In general, ionizing radiation is harmful and potentially lethal to living beings but some types have medical applications in radiation therapy for the treatment of cancer and thyrotoxicosis.

Most adverse health effects of exposure to ionizing radiation may be grouped in two general categories:

deterministic effects (harmful tissue reactions) due in large part to killing or malfunction of cells following high doses from radiation burns.

stochastic effects, i.e., cancer and heritable effects involving either cancer development in exposed individuals owing to mutation of somatic cells or heritable disease in their offspring owing to mutation of reproductive (germ) cells.

The most common impact is stochastic induction of cancer with a latent period of years or decades after exposure. For example, ionizing radiation is one cause of chronic myelogenous leukemia, although most people with CML have not been exposed to radiation. The mechanism by which this occurs is well understood, but quantitative models predicting the level of risk remain controversial. The most widely accepted model posits that the incidence of cancers due to ionizing radiation increases linearly with effective radiation dose at a rate of 5.5% per sievert. If this linear model is correct, then natural background radiation is the most hazardous source of radiation to general public health, followed by medical imaging as a close second. Other stochastic effects of ionizing radiation are teratogenesis, cognitive decline, and heart disease.

External terrestrial sources

Most materials on Earth contain some radioactive atoms, even if in small quantities. Most of the dose received from these sources is from gamma-ray emitters in building materials, or rocks and soil when outside. The major radionuclides of concern for terrestrial radiation are isotopes of potassium, uranium, and thorium. Each of these sources has been decreasing in activity since the formation of the Earth.

Internal radiation sources

All earthly materials that are the building blocks of life contain a radioactive component. As humans, plants, and animals consume food, air, and water, an inventory of radioisotopes builds up within the organism (see banana equivalent dose). Some radionuclides, like potassium-40, emit a high-energy gamma ray that can be measured by sensitive electronic radiation measurement systems. These internal radiation sources contribute to an individual's total radiation dose from natural background radiation.

The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) itemized types of human exposures.

Type of radiation exposures		
Public exposure		
Natural Sources	Normal occurrences	Cosmic radiation
		Terrestrial radiation
	Enhanced sources	Metal mining and smelting
		Phosphate industry
		Coal mining and power production from coal
		Oil and gas drilling
		Rare earth and titanium dioxide industries
		Zirconium and ceramics industries
		Application of radium and thorium
		Other exposure situations
Man-made sources	Peaceful purposes	Nuclear power production
		Transport of nuclear and radioactive material
		Application other than nuclear power
	Military purposes	Nuclear tests
		Residues in the environment. Nuclear fallout
Historical situations		
Exposure from accidents		
Occupational radiation exposure		
Natural Sources		Cosmic ray exposures of aircrew and space crew
		Exposures in extractive and processing industries
		Gas and oil extraction industries
		Radon exposure in workplaces other than mines
Man-made	Peaceful purposes	Nuclear power industries

sources		Medical uses of radiation
		Industrial uses of radiation
		Miscellaneous uses
	Military purposes	Other exposed workers
Source UNSCEAR 2008 Annex B retrieved 2011-7-4		

Emission Estimation Technique for Mineral Sands Mining and Processing.

Complying with Exposure Standards (National Pollutant Inventory)

Heavy mineral sands deposits are made up of various assemblages of titanium-bearing minerals, such as rutile, leucoxene, ilmenite, xenotime and monazite (containing rare earth metals), and the industrial minerals zircon, kyanite, and garnet. Mineral sands mining operations are currently located on Australia's east coast in northern NSW and southern Queensland, and in the south west of Western Australia. Dry mills and synthetic rutile plants are located in Western Australia at Geraldton, Eneabba, Muchea, Bunbury and Capel.

Titanium is mainly used in white paints and dyes, and in some alloys where properties of high heat resistance and high corrosion resistance are required. Zircon, because of its high melting point (>2,500 degrees Celsius), is used for manufacturing refractory bricks, ceramics and glazes. Monazite is mainly used in visual electronics.

The production of mineral sands generally follows a three-stage process:

Mining – dredge or dry mining;

Concentration and separation – using gravitational, magnetic and electrostatic processes; and

Synthetic rutile production – involving chemical reduction, leaching, aeration and physical separation.

Mining

Mining begins with the removal of vegetation (and subsequent burning or use in land rehabilitation) from the mine site, and the removal and stockpiling (or transfer to previously disturbed sites) of topsoil and sub-soil.

Orebodies are often interspaced by non-mineralised material (overburden and interburden) which must be removed to gain access to the ore. This is either stockpiled or backfilled into voids from previously mined areas. Revegetation is often part of the operations at mineral sand mining and processing facilities. Replanting of removed vegetation often occurs for embankment stabilisation and as a seed resource for future revegetation.

Mineral sands bearing ores (and the associated soils and overburden) are recovered by either wet dredging or dry mining techniques. The technique used is largely dependent on the location of the orebody in relation to the local groundwater.

Dredge mining involves the recovery of ore from a void filled with groundwater. The dredge utilises a cutting head to disturb the ore, which is then recovered as a slurry, and pumped to a wet separation plant via a floating pipeline. Water is often added to the dredge pond to maintain optimum water levels for operation.

Dry mining uses conventional mining equipment, generally scrapers for overburden removal and loaders for ore recovery, although excavators and haul trucks may also be used.

The recovered ore is screened to remove oversized material, slurried, and then passed through a trommel to remove any remaining oversized material.

Concentrating

Recovered ore is passed through a heavy mineral recovery plant to yield heavy mineral concentrate (HMC). The heavy mineral sands are separated from the lighter tailings (waste material) using gravity spirals. Tailings are then either returned directly to the mine void or placed in drying ponds from which water may be recovered for re-use. Solids are later returned to the mine void or sealed and rehabilitated.

Flocculants are often used on tailings prior to release, to allow for better decant recovery and void fill ratios.

Dry/Wet Separation of HMC

HMC is passed through various separation processes to recover the minerals present. Separation exploits the physical properties of each different mineral, including conductivity (electrostatics), magnetism (magnetic), and density (gravity) to isolate the various minerals. This produces the saleable product for the majority of mineral sands.

Only zircon and ilmenite receive further treatment. Zircon processing may include acid washing to improve the cosmetic value of the product. Some ilmenite may be further processed to produce high-grade synthetic rutile as described below.

The non-valuable tailings process streams are generally stockpiled before being returned to the mine void or used in waste pond construction.

Synthetic Rutile Production

In some cases ilmenite product may be processed further to yield a higher-grade synthetic rutile product. This is achieved using reduction kilns to remove iron from the mineral matrix by reducing it to metallic iron. Coal is used as the fuel source and sulfur or boron compounds as reducing agents; the ilmenite ore is passed through a reduction kiln.

The ilmenite is separated from any char and aggregates that may have formed during reduction and is passed through an aeration phase. During this phase ammonium chloride is used as a catalyst to oxidise the iron, which can then be separated from the synthetic rutile using cyclones.

Prior to drying and shipment the product is passed through a leaching stage using sulfuric acid to remove any remaining impurities (Mulligan 1996).

Wastes produced during this process are dewatered either in tailings storage ponds or using filtration systems and are then sealed in mine voids or remain in the ponds and are rehabilitated.

Most wastewaters are reclaimed and returned to the process although some are treated and released to the environment.

Associated Facilities

Activated carbon is a by-product of mineral sands processing which has commodity value. There are no known emissions associated with the production and handling of this product although it is possible, they do occur.

Activated carbon may contain residual trace, or occasionally elevated levels of NPI substances concentrated by the reduction process. The movement or sale of these materials within or from the facility is not considered as an emission.

Ancillary Activities

There are a number of ancillary activities associated with mineral sands mining and processing that result in emissions that may be reportable. Examples include fuel storage, power generation and maintenance activities. Generic manuals for these activities are available.

Fuel and Organic Liquid Storage

Storage of fuel and other organic liquids is likely to occur at mineral sands mining and processing facilities. Bulk liquid fuels held on site may include gas fuels (LPG and LNG), diesel, petrol, or oil.

Emissions resulting from the volatilisation of these fuels during storage, transfer and transport may need to be estimated for NPI reporting purposes. Small quantities of other organic materials may be used in processing operations, analytical procedures, or maintenance purposes, and may also require consideration.

Fossil Fuel Electric Power Generation

Fossil fuel electric power generation systems are delineated into steam plants, gas turbines, cogeneration, and internal combustion generation. It is likely that most mineral sands facilities either draw power from the state electric power grid or generate power from kiln waste heat or internal combustion engines.

Petrol, natural gas, distillate and/or LPG internal combustion engines and generators are commonly used to provide electricity in remote areas, and for stand-by (emergency) purposes. Any emissions from fossil fuel electric power generation undertaken within facility boundaries must be considered in the NPI process.

Maintenance Activities

Materials used in maintenance activities often contain NPI substances that, during use, may be released to the environment. For example, maintenance activities involving the use of degreasers, likely to contain volatile organic compounds, may result in emissions to air, land and/or water during use, or at disposal.

Components of all washdown water streams need to be considered when calculating emissions to water and land, as this effluent may contain metals, volatile organic compounds, benzene, toluene, ethylbenzene and xylenes (BTEX) species, polycyclic aromatic hydrocarbons, sulfuric acid and descaling chemicals.

Although these emissions are likely to be insignificant in comparison to those from other sources, each facility should investigate all chemicals used in maintenance activities to ensure that all relevant NPI emissions are captured.

Other emission sources associated with maintenance activities that may be present at mineral sands facilities include welding, painting, and sand blasting. Products used for these purposes, and any waste materials generated, may result in NPI emissions and should be investigated.

EETs (Estimates of Emissions techniques) and Background Pollution

Emissions to Air,

Emissions to Water, and

Emissions to Land.

Emission Estimation

Estimates of emissions of NPI-listed substances to air, water and land should be reported for each substance that exceeds or triggers a substance category threshold. Emissions of triggered substances must be reported for all operations/processes relating to the facility, even if the actual emissions of the substances are very low or zero. The reporting list and detailed information on thresholds are contained in the *NPI Guide*.

In general, there are four types of emission estimation techniques (EETs) that may be used to estimate emissions from the facility:

sampling or direct measurement;

mass balance;

fuel analysis or other engineering calculations; and

emission factors.

Continuous Emission Monitoring System Data

A continuous emission monitoring system (CEMS) provides a continuous record of emissions over time, usually by reporting pollutant concentration. Emission calculation is based on the same principles as for stack sample except, rather than there being one sample event, there are multiple events. As with stack sampling, the measured pollutant concentrations are converted to emission rates by multiplying the pollutant concentration by the volumetric gas or liquid flow rate of that pollutant. This is particularly applicable to emissions of sulfur dioxide from synthetic rutile process stack emissions.

Unlike stack sampling, CEMS often report real-time hourly emissions automatically, and it is necessary to estimate annual emissions from hourly concentration data manually.

Fuel Analysis: Fuel analysis is an example of an engineering calculation that can be used to predict SO2, metals, and other emissions based on application of mass conservation laws.

EETs for Emissions to Air

Background

Emissions to air are often the most significant NPI reportable emissions from minerals sands mining and processing facilities.

Main emission sources include:

Mining operations;

Stockpiling, transport, and handling of ore and waste materials;

Stack emissions from reduction kilns, sulfuric acid leaching, and product dryers; and

Production of gases during wet processing, and from solid wastes.

Emissions to air should be estimated at their point of release. Emissions estimation for NPI purposes does not take into account the fate of emitted substances, such as the rate of decay within the atmosphere, or the rate of deposition.

Air emissions can be classified as:

Fugitive source emissions; and

Point, or stack source emissions.

Fugitive Emissions

Fugitive emissions are those not released via a vent or a stack. They include mobile and dispersed sources, and emissions associated with leaks and spills.

Examples of fugitive emissions sources include wind erosion of ore, concentrate and by-product stockpiles (dust emissions), and emissions of dust and combustion products from vehicles. Dust emissions from seals, skirting and open crushing points, as well as vats and open vessels, flange and equipment leaks, are also considered fugitive.

The majority of emissions resulting from mining, mineral processing and associated activities are classified as fugitive emissions.

EETs based on emission factors are the preferred method for estimating emissions from fugitive sources.

Point Source Emissions

Point source emissions are released to the atmosphere from a single, stationary source. An air emission control device such as a scrubber, fabric filter, afterburner, or electrostatic precipitator may be fitted to a point source to remove or reduce particular components of emissions.

Most emissions to air from synthetic rutile processing operations are likely to be released via a main stack and are classified as point source emissions. It is generally accepted that direct measurement is the most appropriate approach to be taken when estimating stack emissions. In the absence of reliable monitoring data other approved EETs may be used.

Dust (TSP)

A large proportion of NPI reportable emissions to air from mineral sands mining operations are likely to be associated with total suspended particulate matter (TSP). Substances contained in TSP may include metals and particulate matter with an equivalent aerodynamic diameter less than 10 microns (PM10). The NPI substances contained within the TSP generated by a facility and the PM10 component of the TSP have to be reported to the NPI if the substance's reporting thresholds are exceeded.

EETs for TSP and PM10 emissions are provided in the *NPI EET Manual for Mining.*

Sources of dust emissions that may require consideration include:

drilling;

blasting

wheeled vehicle movement;

grading;

scrapers;

dozers;

ore and waste handling (truck, front end loader and excavator loading and unloading);

processing (screening, separation, milling); and

wind erosion of disturbed areas (stockpiles, pits, TSFs, product and waste/by-product stockpiles etc).

Mining

Most air emissions produced during mineral sands mining activities are associated with either dust generation, or fuel combustion. EETs or emission factors for these emission sources are provided in the *NPI EET Manual for Mining.* The *NPI EET Manual for Combustion Engines* provides some alternative emission factors relating to fuel combustion.

Fuel Combustion in Mining Equipment

Mining equipment used at a mineral sands mining and processing facility may include petrol and diesel industrial engines; petrol and diesel motor vehicles, commercial vehicles and trucks, and large stationary diesel and dual fuel engines.

Common products of combustion emitted to air from mining equipment and vehicles include:

carbon monoxide (CO); oxides of nitrogen (NOx); sulfur dioxide (SO2); organic compounds -

including volatile organic compounds (VOC), benzene, toluene, ethylbenzene, xylenes, polycyclic aromatic hydrocarbons (PAH), and polychlorinated dioxins and furans; and particulate matter of diameter 10 µm or less (PM10).

The following metals: arsenic, antimony, beryllium, boron, cadmium, chromium III & VI, cobalt, copper, lead, nickel, selenium, and zinc may also be emitted from some fuel types.

Generally the composition of emissions may reflect the characteristics of the

fuel.

Further guidance on the estimation of emissions from fuel combustion may be found in the following NPI EET manuals:

Vehicles – *NPI EET Manual for Combustion Engines* or *NPI EET Manual for Mining*

Boilers and furnaces – *NPI EET Manual for Combustion in Boilers*

Stationary Internal Combustion Engines – *NPI EET Manual for Combustion Engines*

Power generation – *NPI EET Manual for Fossil Fuel Electric Power Generation & NPI EET*

Manual for Combustion Engines

Blasting

EETs for the estimation of NPI substances emitted in dust from blasting events are provided in the *NPI EET Manual for Mining*.

Explosives Detonation

NPI substances emitted to air from the detonation of explosives commonly used at mining facilities include carbon monoxide (CO), oxides of nitrogen (NOx), ammonia (NH3), hydrogen cyanide (HCN), hydrogen sulfide (H2S) and sulfur dioxide (SO2).

Emissions of various combinations of these substance from a range of different types of explosive may be estimated using EETs provided in the *NPI EET Manual for Explosives Detonation and Firing Ranges*.

Dredging

Emissions to air associated with dredging operations are primarily associated with fuel combustion. Other emissions may result from maintenance activities and spills.

Hydrocycloning and Wet Concentrating

Emissions to air associated with mineral sands hydrocycloning and concentrating processes are likely to be relatively minor.

Some emissions of volatile organic compounds (VOCs) may result from the use of organic flocculants, and each facility should assess the use of such substances in

these processes.

Where organic flocculants are used, it should be assumed that 100% of the volatile organic fraction in the flocculant is emitted to air, unless other information is available.

Information concerning chemical composition and physical properties of various process chemicals, including flocculants, may be sourced from suppliers, or Materials Safety Data Sheets (MSDS).

It is recommended that wherever practicable such information be used to provide a greater level of accuracy in mass balance emission estimation.

Burning of Cleared Vegetation

Some facilities may burn vegetation following its removal prior to mining.

Emissions of NPI substances associated with the combustion of vegetation include various metals, 1-3 butadiene, carbon monoxide (CO), oxides of nitrogen (NOx), particulate matter (PM10), and total volatile organic compounds (VOC) (see Table 1 of the *NPI EET Manual for Aggregated Emissions from Prescribed Burning and Bushfires)*.

Emission factors for the estimation of these emissions are provided in Table 2.5-5 of Section 2.5 Open Burning of AP42.

A range of EETs, including emission factors (Table 4), is also provided in the *NPI EET Manual for Aggregated Emissions from Prescribed Burning and Bushfires*.

Facilities should assess each of the EETs presented to determine those most appropriate.

HMC Separation

Emissions of NPI substances to air from heavy mineral concentrate (HMC) separation processes include components of TSP and combustion products.

Dust Emissions

Emissions of TSP including metals and PM10 from HMC processes and product handling may be calculated using emission factors, mass balance, or engineering calculations as described in the *NPI EET Manual for Mining.*

Dryers

Emissions of NPI substances to air from industrial dryers used in mineral sands processing include gaseous emissions from the ore/product, such as hydrogen sulfide (H2S), sulfur dioxide (SO2) and combustion products (see 5.3.1 for a listing of combustion products).

Direct monitoring, emission factors and engineering calculations may be used for emissions estimation.

Monitoring

Emissions to air from ore and product dryers used in mineral sands processing operations are likely to be released directly from one or more emission stacks. Such emissions may be monitored under existing environmental or O&HS monitoring programs, which may provide data applicable to NPI reporting requirements.

For NPI purposes, monitoring data should be collected over an extended period of time and be representative of normal operating conditions. Any anomalous events should also be accounted for when calculating total emissions estimates for a reporting period.

Acid Washing and Leaching

Few emissions to air are likely to result during acid wash treatment (principally of zircon however other materials may receive similar processing). By-products of the washing process and any residual reagents present in waste streams may be estimated using a combination of monitoring data and mass balance, or where applicable, engineering calculations.

Some sulfuric acid may be emitted in acid mist evolved during zircon treatment. Acid mist contained and treated within the plant's water management system does not have to be estimated as an emission.

Sulfuric acid within acid mist emitted to air land or water does have to be estimated

and reported as an NPI substance. The characteristics of each facility should determine the reporting requirements of these emissions, especially in relation to the emission from other sources within the facility.

Where emissions are to be estimated, direct measurement of acid emissions may be undertaken (either regularly or historically) at some facilities and may provide useful information regarding the scale of emissions.

However, there are difficulties associated with converting ambient concentrations to an actual mass emitted and complex modelling is generally required to relate such data to a quantity emitted.

At some facilities acid mist may be reclaimed. Mist may “fall out”, condense on nearby plant machinery and buildings, or be brought to ground in rainfall at or near the source from which it evolved. If the appropriate NPI thresholds are exceeded, all emissions of NPI substances to air, land and water are to be reported to the NPI. This is the case even if substances later “fall out” or condense on plant machinery and buildings.

Reduction Kiln

Emissions to air from reduction kilns are primarily particulate matter and combustion products. The addition of sulphur during the process, either associated with the feed stock or added to assist the reduction process, results in additional emissions of oxides of sulphur. Sulphur may be substituted with other substances such as hydro boracite, hence reducing emissions of sulphur compounds. However, any emissions resulting from the degradation of these materials must also be considered.

Emissions resulting from the reduction process in kilns are generally released to the atmosphere via dispersion stacks. Other fugitive emissions from kiln seal leaks and input/output shafts are likely to be insignificant and may be able to be ignored.

Common products of coal combustion include oxides of nitrogen, sulphur dioxide, hydrogen sulphide, carbon monoxide, particulate matter, organic compounds (including total volatile organic compounds, benzene, toluene, ethylbenzene, xylene, polycyclic aromatic hydrocarbons, and polychlorinated dioxins and furans), and metals (arsenic, antimony, beryllium, boron, cadmium, chromium III & VI, cobalt, copper, lead, nickel, selenium, zinc).

The actual composition of combustion emissions will vary with the type and characteristics of the coal used and ore being processed.

Emissions control techniques (primarily for reducing sulphur dioxide and particulate emissions) include wet scrubbers and electrostatic precipitators. Control efficiencies of any devices present should be assessed, where necessary, by each facility.

Sulphur dioxide (SO2) retained in the synthetic rutile product from processing may be released during storage and transportation. These emissions are likely to be small and often cannot be allocated to any particular facility (as they occur throughout the life of the product). However, it is recommended that facilities exercise judgement when seeking to quantify these emissions.

Estimations may be made by sampling the SO2 content of the product at each stage following production. Emissions can then be allocated assuming that the difference in the SO2 content is due to gaseous release to air.

Regular assessment of sulphuric acid, SO2 is required in water, air, and soil.

Waste and Process By-Product Treatment and Disposal

For NPI purposes major emissions released from waste materials generated by the minerals sands mining and processing industry include ammonia, sulphur dioxide and hydrogen sulphide, as well as dust generated from mining waste materials, TSFs and other pond surfaces.

Depending on the EET used, it is likely that any emissions associated with these waste streams will be accounted for in overall process mass balances. In the case of ammonia emissions, the mass balance suggested in section 5.5.5 would provide an estimate of emissions that may occur from disposal of solid wastes and by-products as well as gaseous process emissions.

Emissions of sulphurous compounds (in particular sulphur dioxide and hydrogen sulphide) are likely to be low in comparison to other sources such as reduction kilns and dryers.

Other emissions will need to be reviewed by each facility independently to assess their significance.

EETs for Emissions to Water

Background

For the purposes of NPI reporting, emissions of substances to water can be categorised as discharges to:

surface waters (e.g. lakes, rivers, dams, estuaries and dry water bodies);

coastal or marine waters; or

stormwater.

Groundwater is not included in the NPI definition of a “water body”, and any emissions of NPI substances to groundwater should be considered as emissions to land.

Emissions to water from mineral sands mining and processing activities may be associated with:

surface runoff and erosion from processing and mining areas;

the release of process discharge waters and liquid waste streams;

discharge of sewage and domestic waste waters; and

spills to surface waters.

Point or pipe sources involve a release from a single fixed point or pipe. Fugitive sources and leaks include spills, pipe failure, and any emissions resulting from erosion, surface runoff, or overflow from liquid impoundment that is released to surface waters.

The most accurate method of estimating emissions to surface waters is likely to be direct measurement.

Mass balance, supplemented with some monitoring data, may also prove effective.

Ultimately facilities should choose the combination of approved EETs most suited to their operations, procedures, and the characteristics of the emissions involved.

Runoff and Erosion

Surface runoff may contain NPI listed substances either suspended, or in solution.

Any runoff containing sediment due to erosion process is likely to contain trace metals in similar concentrations to that of the source soil, ore, or waste material. The efficiency of a facility's existing stormwater management system will determine the volume and composition of waters being emitted at the facility.

Actual emissions will be dependent on weather conditions and the characteristics of the facility area as a catchment. At some facilities runoff may be completely contained within site boundaries, collected and treated, disposed of, or reused. In such cases, NPI substances involved are transferred, as opposed to being emitted by the facility, and should not be considered for NPI reporting purposes.

Depending on the quantities of NPI substances a facility is likely to emit to water and the type of information available, either a direct measurement/engineering calculation or mass balance approach may be used for emission estimation.

Direct Measurement

Site-specific information concerning runoff flow rates and composition may be used to estimate emissions of NPI substances to surface waters. Water quality and flow rate monitoring data may

indicate the mass of any constituent NPI substances emitted, although it is unlikely that all NPI substance will be covered. Where assay data is unavailable the concentration of NPI substances in suspended particulate matter contained in runoff can be assumed to be equivalent to the source material.

Flow and erosion rates can often be estimated based on models, or engineering calculations such as those presented in Australian Rainfall and Runoff (1997).

Discharge of Waters

Where facilities release treated process waters, sewage, decant liquor or liquid waste streams to surface waters, all constituent NPI substances are considered to be emissions.

NPI substances in emissions to water may include metals, nutrients and/or substances contained in reagents or reagent residue.

Each facility should assess the wastewater streams to determine which, if any NPI

substances are present. The characteristics of the source process should give a reasonable indication of the likely composition.

Where waters are not altered from their natural/original state (i.e. concentrated, containing additives, been treated, or containing run-off from stock-piles or TSFs) their discharge is not considered an emission for the purposes of estimating emissions of NPI substances.

Discharged waters are often monitored either for regulatory purposes, or as a matter of “good practice” resource management and as an indication of operational efficiency. Where existing data is available, direct measurement is an effective means of quantifying emissions of NPI substances.

Alternatively, a mass balance approach may be applied.

Direct Measurement

Emissions of NPI substance contained in discharged waters are best estimated using direct measurement (i.e. monitoring discharge streams release rate and composition).

Monitoring must be conducted over an extended period and should be representative of emissions generated under normal operating conditions. Any anomalous events such as a spill or leak into the wastewater stream must also be accounted for.

EETs for Emissions to Land

Background

Emissions of NPI substances to land may result from the treatment, storage, and handling of solid and liquid by-products, slurries, sediments, processing reagents, and chemicals used at the facility.

Emissions may also result from the use of chemicals (such as pesticides, herbicides and fertilisers) in environmental management practices, where the application may contain listed NPI substances.

Sources of emissions to land can be broadly classified as:

emissions to land from surface impoundments of liquids, solids and slurries, such as tailings storage facilities and decant ponds;

emissions to land from storage facilities for solid, liquid and slurry by-products and wastes (including emissions during transfer of materials to tailings storage facilities);

unintentional leaks and spills; and

surface applications.

For the purpose of NPI reporting the deposition of process by-products to surface impoundments, such as various TSFs, and mine voids are not considered emissions. However, emissions from these facilities to the environment, such as seepage to surrounding groundwater, are considered emissions and need to be considered in NPI reporting.

On-site landfill refers to those emissions originating from a landfill or other impoundment within the facility boundaries, including dredging ponds, solar evaporation impoundments, various TSFs and mine voids.

Emissions to land from irrigation sources include the use of treated or contaminated waters for irrigation purposes.

Land emission sources referred to as ‘other’ include all emissions not covered under landfill or irrigation definitions, including spills and leaks, and deposition of materials containing NPI substances to areas not classified as landfills.

Similarly, some application of materials to land may be classed within the concept of ‘beneficial use’ and contained NPI substances therefore not reportable as emissions. This is often the case with by-product solids that are used as soil ameliorants. Where an emission is believed to fall within this category, advice should be sought from your local NPI unit before reporting (or not reporting) emissions.

Impoundment Seepage

When considering seepage as an NPI reportable emission, three variables need to be quantified:

(i) the seepage rate

(ii) the rate of seepage recovery

(iii) NPI substance concentration in seepage.

Table 7 Hypothetical inventory of a mineral sands mining and processing facility.

Mining	Potable water consumed, kilolitres
Ore mined, tonnes	Bore water consumed, kilolitres
Overburden/Interburden mined, tonnes	Decant water consumed, kilolitres
Ore treated, tonnes	***Synthetic Rutile Processing***
HMC produced, tonnes	Ilmenite Processed, tonnes
By-product solids/liquids produced, tonnes	Synthetic rutile produced, tonnes
Flocculant used, litres	By-products produced, tonnes
Diesel consumed, litres	Diesel, litres
Electricity used, MWhrs	Natural gas, litres
Other byproducts produced, tonnes	Coal, tonnes
Bore water consumed, kilolitres	Electricity, MWhrs
Dry/wet processing	Sulphur (added), kilograms
HMC processed, tonnes	Sulphur dioxide (emitted), tonnes
Ilmenite produced, tonnes	Ammonium chloride, tonnes
Zircon produced, tonnes	Sulfuric acid, tonnes
Tailings produced, tonnes	Flocculant, litres
Natural gas consumed, litres	Biocide, litres
diesel consumed, litres	Potable water, kilolitres
Electricity, MWhrs	Bore water, kilolitres

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Safe Work Australia: "Guidance on the Interpretation of Workplace Exposure Standards for Airborne Contaminants" April 2012.

How Far Can Respirable Dust Actually Travel? September 24, 2019, Nosilicadust, Silica Dust Regulations, Silica Series

Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2019 (Mineral Regulations) and *Part 2 of Schedule 1 of the Mineral Resources (Sustainable Development) (Extractive Industries) Regulations 2010* (Extractive Regulations).

Globally Harmonised System of Classification and Labelling of Chemicals (GHS) – the classification of carcinogens.

earthresources.vic.gov.au

www.jorc.org

https://esis.irc.ec.europa.eu/index.php?PGM=cla

Appendix 11: Dust

The conclusion in the EES report that dust emissions will be within acceptable limits relies on the monitoring and modelling undertaken by Katestone 2020: (Appendix A009). This report is littered with typographical errors and inadequate explanation of some terms used which make it hard to determine the validity of their modelling.

Examples:

P 11"The adopted guideline of 120mg/m^2/ day for monthly maximum dust deposition rates equates to 3.6g/m^2 /day "

They clearly mean m^2 /month

On pp131,132 they refer to:

"EF_{PM19} emission factor for TSP"

It appears that they mean

EF_{PM10} emission factor for PM_{10}

Katestone Tables 25,28,31, B3,B7, and B8 refer to zirconia. Zirconia is ZrO_2. The mine is to produce zircon, $ZrSiO_4$. The element Zr is zirconium. It is unclear to what they are referring.

Katestone (2020) did provide a glossary of terms (p vi). However, terms such as VKT and VMT (pp 125-134), critical to understanding the equations that they provided, are not defined.

Katestone, in common with other consultants employed by the mining company, would be under implicit pressure to produce a report which downplays any risk to the community or the environment, or to suggest methods by which any unavoidable risks can be ameliorated.

Nevertheless, the claim (Katestone p133) that if 0.25mm of rain fell on any one day it was assumed that no wind erosion from stockpiles occurred is astounding. Given that evaporation can exceed 10mm/day in summer (Table 4, below) and that cold fronts with accompanying showers may follow days of hot northerly winds with very high evaporation and winds, this defies logic. It is possible, as demonstrated by other typographical errors, that the decimal point is in the wrong place, but even so this exclusion is difficult to justify. It does, however help the model to reduce the estimate of dust which will be produced by the mine.

Evaporation was measured at BoM East Sale Weather Station 85072 until early 2015. Tables 1 – 4 below were derived from these data.

Table 1. Average Daily Evaporation, East Sale Weather Station 85072. 2001-2014													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2001	6.34	5.87	4.89	2.86	1.48	1.33	1.26	2.63	2.47	3.55	4.55	4.46	3.47
2002	5.91	4.93	4.59	2.51	1.43	1.99	1.55	1.92	4.08	3.99	6.05	5.94	3.74
2003	7.25	5.49	4.41	2.50	1.79	1.97	1.63	2.39	4.15	3.35	5.38	6.38	3.89
2004	6.33	5.94	4.85	3.25	1.70	1.74	1.63	2.25	2.48	3.78	5.15	5.12	3.68
2005	5.39	5.04	4.34	3.21	1.94	1.25	1.56	2.17	2.52	4.45	5.35	7.16	3.70
2006	7.02	5.81	4.95	3.66	1.68	1.05	1.59	2.26	3.55	5.41	6.02	6.79	4.15
2007	7.52	7.26	4.54	2.64	2.22	1.69	1.37	2.30	3.11	4.86	4.56	5.86	3.99
2008	6.75	5.05	4.70	2.83	1.79	1.47	1.35	1.91	3.90	4.72	5.81	5.43	3.81
2009	7.46	6.15	4.78	2.98	1.94	1.07	2.14	3.25	3.45	3.70	6.54	6.15	4.13
2010	7.25	5.50	4.47	3.05	1.86	1.27	1.22	2.35	3.08	4.12	5.11	5.18	3.71
2011	5.51	5.28	3.79	2.67	1.37	1.49	1.70	1.77	3.41	3.68	4.91	5.57	3.43
2012	6.65	4.92	3.35	2.74	1.85	1.09	2.02	2.35	3.66	4.31	5.25	7.15	3.78
2013	7.66	6.31	5.21	2.97	1.58	1.13	1.57	2.88	3.19	4.70	4.62	6.39	4.02
2014	7.76	6.73	4.77	2.25	1.87	1.16	1.70	1.90	2.78	4.20	5.74	5.35	3.85
Average	6.77	5.73	4.54	2.87	1.75	1.41	1.59	2.31	3.27	4.20	5.36	5.92	3.81

Table 2. Total Monthly Evaporation, East Sale Weather Station 85072. 2001-2014

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2001	196.6	164.4	151.6	85.7	45.8	40	39	81.4	74.2	110	136.4	138.4	1263.5
2002	183.2	138	142.4	75.4	44.2	59.8	48	59.4	122.4	123.8	181.4	184.1	1362.1
2003	224.8	153.8	136.8	75	55.6	59.2	50.6	74	124.4	104	161.4	197.8	1417.4
2004	196.2	172.2	150.2	97.6	52.6	52.2	50.6	69.6	74.4	117.2	154.6	158.8	1346.2
2005	167	141.2	134.4	96.4	60.2	37.6	48.4	67.2	75.6	137.8	160.4	222	1348.2
2006	217.6	162.6	153.4	109.8	52.2	31.6	49.2	67.8	106.6	167.8	180.5	210.6	1509.7
2007	233.2	196	140.6	79.2	68.8	50.6	42.6	71.2	93.2	150.8	132.2	181.8	1440.2
2008	202.6	146.4	145.6	82	55.4	44	41.8	59.2	117	146.4	174.4	168.4	1383.2
2009	216.4	172.2	143.4	89.4	60	32	66.2	97.4	103.4	111	189.8	190.6	1471.8
2010	224.6	154.1	138.6	91.6	57.8	38.2	37.9	72.8	92.4	127.6	153.2	160.6	1349.4
2011	170.8	147.7	117.6	80	42.5	44.6	52.6	55	102.2	114.2	147.2	172.8	1247.2
2012	206.2	142.6	103.8	82.2	57.2	31.6	42.4	73	109.7	133.6	157.5	221.7	1361.5
2013	237.6	176.7	161.5	89.1	44.2	33.8	48.6	89.2	95.6	145.8	138.6	191.6	1452.3
2014	240.6	181.6	147.8	67.6	58	34.8	52.8	59	83.4	130.2	172.2	160.4	1388.4
Average	208.4	160.7	140.6	85.8	53.9	42.1	47.9	71.2	98.2	130.0	160.0	182.8	1381.5

Table 3. Total Monthly Rain, East Sale Weather Station 85072. 2001-2014

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2001	41.6	25.0	46.8	97.8	32.2	36.2	60.8	65.8	43.6	77.8	76.6	67.2	671.4
2002	29.8	75.6	33.2	100.6	25.2	40.0	20.6	4.2	36.8	28.0	36.6	23.2	453.8
2003	6.4	17.8	27.6	31.0	10.0	43.2	31.2	54.2	32.6	85.6	32.4	34.6	406.6
2004	44.0	32.6	9.2	136.6	33.0	24.6	31.2	40.8	59.2	39.4	75.2	47.0	572.8
2005	33.4	57.4	16.4	25.4	14.2	20.0	76.0	35.0	38.0	22.8	64.0	46.8	449.4
2006	40.8	13.2	12.2	40.6	32.8	12.2	29.8	37.0	39.6	8.6	21.0	13.8	301.6
2007	7.0	109.8	57.0	50.8	15.4	122.2	57.8	31.0	16.4	21.6	113.4	50.4	652.8
2008	58.0	58.4	7.6	15.2	43.8	9.8	33.2	42.2	11.6	7.0	116.6	49.2	452.6
2009	3.2	26.8	19.0	39.0	23.8	15.8	25.6	40.2	63.8	43.8	39.4	37.0	377.4
2010	32.2	70.0	47.2	24.8	42.0	32.2	10.4	40.0	15.6	60.4	64.0	83.0	521.8
2011	39.4	96.8	60.8	50.4	33.4	23.0	70.2	47.8	53.4	54.8	134.8	51.2	716.0
2012	45.4	83.0	96.4	21.8	81.4	90.6	14.0	45.8	41.4	33.2	55.6	32.0	640.6
2013	4.4	56.0	38.6	52.5	12.6	169.4	23.2	38.0	60.0	49.6	37.0	32.0	573.3
2014	22.0	14.2	44.4	62.0	27.6	52.2	24.2	41.6	49.8	57.4	65.6	124.4	585.4
Average	29.1	52.6	36.9	53.5	30.5	49.4	36.3	40.3	40.1	42.1	66.6	49.4	526.8
Daily ave	0.94	1.88	1.19	1.78	0.98	1.65	1.17	1.30	1.34	1.36	2.22	1.59	1.44
Evap-rain	5.83	3.85	3.36	1.08	0.76	-0.24	0.42	1.01	1.94	2.84	3.14	4.33	2.36

Table 4. Number of days each month in which evaporation exceeded 10mm, East Sale 2001-2014													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
2001	3	1	0	0	0	0	0	0	0	0	0	0	4
2002	1	1	0	0	0	0	0	0	0	0	1	0	3
2003	3	0	0	0	0	0	0	0	0	0	0	2	5
2004	0	1	0	0	0	0	0	0	0	0	1	0	2
2005	0	1	0	0	0	0	0	0	0	0	0	2	3
2006	2	1	0	0	0	0	0	0	0	1	1	2	7
2007	3	4	0	0	0	0	0	0	0	0	1	1	9
2008	4	1	0	0	0	0	0	0	0	0	2	0	7
2009	5	2	1	0	0	0	0	0	0	0	2	0	10
2010	2	3	0	0	0	0	0	0	0	0	0	0	5
2011	0	2	0	0	0	0	0	0	0	0	0	0	2
2012	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	7	1	0	0	0	0	0	0	0	1	0	3	12
2014	5	4	0	0	0	0	0	0	0	0	0	1	10
Total	35	22	1	0	0	0	0	0	0	2	8	11	79
Average	2.5	1.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	0.8	5.6

In Katestone (2020) Table 3 there is a requirement to enforce speed limits on haul roads to ensure that vehicles travel at speeds which will not generate excessive dust. Yet equations for dust emitted by scraper in travel mode, bulldozing or wheeled vehicles appear to take neither vehicle speed nor wind speed into account (p131-134). Grading (p133) does consider vehicle speed, and erosion from active stockpiles is dependent on wind speed.

Katestone have relied heavily on their onsite monitoring station, plus modelling to determine wind speeds. According to local landholders the location at which this monitor is situated is not fully exposed to winds (R Coleman, G Johnson, pers comm). The maximum wind speed recorded by Katestone (p13) over a 1hour average was 11.5 m/s (41 km/hr).

They found that dust deposition at sensitive receptors (houses) in the vicinity of the proposed mine was within acceptable limits. This is unsurprising, as their observations were undertaken in the absence of the mine.

Bureau of Meteorology (BoM) look to mention raised dust in forecasts when it has been dry for a lengthy period and they expect average winds of around 35+km/hr (which would generally mean wind gusts of around 55+ km/hr. (Steven McGibbony, Severe Weather Manager, BoM, email dated 2 October 2019).

Analysis of wind speeds recorded by the BoM at Bairnsdale for the 12 months from 1st October 2018 to 30th September 2019 revealed 66 days (roughly 1 day in 6) when maximum wind gusts exceeded the 55 km/hr threshold at which dust may be raised. On 10 of these days peak wind gusts exceeded 75 km/hr (Table 5 below). Typically the direction of the peak gusts was south-westerly, which would propel dust raised in the direction of the vegetable areas of the Lindenow flats. Although it cannot be concluded that the winds at Glenaladale are identical to those at Bairnsdale airport, these strong winds are usually associated with cold fronts which have a widespread impact. This does cast doubt on the velocity of the winds recorded by Katestone. The mine site is elevated, and in the absence of screening the mine area will be subjected to strong winds.

The potential for large bare areas to generate dust is well recognised. Agriculture Victoria promotes the use of stock containment areas to, among other purposes, “reduce soil erosion or damage to paddocks during a drought or dry conditions”

https://agriculture.vic.gov.au/__data/assets/pdf_file/0008/537578/Stock-containment-areas.pdf

Cropping paddocks are likewise prone to wind erosion.

Figures for evaporation at East Sale (Tables1 and 2, above) are broadly in line with the figures given in the EES (Coffee 2020 Table 3.1). There was an average of 5.6 days each year where evaporation exceeded 10mm per day (Table 4). Average daily evaporation minus rainfall for January was nearly 6mm/day (Table 3). Although the ore body will be wet when first exposed, drying will be rapid.

Table 5: High wind days at Bairnsdale Oct -Sep 2018/19					
Date	Max Wind Gust (km/hr)	Direction	Date	Max Wind Gust (km/hr)	Direction
27/10/2018	65	WSW	30/05/2019	57	W
2/11/2018	74	NNW	31/05/2019	57	WSW
3/11/2018	67	WSW	3/06/2019	57	S
5/11/2018	59	NNW	12/06/2019	59	NNW
22/11/2018	56	WSW	29/06/2019	61	NNW
23/11/2018	72	WSW	30/06/2019	57	WNW
2/12/2018	70	SW	11/07/2019	65	W
3/12/2018	76	WSW	12/07/2019	61	WSW
28/12/2018	56	S	13/07/2019	61	W
4/01/2019	81	SW	14/07/2019	74	WNW
13/01/2019	59	E	15/07/2019	61	W
18/01/2019	59	SW	16/07/2019	70	WSW
25/01/2019	59	NNW	18/07/2019	57	WSW
30/01/2019	56	NNW	23/07/2019	57	SW
5/02/2019	57	E	3/08/2019	56	WSW
6/02/2019	56	E	9/08/2019	78	W

9/02/2019	70	W	10/08/2019	65	WNW
12/02/2019	80	WSW	16/08/2019	56	NNW
13/02/2019	59	WSW	18/08/2019	59	NW
6/03/2019	76	WSW	19/08/2019	65	W
12/03/2019	67	SW	20/08/2019	65	WNW
16/03/2019	57	E	21/08/2019	81	W
25/03/2019	76	W	22/08/2019	80	W
26/03/2019	61	W	24/08/2019	70	WSW
29/03/2019	65	NNE	28/08/2019	56	SW
30/03/2019	65	WSW	1/09/2019	74	WSW
31/03/2019	57	WSW	7/09/2019	85	W
18/04/2019	65	WSW	8/09/2019	57	WSW
26/04/2019	74	WSW	9/09/2019	61	SW
28/04/2019	65	WSW	12/09/2019	72	W
8/05/2019	57	WSW	13/09/2019	61	WSW
27/05/2019	72	W	21/09/2019	67	WNW
29/05/2019	59	WNW	27/09/2019	81	WSW

Katestone's conclusion that their modelling of potential dust raised from the mine will be within acceptable limits relies heavily on the adoption of dust mitigation measures described in Table 17 of their report. These include the continuous use of water while scrapers are operating, the watering of transport routes, the necessity to keep dozer travel routes and materials moist, and the application of water and/ or suppressants during haulage and grading.

Elsewhere, on p3-31 of the main report it is stated that "water trucks will routinely spray water onto exposed areas, roads and within the mine void to suppress fugitive dust created by mobile plant and equipment movements. An estimated 400 megalitres (ML) of water per year will be used for dust suppression."

EEM (2020a) Appendix 006, Appendix A p47, in their modelling of water requirements for the project, calculated that around 375ML/year is required solely for watering the haul roads. This leaves 25ML/year for water for dust suppression in all other situations. In the Main Report, Table 3.1 "Estimate of area of disturbance in project area at any point of time" gives 35 ha in the topsoil, strip, 23 ha in the overburden strip, 18 ha in the ore and mine void floor, 19 ha for tailing cells construction in the mine void and another 40 ha for topsoil and overburden placement.. There are also large areas in the TSF and topsoil stockpiles.

Reading on, on page P 3-18, bottom paragraph we find that: "The selected mining layout is a series of cells approximately 300m wide by 1000 m long. The mine is expected to have two active mining voids of less than 60 ha each at any one time, with an area of 10 ha within each void being used for tailings". This is hard to reconcile with the 18ha for ore and mine void floor given in Table 3.1

EEM (2020a) p47 allowed 3 mm/day in excess of evaporation for the fact that water output cannot be so precise as to exactly match evaporation. Including this factor, on days of evaporation ranging from 5-10 mm, 1ML would cover from 12.5 to 7.7 ha. If this was sprayed over just the 60 ha of active exposed mine floor, the 25ML would last between 3 and 5 days. Kalbar are proposing to purchase 2 water trucks to suppress dust both on haul roads and disturbed areas. These are to be either 45000L or 75000L capacity. These would require 22 or 13 trips respectively to put out 1ML, with associated filling and spraying times. It is obviously completely absurd to suggest that they could be used for widespread dust mitigation. It therefore follows that the dust mitigation factors essential to Katestone's conclusions that dust emissions will be acceptable cannot be met. Therefore Katestone's conclusions are invalid, and dust emissions from the mine will exceed acceptable limits.

This brings us to the composition of the dust. The ore contains between 20 and 25% fines (particles smaller than 38µm) (Main report p3-18), much of which will be susceptible to wind. Some of the lower grade ore is to be included in the overburden. On p 3.20 of the main report it was stated that around 1% of the ore will be in material greater than 300 mm which will be screened prior to pumping and used as a road base and for other construction purposes. Pounding by heavy vehicles is likely to reduce this material to dust.

The mineral composition of the fine tailings, coarse tailings and mineral ore were chemically analysed by Envirolab, (Certificate of Analysis 217289-B, Appendix A002 Appendix D Appendix D). Their analysis of metal concentrations (mg/kg) in the three substrates, and particularly the ore and fine tailings gave high concentrations of a number of highly toxic elements. Environmental Geochemistry International (EGi) (2020) Appendix A002 Appendix D, omitted to mention a number of these, including gallium, lanthanum, strontium, titanium, vanadium and zirconium, all extremely toxic when airborne. The EGi and Envirolab tables are reproduced in the water section of this report.

Thus, if the mine proceeds, we have a situation where the systems proposed for dust mitigation cannot possibly be effective. It is highly probable that the raised dust will contain a number of toxic chemicals including carcinogens. These will contaminate the rainwater tanks of houses in the vicinity, and possibly even the Woodglen reservoir which supplies drinking water to the major population centres in East Gippsland Shire. PM_{10} and $PM_{2.5}$ particles can travel many kilometres.

The workforce at the mine will be exposed not only to these elements but also respirable αquartz. The Lindenow vegetable industry employs large numbers of staff, many of whom work in the fields. The local residents and employees will be directly exposed to dust emissions from the mine, with associated health risks.

There is also the risk that if Kalbar do run out of water or that due to future trade or economic conditions the mine becomes unviable the mine will remain as a source of pollution for many years, putting the viability of the neighbouring horticultural industry in jeopardy.

The mine should not be permitted to proceed.

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Chapter 6: ECONOMICS

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Executive Summary

The EES has failed to demonstrate that the project is viable, that it is the best use of available resources or that it is compatible with the State's economic, environmental, or social aspirations.

The EES has not presented a convincing analysis of the 'no project' scenario, nor has it considered the costs of project failure – a likely event given the history of mines in Victoria.

The business and financial risks have not been adequately described or evaluated, including the full capital and rehabilitation costs, and the challenges with entry into the market of other more accessible producers, or aspects of sovereign risk around rare earths production and sales. In addition, the proponent has failed to consider the rapid changes in the rare earths industry because of environmental concerns.

There is insufficient information in the economics report to judge the NPV of the project and make adequate assessments as to whether the financial benefits for the proponents outweigh the costs to the local community, important regional businesses and the local government area.

The report fails to demonstrate if the Fingerboards can be mined economically as it fails to consider a number of costs that should have been included. In addition significant underestimates of many costs are highly challengeable. Should they be included at their true value the project would rapidly lose any semblance of a positive NPV.

The benefits for local employment are grossly overstated, and the use of 'high' average wages as an inducement is in direct contrast to the information about wages cited in the Horticulture Report.

The proponent's use of dated information and inappropriate comparisons has resulted in the failure to adequately assess the indirect costs of the project – including those related to the long-term loss of agriculture, loss of biodiversity, costs of emissions and threats to the local horticultural industry.

While the economics report does not provide adequate information on which to fully assess whether the Fingerboards project is the best use of available resources, the information it does provide clearly indicates that the 'no project' option is a more favourable and strategically sensible choice.

It Just Doesn't Add Up

The purpose of the Mineral Resources and Sustainable Development Act 1990 (MRSDA) is to encourage 'economically viable mining and extractive industries that make the best use of, and extract the value from resources, in a way that is compatible with the economic, social and environmental objectives of the State'.

The EES has failed to demonstrate that the Fingerboards Project is economically viable or that it is the best use of available resources or that it is compatible with the State's economic, social or environmental objectives. It does not enhance community well-being and welfare, and actively works against intergenerational equity by leaving an environment that has had its full alternative productive value destroyed for at least an estimated 60 years. And that has destroyed the biodiversity and ecosystem services currently provided by the project area, including the permanent destruction of very important groundwater in and around the project area.

In fact, from the proponent's own modelling, if it fails to secure and maintain a partnership with an offshore rare earths processor that is willing to pay over $300M a year for what is in effect not a particularly high value Heavy Mineral Concentrate (HMC). The project is a very expensive and destructive loss-making exercise.

Legislation, Regulations and Objectives of the State

While the MRSDA is clear in its objectives a number of other pieces of legislation, regulations, strategic documents and policy directions are relevant to the Fingerboards project. Table 1 outlines some of these.

Table 4: Legislative Framework

ACT	PURPOSE	OBJECTIVES
Mineral Resources and Sustainable Development Act 1990 Enhancement of community well being Intergenerational equity	The purpose of this Act is to encourage mineral exploration and economically viable mining and extractive industries which make the best use of, and extract the value from, resources in a way that is compatible with the economic, social and environmental objectives of the State.	(2) For the purposes of this Act, the principles of sustainable development are— (a) community wellbeing and welfare should be enhanced by following a path of economic development that safeguards the welfare of future generations; (b) there should be equity within and between generations; (c) biological diversity should be protected and ecological integrity maintained; (f) both long and short term economic, environmental, social and equity considerations should be effectively integrated into decision-making;

Environment Protection Act (2017) Amendment 2020	Provides legal framework to protect the environment of Victoria to achieve sustainable use and holistic environmental management	Establishes standards for noise emissions and the air, water and land in Victoria, the territorial sea along the Victorian coast to Victorian Rivers from oil and noxious substances Criminally enforceable, general environmental duty to understand all the risks to humans and the environment that your actions pose and to take reasonably practicable steps to eliminate or minimize them
Water Act 1989 Vic	To ensure equitable, sustainable access to water resources whilst recognising and valuing the needs of the community (including Aboriginal People) and environment	8) This section does not authorise any act or omission that may— (a) cause any water to be polluted; or (b) obstruct the flow of any water in a waterway; or (c) erode or otherwise damage the surrounds of any waterway.
Commissioner for Environmental Sustainability Act 2003 *State of the Environment Report 2018*	To change reporting on the state of the environment and embed it in government decision making processes. Over time, this approach will equip Victoria to account for the economic benefits of a healthy ecology based on an internationally accepted framework, SEEA	encouraging decision making that facilitates ecologically sustainable development, Recognises the fundamental relationship between healthy ecosystems and human health
Climate Change Act 2017	To provide a statutory foundation for action in Victoria to reduce greenhouse gas emissions to net zero by 2050; and to ensure the state's economy, community and natural environment are resilient to the impacts of climate change	All our actions sustain and enhance our natural environment and ensure that our lands, waters and seas are resilient to climate change Reducing energy and non-energy (landfill and waste) emissions Integrate climate change into planning for future use of Victoria's water resources

EES – Minister's Requirements

The Final Scoping Requirements for the EES included an instruction that the EES include' discussion of all potential direct, indirect, on-site and off-site effects as result of the proposed action'

The Objective for Resource Development is to '*achieve the **best use** of available mineral sands resources, in an **economic and environmentally sustainable way**, including while **maintaining viability of other local industries***'.

Key issues

- Opportunity for development of a known mineral sands resource.
- **Efficient and environmentally sustainable mining** of available resources.
- **Best use of land's resources** considering environmental, agricultural and forest values.
- **Potential impacts** on the existing local industries, businesses and landholders.
- Impact of commodity price fluctuation on **project sustainability**.

Priorities for characterising the existing environment

- Identify the **extent, nature and development potential of the ore body**, and composition of heavy mineral concentrate, including radiological content and activity levels.
- Identify the composition of tailings and waste material, including radiological content and activity levels.
- Identify opportunities for local workers and suppliers of goods and services that could support the project.
- Describe local industries in the vicinity of the project which could be affected by the construction, operation, decommissioning and rehabilitation of the project, including agriculture and forestry.

Design and mitigation measures

- Describe alternative mine configurations to access mineral sands reserves (including location of the project's infrastructure) and strategies for management and disposal of tailings and waste material to avoid and minimise impacts and potential sterilisation of future reserves.
- Describe off-site activities including transportation and storage of heavy mineral concentrate;
- Describe methods and strategies to demonstrate the radioactivity of tailings and waste materials stays within environmentally acceptable exposure levels.
- Describe alternative methods of site preparation which could optimise site rehabilitation, including potential for future productive land uses.
- Outline measures to enhance potential benefits to local and regional businesses and minimise potential adverse effects to local land-uses and businesses.

Assessment of likely effects

- Assess the project feasibility including the predicted economic costs and benefits from construction and operation of the project, including capital investment, operating expenditure, employment and business opportunities, taxes and royalties to the regional, state and national economies, and the temporary and permanent impacts on agriculture, forest resources, tourism and businesses.

Approach to manage performance

- Describe key elements of the proposed mine work plan to enable monitoring of efficient resource recovery.

The EES document fails to address or reveal the most fundamental issue, i.e. the extent, nature and development potential of the ore body. All information is based on very limited input data. For example, a single 10 tonne 'representative' ore sample taken in different years, and from numerous locations across the project area, without any indication of an authentic Chain of Custody. In fact, Kalbar is currently undertaking an extensive delayed drilling program made possible only through funding from AKNR BV – a company whose payments also made it possible for Kalbar to pay its creditors. (Kalbar Operations Pty Ltd, 2020)

Benefits of 'no project' scenario not identified

The assessment was expected to document the effects relative to the 'no project' scenario.

A major shortcoming of the approach used by the proponent is that in comparing with the 'no project' scenario, it adopted a dated model that only assessed a very narrow cost benefit approach. The disputable figures were provided by the proponent, and failed to consider the full environmental, social and economic costs of the project.

For example, the loss of Ecosystem services has not been included in the economic analysis and the 'savings' from avoidance of that loss has not been shown as an advantage for the 'no project' scenario.

Outdated approaches consider the Ecosystem in terms of what can be immediately extracted, whereas more modern approaches look at the indirect 'non-market' benefits that ecosystems provide to things within, and outside, the ecosystem. Such as natural water filtration, carbon sequestration, and contribution to human and animal wellbeing.

Biodiversity offsets are a very poor substitute for the cost of loss of the ecosystem and its services.

This is particularly the case given the permanent changes the project will cause, and the extraction of materials at discounted prices that can be readily and more economically substituted, with far less environmental and economic damage.

Similarly, there has been no consideration of the opportunity costs of enduring and/or permanent changes to the landscape such as destruction of groundwater systems.

Project risks not accounted for or inadequately accounted for

Discussions with civil contractors, engineers and experienced miners indicate the costings put forward in the BAEconomics report are not reflective of the true cost to develop the project.

Many of these underestimates relate to the complexity of the operation, the depth of excavation, the amount of water required for dust management and the alternative transport routes proposed.

Exploitation of the Fingerboards resources poses a number of very significant risks. Any of which, in isolation, could severely undermine the profitability of the enterprise. And in combination, could destroy it altogether.

Project risks cannot be treated in isolation

Proper Project Management means it is neither practical nor sensible to attempt to treat those project risks in isolation, as one often affects, or is affected by, the other. E.g. the poor quality of soils requires importation of better-quality soils for dam wall and base retention, thus increasing project costs and putting pressure on returns.

Similarly, difficulties obtaining sufficient water for dust retention increases likelihood of exceedances, with fines or mandated shut down. Whereas dampening ore faces with scarce water reduces processing capacity, throughput and revenue.

The project is extraordinarily complex.

There are unprecedented challenges arising from such factors as highly dispersive soils, complex landscape, depth to ore, nature of overburden, intricate and delicate groundwater system on the project site, and the impacts on important river systems affecting two Ramsar wetlands.

Even the most experienced miner would be daunted by such massive and intertwined environmental risks, and it is highly unlikely that any other mineral sands mine in Australia or overseas has done so successfully.

The complexity is such that risks cannot be taken in isolation. None exist in isolation, and the effects of their interrelated nature translates to negative outcomes far more likely to be cumulative and exponential.

Impossible to rely on figures given limited exploration data

It is noted that the BAEconomics report relies on high level figures primarily provided by Kalbar in relation to capital and operating costs.

However, there is little in the EES documentation to explain, support, or justify many of those figures. There are certainly many statements made in the report that raise alarming concerns around whether costings have been properly done.

Notably all the information in the EES appears to be based on multiple variations and takes on Assays of a very limited number of samples. This is particularly in relation to the orebody.

Closer reading of the EES indicates there was only one 10 tonne sample provided for analysis, and that there were a mixture of samples taken from a few locations at different times. And with no evidence of a proper Chain of Custody. It is impossible on such limited information to make a proper assessment of the validity of the information being relied upon.

Further the company had not accessed a number of properties prior to the EES and is only now undertaking an extensive drilling program to determine the if the promised ore body in fact exists. In addition, Kalbar does not appear to have followed the critical advice provided by GHD, specifically in relation to establishing a test starter pit to determine, amongst other things, what slope of the pits would be required in light of the overburden structure. This is a critical consideration that has significant impacts on the economics and safety of the mine.

Can the Fingerboards be mined economically and sustainably?

There are a number of unanswered questions that the economics report has not, and could not, satisfy given the limited input data. The following is an unexhausted list of some of missing data/information

In relation to the orebody

- Location and rate of return of the orebody
- Materials required to be brought to site due to unsuitability of existing materials, e.g. clay for lining dams
- Testing to see if coarse and fine tailings can be conditioned to the extent needed, and in the time allotted for return to the voids

In relation to transport

- Costings for transport alternatives
- Additional biodiversity offsets required for rail sidings
- Costs of purchasing or hiring trains if Stratford bridge is completed
- Costs to upgrade rail line to accommodate freight trains

In relation to road diversions

- Capital cost of diverting roads
- Repairs and maintenance agreements developed with Council
- Payments to VicRoads for maintenance and repairs of public roads

In relation to use of or interference with private land and amenity

- Purchase or lease of farmland in within the project area – particularly given the benchmark of $3.1million for a 50 acre property
- Allowance for VCAT or other legal costs
- Compensation for loss of production or interference with existing businesses
- Costs to purchase and maintain real time continuous monitors

In relation to other water needs

- Costs to purchase water or licenses
- Costs to engage specialist ANCOLD dam design company
- Costs to construct onsite dams (including importation of clay or suitable liners)
- Costs to purchase extra water trucks (two will be insufficient)

In relation to power and other needs

- Capital costs to construct and maintain the 66kV line
- Alternative to 66kV line if not available when operations begin
- Insurance and legal costs

In relation to rehabilitation

- Cash provision for rehabilitation at point of maximum disturbance. Conservative estimates are $120,000,000

In relation to mining and processing

- No indication of allowance for downtime – 15% is industry standard
- No allowance for insufficient water for processing needs
- No indication of safety considerations in line with Australian standards reflected in pit design

Challenging the BAEconomics 'benefits'

In addition to the lack of information in relation to the practicalities of mining the resource, the EES gives insufficient information to determine if the project is financially viable. Indeed, the 'Economic Impact Assessment' provides very little in that regard, being dependent as it is on numerical data provided by Kalbar. This provided data seems to have been accepted without challenge, or without requirement for judgement in light of the overall project area, its location and the inherent challenges as previously recognized by both Rio Tinto and Oresome minerals.

Table 1-10 lists supposed economic benefits to Victoria that are not fully explained or justified and not supported by evidence.

Table 5: Economic benefits critique

Production related	NPV	MFG comments
Company tax, producer surplus, royalties	$158.9million	No indication of input data. Joint venture indicates majority of profits could go overseas – not just outside Victoria Business model (sales through to partner agency in China) indicates company tax is highly unlikely to be paid – particularly in light of major mineral sands producers company tax payment records. No indication of royalties supposedly attributable to mine – it is understood that other mineral sands mining companies have been given excused royalty payments altogether in Victoria No indication of consideration of business risks rather that price variability – experience at other sites indicate sensitivities to competition, product demand, global trends and downturns, sovereign risk, international politics and strategic directions (consider strategic directions to reduce Chinese dominance of rare earths), climate change and associated influences on policy directions,
Net economic benefits to existing landholders	$0.00	This is most definitely a **negative figure** Even before the mine commences, future incomes has been affected as farmers have been reluctant to invest in improvements., According to Kalbar's draft Planning Scheme Amendment they are expecting to compulsorily acquire land at pitiful rates that do not reflect past investment and future opportunities associated with the land (including succession plans that have been put on hold because of mining threat). Decline in property values for adjacent and nearby landholders (within 2-3km) should be reflected – as they are by banks who discount property values in mining areas and 'equity' figures for overdrafts, loans, etc.
Net economic benefit to local workers	$25million	Assumes workers wouldn't get jobs elsewhere, assumes all workers on average ~$100,000 when Kalbar's own reports have indicated award wages for miners are only $5,000-$7,000 per annum higher than for agricultural workers. The experience of $25 per hour for mine workers was common on the Douglas mine

Net economic benefit to local suppliers	$209.4million	Speculative figure. What is included in 'local suppliers'? What about impacts on other suppliers (e.g. agricultural and associated services) due to negative effects on agricultural and horticultural industries.? What about effects on local tourism operators whose niche appeal has been destroyed by nearby mine? The Agriculture report stated there had been no decision made on what % of mining and other equipment would be imported and what would be from Australian manufacturers.

Employment and Training

The mine promises a handful of jobs (the equivalent of one extra for every 22,500 jobs across Victoria). Kalbar has already indicated that most of those jobs will be placed through contractors. Mining contractors invariably have their own staff who are more likely to spend wages at their home base rather than East Gippsland.

In fact, plans to upgrade the Bairnsdale Airport include the justification that it will be needed for FIFO workers if the Fingerboards mine is approved.

Of the jobs Kalbar have on offer, the majority of the high paid jobs will be with their executives and specialists. The claim that average wages will be over $100,000 conflicts with previous claims Kalbar made in their horticulture impact presentations that the award for miners, compared to those in Horticulture/Agriculture, is only $5-7K per annum different for a full time worker. It is therefore most likely that the benefits to those who get jobs on the mine, who are working in other industries, will be far less than indicated in the figures.

The employment 'benefit' takes no account of possible job losses due to impacts on other industries. For example, Kalbar is stating they will be paying $4.7million in 2021 to secure rights to the 3GL winterfill available. This could readily be at the expense of other users – e.g. irrigators - who could be priced out of the market. Employment losses from horticulture with the associated flow on effects should be considered.

Emissions estimates (Mine-Free Glenaladale, 2020) indicate that each job on the mine will create 127 more emissions than other jobs in the State.

The company asserts motherhood statements pertaining to the mine acting as an incentive for further training. It ignores the fact that such training is not, and is unlikely to, become available at the local TAFE. Therefore, any purported benefits must be discounted.

Inadequate assessment of external effects

The Minister also required the proponent to assess the external effects of the project. Table 1.3 in the BAEconomics report states the evaluation approach used for this assessment.

What is demonstrated in that report is that BAEconomics has taken a somewhat arbitrary approach to quantifying those effects. It would appear that if BAEconomics was unable to formulate an amount, there was a default the value being $0.00.

It is highly unlikely this approach would be accepted as best practice in many areas of economic modelling activity in contemporary business.

It can be seen that many of these approaches are highly contestable and lead to glaring underestimates of valuations ascribed to external effects. The following is a non-exhaustive list of concerns about the approaches to, and results of, BAEconomics valuations of 'external effects'.

The list includes some of the considerations MFG believes should be factored into those costings.

Table 6: External effects methodology critique

Category	**BAEconomic's evaluation approach**	**MFG comments**
Loss of surplus in other industries – agriculture	'Market based productivity measure – reduced agricultural output - bases figures on ~400ha per year out of production and only allows $20,000pa based on 20-year mine life.	Inappropriate measure, uses dated figures and questionable approach. Land lost to agriculture is lost for 25 plus years. Kalbar's own maps show all land will be unavailable for farming whilst the mine is in operation. Reliance on progressive rehabilitation is fanciful and has no backing in reality. Gross amount figures should have been used as these are what contribute to the economy. Further all money spent on local agriculture is spent locally Even at Hamilton Sierra's figures (DSE 20) over a1676 acre hectare? mine site, this amounts to gross revenue of over $5million per year, $125million over life of mine (including 5 years rehab) – and if considered time for shade trees (60 years) to grow after mining finished - $402 million
Loss of surplus in other industries – future agriculture options	No consideration	Does not include loss of agricultural potential of the land or opportunities forgone by future generations who may want to raise stud flocks or herds, run dairy cattle, plant hemp, grow fruit trees, olives, etc.

Loss of surplus in other industries – tourism, recreational industries (e.g. cycling, horse riding, fishing, etc)	No consideration	Mine will impact on tourism and recreation generally – effect will be on local businesses as tourists avoid Dargo and Mitchell River National Park as destinations, fishing in Mitchell reduced due to siltation
Loss of surplus to other industries - horticulture	Dismisses	Unrealistic assessment of likelihood and impact on horticultural industries Considers impacts that can't be predicted don't require quantification – e.g. impacts on reputation. This is Contrary to increased importance of provenance. Ignores first buyer importance, i.e. supermarkets No consideration of additional effects of impacts on organic producers
Devaluation of surrounding properties for both sales and for bank loans and overdrafts	Ignores	This is a cost to communities and should be included – Estimates are of 30% devaluation for sale purposes and banks willingness to support overdrafts At current valuations this would run into millions for land within 2 km of mine-site (location and contamination taken into account as well as standard banking decisions)
Biodiversity	Offset costs using a market-based valuation No inclusion of common species and GHUs Does not include EPBC offsets Claims they will be finding offsets as they go	Units are underestimated and not current. Not all properties were assessed, including infrastructure options impacts Valuation does not reflect offset costs across state, e.g. Yarra Valley $146,000 plus GST for one Species Habitat Unit would bring Kalbar's figures to $167million. Offsets should be determined by an Accredited Biodiversity Offset Broker, rather than an individual or company on behalf of the miner. Must consider EPBC offsets Should consider GHUs and cumulative impacts such as loss of biolink and other important symbiotic factors e.g. eels in the local waterways are a crucial part of the carbon cycle. The SHUs for the Fingerboards are unlikely to be available through the NVOR and the staging of the payments should not be allowed.

Greenhouse gas emissions	1.07m tonnes based on figure of ~$13/tonne Claims contribution of 0.07% to State's emissions will only cost $10,000 for life of mine – justification based on Victoria's emissions cf Global emissions (Alan Jones – grain of rice 'methodology')	Emissions calculations significantly underestimated. Did not include costs of transport and shipping, disposal of site waste, used a highly questionable approach to 'land clearing'. Current figures are $16/tonne. Conservative estimates of emissions attributable to project are around 2,000,000 tonnes CO_2-e LOM costing more than $32,000,000 Comparison to global estimates is unconscionable
Microclimate change impacts	Not considered	Large scale stripping of land changes the microclimate for many kilometres around and will lead to increased ground temperature, and increased moisture evaporation. Impacts other landholders' amenity as well as capacity to produce
Housing	Discussion is not solution	Bairnsdale always has shortage of rentals, now more severe due to recent fires which displaced hundreds of individuals. Costs of disruption and loss of people as mine employees squeeze out low income renters Incorrect and outdated claims about housing availability in region
Public infrastructure costs	Claim none as balanced by Kalbar's offer to 'voluntarily' make good any impacts	Should include costs to upgrade and maintain Lindenow-Glenaladale and Friday Creek Roads as an alternative for traffic coming from the east to the Mitchell River NP as this is now the most likely reasonable alternative for visitors. Realistic assessments noting damage done in other mining provinces and full costing based on updated figures are required Waste management costs required to avoid situations that Pooncarie and other regions suffer as a result of miners commandeering landfill availability or expecting councils to remove their waste and relocate

Surface water and groundwater	Claim defensive expenditure: licence lined up for ongoing access to water, claims adequate	Miner's first call on water will reduce availability to other industries – including horticulture – effect must be included in costs Removal of gravel aquifer at Fingerboards and capturing water for mine use decreases flows to Mitchell and hastens introduction of water restrictions. – What does 4 extra weeks water mean to irrigators? No allowance for effects on long term rehabilitation due to Haunted Hills formation being used for mine infrastructure No indication of costs of intercepting water that would normally flow to other farmers or the environment
Heritage	Claims can't put a value on AHC therefore worth nothing	Not all properties have been assessed. Needs thorough assessment by, and agreement with, GLaWAC
Monitoring noise and air quality	Claims defensive expenditure including purchase of monitoring equipment	Grossly inadequate for monitoring that will be required – noise will be one of the major impacts on adjacent and nearby residents – figures only allow for $5,000 a year to be spent on mitigations
Traffic and transport	Ignores	Should consider the costs associated with additional accidents and damage to vehicles through road deterioration
Landscape and visual	Diminishes	Mine visible from a number of locations not accounted for – including all up the Mitchell Valley – gives very negative impression of the 'clean, green produce' especially to international visitors and product buyers

Approach to capital costs

While there is no indication beyond the high-level overarching amount, there are concerns that a number of considerations haven't been given adequate attention.

These include

1. Land purchase or lease agreements given Kalbar's mining sequence maps indicate a 'scattergun' rather than linear approach to mining. This would enable Kalbar to selectively/strategically select/choose the highest yielding ore. Despite the claims of 'co-existence' this means that rather than the 'average' 400 or so hectares out of farm production at any one time, within a couple of years the entire site will be impacted in one way or another. Farming nearby will be impossible. Early, ethical and fair agreements to either lease or purchase the land must be obtained. The benchmark has already been set by Kalbar with the purchase of a 50 acre property for more than $3million dollars, and the same value per hectare would be expected to purchase land from other land in the project area that is required for mining. This means the capital figure to establish the mine is grossly understated.
2. Legal and insurance costs must be indicated
3. Costs associated with establishing offtake and other agreements
4. If rail costs – costs to establish rail infrastructure and costs to buy or lease and fit out rolling stock, costs for road and other upgrades required for safety purposes (e.g. Racecourse Road Bairnsdale)
5. Costs of establishing administration and other facilities
6. Accurate cost to establish 66kV power – if Oresome budgeted $14.5million in 2013, how is it that Kalbar considers $6million adequate
7. Costs associated with dam construction due to project area clay/soil challenges as outlined in the GHD starter pit information
8. Additional costs associated with dust mitigation – i.e. number of water trucks allocated is beyond inadequate
9. Costs associated with additional water needs – water conceptualization has not considered contribution by open orebody to dust
10. Should diesel for generators and such be added in here too?

Costs of project failure

What is not considered in the economics report is the cost to the environment and the community if the project fails. These include

- Destruction of the Perry River system and chain of ponds
- Destruction of groundwater and services it provides
- Negative ecological outcomes for the Mitchell River and the Gippsland Lakes Ramsar site
- Permanent loss of un-rehabilitated farmland
- Continued contamination of surrounding areas from un-rehabilitated mine site

- Impacts on productiveness and reputation of Lindenow Valley produce
- Impacts on recreational fishing industry.
- Costs to the State to stabilise the site to prevent further damage
- Cost to the State to rehabilitate project area

Business risks

Apart from the incomplete information about project costs and benefits, the economic, impact assessment fails to mention a number of business risks that would be expected to be considered in even the most straightforward business proposal.

These include a number of generic aspects such as the changing social norms and attitudes towards climate change, and a number of risks that are more specific to mining, and mineral sands mining in particular.

Social licence

EY Megatrends confirms the importance of social licence for project acceptance and continuation (Ernst & Young, 2020). Social licence is relevant to all ages. Research clearly demonstrates climate change and associated environmental concerns such as pollution and loss of natural resources are all key concerns of Gen Zers and are increasingly important amongst all other generations.

Gen Y and Zers will be the main influencers during the project life. It is this cohort, and the following generations who will be most affected by its negative impacts. They are more likely to be able to mobilise quickly around a cause and it is foreseeable that they could do so in relation to this project – not just because of its polluting and other effects on the local environment and ecosystem services, but also because of the increasing global awareness of, and attempts to remove or reduce, the harm done through rare earths processing.

Strategic marketing risks

Kalbar's own investor presentations aim to 'sell' the project by showing how a 'buyer' of the HMC can make a profit through processing to the final rare earths stage. In fact these presentations indicate that it is only a final rare earth processor that could make a profit from the project. (Kalbar Limited, 2020) According to their most recent information available, this will be done in China.

China is already attempting to digress from the negative environmental effects of rare earths processing and is seeking alternative means to make that less costly. China, like the rest of the world, is also all looking at alternatives to rare earths. This is influenced by the enormity and permanency of negative environmental effects from processing to extract individual elements. It is conceivable that within the next few years the Chinese and global push for higher environmental standards could affect the 'demand' for the Fingerboards' HMC.

Sovereign risk

A third aspect of social licence that could affect offtake contracts for the HMC is the apparent breach of US/Australian strategic alliances in relation to rare earths, which are aimed at reducing China's dominance of the market.

Kalbar's 'agreements' with Asian partners could well be perceived unfavourably by both the ordinary voter and at a public policy level.

Risks specific to mineral sands mining risks

In addition to the many generic risks there are a number of factors that indicate the project is unlikely to achieve the claimed outcomes. Many of these were indicated in an investor presentation Minerals Development Limited made. That presentation was in relation to a mineral sands mine which was effectively a simple ore body with very little overburden, that was closer to end markets, accessed cheaper labour and had considerably longer reserves, to name just a few advantages. (MDL , 2013)

Additional advantages of the mine were the limited competition, cheap clean power and deep-water shipping facilities. The orebody produced a much higher percentage of very heavy minerals (91% compared to the Fingerboards 21%) and there was little in the way of biodiversity impacts and costs that had to be accounted for or managed.

Even with such advantages MDL identified a long list of risks, both specific to the company and more general in nature. Any of those either individually, or in combination, could affect the operational performance of the company.

Some of the Key Risks identified by MDL that should have been considered by Kalbar include

- Delay or denial of permits
- Uncertainty of commodity prices and global demand
- Fluctuations in exchange rates
- Political, legal and fiscal changes
- Changes, limitations, withdrawal and/or challenge to mining rights and title interests
- Community disputes and protests
- Adverse changes to emissions regulations and pricing
- Health, safety, environment and/or community incidents impacting operations and/or reputation
- Inability to obtain/retain financing on acceptable terms or a contravention of financing covenants
- Current expectations of future cash flows and available funding may not be realised, inhibiting planned expenditure and growth
- Cost inflation adversely impacting capital, operating costs and project expansion viability
- Events and/or changed expectations resulting in the impairment of assets and goodwill
- Uncertainty of resource, reserve and production estimates adversely impacting the profitability of mining and/or processing
- Loss of key personnel

- Labour disputes and employment regulatory changes which could lead to lost production and/or increased costs
- General operational risks, including (but not limited to): natural disasters and events; capital equipment breakdowns; limitations or interruptions to transportation/port infrastructure, power generation and water supplies; breakdown / cyber-attacks of information technology infrastructure and process control systems; a major incident resulting in fire, explosion or other loss of control to the process, potentially leading to the release of hazardous materials; and supply chain failure
- Inadequate insurance cover
- Unanticipated or higher than expected rehabilitation, closure and reclamation costs
- Realistic assessment of 'operational availability' of plant and equipment – 85% is industry standard

One of the key risks for Kalbar that was also identified by MDL was the possibility of a breakdown in joint venture relationships. Recent events in Chinese/Australian trading relationships indicate that this is a very real possibility. And one that can't be readily dismissed.

Risks endemic to Fingerboards resource

A report by Rio Tinto (2013) on the Glenaladale deposit indicated rationales for why both Rio and Oresome – Kalbar's predecessor – decided the challenges involved in developing the resource for the returns achievable made it not worth pursuing.

In essence, the reports determined that the 'resource' was too high risk with too little likelihood of positive return. There is no indication in the EES that Kalbar has identified, admitted to, or adequately considered the type of resource development risks that these very experienced mining companies did.

Such an optimistic and Pollyanna- like approach has no place in decision making when so much is at risk.

The Rio Tinto/Oresome feasibility study clearly highlighted major resource development risks Kalbar should have acknowledged. (Rio Tinto Exploration Pty Ltd, 2013)

These include

- Production of clean high SG TiO2 may not be feasible
- High slimes reduce value
- Water security and supply (particularly in a drying climate with more frequent drought years) is considered a fatal flaw in the project
- Need for investigation of some environmental issues
- Environmental restrictions – including destruction of vulnerable and threatened EVCs
- Difficulties obtaining or maintaining a social licence

- Planning and other restrictions on infrastructure needs – including road diversions, desire for compulsory acquisitions, etc.
- High iron oxide content indicating need to investigate further for possible Acid Mine Drainage
- Spiral performance and recoveries due to % of slimes
- Freight and logistics – including availability and costs of port options
- Product saleability given quality and impurities

In addition, the reports indicated some risks that required even more detailed investigation and assessment and complex or detailed management.

These included;

- Handling and disposal of clay
- Water management and reclamation
- Trade union activity during construction

It is of grave concern that the EES has advanced/proceeded to this stage without Kalbar demonstrating a need to address any of the main risks which Rio Tinto identified. Regardless of the specific and clear advice from GHD, i.e. a test pit that would have given an indication of pit slopes (for safety) the need for imported material for dam linings, etc.

Kalbar's business model

A series of Investor presentations on Kalbar Resources website give a glowing account of the projected returns from the mine. However further investigation of these presentations raises considerable alarm as there appears to be an unwarranted reliance on sales to rare earths producers. This is due to the returns from titanium and zircon products not being sufficient to cover the purchasers cost of HMC.

For example an August 2018 Investor Presentation (Kalbar Resources, 2018) depicts how the best economic outcomes could be achieved by the 600,000 tonnes per annum of the Heavy Mineral Concentrate produced.

Figure 1 shows the latest Australian Trade and Investment Commission's assessment of critical minerals around Australia. (Austrade, 2019) and that the Fingerboards is not considered a valuable mineral sands resource.

That assessment reflects a high level of credibility, particularly given Kalbar's promotion of the potential for the project to be sold on to an Asian rare earths' processor as the only way the HMC will be translated to a profitable outcome.

Figure 2 indicates that as an ilmenite/zircon producer, the Fingerboards mine is a loss-making venture. The company is claiming they will achieve around $500 gross per tonne annually for sale of the concentrate to an Asian processor. Their gross revenue from that is stated to be around $4.9billion over the operating life of the mine, which averages $327million annually.

Notwithstanding the fact that Kalbar have seriously underestimated their capital, operating and transport costs, using this figure, and the information in the August 2018 report, the company is relying on the purchaser paying $327million for 600,000 tpa of the concentrate, and then to add value to that by further processing

Figure 29: Critical mineral deposits and major mines in Australia (Austrade, 2019)

Figure 2 and 3 shows two investor presentation that are displayed on Kalbar's website. Both give examples of Kalbar's business model that depends on final stage rare earths oxide production to reach a profit.

BAEconomics figures state Kalbar is expecting $4.9billion gross revenue over 15 years for the HMC – approximately $370,000,000 a year for the 600,000 tonnes sold.

Both figures indicate that there are two possible paths that a purchase of the HMC might take to producing a saleable product. In each case, to limit the further processing to the intermediary stage of producing rare earth concentrate and Yttrium, the buyer would not cover the costs of purchasing the HMC.

It is only if the purchaser is able to process the product to the final rare earths oxide stage that they can possibly make a profit – how much of a profit.? This would depend on their capital, administration, operating costs, selling and distribution costs, etc. For an Investor with a greater understanding of the context, it appears a very risky proposition when there are so many more economically appealing sources of rare earths.

Unless there is some unknown or hidden information about an exceptional by-product – which is unlikely as the presentation was developed to try to attract investors – even the most foolhardy investor would want much higher returns to take

a chance on such a marginal project. It does not cover the costs of zircon or titanium products and relies on an industry that already has established competitors and better resource prospects than the Fingerboards. It is obvious from these presentations that the Fingerboards project is not being developed for producing mineral sands. To do so would see it making a loss from the start.

That Kalbar need to rely on a possible rare earths' processor is equally fraught with risk particularly given the nature of the rare earths market and the political climate surrounding China's dominance of it.

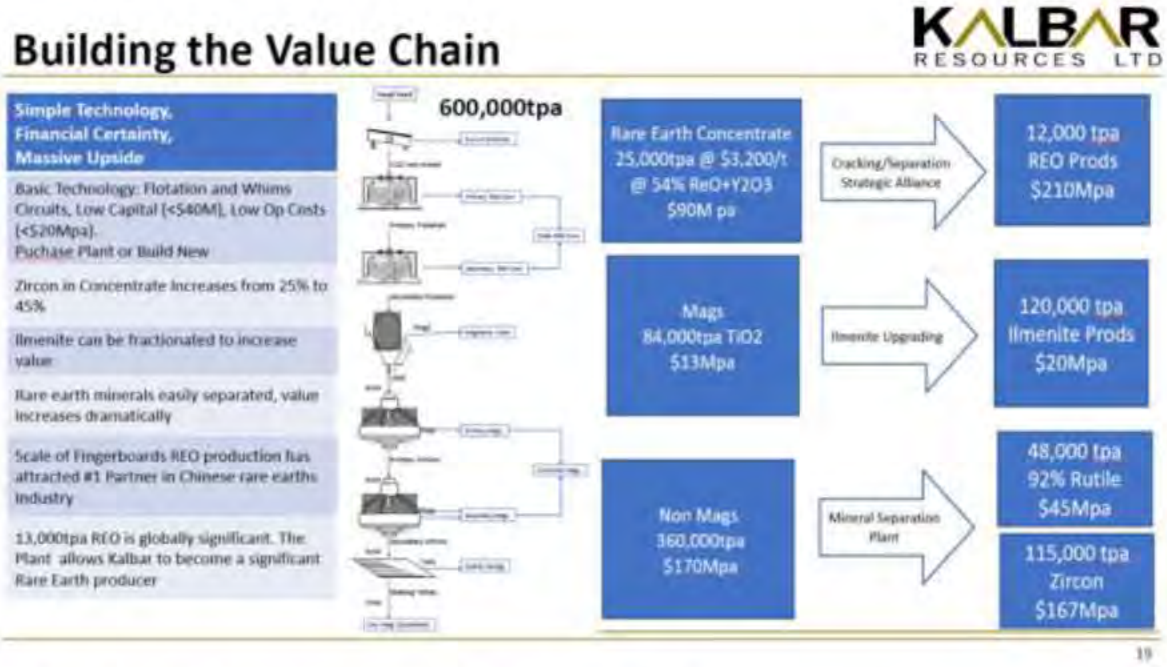

Figure 30: August 2018 Investor presentation (Kalbar Limited, 2018)

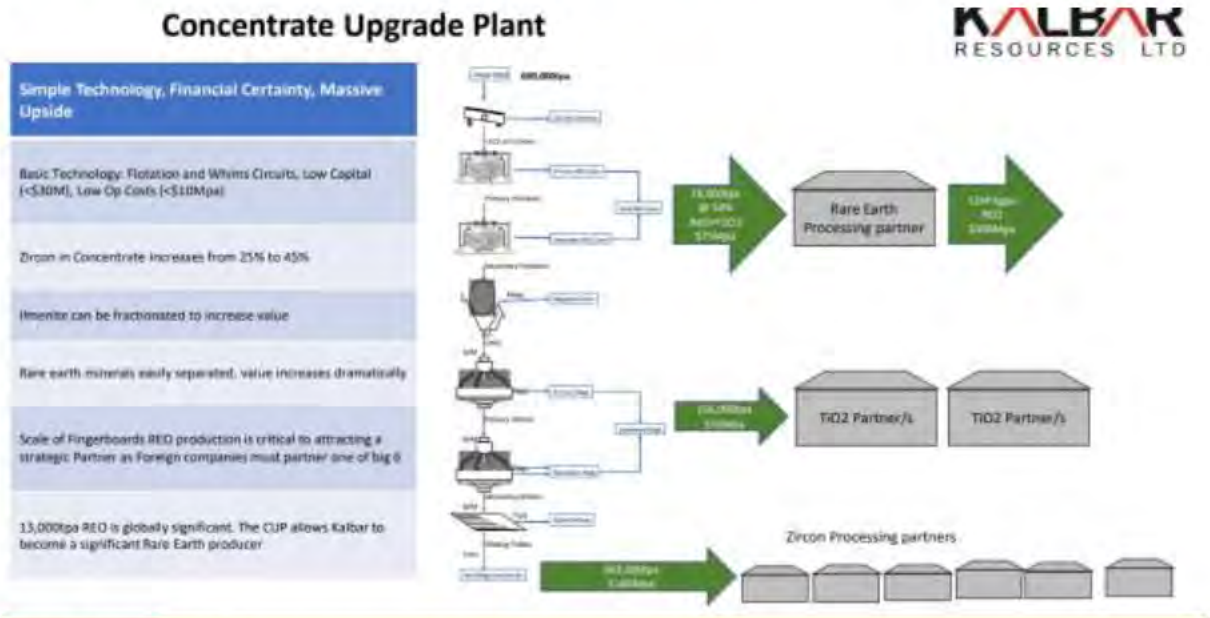

Figure 31: June 2018 Investor presentation (Kalbar Limited, 2018)

Reliance on rare earths for profitability is fraught with risk

Kalbar, like other mining companies trying to gain a social licence, promote possible use in 'green' technology to justify the reliance on rare earths. However, the technical, environmental and social challenges associated with the production of rare earths has led many countries, including China, to move away from the traditional approaches to mining and processing. Many countries have started investing in recycling of rare earths as a means of reducing the devastation to the environment. A number of companies are finding as effective alternatives for their products. In fact, there is in increasing trend to move away from the use of rare earths in 'green' technology and from the dated mode of mining that takes devastation for granted. (Science History Institute, 2019)

It appears that the 'rare-earth alarm bells' are based on a shortage of understanding rather than a shortage of rare earths. (Lovins, 2017)

Lovins describes warnings about China's monopoly of rare earths threatening the shift to electric motors and wind turbines as 'nonsense', and shows how efficiencies and substitutions have resulted in non-rare-earth dependent motors doing the job as well (or better) than those motors relying on magnets which have been produced using rare earths. There is an ever-increasing awareness of this and a move from major companies away from the use of rare earths. These trends, that are better for the environment and better for the economy, clearly indicate that Kalbar's intention to sell the HMC primarily for profits from rare earths is a problematic and a risky business strategy.

The repercussions of the last 'media induced' reaction to China's 'monopoly' in 2010, indicate that the reliance on the rare earths end product is almost certain to lead to an early demise of the project that will result in the community with a legacy of an un-rehabilitated environmental catastrophe if sufficient bonds are not in place.

Furthermore, even if the use of rare earths is not phased out within the next decade, a recent report commissioned by Geoscience Australia shows the Fingerboards mine is not even considered as a potential source. (Mudd, et al., 2018) In fact, even though Australia produces 12% of the worlds rare earths it only rates 6th in the world in terms of available resource. (MInerals Council of Australia, 2019)

Brazil, Vietnam and Russia each have more than three times Australia's 2.75% share of rare earths deposits. (US Geological Survey, 2020) Reliance on being able to sell the Fingerboards HMC at a 'required price' is problematic when these and other countries have such a competitive advantage. It is a recipe for investment disaster.

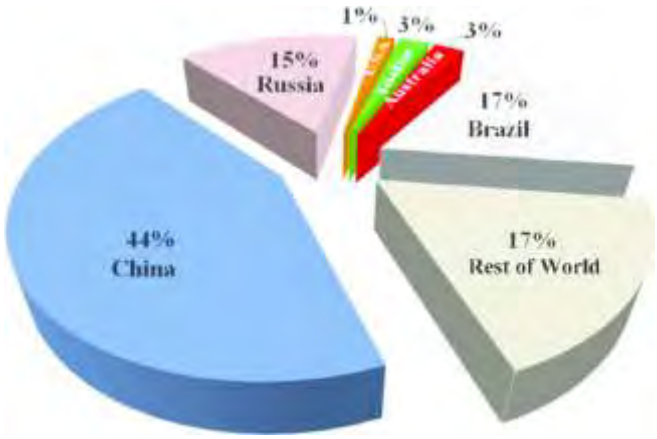

Figure 3: Distribution of rare earths globally (Barakos, Mischo, & Gutzmer, 2015)

Furthermore, as noted by researchers from the Sustainable Minerals Institute in Queensland, rare earths are not in short supply. The SMI discusses the unnecessary environmental damage from rare earths mining and processing and notes the need to take a more strategic approach to their production, and to invest in recycling to reduce environmental and social costs. (Golev, Scott, Erskine, Ali, & Ballantyne, 2014)

Of importance to note is that even if rare earths were in short supply the Fingerboards resource is not even recognized as an important deposit in the latest Geoscience publications (Mudd, et al., 2018)

It seems foolhardy in the extreme to be promoting a project that is clearly unable to make money from the mineral sands' components. Especially as it has such significant negative implications for the environment, local economy and community, particularly when there are so many other, richer, more easily accessible and more competitive rare earths deposits across Australia and around the world.

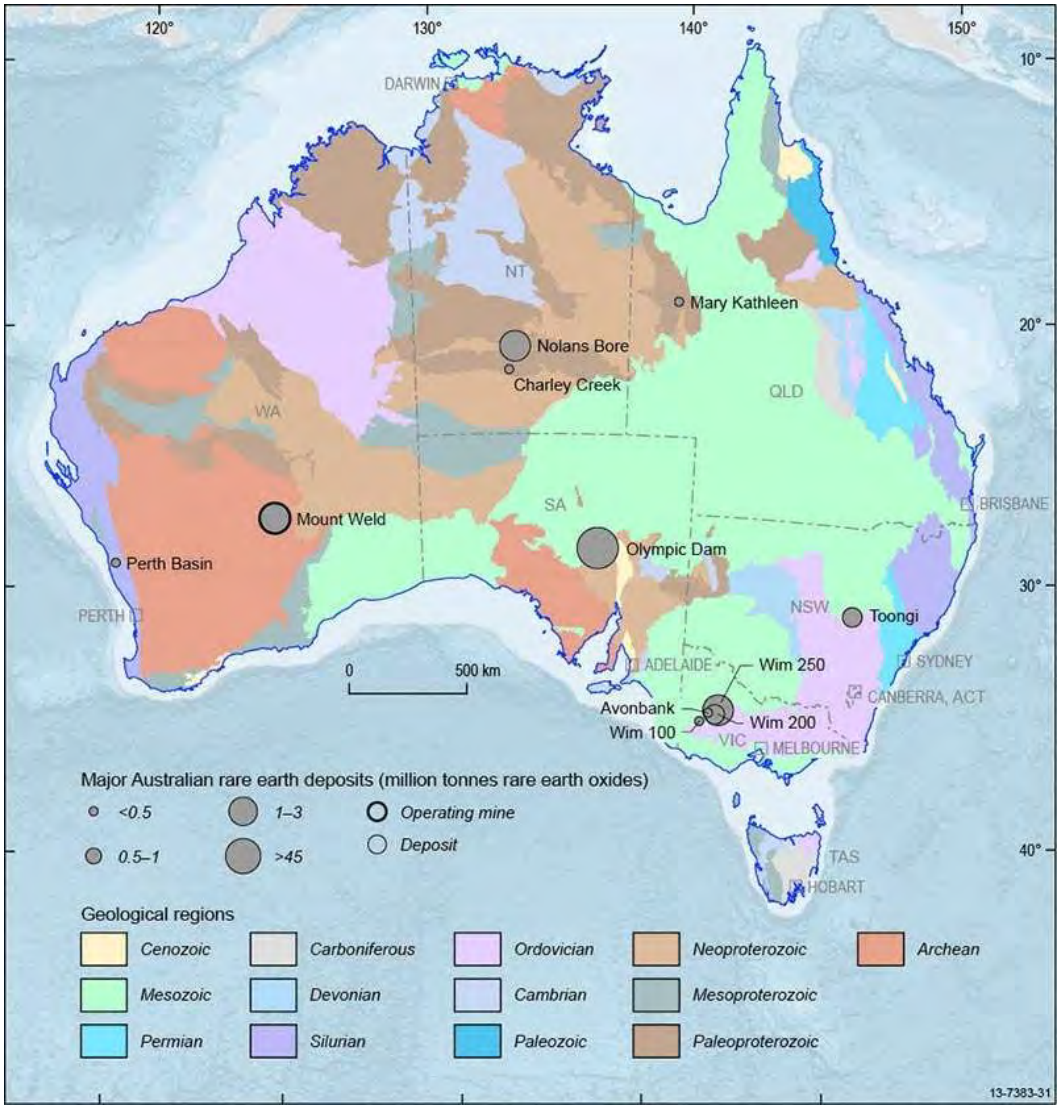

Figure 4: Important rare earths deposits in Australia (Huleatt, 2019)

Is this the best use of the available resource?

It may be perceived that the Fingerboards is just a money moving exercise for mining companies. The deposit didn't fit Rio Tinto's business model, and after careful consideration of a commissioned report on the potential for a mine on the same site, Metallica Minerals/Oresome also abandoned the plans to pursue the ore. Both these companies have a long history in the mining industry – unlike Kalbar which was originally established as an 'investment company' by Hillgrove Resources to offload a bauxite mine in Indonesia and only changed its identify to 'mining' some years later. Kalbar has proven its networking and promotional capability but certainly has absolutely no track record as a mining company. This fails to align with the Minister's Scoping Requirements.

The EES makes a number of claims of very modest economic benefits of the project. As stated elsewhere in this response, those benefits have been grossly overstated because of the failure to consider business risks associated with the project that are likely to significantly reduce gross returns, and incorrect figures ascribed to the economic 'costs' of the project, as well as complete avoidance of the 'non-market' costs.

The proponent touts the zircon content of the project claiming it will add significantly to the global zircon market. However, they fail to say that impurities and other problems with the product mean that without the addition of the rare earths' component (fully processed for the end user) the mine is not viable.

In addition, the impurities in the titanium products make them virtually valueless on a global scale.

Further evidence that this project is no more than a money moving exercise is evident in Kalbar's justification for road diversions as outlined in EES Chapter 4 Alternatives that provides justification for diverting roads that are critical to the local community, commuter traffic and tourists. Table 4 below shows the cash flow Kalbar claims it will lose if not permitted to divert the roads. How can $6.26 tonne cash per tonne be in any way reflective of the full cost to access the ore. No consideration has been made of the costs to remove the overburden, the power costs to transport the slurry to the processing plant, the costs to process and the costs to transport to the end user. In fact, neither of the diversion options achieves anywhere near the 'cash flow' of $27.00 a tonne that Kalbar have claimed elsewhere. How long can this type of money moving exercise continue before the company is unable to fund operations any longer?

Table 7: Cash flow per tonne of ore from diverting roads

Road diversions	Tonnes of ore mined	Cash Flow	$/tonne ore	Biodiversity loss
Bairnsdale - Dargo Road	34,500,000	$216,000,000	$6.26	10.61 ha native vegetation plus 42 large trees
Fernbank - Glenaladale Road	2,500,000	$42,900,000	$17.16	4.45 ha native vegetation plus 39 large trees

Strategic exploitation of Victoria's resources required

Given the low quality of the resource, in the interests of sensible, and strategic exploitation of Victoria and Australia's resources it would be far wiser to consider what is available in relation to meeting global zircon, titanium and rare earths needs.

In Victoria alone there are a number of other mines that meet the current (?) criteria, some of which have already been approved and others which are in advanced stages in the approvals process.

Much has been made of a number of these in Victoria's Western District including;

1. WIM 150 – which has a very similar composition – including zircon and rare earths - to that of the Fingerboards but has a higher total heavy mineral percentage and with a deeper orebody averaging 11.2m. WIM 150 has an ore reserve life of 55 years compared to the Fingerboards 15 years. (Mining Link, n.d.)
2. Donald – which has over 5,700Mt of mineral sands at an average grade of 3.2% HM. The project has already been approved for development, has a mining licence, a CHMP in place, water rights and an export licence. (Astron, 2020)
3. Goschen – which is in the EES approvals stage and has both its zircon and rare earths components individually viable and has a significant cost advantage over the Fingerboards of having its ore near the surface. (VHM Ltd, 2019)
4. Avonbank – Which claims a 32 year mine life processing more than 463Mt at an average 4%, has a 10 metre average thickness ore body, sits only 12 or so metres beneath the surface and has no major environmental or cultural heritage constraints. (WIM Resource Pty Ltd, 2017)

The advantages of these mines over the Fingerboards, apart from longer life, lower strip ratios, better product and less social and environmental problems, include proximity to purpose-built infrastructure and the Port of Portland. This port is already equipped for the transport of bulk ore. In addition, these mines are not located in highly erodible landscapes like that of the Fingerboards. This brings a significant reduction in risk from the mining process per se, less risk of rehabilitation failing and less risk of the disturbed area not being able to be returned to production. This competitive advantage of the Western District projects markedly increases the likelihood of financial failure of the Fingerboards project.

Beyond the mineral sands in Victoria there are numerous other prospects across Australia that will cater all aspects of the market (e.g. Mount Weld and Thunderbird) as well as many others in development around the world. In addition, as stated earlier, there are far more valuable rare earths mines either in operation or in various stages of development across the world that are all well positioned to meet global demand for the next several decades – particularly when that demand is predicted to fall as companies continue to find less environmentally damaging alternatives.

Promises, promises

A quick glance at the experience of mining across the State and Australia shows just how removed the promised benefits are when the mine is in operation, how long-lasting the negative impacts are, and how quickly the miner moves on to the next best thing – like a 'player' having to keep the current target on board while looking over their shoulder for the next opportunity to exploit. It doesn't take much research to identify the number of times politicians and councils have acted on superficial assurances, or local government areas building all hopes for a sustained economic boost on the basis of the 'word' of the miner. Meanwhile the community doesn't have to look far to see the catalogue of discarded and dejected hopefuls.

We also see the extent to which mining companies are adept at grooming key contacts and exploiting the possibilities of jobs to gain political support.

The promise of 30 years of ongoing well-paid jobs in mineral sands mining in the Murray Basin springs to mind due to the similarities of what is being promoted in East Gippsland.

In relation to mineral sands mines in Western Victoria, the grandly titled 'Murray Basin Mineral Sands Infrastructure Planning Study' was produced in July 2000. (Sinclair Knight Merz, 2000) It was effectively a wish list of publicly funded upgrades to infrastructure that was being sought by a cohort of mining companies including Iluka and Basin Minerals.

The study claimed the Murray Basin could generate 450 well-paid direct permanent jobs for a period of 30 years and a flow on effect of 1100 but only if 'there is adequate infrastructure to enable the Murray Basin to be developed to its full potential'. 'Teasers' were put out naming a number of towns as potential separation plants and a number of destinations for potential product flows. An extensive list of transport infrastructure upgrades – to be funded by government - was put forward. Fast-tracking native title 'obstacles' was demanded, along with upgrades of energy and telecommunications infrastructure and a guarantee of supply of water resources and fast tracking of environmental approvals. While there is no doubt the industry created some jobs in Victoria between 2002 and 2015, the promise of permanency did not eventuate, mine lives were half that touted, and employment numbers never matched the hype. Communities were decimated as people left, either bought out by the miners or because the thought of living near an operating mine was too overwhelming. The planned-for riches in the community did not eventuate and there has been no improvement to socioeconomic outcomes in either Douglas or Ouyen.

The decision to put the mineral processing plant at Hamilton (which wasn't included in the Study's options) blind-sided other LGA hopefuls who had been lured to support the mining through the potential of jobs it may provide.

The mines were closed some years ago and the processing plant in 2017. A massive low-level radioactive waste plant, without resourcing or support from the EPA, DHS or Earth Resources, has been the only lasting legacy for Horsham City Council.

At the same time as those mines were operating the industry experienced a series of twists and turns in fortunes. There were multiple examples of building stockpiles to 'massage the market', then reducing operations to draw down the piles, before putting mines into 'care and maintenance' in response to variable markets

The nature of mineral sands mining

Despite the rhetoric intended to persuade LGAs and communities of long term, steady jobs, the nature of mining projects is to mine the better grades, or most accessible ores first to speed up paying off capital investment.

As mines progress they face 'declining grades and inevitably higher costs'. (Sarcevic, 2020).

This was evident at the Douglas mine where the plans put to the EES panel for steady extraction and progressive rehabilitation were readily overturned by a variation to work plan to allow the company to expediate extraction of the product. The result was a mine life of less than half that touted by the promoters as the resource was rapidly depleted and the company's attention moved to Ouyen.

A similar story happened there where the LGA, businesses and community found the industry stripped the resource within a few years. As most farms were bought by the miner, there is no longer a community in Kulwin, and the company seems in no hurry to rehabilitate the massive, dusty, open cut left behind.

The situation at the Fingerboards is likely to be far more problematic. The ore is not high grade. Resource estimates are always 'in situ' and Kalbar is relying on processing in Asia to get it to a saleable state.

Whilst parts of it – namely around gullies – are readily accessible in the early stages of mining, the accessibility rapidly decreases, and the increasing depth of overburden and upper sands makes the project decreasingly attractive.

Based on the plans of the firm, it is anticipated that by Year 3-4 those areas will become increasingly uneconomic not just to mine, but to also process due to the depths of overburden that must be moved and also because of the increasing costs of processing the very low grade upper sands.

Mineral sands – a precarious investment, especially for a small Region

The mineral sands industry is notoriously volatile. Regions that rely on it do so at their peril.

Even the most experienced players in the industry experience expensive and often seemingly insurmountable problems. And those problems occur even in countries where government and industry can 'ride roughshod' over the community to an even greater extent that they do in Victoria. (Ross, 2020)

The Fingerboards Project will not produce high quality TiO_2 and because of the cost of processing this lower quality product, will never attract the prices claimed (or needed) by Kalbar for the mine to be economically viable.

The range of problems experienced by Iluka, Cristal, Tronox, Rio Tinto and Ineos - all big players on the global stage – include technical and construction issues, labour difficulties, accidents and volatile swings in prices, profits and demand. (Sarcevic, 2020)

Added to that is the growing awareness of the often unethical or tyrannical treatment of communities across the globe which has led to increasing concern, unrest and unwillingness to be manipulated by mining companies.

A case in point is TiZr/Eramets Grand Cote wet sands operation in West Senegal that has destroyed the lives and traditional economies of local communities and allowed the operators, in league with government players, to disenfranchise, dislocate and 'rehouse' whole communities. (EJ Atlas, 2018) The experience of displaced villagers appears very different to that of the companies' employees who they (the mining company?) insist are treated like family. (GCO, 2017)

In many ways the experiences in Victoria are not much better. The Murray Basin was touted as the saviour of the Western District and the source of well-paid jobs for decades to come. In all cases the mine life was barely half that touted in the promotional material, at public meetings and ~~an~~ in forums intended to influence decision makers. Communities were not better off, either during mining or afterwards and many have been permanently depleted.

Thousands of hectares of land will take decades to be restored to their pre-mining productive capacity – despite the guarantees of ongoing rehabilitation. While Iluka did well financially out of those mines, the communities experienced no long-term benefit.

There is a disconcerting and ongoing issue of decision makers taking at face value what they are told by the miners. History shows despite all the hype the long term, well-paid local jobs will not eventuate, local government areas will not prosper, and there will be no improvement in social indexes. Many companies will be vying for favour with the miners but they invest in the hope of that at their peril – stories abound of car dealers and others investing heavily only to find the hype did not match the experience, and the investment reflecting a very expensive misjudgement.

The reality was that local communities were depleted, local roads disintegrated, promised rehabilitation did not occur and ratepayers were left not only with the cost of repairing and rebuilding local roads, but also with the 'management' of a low-level radiation 'dump' that the Regulators wiped their hands of.

Many of the world's dry mining operations are in South Africa, Kenya and Mozambique. Only the Rio Tinto Richards Bay operation is considered to be in steep decline. However, many countries are now starting to realise and act on the savage environmental issues caused by many of the mines – especially coastal ones. In this day and age it seems remarkable and perhaps inconceivable that places like India is ahead of Australia on the environmental management of sensitive areas.

Admittedly zircon dominated projects like Jacinth Ambrosia and Grand Cote are less common, but then so is the demand for that product – and in particular when it seems to have the processing problems that accompany high levels of impurities in the ore. Rio Tinto is opening up another zircon dominant mine in South Africa to replace its Richards Bay one. (TZMI, 2019) All these mines have far better, far more easily accessible and far more readily processable ore than that at the Fingerboards. They are also in areas where labour is cheaper and community unrest is very readily stifled.

Existing industries more valuable in the long term

Underestimation of value of agriculture and horticulture

This is a pre-existing industry that makes a major financial contribution to the local and State economy in the order of $155 million annually and is a major employer of up to 2,000 workers depending on the season. Every direct job creates over 4 indirect jobs whereas one job in the mine will only create one indirect job. The indirect value of the horticulture industry was not included in assessing the value of this industry which is a major misrepresentation of its worth and importance. (Mine-Free Glenaladale, 2020)

Undervaluation of Horticulture Industry

The RMCG report significantly undervalued the economic significance of the horticulture industry in the Lindenow Valley. Claiming that vegetable production is valued at $62.6 million annually has understated the financial value of the industry by more than 100%. To use 5-year old data from the Australian Bureau of Statistics from the Bruthen-Omeo statistical division (2015-16), is nonsensical (RMCG, 2020; pg. 28/9). The figure of $62 million was challenged in two EES technical reports, however it wasn't corrected by RMCG. This reflects very poorly on the company and its report. This then also raises further integrity and trust issues.

Hamilton SierraCon (2020; pg. 24) and BAEconomics (2020; pg. 20) stated Agriculture Victoria estimates the local farmgate value of production as around $120 million per annum. Based on information from the industry quoted in the media, the value of production is over $155 million annually and is expected to increase further with expansion plans.

Similarly, the value of dryland farming on the actual project area was severely underestimated.

Quoting such a low valuation figures appears to have been done in order to diminish the significance of both agricultural activities in and beside the project area, and the Lindenow Valley horticulture industry to the economy. The effect could be considered as an attempt to lower the perceived adverse effects of the mine on the horticulture industry (evaluation objective #5). If the value of the pre-existing agriculture and horticulture industry to the economy was considered low, that would meet the aim of lessening concerns about potential deleterious consequences from the proposed mine to the horticulture industry and livelihoods.

Failure to include post farmgate economic value add.

In addition, the reports did not include '*economic impacts of value adding post farm gate*'. Not including this data is significant because agriculture has a much higher multiplier effect on the economy than mining. For every direct job in agriculture, a figure of 4.26 indirect jobs are created (National Farmers Federation; 2017). Only one indirect job will be created for every direct job from the Fingerboards mine (Coffey, 2020; pg. 29).

It also follows that every job lost in horticulture has a four times multiplier flow-on loss effect. This will have a major impact on the local economy and is a significant adverse effect should loss of jobs occur to the horticulture industry as a result of the mine.

There are many local businesses that depend on produce supplied by the horticulture industry and those businesses employ significant numbers of local people.

As an example, OneHarvest (VegCo) based in Bairnsdale is the largest salad processing facility in Australia (OneHarvest, 2020) and employs over 250 workers. VegCo sources 40% of its vegetables from the Lindenow Valley. If the horticulture industry was not able to meet its contractual obligations to supply vegetables it would have significant consequences to the local economy at both ends of the supply chain.

Fit and proper person

The proposed mineral resources (Sustainable Development (Mineral Industries) Regulations 2019 stated that the Minister must be satisfied that a licence applicant is a fit and proper person who will comply with the Act. The importance of the clause in making decisions concerning the allocation of resources is to increase the benefits to the State and communities while minimising risks. Of relevance to the current project is whether the program of work is appropriate given the project, and whether the proponent is likely to be able to finance the proposed work, including the full rehabilitation of the land. The recent VAGO report on the failings of Earth Resources in relation to rehabilitation brings into sharp focus the importance of a thorough and independent investigation of the proponent's financial credentials. Of note, in relation to Kalbar Limited, one of the benefits of a selective share reduction scheme put to shareholders (in relation to ascendance of AKNR BV as a major investor with controlling interest in the Board of Kalbar Operations) devised in March and voted on in August this year was that the associated finances would enable Kalbar Limited to pay its creditors.

It is possible therefore that Kalbar Limited may have been operating while insolvent prior to the joint venture formed with AKNR BV and would not have been in the position of being able to complete any program of work without that finance. Let alone finance the mining proposal and any rehabilitation.

Who is Kalbar Operations Pty Ltd?

It is also noted that the Work Plan in the EES includes corporate information about Kalbar Operations Pty Ltd dated 18 May 2020, and a statutory declaration from the Chief Operations Officer dates 17 April 2020.

In the context that every other document in the EES application being updated as of August 2020, it is surprising that declarations provided in the Works Approval haven't been updated to reflect the status of Kalbar Operations PL as at the date the EES was released. Alternatively, the corporate information should have coincided with the date of the declaration by the Chief Operations Officer.

Had that been the case it would have been noted that as of 17th April Kalbar Operations in fact had four directors, Messrs Farrell and Pettersson and Messrs Scherb (UK) and Gaelin Lizarrago (Peru) from AKNR BV. The latter two were removed from directorship and reappointed in July at the same time a Preferential share was issued to Kalbar Ltd, and a Mr Robert Sennit was appointed to the Board to give AKNR BV control.

Further if director's statement dates had to coincide with the alterations and edits to the EES documents, ASIC documentation as of 24 July would have shown AKNR BV owned 11,666, 666 of Kalbar Operations 12,396,669 shares or just over 94%. So effectively in July, when the EES documents were being finalised, the proponent Kalbar Operations Pty Ltd would have been seen to be majority foreign owned (and by a very large percentage) and with a board that was foreign controlled.

The concerns about this situation were brought to the attention of the Regulator and a significant amount of reshuffling and backdating of documents lodged with ASIC (including the surprising discovery of a $147 million error in records) has since redressed that imbalance – at least on paper.

So, in summary, this project represents an economically unstable proposition on the background of unrealistic assessments of the challenges of mining in such a complex landscape, unrealistic expectations of marketability of the product ineffective and inadequate consideration of all costs involved and unwillingness to examine or address the business risks. The Project is underpinned by a company that has not mined as a Company before but has clearly demonstrated they lack capacity to meet the criteria for 'a fit and proper person'.

Given the serial failings of mining operations to deliver the promised financial benefits to communities and minimise environmental and other risks this submission asserts that the proposed mineral sands mine at the Fingerboards should not proceed as it fails to meet the Scoping Requirements of the EES.

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Chapter 7: HORTICULTURE

Located on top of the plateau in the photograph above, a total of 13 square kilometres of agricultural farmland is proposed to be excavated up to 45m deep for the mining of mineral sands and rare-earths.

The boundary of the Fingerboards Mineral Sands Mine Project will be as close as 350m from the Mitchell River which is the river shown above.

Water from that river is extracted to irrigate the vegetable fields in the Lindenow Valley, or Mitchell River Valley as it is also known.

Those vegetable fields as shown in the foreground of the photograph are as close as 500m downwind from the mine project (Figure 1).

1. Executive Summary

Since January 2019, 75% of the horticulture business owners from the Lindenow Valley have publicly stated their opposition to the Fingerboards Mineral Sands Mine Project, with the remaining 25% indicating they were waiting for the EES. The opposition is in response to the expected and foreseeable serious impacts the mine will have on their businesses and livelihoods. From correspondence and community meetings, both RMCG (the consultants engaged by Kalbar to undertake the horticultural impact assessment) and Kalbar should be aware of their stated opposition to the mine.

This proposed mine is a significant threat to the viability of the $150 million per year Lindenow Valley horticulture industry, placing that industry and its 2,000 direct jobs at risk. RMCG understated the financial value of the industry by more than 50% claiming its farmgate worth as $62 million annually. RMCG's valuation does not accord with the facts. It is contended that RMCG stated such a low valuation to reduce the perceived adverse effects of the mine on a major pre-existing industry.

Every direct job in agriculture creates four indirect jobs, whereas one mining job creates one indirect job. This multiplier effect plus the economic impacts of value-adding post farmgate were not included by RMCG in assessing the full value and importance of the horticulture industry. This means its full worth has not been reported, possibly to diminish its significance as a pre-existing industry that has major beneficial flow-on effects to other regional businesses and the local economy.

It also follows that every job lost in horticulture has a four times multiplier flow-on loss effect which will have a major impact on the local economy and is a significant adverse effect should loss of jobs occur to the industry as a result of the mine.

The proposed mine is to be located on top of a plateau with the horticulture farms downwind from the mine. The closest farm is 500m below, on the other side of the Mitchell River, which is the main source of water to irrigate the crops.

This is not a sand mine! It is a mineral sands and rare-earths mine. The content of the ore body being mined is not benign. There are risks from what will be in the dust due to the materials being mined from depths of 45m below the surface. There are significant threats to the horticulture industry from the high risk of contamination of soils, crops and water, both perceived and real with no specific mitigation measures cited or possible for the organic businesses.

Horticulture growers are required to follow strict quality assurance certification measures for their produce, with even higher standards imposed on organic growers. This establishes the quality, safety and reputation of the produce grown. Therefore, the prospect of a mine in close proximity generating dust with toxic materials present, raises serious questions about the viability of the horticulture businesses, particularly the certified organic businesses, should there be quality assurance failures.

Because all sensitive receptors were not identified with 60% unreported, the impact of air quality (dust), noise, light and vibration was not considered on all possible sensitive receptors and businesses. The risks from those study areas cannot be stated as low as the impact on all receptors was not assessed. The risk of reputational damage to the produce from the Lindenow Valley both real and perceived could arise from contamination by excessive amounts of dust, radioactive dust, heavy metals, contaminated water, or human pathogens.

The mitigation measures cited will not address the negative impact of hazardous dust to the crops and soils due to RMCG's failure to know local farming practises.

Buyers know where the produce comes from. Wholesale buyers of fresh produce, including the major supermarkets will not purchase produce from a grower or region if they have concerns either perceived or real about the quality or safety of that produce, or the reliability of its supply. RMCG did not mention the role of buyers, instead focusing on consumer purchasing habits. If the buyer does not purchase the fresh produce it will never reach the consumer, so consumer purchasing habits and provenance are not the main determinants of reputational risk.

Mitigation strategies proposed such as committees and reference groups, EnviroVeg certification are not going to address the potential reality of buyers deciding not to purchase from the area because there is a hazardous mine close by. The risks are high that regional reputation will be impacted which could result in the collapse of the sector and its associated local industries.

There is abundant evidence that water security is a major issue for the horticulture industry without another major user (the mine) competing for access to the same sources of water. The proposed mine will compete with existing users for access to water and therefore the EES scoping requirements have not been met.

Climate change is a major risk for the industry and its impact has not been adequately addressed. The risk from flooding events has also not been included in the impact assessment.

There are several reasons provided to support the high probability of contamination of water sources including aquifers. The availability of clean water is under threat; without it the horticulture industry will not survive. Any level of risk is too great because the negative consequences are high.

No primary research was conducted by RMCG to assess the impact of the mine proposal on the horticulture industry. There are many serious flaws in RMCG's report including their concluding comments.

The reports RMCG relied on were not independent; most of them were funded by Kalbar with disclaimer provisions or limitations stated. It is necessary to refer to our response to those reports in other parts of this community submission, particularly radiation, air quality, noise and water to understand the full impact of the risks to the horticulture industry. Noise was not a study that RMCG referenced, however it should have been included so the risks from noise have not been mitigated.

There are many serious risks to the industry that cannot be mitigated as outlined in this submission. There are other risks such as flooding and health risks to workers in the fields that were not identified nor was the risk posed by the use of altered sands on the mine footprint during rehabilitation. Proposed mitigation strategies in their report are rudimentary and lack substance; they will not reduce the high risks.

In relation to co-existence, none of the three Busselton producers given as examples were vegetables growers. To claim co-existence, the circumstances must also be comparable which is not the case. Co-existence at this location is not possible.

Nothing in the RMCG report addresses the fundamental problem that if the mine proceeds that it will potentially draw workers away from the horticulture sector; it will be a strong competitor for labour as it is able to pay a higher award rate. The mine will only exacerbate a major problem currently experienced by the industry and will compete with the horticulture industry for labour. Given its higher rates of pay, the mine is able to attract workers from around the country which the horticulture industry is not able to do. There would be no need for the mining company to develop strategies to attract workers because there would be no need for them to do this. If the mine did have problems attracting workers, it challenges a major argument for the mine, that it will create jobs.

Should the mine be approved, horticulture business owners have committed to soil testing being undertaken in their fields to establish baseline data before the construction phase and also during mining operations. Should soil health change this would potentially be the basis of a class action against the company and the Victorian Government for allowing the mine to proceed given the foreseeable risks. It is unreasonable for the Government to foist this risk on these businesses so it must take responsibility for any adverse consequences if it approves this mine.

Being located in rural Victoria we are rightly concerned that enforcement of regulations will not happen. Until the Government adequately resources regulators and ensures compliance failures are addressed, the risks are too great that history will repeat itself here with dire consequences from regulatory failures.

In recognition of the horticulture industry's importance, last year the Victorian Minister for Resources, Agriculture and Regional Development exempted 4,000 hectares of the Lindenow Valley from mining and minerals exploration recognising the need to: '*permanently safeguard this prime agricultural land that produces world class food and secure the employment opportunities it creates' (Premier of Victoria, 2019).* Given the importance of this land, the Government must continue to protect it by not approving this mine project.

The horticulture industry is poised to expand further with water security an existing threat that impacts on these expansion plans. If the 3 GL of water annually that the mine project requires was made available to the horticulture industry, a long-term contributor to the economy, they could create three times more jobs than the mine project. This is based on their irrigation data, compared to Kalbar's proposed 193 positions, the majority of which are to be filled by contractors. Using water to grow healthy food is needed to sustain life, particularly at a time when more agricultural land is being consumed for other purposes.

Details about the risks and responses to the mitigation strategies are outlined in this submission which has been compiled with the input of the majority of the impacted horticulture business owners. For the reasons outlined above and detailed in the submission that follows, the reputation and viability of the horticulture industry is under serious threat as well as the livelihood of its business owners if this mine project was to be approved.

2. Horticultural Impact Assessment Requirements

The objective of the horticulture impact assessment was:

> '*to assess the potential impact of the proposed mining operation on nearby horticultural businesses within the Lindenow Valley*' (RMCG, 2020; p 1).

The scoping requirements of the EES included eight draft evaluation objectives. The fifth objective, 'Social, Land Use and Infrastructure' specifically mentioned horticulture:

> '*to minimise potential adverse social and land use effects including on …irrigated horticulture…*).

The impacts of the project should also be assessed in relation to these evaluation objectives:

- Resource Development ('*maintaining viability of other local industries')*
- Water, Catchment Values and Hydrology
- Amenity and Environmental Quality
- Landscape and Visual (Kalbar, 2020; Chapter 5 p 6).

Horticulture comes under socioeconomic and cultural environment in the risk-based impact assessment, which is about considering the potential risk to fertile soils, stable landforms, livelihoods, water quality and adequate water supply (Kalbar, 2020; Chapter 7 p 7).

The contributing EES technical reports that informed the RMCG horticultural impact assessment were: groundwater and surface water; air quality; radiation; and roads, traffic and transport (Kalbar, 2020; Chapter 7 p 8). Noise should have also been included and is a major oversight.

To complete the impact assessment, reference must also be made to the observations and conclusions reached about those technical reports as outlined in other chapters of this community submission and presentations that will be made about them, including about this report. This is necessary to determine the full impact of the project on horticulture (which includes a viticulture business).

There are many flaws and fundamental errors in the RMCG report which are unacceptable for an agricultural consultancy firm. An examination of that report and their conclusions follow, including an assessment against the evaluation objectives and risk-based impact assessment.

3. Horticulture Businesses Oppose Fingerboards Mine Project

In the concluding comments of the RMCG report it stated:

> *'a greater majority of horticultural producers consulted through this study are supportive of the project on the proviso of one important condition; "as long as everything is done right,"* (RMCG, 2020; p 74).

It was astounding to read that conclusion and also astonishing that it appears under the heading 'Consultation with Industry.' ***That concluding statement is refuted in the strongest possible terms***.

The vast majority of the horticulture business owners from the Lindenow Valley are ***not supportive*** of the Fingerboards mineral sands mine project. Their opposition is in response to the expected and foreseeable serious impacts the mine will have on their businesses and livelihoods. RMCG and Kalbar were very much aware of the strong objection to the mine project, as outlined below, so to make this statement is misrepresenting the facts.

On 31 January 2019 a letter addressed to Kalbar's CEO and signed by 75% of the horticulture business owners raised several pages of questions and concerns about the mine, concluding on page 4 that the RMCG horticultural impact draft report was '*totally unacceptable*'. The letter was from 9 of the 12 businesses; the remaining 3 weren't approached to sign it as they had publicly indicated they were waiting for the release of the EES to determine their position on the mine. Following repeated requests via emails, Kalbar's CEO failed to respond in writing to each of the questions as they were asked.

Since that time there have been several letters to the editor, media releases and articles in various newspapers and a magazine, as well as television and radio interviews from representatives of the horticulture group outlining their concerns about the mine project.

On 29 October 2019 when the RMCG report was presented by one of their consultants Mr Clinton Muller at a public meeting organised by Kalbar, Mr Kane Busch from Busch Organics, one of the impacted businesses stated on camera, as the session was filmed:

'I am speaking on behalf of 75% of the horticulture/viticulture business owners of the Mitchell River Valley who are not waiting for the EES report to be released to speak out against this proposed mine. We have no confidence in RMCG's report which was conducted over a year ago. We do not agree there will be a low risk of contamination. Our concerns have not been addressed and the risks are too high for the Government to allow this mine to proceed.'

Given the statements made that evening with Kalbar and RMCG staff present, there should be no doubt about the opposition to their report and the mine project from the majority of the impacted horticultural businesses.

4. Financial Undervaluation of Horticulture Industry

The RMCG report significantly undervalued the economic importance of the horticulture industry in the Lindenow Valley. Claiming that farmgate vegetable production is valued at $62.6 million annually understated the financial value of the industry by more than 50%.

The 5-year old data from the Australian Bureau of Statistics, Bruthen-Omeo statistical division (2015-16) used for the study was not the best source of information, nor is it current (RMCG, 2020; p 28/9). The figure of $62 million was challenged in two EES technical reports, however it wasn't corrected by RMCG or Kalbar which reflects poorly on them and their EES report. This raises integrity and trust issues. Hamilton SierraCon (2020; p 24) and BAEconomics (2020; p 20) stated Agriculture Victoria estimates the local farmgate value of production as around $120 million per annum.

Based on information from the industry quoted in the media, the value of horticultural production is over $150 million annually and is expected to increase further with expansion plans.

Quoting such a low valuation figure attempts to diminish the significance of the Lindenow Valley horticulture industry to the economy and reduce the perceived adverse effects of the mine on the horticulture industry (evaluation objective #5). If the value of the pre-existing horticulture industry is reduced, it lessens concerns about the potential deleterious consequences from the proposed mine to the horticulture industry and the livelihoods of those business owners.

The Lindenow Valley supplies vegetables to fresh markets, supermarkets, fast food outlets, cafes, restaurants, cruise ships, and various businesses along the value-added product chain throughout Australia and overseas. This is a major horticultural production area for the State as reflected in these statistics:

- Over 30 semi-trailer truckloads of fresh produce leave the area daily, increasing to around 50 semi-trailer truckloads during the summer months.

- East Gippsland is home to the largest fresh bagged salad company in the southern hemisphere as well as 2 of the top 10 salad producers (by volume) in Australia with this area being the main source of supply for lettuces for the rest of the country during the summer.
- 20% of the lettuces used nationally by McDonalds outlets comes from here.
- By volume, the 3rd largest green bean and sweet corn grower in Australia is located here.
- This area is home to 3 significant organic vegetable growers with Busch Organics a major organic vegetable grower in Australia.

5. Why Wasn't Post Farmgate Economic Value-adding Included?

On page 19 of the RMCG report it states that data used for the economic value of the industry did not include '*economic impacts of value adding post farm gate*'.

Not including this data is significant because agriculture has a much higher multiplier effect on the economy than mining. For every direct job in agriculture, a figure of 4.26 indirect jobs are created (National Farmers Federation; 2017). Only one indirect job will be created for every direct job from the Fingerboards mine (Coffey, 2020; p 29). It also follows that every job lost in horticulture has a four times multiplier flow-on loss effect which will have a major impact on the local economy and is a significant adverse effect should loss of jobs occur to the horticulture industry as a result of the mine.

There are many local businesses that depend on produce supplied by the horticulture industry and those businesses employ significant numbers of local people. As an example, OneHarvest (VegCo) based in Bairnsdale is the largest salad processing facility in Australia (OneHarvest, 2020) and employs over 250 workers. VegCo sources its vegetables from the Lindenow Valley. If the horticulture industry was not able to meet its contractual obligations to supply vegetables it would have major consequences to the local economy at both ends of the supply chain.

6. The Land in Question

Figure 2. Lindenow Valley shaded area showing 4,000 hectares exempted from mining and minerals exploration with BOM wind rose showing prevailing wind direction (period 1942 to 2020)

The photograph at the beginning of this chapter shows the location of the mine on the plateau above the Mitchell River with the vegetable fields of the Lindenow Valley in close proximity. The area shaded in the photograph above was exempted by the Victorian Government from minerals exploration and mining licencing on 22 July 2019 (refer to Figure 2). This map also shows that contrary to the RMCG diagram shown at Figure 5 -1 in their report, this area is under intensive cropping, which is sown on a rotational basis throughout the year, it is not seasonal.

On 22 July 2019 the Victorian Minister for Resources, Agriculture and Regional Development, The Hon Jaclyn Symes MLC exempted 4,000 hectares of the Lindenow Valley from mining and mineral exploration recognising the need to:

> '*permanently safeguard this prime agricultural land that produces world class food and secure the employment opportunities it creates*, *well into the future'* as it is an area *'of exceptional agricultural value,' (Premier of Victoria, 2019).*

Figure 3 below shows the location of the Fingerboards mineral sands mine project in respect to the Mitchell River and the vegetable fields of the Lindenow Valley.

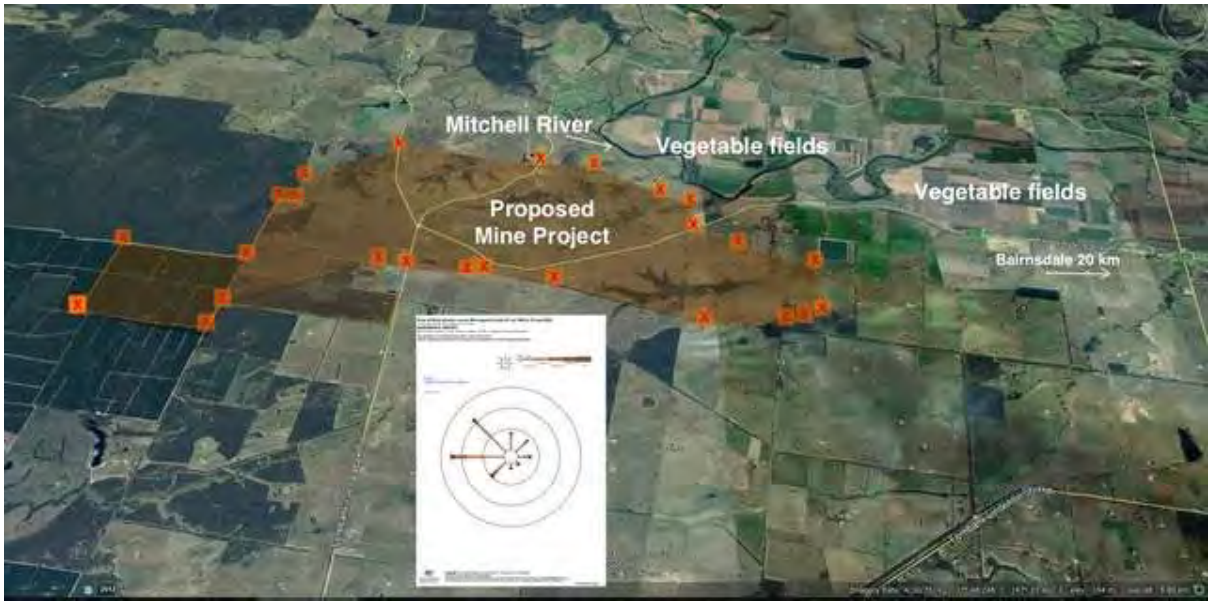

Figure 3. Proximity of mine to Lindenow Valley vegetable fields with prevailing wind direction from west/northwest

7. This is NOT a Sand Mine!

In numerous places throughout the RMCG report the mine is referred to as a 'sand mine'. It was also said: '*They may perceive a sand mine as a 'scar' in the landscape but different from a coal or ore mine, not necessarily a threat to vegetable quality or safety based on knowing sand as beach, sandpit or building material.'* (RMCG, 2020; pp 5 & 58).

This is not a sand mine, it is a mineral sands and rare-earths mine. The content of the ore body being mined is not benign. There are risks from what will be in the dust due to the materials being mined at depths of approximately 45m below the surface, (although the maximum depth varies in different studies in the EES as does the total area proposed to be mined).

There are radioactive and cancer-causing substances being mined. Below the surface of the ground and undisturbed these substances do not pose a health risk. It is when they are excavated and crushed that dust is generated and it is the dust or particulate matter in the dust that poses a health and contamination risk. It is contended that the full analysis of the ore body hasn't been disclosed in the EES report and therefore the full risks have not been exposed.

We don't trust the information in the EES because we don't know what the laboratory was asked to analyse in the samples the laboratory was given. Therefore, the full and real dangers from the dust is a matter of serious contention. The fine dust that will be generated during mining excavation will have an impact on crops, soils (contamination) and human health (on the large number of workers in the fields).

Evidence relating to the ore body is covered in other chapters of the community submission and must be considered in relation to the potential risks for this irrigated horticulture industry considering how close it is downwind from the proposed mine.

8. Flaws in the RMCG Methodology

We contend there are a number of significant flaws in RMCG's methodology.

8.1 No primary technical research undertaken by RMCG

The methodology undertaken by RMCG for their 'study' was seriously flawed. In a Kalbar information sheet emailed to participants of RMCG's horticultural impact assessment it stated:

> *'It is important to note that RMCG did not undertake any primary technical research on the issues raised by the landholders, but reviewed the relevant technical reports (e.g. dust, water, etc.) to determine their conclusions'* (Appendix 1).

Contrary to assertions made throughout the RMCG report about the EES technical studies being independent, they were not as the consultants were funded by Kalbar to undertake work directed by Kalbar, under parameters set by Kalbar such as, for example, where the one wind monitoring station was located which is known by locals to be in a wind shadow. There are limitations statements and disclaimer provisions in many of those technical study reports such as:

> *'it is not possible to make a proper assessment of this report without a clear understanding of the terms of engagement under which the report has been prepared, including the scope of the instructions and directions given to Coffey, and the assumptions made by the relevant Coffey consultants who prepared the report'* (Coffey, 2020; p 'Important information about your Coffey Report').

There is therefore an inherent bias in the RMCG report as it is based primarily on reports undertaken by Kalbar's consultants, with no independent primary research undertaken.

8.2 Impact on horticulture industry not initially considered

The pre-existence of the horticulture industry and the potential impact of the Fingerboards mine project was initially overlooked by the Technical Reference Group (TRG) until pressure was exerted by the horticulture industry for potential impacts of the mine on their businesses to be considered. In initial diagrams the Mitchell River was not shown and still isn't in their Figure 5-1 (RMCG, 2020; p 21). There was no local representative from the horticulture industry or the local community on the TRG.

8.3 How was the impact assessment undertaken?

There are eleven horticulture and one viticulture businesses in the Lindenow Valley. Most but not all of them were contacted in 2018 by RMCG to participate in a one-on-one informal coffee discussion with two RMCG consultants. No formal presentation about the proposed mine project was given to the participants to disclose the full potential risks. In the absence of information about matters such as what is in the ore body and a range of other facts, it is strongly advocated that the interviewed participants were not given all the information to make an informed assessment of the potential impacts.

As the saying goes, 'you don't know what you don't know.' Individual interviews to document concerns done in the absence of concrete information was the basis of the RMCG study. No formal record of the discussions was provided to participants to summarise the results of their individual interviews for verification purposes.

RMCG then conducted a desktop review where they referred to other EES technical studies funded by Kalbar, **with no independent primary research undertaken.**

Mr Karl McIntosh, the RMCG lead consultant during those one-on-one discussions left RMCG before a draft of their report was finalised. Dr Doris Blaesing from RMCG who is based in Hobart, took over writing the report without, as she acknowledged at the time, having seen the impacted area, nor speaking with participants to verify RMCG's report conclusions. One of the horticulture business owners Mr John Hine offered to pay all expenses for Dr Blaesing to travel and tour the area however she declined the offer.

A summary of RMCG's draft findings was released to all study participants on 21 December 2018 even though all of Kalbar's technical studies used by RMCG to make their assessments were far from being finalised. It was over 6 months after RMCG's report was released that the Independent Review of Water Related Studies, an important study impacting on horticulture, was available. It concluded that, '*the groundwater and surface water study is not sufficient to support the impact assessment and the obligations of the Project's Scoping Requirements'* (AECOM, 2019; Summary). Therefore, how could RMCG have formed a comprehensive view of the impacts from incomplete technical studies and a water study that failed to meet its scoping requirements. RMCG's report also failed to consider the impact of a number of changes that have been made to Kalbar's proposal since those 2018 interviews such as the risks from the nineteen dams on gullies and creeks.

There were other significant concerns expressed during the one-on-one discussions that were not included in the RMCG summary report such as:

- the health impact on workers due to inhalation of silica dust and potential carcinogenic substances.

- the undulating terrain and many gullies where the mine will be located which will exacerbate the potential for run-off and siltation of the river, particularly from torrential flooding events known in the area from east coast lows.

8.4 RMCG errors on slide presentation 11 June 2019

A slide presentation was compiled by RMCG dated 11 June 2019. Some obvious errors not expected from an agricultural consultancy company follow:

- Slide #5: *Horticulture in the Lindenow Valley* - showed a high production period for green beans in June, as well as other errors in that table such as not identifying all the crops grown in the area (the error about beans was subsequently fixed by RMCG after this error was pointed out to them at the 29 October 2019 presentation).

- Slide #10 *Dust*: *Washing is common management practice* - this is incorrect as ***harvested produce in the fields is not washed before transport*** which has important implications for dust deposition on crops, including grapes which are not washed before being crushed for wine production.

8.5 RMCG rating on risks stated as moderate

Most importantly, RMCG reported that the impact assessment was moderate in the following areas (Appendix 2):

- Slide #11: *Irrigation Water Availability* – listed the impact assessment risk as 'Moderate' indicating that '*the availability and security of water supply is a key consideration for current and the possibility of expanded horticulture production in the region.'*
  {Refer to 'Impact on Water' section below for an analysis of this}.

- Slide #13: *Competition for Labour* - listed the impact assessment risk as 'Moderate' and residual risk as 'Moderate.'
  {Refer to 'Impact on Labour' section below for an analysis of this}.

- Slide #15: *Potential Damage to Industry Image* - listed the impact assessment risk as 'Moderate' and the residual risk as 'Moderate' indicating it was '*difficult to assess - provided no offsite impact limited risk* and *that the risk was not quantified for certified organic production.*
  {Refer to 'Impact of Dust and 'Reputational Risk' sections below for an analysis of this}.

Climate Change: The future impact of climate change was listed as a key risk to horticulture in relation to water security and reduced availability of irrigation water, with no impact assessment given on the slide although the risk must at least be moderate as irrigation water availability was recorded as a moderate risk. Given the life of the mine is over 15 years and the mine will be utilising considerably more than the 3 GL of water annually due to the nineteen proposed dams on gullies and creeks, the consequences are dire for the horticulture industry if clean water is not available. **Climate change is a major risk for the industry and its impact has not been adequately addressed. The risk from flooding events has also not been included in the impact assessment.**

8.6 RMCG 29 October 2019 presentation at community meeting

Shortly before RMCG was scheduled to present their report at a Kalbar public meeting on 29 October 2019, another slide presentation dated 25 October 2019 was substituted on Kalbar's website replacing the 11 June 2019 presentation.

Where risks had previously been identified as low, the risks were stated as low in the revised slides. Importantly, where the risks were stated as medium in those three slides above, no mention was made of what the risk level was.

Reference should be made to competition for labour in the risk register in RMCG's report which has it rated as medium after mitigation measures (RMCG, 2020; p 71).

In relation to the potential damage to industry image (Slide #15) the statement that the '*risk had not been quantified for organic produ*ction' was removed without any explanation. Knowing this wasn't quantified is a significant issue. The risks to image for organic growers in the Lindenow Valley are significant and they are not mitigated. There was also a statement that '*losses based on image can't be predicted'* with the risk rated as low (to be discussed in 'Reputational Risk' section below). How can the risk be rated as low if the losses can't be predicted?

As mentioned above, Dr Blaesing had not visited the impacted area. In response to a question asked on 29 October 2019 meeting, Mr Clinton Muller, RMCG's Melbourne based team member who gave the RMCG presentation that night acknowledged he had also not visited the impacted area (captured on video).

If they had visited the region and spoken to stakeholders, we believe they would have seen that the location of the mine project poses high risks for the horticulture industry which is too close to the proposed mine.

9. Key Stakeholders Omitted from the Study

Many of the horticulture businesses/residences located in the Lindenow Valley were not identified on Kalbar's sensitive receptors map.

This has significant ramifications for those businesses as the EES technical reports that referred to sensitive receptors such are noise, vibration, light, and air quality impacts (dust) did not consider all the impacted horticulture businesses (refer to pink shaded area called 'Section 7 amendment' on map 8.25 (Kalbar, 2020; Chapter 8 p 107). The legend for that map was placed over the horticulture area so it isn't possible to see the whole area.

Because all sensitive receptors were not identified, with 60% missing, the impact of air quality (dust), noise, light and vibration was not considered on all possible sensitive receptors and businesses. **The risk therefore cannot be stated as low as the impact on all receptors was not assessed**. RMCG did not reference nor consider the impact of noise on the horticulture industry which is a significant oversight.

It would be dangerous to approve a mine where so many people live, work and farm.

The fact that so many residences are missing from their sensitive receptors maps leaves the impression that this was either carelessness or an attempt to minimise the appearance of risk with so many people living and working close to the mine project.

10. Impact of Dust

Figure - 4 Vegetable fields below proposed mine that will be near the row of trees on the upper ridge

It has been acknowledged by Kalbar that not all the dust from the mine site can be contained.

Strong winds over several days are common in the proposed mine area, with the vegetable fields in the path of the prevailing winds. The vegetable fields are as close as 500m downwind from the proposed mine. Videos are available showing impacts from dust storms due to high winds.

Kalbar advises that on windy days mining operations will cease. How is 'windy' defined? Who will bear the cost of ceasing operations and realistically, could that occur given the number of successive days of high winds? The risks from dust impacting on the crops is high and the mitigation strategies proposed are not going to reduce the risks as outlined below.

To understand the full risks and potential impacts associated with dust, it is necessary to refer to the radiation and air quality chapters in this community submission. Concerns about dust for the industry are outlined below.

10.1 Crops not identified and why that's important

The full range of crops grown in the Lindenow Valley were not identified in the RMCG report, with outdated information and inaccurate horticultural production data shown in their tables. The impact assessment is faulty as a result. Significant crops grown in the region but not identified include (RMCG, 2020; p 21): broccolini, celery. beetroot, cabbage, zucchini, herbs, asparagus. borlotti beans, pasture crops used as silage, hay and grains.

10.2 Why dust is high risk

Although dust on horticulture farms is an issue that has to be managed by the industry, it is the nature and composition of the dust plus its prevalence and difficulty in removing from vegetable crops and grapes that is of particular concern.

Dust from mineral sands mining can be radioactive: It is established that dust generated from the proposed mine will contain radioactive substances and the level of risk is expected to be much higher than declared. In addition to radioactive substances, cancer-causing substances are also expected to be in the dust which is very different to dust found on the farm in terms of the health danger posed.

In the technical report relied on by RMCG it stated: *FINDING – the washing procedure of vegetables at the farm gate and prior to consumption reduces the potential for any uptake*. (RMCG, 2020; p 37). Reducing the potential doesn't eliminate it. RMCG relied on produce either being washed or irrigated. Not all the produce is washed nor is it irrigated a few weeks before harvest resulting in a long period of time for dust to gather on the crops. Therefore, the risk from contaminated dust is high.

In assessing the risks of radionuclides in the dust, RMCG relied on a technical report from SGS Radiation Services Pty Ltd. That company advised their study was based on information provided by Kalbar (RMCG, 2020; p 36). How representative was the data that Kalbar supplied compared to what will be mined? SGS Radiation Services stated that they assessed the risks based on analysing a small number of soil surface samples (RMCG, 2020; p 36). Surface soil samples will be much different to what will be excavated 45m deep in the ground. There are therefore serious concerns that the real risks from radionuclides have not been fully assessed.

Dust can contain heavy metals: Humans are more likely to be exposed to heavy metal contamination from dust that adheres to edible plants because it is very difficult to wash off all the dust particles from the plant before eating (Hussain, 2012).

Effects of dust on the health of farm workers: There was no mention of the impact of dust on workers in the field, particularly silica dust which is known to cause lung disease plus other carcinogenic substances that could impact on human health (refer to chapters on radiation and air quality in this submission). Up to 2,000 workers depending on the season are employed in the Lindenow Valley. This oversight of not mentioning the impact on workers was recorded in the letter by the horticulture group dated 31 January 2019 however it has not been mentioned as a risk. This is an unacceptable and high human health risk and cost to the horticulture industry.

Dust can be difficult or impossible to remove: It was stated that cauliflower will be impacted by dust as their leaves do not cover the vegetable throughout the period it is growing and therefore the risk of dust being embedded in the plant during the growth phases of the vegetable is high (RMCG, 2020; p 32).

Contrary to the RMCG report, cauliflower is not the only crop that would be impacted. Vegetables such as cabbages and cos lettuce are grown in the area and are greatly impacted by dust because of the way they grow. It is not until cabbages are cut open that dust buried in the layers is exposed and by then it is too late. Ash from recent bushfires in the Dargo area (about 70kms north of the Lindenow Valley) was found in cabbages and the crop was unsaleable.

Fine dust that accumulates on heading crops such as lettuce and cabbage will get buried into the head and be impossible to remove; sand and dust congregates in the stem of cos lettuces. Also, dust that accumulates on crops that are not overhead irrigated is likely to become firmly attached and difficult to remove by washing.

Even on crops that are irrigated by sprinklers such as baby leaf lettuce, spinach and rocket, which are now major crops in the region, they might only be irrigated two to three times per week, giving dust time to adhere to the leaves.

Not all horticultural crops are washed: Many of the vegetables are harvested in the fields and must not be washed before being transported which is contrary to one of the proposed mitigation measures to control dust on crops. Baby leaf lettuce, rocket and spinach and beans, are not always washed before sending to market. Processors specify that certain harvested crops must not be washed before transport as it affects the produce and can lead to diseases. Grapes are not washed before being crushed on site for wine production.

On-farm mitigation measures won't address the new risk posed by non-farm related toxic dust particularly at the volume that is likely.

Potential impacts of dust on the vegetable supply chains and consumers: If contamination does result from dust or turbid water, the produce cannot leave the farm gate, which is a significant financial loss to be borne by the grower. It also means that processors, retailers and wholesale buyers have an interruption of supply.

If these disruptions become commonplace, supermarkets and fresh produce buyers will look to source from growers in other regions to ensure reliable and clean produce leading to a high risk of permanent loss of market. Short of a legal battle in court, the vegetable growers will have no recourse for compensation from the mining proponent. This is a foreseeable risk that is high to the industry and their livelihoods will be impacted.

Impact of dust on air quality: In the EES report it stated dust deposition modelling indicated no exceedances of air quality criteria at any of the sensitive receptors within one kilometre of the project area during construction (Kalbar, 2020; p 19). The dust posing the highest risk will be generated during the excavation phases as that is when the most dangerous dust particles will be present. Prevailing winds are from the west and the mine is located east of the vegetable fields.

There was only one air quality monitoring station mandated by the EPA for the air quality study conducted by Kalbar's consultant Katestone. Kalbar located that one monitoring station in an area known by locals as being in a wind shadow. At a community meeting the Katestone consultant was informed about this and questioned about the location of the monitoring station so both Kalbar and Katestone knew about this.

This raises major concerns because RMCG relied on data which is flawed (refer to the chapter in the community submission on air quality). That monitoring station was not working 22.3% of the time with data missing, potentially during storms when high winds would have produced different results. Meteorological data for wind speed is suspect with no gusts recorded in the data and no wind speeds above 40km/hour, so it is not reflecting all wind conditions experienced in the area. Given the RMCG report relied on flawed data, the risks of damage to the crops is high which will have financial consequences for the growers.

Kalbar's identification of sensitive receptors is also flawed having not identified all the receptors where crops are grown. Therefore, the full impact of dust, air quality and dust migration on crops has not been properly assessed to determine all the risks.

How far can dust travel: The fact that dust travels long distances is well known (Saharan dust on the Alps; mallee dust storms reaching Melbourne and beyond). With the vegetable fields close by, dust impacting on the industry is inevitable given high wind events regularly experienced in the area over several days.

Risks to soil health: Dust not only poses a risk to the cultivated vegetable it also poses a risk from its accumulation in the soils and the eventual uptake of heavy metals and rare-earth elements during the growing phases of the plant and vegetable crop. In a former mining area of Northern France, surveys were conducted by the Ministry of Health to understand why the number of diseases was approximately ten times above the national average.

The study identified two main factors that contributed to population exposure: the ingestion of plants produced in the contaminated area and also the ingestion or inhalation of contaminated dust or soil via hand to mouth transfer for younger children (Pruvot, 2006).

Root crops such as beetroots are particularly vulnerable, evidence which is not likely to become apparent for a period of time. No mention was made of this in the RMCG report which is a significant risk given this mine is proposed to operate for 15 years.

Proposed dust control measures: Kalbar proposes wetting down the dust, which does not remove it. It just transfers the dust of all sizes to another area that can be picked up by swirling winds and dispersed again. It will not be possible to keep all surfaces on the mine site wet at all times particularly as mining operations are proposed 24 hours daily. If the primary dust exists, it will be a contamination risk.

Compliance with regulations: It is not uncommon to read reports in the media about failures of mining companies to meet their compliance requirements. There is no trust that this proposed mine will be any different given Kalbar has no experience operating a mine. As recently reported, the mining industry hid ongoing dust monitoring problems at Port Hedland in WA from the regulator with as yet, no repercussions (ABC News, 2020).

Being located in rural Victoria we are rightly concerned that enforcement of regulations will be more difficult. Until the Government adequately resources regulators and ensures compliance failures are addressed, the risks are too great that history will repeat itself here with dire consequences from regulatory enforcement failures.

10.3 Food safety risks

Human pathogens can easily be transported into vegetable crops with dust. Some examples follow:

- In March 2018, an outbreak of Listerosis caused by rockmelons grown in NSW made 22 people sick, claimed 7 lives and caused a miscarriage. The pathogen was spread by dust contaminated with *Listeria monocytogenes* which was not removed by the normal washing operations (NSW Food Authority, 2018).

- In February 2016 more than 200 people became sick from salad leaves that had been contaminated with *Salmonella anatum*. The bacteria are thought to have been in manure applied to a neighbouring paddock which washed in runoff and/or blew onto the crop. Triple washing in chlorine failed to remove the bacteria. It has been demonstrated that even high levels of chlorine cannot achieve more than 2-log reductions in pathogens on vegetable surfaces; this is not enough to ensure they are safe to eat if highly contaminated.

If human pathogens are internalised (for example, through cuts or damaged leaves at harvest) then they cannot be removed by washing but can multiply inside the vegetable during storage.

This raises issues about whether dust from the proposed mining operation could transport human pathogens such as *Listeria* and *Salmonella* which are common in the environment and whether washing would be effective at removing contaminated dust from vegetable crops that are washed, although as previously stated, not all of them are.

If vegetables are dusty when harvested, the dirt will react with sanitisers during washing, rapidly rendering the sanitiser ineffective against human pathogens.

It is most important to note that a large number of vegetables grown in the Lindenow Valley can be eaten uncooked (e.g. bean, broccoli, cabbage, celery, lettuce, herbs salad greens) so there is no “kill” step before consumption, increasing human health risks.

No assessment was made in the RMCG report of the economic consequences attributed to dust contamination (RMCG, 2020; p 35). Mitigation measures will not address the issues raised in this section nor in reputational risk outlined below so therefore the risk remains high.

11. Reputational Risk

Figure -5 Horticulturalist showing Dr Read MP where the mine is proposed, 500m from his property

11.1 Quality assurance implications

Horticulture growers are required to follow strict quality assurance certification measures for their produce with even higher standards imposed on organic growers. This establishes the quality, safety and reputation of the produce grown.

There are six organic certifiers in Australia, not two as stated by RMCG (Guide to Organics, 2020).

Certification standards require produce to be free from foreign objects and visible dirt or dust and to be free from heavy metals. Affected produce is not able to be packed and sold (RMCG, 2020; p 12 & 32).

Therefore, the prospect of a mine in close proximity generating dust with heavy metals present, raises serious questions about the viability of the horticulture businesses should there be quality assurance failures.

Failures will result in financial and reputational loss, impacting on the livelihood of the growers. The bar is set even higher for organic and certified organic crops in the Lindenow Valley, with failures resulting in loss of their organic status for three years.

If radioactivity is detected in produce shipped overseas the consignment will be destroyed and bans placed on further orders for a period of time, harming the reputation, financial and employment performance of the horticulture business, placing future export of produce in jeopardy. These are all foreseeable risks.

11.2 Organic certification

Although RMCG has a section in their report about organic certification and the high level of requirements for that industry, no specific risks were identified or addressed in their report across a range of matters such as soils, crops, livelihoods, regional reputation. This is a major failing of their report and is a reflection that the risks are high to the organic businesses and cannot be mitigated.

This area is home to three major organic vegetable growers including those that are certified organic. There will be significant impacts on this industry that cannot be addressed or mitigated if the mine was approved so it is considered that this is the reason why the impact assessment was silent about organics. The local Organic Agriculture Association which has 150 members have indicated their strong opposition to this mine project. Australian Organic Limited, a leading peak body for the organic industry has provided a letter of support to certified organic operators contesting this development (Appendix 3).

11.3 Clean reputation of produce and potential impacts on markets

Quality assurance (QA) requirements establish the clean reputation of produce before it is sold to retailers and reaches the consumer. The most common QA system used is Freshcare. The Freshcare Food Safety & Quality Standard is an industry owned standard. Based on the principles of Hazard Analysis Critical Control Point, the Freshcare Food Safety & Quality Standard describes the good agricultural practices required on farm to provide assurance that fresh produce is safe to eat and has been prepared to meet customer requirements (Freshcare, 2019; p 3).

The supermarkets also use a system called HARPS which is a retailer-led scheme designed to assist with compliance to food safety, legal and trade legislation for suppliers to the major grocery retailers in Australia: ALDI; Coles; Costco; HelloFresh; McDonald's Australia; Metcash (IGA); and Woolworths (HARPS, 2020).

If Freshcare and/or HARPS quality assurance requirements were compromised by contamination from the mine, this would have severe financial and reputational consequences for vegetable production and the jobs, both direct and indirect, that support this industry.

The risk of reputational damage to the produce from the Lindenow Valley both real and perceived could arise from contamination by excessive amounts of dust, radioactive dust, heavy metals, contaminated water, or human pathogens. If the buyers or consumers have doubts about the quality or safety of the crops produced in the region, they will most likely source produce from elsewhere.

So, before produce reaches the consumer, it must satisfy strict quality assurance requirements and the retailer must be satisfied there are no risks with supply or potential failures due to possible contamination incidents. All produce is traceable back to the farm block, so labelling is important to identify the source of the produce.

A big question for retailers, processors and buyers is will they take a risk of continuing to buy from the Lindenow Valley when they could potentially source supply elsewhere for produce that is able to be sourced elsewhere depending on the season. This would have major ramifications on the horticulture industry and for the local and State economy as this industry is a long-term sustainable industry that employs thousands of people both directly and indirectly compared to a mine that will employ less than 200 people and won't be around in less than 15 years' time.

What recourse is there for the industry if the Victorian Government approves the mine and contamination occurs? Given this is foreseeable, it is unacceptable for growers to have to prove liability. Nevertheless, the only recourse for the industry will be to undertake extensive soil testing to establish baseline data that can be used to pursue a legal class action if required.

11.4 Public perceptions and consumer buying habits

In the RMCG report it stated:

> '*the extent of potential impact on organically produced vegetables over conventional produced ones may be greater if produce was sold locally and given the expectations many consumers may have of the place of production for organic produce. If organic vegetables were sold outside the region via major retailers and without geographic identifiers, the potential impact of the vicinity of a mine would most likely be the same as that for conventional vegetables*' (RMCG, 2020; p 64).

Certified organic produce has an identifier code which enables buyers and consumers to know where the produce is sourced. Contrary to the above statement organic produce is sold locally, for example, at the Bairnsdale Woolworths store. Organic products are also sold at the local Bairnsdale farmers market.

Fresh produce has identifier labelling on the pallets. Some produce has the name of the farm displayed on each bundle of produce such as Bulmers baby broccoli that is sold in small bundles with a card displaying their name. The back label on Lightfoot & Sons wines gives their full address and 'Gippsland Lakes District' is on the front. Some local restaurants and cafes such 'Sardine' and the Lindenow "Long Paddock" state the source of the produce on their menus.

These examples contradict the above quotation from the RMCG report that says the source of the produce is unidentified to the consumer.

The RMCG report gave great weight to provenance suggesting that consumers:

> '*generally, may have a limited understanding of how a sand mine* (emphasis given) *might influence product quality if an incident should occur,'* and *'they may not make a connection between visual amenity of a landscape and production on farms,' (*RMCG, 2020; p 5*).*

This implies there isn't any risk if the consumer doesn't know about the existence of a mine in the area where the produce is grown, or the actual nature of the proposed mine. This is a preposterous notion. This suggests a level of naivety by consumers that is unsubstantiated.

> *'The game is changing as more and more people want to know where their food comes from. Consumers are hungry for ethically sourced foods that can be traced back to their origins,'* referred to as a *'global awakening to provenance.'* (Australian Geographic, 2020; p 54).

Once tainted, reputations are very difficult to repair. We draw your attention to the frozen berry scandal not long ago, involving fruit from China and the consumer reaction and purchasing patterns that followed with labelling of Australian content being demanded by consumers.

The relatively recent safety issue of needles being found in fresh strawberries is another example of what can happened.

It is a fallacy for RMCG to suggest that risks to 'product quality and image' are reduced from 'moderate' to 'low' based on consumer perceptions and assumptions that the consumer is not likely to be aware of nor care where their food comes from.

That position is not proven and there is evidence to the contrary as stated above.

Most importantly, RMCG did not mention the role that buyers have in determining whether the produce will ultimately make its way to the consumer.

Wholesale buyers of fresh produce, including the major supermarkets will not purchase produce from a grower or region if they have concerns either perceived or real about the quality or safety of that produce. Those decisions are made before the produce reaches the consumer so the produce will not reach the consumer if the buyer has any concerns about safety or reliability.

After the produce leaves the farmgate, the consumer is the last step in the supply chain, there are other important steps before it reaches the consumer with quality assurance measures that must be satisfied first.

Reputational risk is a key consideration for buyers (retailers, processors, supermarket chains) so decisions can and will be made to not purchase from the grower if the buyer has any concerns either perceived or real about the quality, safety or reliability of supply and may look to source produce from elsewhere if that is possible. **RMCG did not mention the role of the buyers which is a critical step in whether produce will actually reach the consumer.**

Therefore, reducing the risk of reputational loss from moderate to low based on provenance considerations by the consumer is not accepted for the reasons given. As the critical precursor steps of having to satisfy quality assurance measures and certification before produce leaves the farmgate and the major role that buyers play in the acceptance of produce prior to sale, these pose the greatest risk to 'Potential Damage to Industry Image'. This risk is considered to be high.

RMCG failed to identify the source of greatest risk which cannot be avoided or mitigated. Failure has significant consequences for all horticulture businesses as the potential negative impact on one business will have a flow-on effect, with severe financial consequences for all of them and their livelihoods.

11.5 EnviroVeg is not a mitigation strategy

A mitigation strategy to address regional reputation proposed by RMCG was for Kalbar to support growers to gain certification for Enviroveg. Enviroveg certification is available through Freshcare Environmental, and while both are systems for acknowledging good environmental stewardship, the program has not been widely adopted in Australia and is not required by any of the major retailers or processors.

Enviroveg and Freshcare Environmental are not known to consumers so suggesting that growers seek Enviroveg certification to establish a clean green image is not going to assist. Produce has already achieved that status due to meeting existing quality assurance requirements.

It is difficult to see how an environmental certification provided by EnviroVeg will have any impact on the potential risks identified, which would be caused by the mining operation (Kalbar) not farming.

The further additional mitigation measure of having a 'stakeholder engagement plan' to manage issues about markets and employment is nonsensical.

As the strategies proposed to mitigate risks of the mine impacting the clean green image of the produce fail, and other proposed mitigation measures will not address the core issue of having a hazardous mine so close, the risks are high that regional reputation will be damaged.

12. Impacts on Soils

Healthy soils are fundamentally important for healthy, productive crops, so their quality and condition are vital. The Lindenow Valley is productive horticulturally due to the rich alluvial soils of the Mitchell River floodplain and its temperate climate. These soils are critically important to the continued high productivity of produce from this area.

The RMCG report identifies contaminants transported by air (dust) or water as a hazard to the fertile soils (RMCG, 2020; p 6).

It is very important to know what will be contained in the dust, the potential contamination risks from the dust and the fact that there will be dust deposition on plants and soils due to the proximity of the mine, noting dust travels a long distance. The take-up of rare-earth elements and toxins in plants through the soil also poses human health risks.

Organic producers understand the value and importance of soils. As stated on one of the impacted growers website, Busch Organics:

> '*For generations we have considered our soil to be the lifeblood of a successful farming operation. Situated on the rich river flats in East Gippsland, the soil here is highly regarded as some of the best in the country. Plant health begins with soil carrying microbes and bacteria alike. Every opportunity is taken to improve soil structure, which sees green manure crops grown to be returned to the medium loam soil every autumn. By returning important nutrients to the soil we replace those which were removed during the growing season*' (Busch; 2009).

Under Freshcare's Food Safety Quality Standard 5.12, risk assessments are conducted for each growing site to determine the risk of heavy metal contamination of produce from the soil/growing medium (Freshcare, 2019; p 13).

The mine is expected to have unacceptable consequences for the soils given the heavy metals and rare-earth substances being mining.

The mitigation measures cited will not address the negative impact of hazardous dust to the soils. No mitigation measures will be able to address the deposition of dust on the soil, impacting the health and quality of that soil. Soil impacts affect plant productivity.

Should the mine be approved horticulture business owners have committed to soil testing being undertaken to establish baseline soil data before the construction phase of the mine and also during mining operations. Should soil health change this would potentially be the basis of a class action against the company and the Victorian Government for allowing the mine to proceed given the foreseeable risks. It is unreasonable for the Government to foist this risk on these businesses so it must take responsibility for any adverse consequences if it approves this mine.

13. Impact on Water

Figure -6 Mitchell River flows between horticulture fields and mine located on upper ridge

Before considering this section, reference needs to be made to the impact assessment concerning ground and surface water of this community submission and how those conclusions have a bearing on the horticulture industry which is a major existing user of the same water sources proposed to be used by the mining company.

13.1 Access to water not to compete with existing users

Scoping RULE about the mine:

'Access to water not to compete with existing users.'

The fact that there has been a Lindenow Valley Water Security project in operation for a number of years is a reflection of the already heightened concern about access to fresh water. Irrigation water availability is a very high risk for the industry which is contrary to RMCG's conclusions and their downgrading of this risk from moderate to low. Nothing has changed in fact irrigation water available has become more of an issue not less in response to the drought conditions being experienced and the historical low flow rates of the Mitchell River.

One of the horticulture businesses made a decision not to plant crops for several seasons recently due to concerns about water security.

Kalbar initially stated the mine would need 4 GL of water per year; now the stated requirement is 3 GL per year however they will be consuming much more than that. A more recent addition to the proposal is the creation of 19 dams on creeks and gullies on the mine footprint which will capture additional gigalitres of water thereby reducing what would normally enter aquifers, the Mitchell and Perry River systems and ultimately into the Gippsland Lakes. These dams will considerably reduce water entering the rivers, impacting on environmental flows and water availability for existing users. A number of important questions follow:

- The 6 GL of unallocated winter-fill licences from the 'Gippsland Region Sustainable Water Strategy' was originally intended for use by the horticulture industry from water redirected from the Nicholson and Tambo Rivers to address water security issues for the horticulture industry. What happened to that undertaking?

- What assessment has been done of the reduced flow of the Mitchell River over the years and the further expected reduced flow over time due to climate change, also considering the need for water for environmental flows for the Gippsland Lakes?

- Southern Rural Water (SRW) advised via email on 1 December 2019 there will be an auction if the demand for unallocated winter-fill licences exceeds the 6 GL supply, with the licences going to the highest bidder. Kalbar's CEO at the time Dr Hugo stated, '*it will go to the bidder with the deepest pockets*' (ABC Gippsland radio interview 25th October 2019). Given this advice the statement in the BAE report is not technically correct as the industry who can most afford to pay for the water will be the most successful if a competitive process is required (BAEconomics, 2020; p 21). Isn't this confirmation that the mine will be competing with existing users for water?

- As the mine will be located upstream of most of the irrigators, what will be the impact of the larger capability of the mine to extract water from the Mitchell River and to fill their freshwater dam of 2.2 GL to the potential detriment of downstream users, particularly horticultural businesses and other farms that don't have storage dams?

- What impact will the mine's ability to extract water from the large bore field located outside the project boundary have on irrigators as the same aquifer is being accessed?

- As irrigators have experienced several seasons of full irrigation extraction restrictions from the Mitchell River due to reduced water flow, water security is a significant issue that impacts on the viability of the horticulture industry. What guarantee is there that the mine's heavy use of water will not impact on other users, what compensation will be provided if it does and how will that be done?

- What happens if the water needs for the mine are underestimated, how will this impact on other users? There are real concerns that if water access becomes a problem for the mine will the company reduce water used for dust suppression thereby increasing the risk of contamination from dust?

- What if the drought continues and there is no winter-fill in a given year or longer?
  What happens if the mine is approved and there isn't enough water from winter-fill and the bore field?

- There are plans for the expansion of the horticulture industry which has not been reported by RMCG. How is the horticulture industry's needs for more water to be met in the context of the mine's massive water requirements?

Clearly, the proposed mine will compete with existing users for access to water and therefore this scoping requirement has not been met.

13.2 Minimise effects on water resources and users

Draft Evaluation Objective #3 of the scoping requirements:

'*To minimise effects on water resources and on beneficial and licensed uses of surface water, groundwater and related catchment values (including Gippsland Lakes Ramsar site) over the short and long-term.'*

Records show there have been full irrigation restrictions on extracting water from the Mitchell River during summer periods so it is foreseeable that this will happen again, with the situation being exacerbated by the mine's requirements for water which is estimated to be well over 3 GL annually for up to 15 years. It has been established that Kalbar will be competing for water with farmers and horticulturalists. The industry is already under pressure with water security an extensively documented threat.

Lack of water particularly over the last few summers has damaged local horticultural businesses and resulted in loss of revenue. Due to the lack of water security, one of the growers in the group made a decision not to plant resulting in financial losses to the local economy and his business. Some growers made a decision to plant crops outside the region for that summer as a result of water not being available.

Higher levels of salinity in bores was also reported during these periods. Extraction from bores had to be at a slower rate to enable water to recharge in the aquifer, slowing the extraction volumes.

There is evidence to show that water security is a major issue for the horticulture industry without another major user (the mine) competing for access to the same sources of water.

13.3 Impact of contamination of water and aquifers

What guarantees will be given that there will be no risks of contamination of water resources (rivers and aquifers) and how will horticultural and agricultural businesses be compensated if that occurs?

The Mitchell River is as close as 350m downwind from the mine boundary, below a plateau where the mine is located.

Flooding was not mentioned as a risk in the impact assessment which is a major oversight.

Flooding: If there was a flooding event, disaster planning for the mine is for a 1:100-year flood event which has occurred. If there was a major flood event there are high risks of runoff into the river and siltation. The river is the major source of irrigation water for the horticulture industry and ice to transport vegetable crops is also made from river water.

Dams on Creeks and Gullies: Approval should not be given for the 19 proposed dams on the creeks and gullies. Is it legal for creeks to be dammed? If the spillways fail, contaminated water with heavy metals present will enter the Mitchell River.

It is not acceptable to say that the Mitchell River flows at a certain rate and therefore the impact on the river and downstream users is expected to be minimal. In relation to responsible environmental management in an environmentally sensitive area, no level of contamination of the river is acceptable as a response.

Failure of spillways: Failure of the spillways from any of the proposed dams high above the Mitchell River is foreseeable as a major risk given the dispersive nature of the soils on the mine footprint that has formed those gullies.

Contamination of aquifers: This has occurred by mineral sands mining companies in Australia so there is an unacceptably high risk that this could happen here with significant consequences for all agricultural users. Refer to the South Capel Remediation Project in WA involving Iluka, where an experienced and major mineral sands mining company in this country contaminated an aquifer which will take 10 to 20 years to remediate (Iluka, 2017; p 1). As a company, Kalbar Operations has no experience operating a mine so there are significant reasons to be concerned.

Shallow aquifers will be destroyed: It is acknowledged by Kalbar that shallow aquifers are going to be destroyed as the mine will be excavated up to 45m deep. These aquifers cannot be recreated. This will have a significant impact on water availability.

Rehabilitation concerns: The altered sand after it has been processed and returned to the mine void will be used in rehabilitation of the area. Most importantly, it will not be known how this sand will behave in the future as it has gone through an extraction phase - will it leach elements, will it hold onto nutrients, will this sand still be able to filter water as untouched sand does? These are important questions given the close proximity of the river catchments. There is a high risk that this will impact on ground water which eventually is used by the growers either from bores or from the river. **There was no mention in the RMCG report of how the use of altered sands on the mine footprint during rehabilitation poses a risk.**

Victoria has an abysmal track record in relation to rehabilitation of mines as recently confirmed by a Victorian Auditor-General's Office report released in August 2020. There are very serious and foreseeable risks that the mine could go into 'care and maintenance' should the value of the minerals drop or indeed the company could cease operations for a range of reasons leaving behind the tailings storage facility, dams and an open pit with the potential for contamination risks from leaching and flooding events impacting on aquifers and the creeks, rivers and gullies.

Rehabilitation bonds were identified in that report as being grossly inadequate as an outdated bond calculator is being used (Victorian Auditor-General's Office, 2020; p 1). It can be cheaper for mining companies to forego the bond which is likely to be well below the cost of remediation. This is an unacceptably high and foreseeable risk for all users of ground and surface water which was not mentioned by RMCG.

Examples of monitoring failures following mine closures show the prevalence of these occurrences (Sydney Morning Herald, 2017).

13.4 Implications of a tailings dam

The tailings dam or tailings storage facility (TSF) as it is referred to in the EES has increased over time from 60 hectares to 90 hectares (nearly 1 square kilometre) with 20m high walls. There are a number of major concerns and risks about the TSF as follows:

- No plans have been specified in the EES for construction of the TSF. How can all the risks and potential consequences be assessed without any plans to evaluate those risks? The risks of failure must therefore be assessed as high without that information due to the high incidence of failures of these structures locally and around the world.

- The TSF will be located on a ridge above the Perry and Mitchell River catchments so failure will have an impact on ground and surface water.

- Kalbar's EES consultants have acknowledged there will be leaching and mounding which could impact on ground water.

- Chemical flocculants will be used on the tailings. Safety data sheets give warnings for their use near aquatic life.

- Disaster planning is for a 1:100-year rainfall event. As the area is prone to heavy rainfall from east coast lows (in particular) the risk of a major disaster is highly probable.

- The soils in the area are dispersive with tunnel erosion an unresolved problem according to a Department of Primary Industry report. There are severe risks of failure of the TSF that could have catastrophic consequences given the toxic materials contained in such a large structure that will be on unstable soil.

- Contamination of the aquifers and the Mitchell River, the source of irrigation water for the vegetable produce is a foreseeable and unacceptable risk.

The mine is located on top of a plateau above the Mitchell River. Kalbar claims that modelling predicted that the discharge from storm events of water coming in contact with mined areas from water management spillways will have a negligible effect on water quality of the river (Kalbar, 2020 Summary report; p 16) - this is irresponsible environmental management, no contaminated water should be permitted to leave the site. The risks of negative impacts on aquatic life and contaminating ground and surface water is high.

There are several reasons provided as to why the risk of contamination of water sources including aquifers is highly probable. This poses an unacceptable threat to the availability of clean water that is vital for the existence of the horticulture industry. Any level of risk is too great to take because of the high consequences.

14. Co-existence is Not Possible

The issue of damage to regional reputation is stated as being 'about perception' and therefore is difficult to validate (RMCG, 2020; p 59). Damage to regional reputation is more than perception if contamination actually occurs. Retailers could make decisions not to take any risk with supply and arrange to purchase elsewhere without a grower knowing the reason. The potential risk goes much deeper than perception.

To be able to comment about co-existence the conditions and circumstances must be exactly the same to enable comparison. In looking at the feedback provided by those couple of producers referred to in the EES, any commercial relationship with them also needs to be disclosed. How representative are their comments in relation to all producers in the area?

Although it was stated that an 'interview with a local consultant from the Busselton region confirmed that local vegetable producers have not experienced any issues due to the vicinity of the sand mine no evidence was provided to substantiate this claim (RMCG, 2020; p 59).

None of the three Busselton 'Summary of conversations with producers adjacent to other mineral sands mines,' were vegetables growers. The last one was stated as being a vegetable producer however in the table it said the vegetables were grown at another property not near the mine (RMCG, 2020; p 60).

One of the horticulture business owners from the Lindenow Valley participated in a tour of mineral sands mines in Western Australia organised by Kalbar. Mines in the Busselton area were part of the visit. For example, the size and scale of the mining operations, prevailing wind direction and speeds, the topography (flat ground there), soil structure and surrounding land uses were not comparable to the Fingerboards mine project nor their hours of operation as none operated 24 hours daily, seven days a week. The depth of the Busselton mines was only a few metres, very shallow in comparison to the proposed 45m excavation of the Fingerboards mine project so there are very different implications for matters such as rehabilitation, impact on aquifers and water sources and the types of crops grown.

Co-existence of the Fingerboards mineral sands and rare-earths mine with these horticulture businesses is not possible.

15. Impact on Labour

Concerns about the health of workers in the fields who will be exposed to dust generated from the mine were raised in interviews with RMCG, although this issue was not recorded as a risk for mitigation. To understand the impacts, reference needs to be made to other chapters in this submission pertaining to human health, radiation and air quality. Workers in the fields will be exposed to dust from the mine for prolonged periods which poses an unacceptable human health risk. This risk is not able to be mitigated.

The horticulture sector is a major employer in East Gippsland creating up to 2,000 permanent and seasonal jobs (Premier of Victoria, 2019). RMCG's data is again outdated, referencing figures from 2015.

Labour and skills shortages are experienced nationally in this sector as confirmed by RMCG:

> *'A raft of government enquiries, a growing number of academic reports and industry reviews have investigated the issue. Recruitment for agricultural job vacancies on any skills levels is a challenge nationally'* (RMCG, 2020; p 46).

The coronavirus pandemic is exacerbating labour shortages due to itinerate workers such as backpackers, not being available and also due to job seeker payments.

It was acknowledged by RMCG that there is a substantial difference between horticulture and mining pay rates, concluding that the mine may attract labour away from the farms (RMCG, 2020; p 47).

Nothing in the RMCG report addresses the fundamental problem that if the mine proceeds that it will potentially draw workers away from the horticulture sector so it will be a strong competitor for labour as it is able to pay a higher award rate.

The mine will only exacerbate a major problem currently experienced by the industry and will compete with the horticulture industry for labour. Given its higher rates of pay, the mine is able to attract workers from around the country which the horticulture industry is not able to do.

There would be no need for the mining company to develop strategies to attract workers because there would be no need for them to do this and if they did have problems attracting workers it challenges a major argument for the mine, that it will create jobs.

As a reflection of the seriousness of this issue, RMCG's risk assessment rated 'competition for labour' as 'moderate' before and also 'moderate' after mitigation measures (RMCG, 2020; pp 70-1).

The risk is actually considered to be high!

15.1 Risk of job losses

Should the horticulture industry be impacted by contamination events that shut down any part of the industry, this will result in job losses. As mentioned previously, for every direct job in agriculture, 4.26 indirect jobs are created (National Farmers Federation, 2017). Therefore, every job lost in horticulture has a four times multiplier flow-on effect loss, which must be considered as a major negative consequence for the local economy.

15.2 Job creation opportunities

Based on the horticulture industry's irrigation data, if the 3 billion litres of water the mine will require annually was redirected to the horticulture industry 3 times more jobs could be created, or potentially 600 jobs vs 193 short-term jobs proposed by Kalbar, increasing the revenue from the horticulture industry from $150 million annually to over $200 million.

16. Impact of Noise and Landscape

Given the elevated location of the mine in respect to the horticulture fields, noise from the mining operation will be heard throughout the Lindenow Valley and the mining operations are expected to be seen. It is unacceptable that the mine is proposed to operate 24 hours daily for seven days a week. Given the highly populated area in which the mine is proposed to be located, this operating condition is most unacceptable. The RMCG report did not consider these impacts on the horticulture industry and therefore mitigation measures have not been presented to lower the high impact of noise.

Joint communication is suggested as an additional mitigation measure to ensure the impacts on visual amenity of the mine project is minimal (RMCG, 2020; p 70). This will not address the problems arising from the elevated location of the mine. It is expected that it will be obvious to any visitors to the horticulture farms that there is a mine operation in close proximity.

17. Conclusion

The horticulture industry in the Lindenow Valley is a significant pre-existing industry and is a recognised major financial contributor to the Victorian economy generating many thousands of direct and indirect jobs. Many more jobs than proposed for the mine could be created if water security for the horticulture industry was improved.

The value of the horticulture industry has been recognised by the Victorian Government which has recently taken steps to prevent mining and minerals exploration on that land to protect jobs and the long-term economic value this industry generates.

Based on the evidence presented, it is strongly advocated that the Fingerboards mineral sands mine project will create unacceptable and foreseeable high risks to the horticulture industry in the Lindenow Valley that cannot be mitigated.

The greater majority of the producers in the area have expressed their opposition to the Fingerboards mine project since January 2019, as demonstrated in this response. If approved the mine is expected to have significant adverse financial and reputational consequences to their businesses and livelihoods, particularly to the certified organic businesses.

Everything cannot and will not be ‘done right’ because how can a business with no mining experience manage such a complex project that has many levels of environmental risk.

History provides many examples of regulatory failures of mining companies from businesses that have substantial experience. Therefore, the producers do not trust that the mine operator will be able to abide by the environmental regulations, and for there not to be adverse impacts on the industry’s access to the clean water that it needs. Adverse consequences will not be able to be mitigated with serious consequences for the horticulture industry and livelihoods.

As indicated, it is not consumer purchasing habits that determine whether produce is accepted by the marketplace it is the buyer (retailers, wholesalers and processors) who make that decision before the produce reaches the consumer. If the buyers become concerned about the safety of the produce or the reliability of supply, they will decide if the produce from the area is purchased for subsequent sale to the consumer. The consumer is not the major determinant of reputational risk.

Kalbar has not been transparent in its dealings with the majority of the horticulture producers so to speak about creating trust (RMCG, 2020; p 74) is not possible.

The suggestions and strategies for continued engagement will not address the fundamental problem that this mine project is in an unacceptable and dangerous location that will create unacceptable risks that cannot be mitigated.

To protect themselves from contamination risks should the mine be approved, baseline soil testing will be undertaken by the growers so that litigation avenues can be pursued for compensation should loss occur.

The Victorian Government permanently banned fracking in this State and enshrined that ban in the Constitution on the basis of protecting agriculture. This mine project must not be approved if the Government is serious about protecting agriculture as co-existence is not possible due to the highly unsuitable location of the mine project. Foodbowls are under risk in Victoria, particularly from reducing farmland surrounding Melbourne so the Government must also protect this foodbowl to feed Australia's and Victoria's growing population, including meeting the export demands for our fresh produce.

Mineral sands and rare-earths can be sought from other locations that do not pose the same level of risks to the environment and to a vital pre-existing and expanding industry that is critically important to the local economy for the short and long-term.

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Appendix 1 Letter to Horticulture Study Participants

KALBAR RESOURCES LTD

Fingerboards Mineral Sands Project

Information Sheet – Draft Horticultural Impact Study

Technical Studies are being undertaken to inform the Environment Effects Statement for the Fingerboards Mineral Sands Project. This information sheet provides an overview of the study scope and initial findings of the Horticultural Impact study.

Background

Kalbar Resources (Kalbar) engaged RM Consulting Group (RMCG) to undertake a horticultural impact assessment of the Fingerboards Mineral Sand Project (the Project). The objective was to assess the potential impact of the proposed mining operation on nearby horticultural businesses within the Lindenow Valley.

The EES scoping requirements guided the impact assessment for this study. The study comprised:

- Consultation with key horticultural landholders operating vegetable and viticulture businesses in the study area and an appraisal of the issues and concerns raised by these landholders, considering:
  - Recognised, typical horticultural production aspects and requirements.
  - Relevant published data and information.
  - Technical reports produced as part of the overall EES process.
  - Case studies.
- A separate risk assessment focused on the Project's potential impact on identified horticultural values.

It is important to note that RMCG did not undertake any primary technical research on the issues raised by the landholders, but reviewed the relevant technical reports (e.g. dust, water, etc.) to determine their conclusions.

The findings of the study are preliminary and are subject to further change based on feedback from the Technical Reference Group (TRG) overseeing the Environment Effects Statement. The TRG has provided feedback on the initial findings and sought clarification and review of some aspects of the draft report.

The table below outlines:

- The issues and concerns raised by growers in the consultation undertaken by RMCG;
- An outline of the investigations and findings in the draft Report;
- A response from Kalbar providing further information about the EES technical studies or further work requested by the TRG.

Appendix 2 RMCG Slides of 11 June 2019

Slide 11: Irrigation Water Availability

Slide 13: Competition for Labour

Slide 15: Potential Damage to Industry Image

Irrigation water availability

- Concern about future security of irrigation water – due to increased risk of competition.
- The project seeks up to 3 GL allocation.
- The Mitchell River Basin is not fully allocated, 6 GL winter fill entitlements available.
- The availability and security of water supply is a key consideration for current and the possibility of expanded horticulture production in the region.

Impact assessment	
Standard Mitigation	• Adherence to licence conditions and recommended mitigation measures as per water quality studies. • Communication and engagement with industry.
Risk	Moderate
Additional Mitigation	• Sustained communication and engagement with industry • Onsite water storage for reduced competition for seasonal water demand.
Residual Risk	Low

Horticulture Impact Assessment – Fingerboards Mineral Sands Project 11 11 June 2019

Competition for labour

- Concern of increased competition for labour with the sand mine, particularly in relation to base wage and full time employment (rather than seasonal).
- Horticultural industries face a skills and labour shortages.
- Comparative assessment of award rates indicates a horticultural employee is paid $5-7K (Full time) or $6-9K (Part time) less than the mining award.
- The Project is likely to attract some workforce in the region away from horticulture due to higher wages and job security.

Impact assessment	
Standard Mitigation	• Communication and engagement with industry about attraction and maintaining labour in the region.
Risk	Moderate
Additional Mitigation	• Sustained communication and engagement with industry and regional bodies.
Residual Risk	Moderate

Horticulture Impact Assessment – Fingerboards Mineral Sands Project 13 11 June 2019

Potential damage to industry image

- Concern that the Project will impact on the 'clean-green' reputation of the region – based on perceived risk of contamination and/or association of the region with mining.
- Lindenow Valley reputation for salad vegetable production and innovation (veg innovation day, East Gippsland Food Cluster).
- Mixed evidence to determine risk:
  - Produce provenance – consumer purchasing habits
  - Location and production inputs – Werribee WTP
  - Comparative analysis – production adjacent Sand Mine
- Difficult to assess – provided no offsite impact limited risk. Not quantified for certified organic production.

Impact assessment	
Standard Mitigation	• Adherence to licence conditions and recommended mitigation measures in relation to buffer zones. • Communication and engagement with industry. • Monitoring
Risk	Moderate
Additional Mitigation	• Sustained communication and engagement with industry.
Residual Risk	Moderate

Horticulture Impact Assessment – Fingerboards Mineral Sands Project 15 11 June 2019

Appendix 3

Letter from Australian Organic

28 October 2020

[redacted]

To Whom it May Concern,

Re: Letter of Support for Further Third-Party Environmental Impact Assessments

Australian Organic Limited (AOL) is the leading peak body for the Organic industry in Australia, a member owned not-for-profit organisation protecting and promoting the future of the Australian Organic industry.

As a proud supporter and advocate for organic farmers, we take seriously issues brought to us by our members. We have been made aware of a proposed mining project by Kalbar Operations Pty Ltd, the Fingerboards Mineral Sands Project.

Members of AOL have highlighted concerns regarding the potential harm this operation may pose to their Certified Organic status; their ability to operate their day to day business; and environmental damage both locally, domestically, and globally. Concerns held by AOL members are in relation to the continuance of their Organic Certification as a result of the construction and operation of the aforementioned project. Issues such as potential for contamination caused by airborne dust particles, water pollution from run-off and availability of irrigation water among other concerns.

The National Standard for Organic and Bio-Dynamic Produce (2016) requires organic operators to implement strategies to prevent contamination of their produce. Such contamination is not limited to pesticides or synthetic fertilisers, but also includes the prevention of heavy metal, microbial, or other materials which should simply be absent from our food. Our members operating in this area who have, over many years, been producing high quality food for Australians are gravely concerned about the proposed project.

Australian Organic Limited is not opposed to mining. We see sustainable and economically feasible primary production activities such as mining as significant contributors to the prosperity and wellbeing of all Australians. Farming, and mining, are among the most important productive and profitable industries in Australia. Therefore, ensuring only economically, environmentally and socially sustainable farming and mining operations are approved, is of the utmost importance.

We support Australia's strong environmental regulation at Federal, and State level. We commend the Victorian Department of Environment, Land, Water and Planning (DELWP) and Kalbar Operations Pty Ltd for clearly communicating the opportunity for submissions to be made by the public, via the Engage Victoria website. However, we are concerned that some very relevant and likely effects of this project may not have been adequately considered and discussed in the Environmental Effects Statement prepared and submitted by Kalbar Operations Pty Ltd.

Australian Organic Limited, Nundah QLD 4012 | T: 07 3850 5719 | E: [redacted] | W: [redacted]

We implore the East Gippsland Shire Council, Wellington Shire Council, the DELWP and EPA, and ultimately the Minister for Planning to apply all relevant and appropriate scrutiny to the EES, the Works Approval Application (WAA), and the Planning Scheme Amendment (PSA), to ensure that the best decision is made for the future of Australia.

We also note that the published Terms of Reference for the Fingerboards Mineral Sands Project Inquiry and Advisory Committee (IAC), specifically provides an opportunity for the committee to seek additional specialist expert advice related to agriculture and rural land use; and social impact assessment. We urge the IAC to indeed seek such expert advice on the true cost to the agricultural community in this area, should this project proceed.

We hereby express our support for further environmental impact assessments to be conducted by an independent third-party body.

Yours sincerely,

Nikki Ford
CEO Australian Organic

Australian Organic Limited, Nundah QLD 4012 | T: 07 3850 5716 | E: contact@australianorganic.com | W: australianorganic.com

Chapter 8: AGRICULTURE

Contents

Social, land use and infrastructure

Draft evaluation objective

To minimise potential adverse social and land use effects, including on agriculture, dairy, irrigated horticulture, tourism industries and transport infrastructure.

Key issues

The potential for dislocation due to severance causing reduced access to farmland, businesses, social networks, community facilities and the Mitchell River National Park.

Potential for adverse effects on the existing and future land and beneficial uses …
The potential for changes to the existing infrastructure in the project area and in its vicinity...

Potential damage to local and regional road surfaces along transport routes and increased risk to road safety on transport routes.

Design and mitigation measures

Outline and assess design and mitigation measures that address the potential for adverse land use effects … including the proposed principles for sustainable land use set for rehabilitation of soils and landforms post-mining.

Identify the proposed transport routes' impacts on road safety and operational performance of the existing road infrastructure….

Outline the required transport infrastructure upgrades and additional road maintenance regime to address adverse impacts of the project construction and operation (e.g. road, rail and port).

Describe and evaluate the proposed traffic management and safety principles to address changed traffic conditions …

Outline measures to minimise potential adverse effects on local communities and infrastructure.

Outline measures to minimise potential adverse effects to local businesses and to enhance potential benefits to local and regional businesses.

Assessment of likely effects

> Assess the potential effects on communities living within or near the project area in terms of potential for dislocation, severance or disrupted access to social networks, community facilities and valued places.
>
> Assess the potential effects on the land use in the vicinity of the project, in terms of the extent, duration, likelihood and implications of effects.
>
> Assess the potential economic effects (beneficial and adverse) which could result from the project, including opportunities for business and for existing businesses.
> Assess the potential effects on workforce development opportunities in the local and wider region as a result of the project.
>
> Evaluate the consistency of the project with the policies and provisions of the East Gippsland and Wellington planning schemes and other relevant land use planning strategies.

Approach to manage performance

> Describe any further measures that are proposed to mitigate, offset or manage social, land use and economic outcomes for communities living within or in the vicinity of the project area, as well as proposed measures to enhance beneficial outcomes….

Mine-free Glenaladale respectfully assert that HSC and the Proponent have failed to address these Scoping Requirements, thus rending the EES report invalid.

Concerns with the consulting company, Hamilton SierraCon (HSC) and their disclaimer

The ‘Limitations’ on p... 45 indicate HSC is using their disclaimer to absolve HSC on a range of matters.

“Hamilton SierraCon has made no independent verification of this information beyond the agreed scope of works and Hamilton SierraCon assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to Hamilton SierraCon was incorrect.

This report was prepared between 05 Sept 2017 and 24 July 2020 and is based on the information reviewed at the time of preparation. Hamilton SierraCon disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners".

Of note is the "no independent verification" … but then "no indications ... that information … as provided … was incorrect". It is unusual and concerning that these two principles could co-exist in such an important document.

What was provided in the report, which differs from the Ministers Scoping Requirements

As outlined in the opening pages of the HSC report, the objectives of the Assessment are :

- To describe current agriculture in the Project Area and Local Region
- To describe the value of local agricultural production and the economic contribution of the Fingerboards Project
- To assess the impact of the Fingerboards Project on current agricultural operations
- To describe possible actions to reduce or avoid significant impacts on agriculture and to monitor and manage Project performance

1.2.1 Scoping requirements outlined by HSC focus on "social, land use and infrastructure to minimize potential adverse social and land use effects, including on agriculture, dairy, irrigated horticulture industries and transport infrastructure"

Whilst identifying key issues around potential for dislocation and adverse effects on both existing and future viability, HSC then move to a clear objective of "resource development" whereby the aim is enabling an economically viable mining project which maintains viability of other local industries.

It further extrapolates the key issues are around best use of land considering a range of values, and the potential impacts on existing industries.

This condensing of objectives is a common theme in EES reports commission by the Proponent, and in doing so, is further demonstration that the EES Scoping requirements have not been met. Thus, the EES as a whole is incomplete and invalid.

HSC report and alignment with Scoping Requirements

Before illustrating this deficit, it is important to note the definition, (above) in the Scoping Requirement of the word 'Effects'.

"Effects include direct, indirect, combined, consequential, short and long-term, beneficial and adverse effects."

The failure to explore all realms of the definition is a foundational flaw in this reporting, and in doing so, provides a distorted impression to the casual reader of the reality of the situation.

Photos above taken at The Fingerboards in Sept 2020

Scoping requirements per the Minister's instructions

A description of relevant alternatives capable of substantially meeting the project's objectives that may also offer environmental or other benefits …

This aspect of the Scoping Requirements is large and important, as befitting its placement at the top of the list of requirements.

Section 1.2 p... 6 identifies that the HSC report "does not provide a comprehensive risk assessment", instead referring to those aspects being explored by other contributors to the EES report.

Rather promisingly, the report opens with a description of methodology. But from here, questions are generated by the reader, rather than answered. And the scoping requirement remains unmet.

Descriptions of the existing environment …

Methodology included "a review of desktop information and consultation with a selection of landholders, relevant local agencies and industry groups".

Such 'selection' of information sources could be considered bias if this report was to be referenced against best practise reporting procedures.

Six (6) landholders in close proximity to the Project area were interviewed, in addition to five (5) vegetable growers from Lindenow. It is unknown who was interviewed and their attitude to the proposal.

The Proponent identifies there will be 19 directly affected landholders. There are, of course, considerably more landholders further from the site who will also experience adverse effects should the project proceed. They were not included in the report.

The narrative does not provide clarity around the specific (19) landholders and the distance they are from the Project area. Clearly, those abutting the Project area will have more acute concerns than those further away although it would be reasonably expected that similar concerns would prevail around noise, dust, air quality, loss of access to water and more.

Of note is the comment that a "Kalbar staff member also present in some interviews". This is a concern as those being interviewed may not have felt comfortable giving a forthright and frank response.

There is no clarity around the location of these interviews, and at what time in the engagement HSC has had with the proponent these occurred and if landholders received payment for participation. The questions asked in 2017 may well have a very different response to those asked 2020, particularly given the emergence of information over that time to the public.

(Kalbar also claim in their EES documentation to have, in July 2018, sent 'formal written invitations' to all landholders within 2km of the project area for personal meetings with Kalbar staff to discuss technical study findings and potential concerns. (Ch 6.4.2.1) This is a patently incorrect statement as many landholders within 2km have confirmed they have never received any formal written invitations from Kalbar.)

Many concerns raised by the public are yet to be comprehensively addressed or answered by the proponent or by the EES.

Regardless, these discussions with HSC form the basis for comment in the EES report.

There is also no clarity about how often the HSC consultant attended the area, and the extent to which they relied of information 'filtered' through from Kalbar via Coffey Consultants, the team 'bringing the EES together'. Coffey references are from 2015 in the HSC document.

Desktop review of information provides misguided summations. To include Local Agriculture Region and Australian Bureau of Statistics data in 1.3 which aligns the Bruthen/Omeo land corridor with Bairnsdale under SA2, and then extrapolate to the Glenaladale region is inappropriate. Bruthen is 50 km away and Omeo, 80 km (in a direct line).

What would have been more reflective is to have concentrated on the Glenaladale-Fernbank-Stockdale region.

Drawing on agricultural statistics from SA2 provides skewed data.

The Report describes the forestry plantations of blue gum and radiata pine. Whilst these plantations exist, their inclusion in the report illustrates the lack of local knowledge and history of farming in the area.

The blue gum plantings were initiated in the early 1990's with support from the Commonwealth Government, whose 20/20 scheme aimed to plant 20 million trees in Australia by 2020. Embedded in this scheme were many taxation incentives which attracted investment companies who were seeking to minimise taxation paid by claiming 'write-offs'. The scheme was an abject failure.

When considering the farming sector, and comparing it to poorly implemented plantation schemes, such a comparison is misleading and inappropriate.

While the primary agriculture industries are identified the landscape, they sit within is poorly described. There is no reference to the ancient trees which provide shade for grazing stock. The roots of both ancient and smaller trees assist with binding the soil and leaf litter adds to the trace elements in the soil. The waterways and spring fed dams are not mentioned, nor is the ground flow over paddocks.

The agricultural history will be destroyed in the operation including the historic Dumaresq wool shed and yards and the old farmers houses at the Fingerboards. These are not mentioned.

The climate description draws on Agriculture Victoria 2017 data and uses Mount Moornapa as the local weather station. This was rejected by Katestone in the Air Quality assessment as inappropriate for comparisons. Coffey Consultants in 2015 identified the prevailing winds were "predominantly in a westerly direction".

This conflicts with other information in the EES and including it doesn't recognise the issues with the failure of the wind monitoring at the Proponent's weather station at the Fingerboards. The station was positioned in the lee of a hill, 15 m below the top of the rise. This station in this sheltered site gave skewed and biased information.

Of note is that, regardless of the inherent distortion the placement brings, data (wind speed and direction) was only collected for 77.3% of the time over 12 months, and from there, a broad (and flawed) assertion was made.

The weather data that was used by Katestone, nominated a figure of an average maximum hourly wind speed, where it would be for more accurate and appropriate to quote maximum wind speeds to fully describe the wind effect on dust and noise.

It is common knowledge that strong hot north-westerly winds form the predominant wind direction during the summer, bringing with its bushfire risk from the ranges. Whilst there can be times of cooler easterly winds in summer, the blasting south-westerly winds in autumn, winter and spring aren't included in the description. Gale force wind warnings are common during these times.

A faulty weather monitoring device, coupled with poor local knowledge and research, may have led to a simplified and misleading description on wind conditions which are far more intense and damaging than described. Climate change will aggravate this situation.

When describing pasture growing seasons, CSIRO data is used for 2017. It doesn't make reference the 2017 – 2019 Drought which was the worst in Victoria's history, both for severity and length. A casual glance at the graph may give the impression of sustained poor pasture loading in paddocks.

The Department of Economic Development, Jobs, Transport, and Resources document, Livestock Farm Monitor Project 2017 – 2018 identifies the impact of ongoing drought on grazing stock and pasture levels. (p..17)

This issue is then compounded by the January – March 2014 Mt Ray bushfires in the region, from which the landscape in some areas is still recovering. Any data from this period will be affected and downgraded.

https://files-em.em.vic.gov.au/public/EMV-web/Mt-Ray-Boundary-Track-Fire-Community-Report-2014.pdf

Appendix 3, p. 50 cites soils around **Glenmaggie (Gm)** in the table, however this location is around **66 km by vehicle from Glenaladale**.

https://www.google.com/search?q=glenmaggie+to+glenaladale&rlz=1C1GGGE_enAU450AU451&oq=glenmaggie+to+glenaladale&aqs=chrome..69i57j46i433j46j46i433l3j0i131i433j69i61.3729j0j15&sourceid=chrome&ie=UTF-8

The table then references "occurs in the area north of Glenaladale". It is difficult to determine what the tabled information actually pertains to. Erroneous data of this magnitude has no place in a report of this significance.

The EES report cites Coffey Consultants providing 2015 data, which HSC references. The Coffey information dates from soon after the Mt Ray fires in the area. It is important to recall the disclaimer around accuracy.

The impression portrayed in the report section 2.3 is one of poor-quality ground and limited capacity to be developed and provide feed. "Parts of the Project area are rocky which is a barrier to cultivation and cropping" (p.14)

For anyone not familiar with farming, they may read this and not understand the value of the country. Preserving the topsoils and the fragile 'crumb' structure is vitally important, and cultivation would be counterproductive. This doesn't prevent the land from being utilised for grazing. Many well-nourished cattle and sheep have grazed this country since European settlement some 170 years ago.

Bountiful pastures and mature shade and habitat trees at the Fingerboards

The scoping requirements for agriculture included;

- detailed assessments of potential effects of the project on environmental assets and values, relative to the "no project" scenario, together with an estimation of likelihood and degree of uncertainty associated with predictions…
- intended measures for avoiding, minimising, managing and monitoring effects
- predictions of residual effects of the project assuming implementation of proposed environmental management measures …
- any proposed offset measures where avoidance and mitigation measures will not adequately address effects on environmental values …

HSC seem unable to adequately address these scoping requirements, seemingly addressing their own interpretive criteria, which varies from that requested by the Minister.

The EES report utilised a monetary framework, reducing and simplifying farming enterprise to a unit value.

One would hope best practise is upheld whilst collating and interpreting data from different sources to achieve a reality-based summary of the situation.

https://toolkit.data.gov.au/High_Level_Principles_for_Data_Integration_-_Statistical_Integration_-_Why.html

However, by condensing data to monetary values, and from there, basing predictions and projections, several flaws become apparent.

The data is obtained from distorted or 'out of date' sources. Table 2 is from 8 years ago, Table 3 doesn't account for the impacts of bushfire and Table 4 is provided by Kalbar, hence open to bias.

HSC recognise that for Table 4 "accurate data on specific land use is not available. However, based on consultation with landholders and from a review aerial imagery, an *estimate* of Project Area land use is provided"

Table 5 p.18 includes both pine and blue gum plantation under 'Agricultural Land'. This is further compounded in Table 8. It is appropriate to include radiata pine in the area of forestry production, but to include the now short-lived blue gum planation production and profitability builds a distorted perception of the situation and reflects poor understand HSC have of the agricultural practises in the area.

By placing a monetary unit value on farming, it negates and dismisses the core lifestyle factor which is so important to farmers and families on the land. Whilst not all living on the farm work full time at the land, that in no way detracts from the importance or the viability of the farm.

Broad assumptions underpin sweeping comments, and the report fails to accurately and regularly reference sources of information.

For example, whilst helpfully acknowledging dam construction requires “the right local clay”, the report boldly claims this is “readily available”. But doesn’t endorse this with specifics. **The statement is clearly contradicted by GHDs report that cautions against attempting to use local clay for dam construction.**

This bold and some would say ‘misguided’ plan by the proponent to construct a vast number of dams of varying sizes is contrary to the local awareness of landholders, who have a deep understanding of the conditions in the area and associated challenges. Of note is that landholders avoid placing dams in gullies, and the size of dams on properties are relatively small. This is a risk-based decision which balances the water needs of the property, underpinned by the knowledge around dam structural integrity and the behaviour of the clay and other materials in the construction.

The photo below illustrates what is a common occurrence if local clays are relied on for dam walls. It appears that SHC has not consulted with local landholders or referred to the proponent’s own reports before making such a misleading statement about the ready availability of local materials.

Figure 32: Impacts of dispersive soils and inappropriate clays on dam construction at Glenaladale

Figure 33: Subsidence that occurs when inappropriate clays are used in dams

The EES states the proponent intends to construct 20 dams over the life of the Project. Issues with water flows were raised at a webinar (14 Oct 2020) and copy of part of that information below.

Question	Have you considered the impact of your dams located at the top of gullies on downstream farm gully dams?
Answer	The surface water (runoff) management objective is to minimise the impact on existing natural flows to downstream receptors and prevent the uncontrolled release of sediment-laden runoff from the mine site. Water running off undisturbed ground will be diverted around disturbance areas as part of the surface water management strategy. An adaptive management strategy will be implemented, based on water quality and quantity monitoring results, to determine whether offset water that would typically be returned to the Mitchell River may be directed to ephemeral drainage gullies (and therefore farm dams) in a controlled manner.

https://www.fingerboardsproject.com.au/assets/files/2020/webinar/ees-specialist-studies-q-and-a-webinar-14-october-2020-final.pdf

This response would suggest the proponent plans to release water following runoff events, with the aim of meeting their own needs as a priority, to the detriment of robbing downstream farms and the environment of the natural runoff.

The proponent seems to rationalise this in a pseudo-benevolent manner, stating water will not be turbid or contaminated. However, there are no guarantees around water quality, and the point remains that downstream users and then environment will not receive water as it falls. The impacts on the River and neighbouring landholders will be felt very strongly in times or reduced rainfall or drought.

The proponent has no social or other licence to divert water and prevent its flowing to the Mitchell River or farm dams.

Unknown financial capacity

In the context of a financial overview, there is no information about the costs. The Proponent intents to construct 20 dams over the life of the Project, significantly impacting downstream flows and ecology.

And this lack of funding detail is part of a larger issues. The Proponent has not included a business plan in the EES. Whilst feeling confident to assert the financial gains expected for the community and State coffers, there is no certainty for the community that the Proponent has capacity to fund the project and continue to do so for its projected 20 year lifetime.

The Mineral Resources Sustainable Development Act 1990 (MRSD) Vic has clear criteria pertaining to proponents ability to demonstrate they 'be a fit and proper person' to conduct the business, and that the proponent is able to finance the development and operational costs of the mine, and the licence area holds "an accessible, economically viable body of ore" and that a declared rehabilitation bond has been lodged.

Given exploratory drilling is still continuing now (September/October 2020), questions must be asked about the proponent's capacity to meet this criteria. Most landholders are declining to allow drilling on their property.

Those close by the mine, and those businesses involved with supplying good and services, have no assurances at present that the project will operate in the long term. And fulfil obligations and assertions made in the EES including employment.

No business case has been put forward in the EES to support the claims made by the proponent pertaining to financial benefit for the community.

It is important to note that mining is exempt from paying local rates, so fail to contribute to infrastructure and other responsibilities that the local Shire is tasked with.

Should the project commence, and issues arise, they cannot be immediately negated, and effects will be very long term. Regarding agriculture, this may well mean that farmers have destocked and may have left the area. The tranquillity, peacefulness and the social structure of this farming area will certainly have been destroyed.

With regards to the impacts of the proposed project, the HSC report identifies some, but omits to delve in to detail or to consider more impacts.

This may well be reflective of a lack of engagement with landholders and a poor understanding of the local agricultural practises.

HSC have failed to include adequate reference to the impact on adjacent farms which have been identified in other parts of the EES as 'Sensitive Receptors' and are within two km of the boundary of the proposed project. These farms will become virtually unworkable with the noise, vibration, dust and heavy mine traffic. The farming families will most likely move away.

Misleading inputs

Omitting to include neighbouring farms undervalues the economic output for agriculture in the region that will be affected by the mine, and these properties should have been included when determining the likes of stocking rates and gross margins.

And further to this, gross margins calculated do not reflect the potential return a livestock business could generate within the area to be mined. And whilst such calculations would align with the 'No Project' option, they are not part of the HSC information.

The Project Overview p. 5 states "the project area is approximately 1,675 ha and of this approximately 1,350 ha is proposed to be disturbed".

This then reduces to 1,193 ha on p..11. Confusing statements and significant discrepancies like this devalue the work.

But underpinning these statements is the fact that citing 443 ha of land being removed from agriculture during the project lifetime is misleading. As outlined on p..12 Section 1.4, it is misrepresentative. There is an assumption in this report that "full rehabilitation" (whatever parameter that meets) will be completed in 3 years. An optimistic timeline given the likelihood of droughts and unreliable rainfall.

Elsewhere in the EES the timeframe for successful rehabilitation is given as in 3 – 5 years.

There is no contingency for problematic weeds such as African Lovegrass, Serrated Tussock and Chilean Needle Grass establishing in the area for rehabilitation.

The Project overview states 360 ha will be disturbed at any one time, and with the addition of the infrastructure area, the figure of 443 ha is given. An important and semantic difference is that 443 ha will be removed at <u>any given time</u>.

This brings far different implications for landowners.

It is vitally important to acknowledge that removal of the 443 ha at <u>any given time</u> has profound and debilitating impacts on other areas of farming, such as such as water runoff to adjoining paddocks or removal of sheltered paddocks essential for lambing, calving or off shears sheep.

Removal of some of these paddocks is highly likely to greatly reduce farm production and feed availability as they may be those set aside for hay or silage.

Whilst the optimistic timeline for “full rehabilitation” is listed, the logistics remain flawed, including the inability to provide shade trees for many decades. This renders land far less suitable for livestock grazing, as there is no shelter and raises stock welfare issues. This hasn’t been factored into calculations or reasoning.

When reviewing the potential effects of the project on assets, valid and current data is necessary.

The current 10-year average gross margins in Gippsland for beef is $484/ha, prime lamb $585/ha, and wool $318/ha with farm average stocking rate of 19DSE/ha for the 2018-19 year.

(Table C15 & C4 Live Stock Farm Monitor Project, Victoria, Annual Report 2018-19 https://agriculture.vic.gov.au/__data/assets/pdf_file/0007/537757/Livestock-Farm-Monitor-Project-2018-2019.pdf)

2.6.2 suggests that “a theoretical potential stocking rate of 20 DSE/hectare is calculated based on rainfall and without consideration of the complexity of managing local soil health issues – this stocking rate is not likely to be achievable across the Project area” (p.20)

This may well be taken to illustrate how unfamiliar HSC are with what happens on the land at Glenaladale.

The proponents EES study on Agriculture has determined the area to be mined has a “stocking rate range of 5 to 9 DSE/ha a range in weighted average gross margin per hectare of $130 to $187.”

(44_Appendix-A015_Agriculture Impact Assessment (1).pdf p.27)

This does not reflect the Gippsland average or what is being achieved on neighbouring farms. Even if the stocking rate for this area is less than 19 DSE/ha, it is considerably more than the 5 to 9 DSE/ha estimate given by the consultants.

Local farmers make the socially and economically defensible decision not to exploit the land. That is an ethical choice that is at odds with the values of the proponent.

The proponent has used questionably calculated net figures when estimating the costs of loss of agriculture to the mine but have used gross figures in justifying the mine. They have also only restricted themselves to the timeframe of the mine rather than the full 60 plus years or so it will take for the land to be returned to its current condition and capacity for humanitarian animal husbandry.

In calculating production values, there is no reference or apparent consideration for the landholder on the impact of the proposed project for the past seven or so years.

This has generated uncertainty for farmers/landowners when considering whether to develop and invest in their properties. They have been unable to progress as they would prefer because of the threats the mine encompasses.

Neighbouring properties, not within the footprint of the mine, experience a different level of risk around the mine void have continued to develop their farms/business. These properties are achieving a much higher gross margin and a Gippsland average stocking rate of 20 DSE/ha.

Whilst HSC mention the Lindenow Flats vegetable farmers, and is examined in detail Section 2.6.6., the report precludes assessing farming activities in other areas around the Project.

The report has contradictions and inconsistencies with distances, and another example of that (beyond referencing Glenmaggie, above) is stating “at its closest point the Project area boundary is 500 – 1000 metres from the vegetable production areas”.

It’s either 500 metres or it’s not. For a report that is expected to reflect best practise and analysis, such a broad reference reflects poorly, particularly given there 100% difference between the two measures. There is a considerable variance between these two distances. Regardless, the contaminated dust will still travel well beyond 1000 metres.

The report continues with the fallacy that Glenaladale area, including the flats, enjoys predominantly “cool easterly winds during summer” (refer to previous weather station comments).

HSC may have demonstrated that dryland farming on the Fingerboards plateau and dissected hills is less profitable than the mining operation. Agriculture has produced needed products for over a century and supported a vibrant and productive community. It supported the First Nation people for sixty thousand years. Mining will produce for at the most fifteen years, destroy the base of the community and may rehabilitate the land. Its viability to even function is questionable and there is no business plan to judge this.

And from this surmisal about ‘bang for buck’, whether those vegetable farming ‘balance sheets’ factored in aspects such as the purchase of land, cost of drilling bores and machinery costs is unknown to the reader. Vegetable farming may at times present, on the surface, better returns but there is also a consistent and growing demand for meat and wool.

To suggest that one form of farming is more ‘useful/valuable’ than another indicates a level of contempt that has no place in a report of this (or any) nature.

The National Farmers Federation, in the 2017 report ‘Food, Fibre & Forestry : a summary of Australia’s Agriculture Sector’ rightly states

“Through developing new technologies, seizing environmentally sustainable farm practices, and improving efficiency and competitiveness modern farming is essential to Australia’s economic, environmental and social wellbeing, and a vital source for Australia’s food security and, increasingly, mounting world food needs. Farming is a mainstay of Australian ingenuity, adaptability and enterprise.” (p.21)

"The gross value of Australian agriculture increased by $3.7 billion from 2014–15, to $58.1 billion in 2015–16. "

Source: ABARES, Agricultural Commodities – June Quarter 2017" . (p.6)

This amounts to around 15-fold increase in financial contribution to the economy, something that mining would struggle to replicate.

The importance of agriculture, in all forms, was further bluntly identified in 'Rural Industry Futures: megatrends impacting Australian agriculture over the coming twenty years' Publication No. 15/065 Project No. PRJ-009712

"Australia's rural industries will be impacted by significant change at global, national and local levels over the coming decades. This will create opportunities and challenges for small and large farm businesses. It will have an impact on rural lifestyles, agricultural landscapes and Australia's society and economy in general".

Rural industry megatrends cover both domestic and global change because Australian agriculture is an export-oriented industry which sells around two-thirds of its produce offshore. Whilst domestic markets will remain important, the big growth opportunities are in emerging markets, especially in Asia, which have doubled or trebled their food and fibre imports in recent years and are set for continued and rapid growth. The megatrends are also focused on rural industries and the forces which have an impact on commodity markets and production costs. Each megatrend has supply-side and demand-side implications for industry.

Rising world population and increasing food consumption accompanied by a shrinking global agricultural land area, water scarcity and spiralling energy demand. According to the United Nations Food and Agriculture Organization (FAO), the world must increase agricultural output by 70 per cent to feed its growing population by the year 2050 [5]. However, the world is estimated to be losing 12 million hectares of agricultural land each year to desertification and urbanisation [6]. In addition to this are the challenges of climate change and water scarcity. Australian agriculture has a vital role to play in supplying world food markets and in improving food security. Australia is also well placed to export agricultural expertise and know-how to emerging economies as they seek to develop their own agricultural sectors.

As the world wants more food Australia is well positioned—both in terms of geography and comparative advantage— to supply overseas markets**.**

Australia can respond to the increasing demand by increasing production and exports, but it can't do that if it keeps on losing viable agricultural land to mining."

https://www.agrifutures.com.au/wp-content/uploads/publications/15-065.pdf

Any project which diminishes the available land for farming is placing food security and National Interests at immeasurable risk. This project clearly contributes to this profound and long-term risk.

Mining this ore deposit is not in the best interests of the State, with agriculture best placed to continue to provide a value-added industry.

Mitigation measures proposed and their effectiveness

Potential agricultural impacts, modifications and mitigations form a neat 10-point plan. This seems remarkably 'light on' given the financial contribution of the actual industry itself, and those other businesses which 'value add' to it.

Stakeholder engagement features strongly in the mitigation measures. However, if that process to date is any measure to go by, it has already performed poorly. Whilst concerns have been raised by the public over many years, they remain largely unanswered by the Proponent. Despite the technical studies and EES now available, angst continues as answers are difficult to obtain from the Proponent.

A raft of loose theories is in the EES, including "where possible", "be considered", "as practical", "there is scope", "could include". The lack of strong definitions and standards is a significant concern especially in checking on accountabilities. It would seem that the Proponent is expecting those directly (and indirectly) impacted to 'trust in the process' and 'have faith' that protective mechanisms are (or will be) in place.

When it comes to having 'trust in the process', the community have well founded cynicism that a thorough, effective and transparent process exists.

Protective mechanisms and regulatory bodies have been overwhelmingly unsuccessful in the monitoring and reactive interventions when mining company activity has presented heightened and unacceptable risk to the community and environment.

The EPA at present has poor capacity to bring companies to account, with the recent storage issues around toxic waste in metropolitan Melbourne a clear example where illegal activity was occurring but intervention by regulatory bodies failed at many levels, including the delay on intervention.

https://www.theage.com.au/national/victoria/toxic-waste-stockpile-found-in-rubble-of-burnt-down-warehouse-20191020-p532fy.html

The EPA also has an important role to play in monitoring mine activity. In the Auditor General's Report, it was "found that DJPR "is not effectively regulating operators' compliance with their rehabilitation responsibilities", exposing Victoria to "significant financial risk". According to the report, frequently, mining sites have been poorly rehabilitated or not treated at all, presenting risks to Victorians and the environment."

https://www.sustainabilitymatters.net.au/content/sustainability/article/auditor-general-report-reveals-vic-mine-rehabilitation-failures-62344776

So, as this process has been underway for many years now, the 'process' appears somewhat haphazard and flawed.

There is an extensive catalogue of failed mining operations, including mineral sands projects. The legacy left for the communities is profoundly negative. These include, but are not limited to, including Douglas Mine, Benambra, Hazelwood, and Russell Vale (NSW), The list continues - with alarming persistence.

The consequences of failings within the regulatory framework, and the fall out of this, is highlighted in both the Auditor General Report (Aug 2020) and the Australia Institute 'Dark Side of the Boom' (April 2017), demonstrates the risk that mining presents.

"On average one mine is abandoned per year in Victoria, including the Benambra gold mine which has already cost Victorian taxpayers $7 million. As the owners of the largest mines come under financial pressure, such as the coal company Peabody, close attention needs to be paid to the ongoing phenomenon of mine abandonment in Australia. This represents a massive subsidy to the mining industry, paid by taxpayers and the community through a degraded environment." (p.2)

This was also evident in the Mineral Policy Institute document 'Ground Truths; Taking Responsibility for Australia's Mining Legacies' maps on P..5 the Australia wide phenomena and provides insights around risks and consequences. This document states "the reasons for closure and demonstrates clearly that 44% of mine closures were caused by economic factors (i.e. costs, receivership and markets). Another 34% were the result of efficiency issues (i.e. technical issues, low grades, metallurgical issues)." P. 6.

It continued on to comment "These failures in the mine closure process contrast markedly with the image the industry portrays. For example, the Minerals Council of Australia's (2015) report "The whole story - Mining's contribution to the Australian community" does not mention the impact, scale or financial liability of failed mine closures. It certainly did not present the "whole story". Similarly, in a subsequent report, Mine Rehabilitation in the Australian Minerals Industry, designed to celebrate good rehabilitation outcomes, the Council fails to place the rehabilitation examples within the context of the industry's poor closure record and the number of abandoned mines. For example, while containing two WA sites, the report fails to mention that neither site, nor any others have been handed back to the state in the last fifteen years" P.6

https://www.audit.vic.gov.au/report/rehabilitating-mines?section=

https://www.tai.org.au/sites/default/files/P192%20Dark%20side%20of%20the%20boom%20FINAL_0.pdf

https://mpi.org.au

The Douglas mine water usage impacted on the iconic local platypus population and has, in essence, led to their extinction in that region.

The capacity for effective and full rehabilitation underpins some mitigation measures, and this 'blind acceptance' of the plans on paper transitioning to the field is unsound.

Infrastructure costs on farm, and then corresponding compensation seems below market value. The suggestion that fencing could be replaced at $10/m, including adequate strands, strainers and materials is fanciful and well below current standard pricing of $14-$18/ m for standard fencing, and $20 - $25/m for Wildlife Exclusion fencing.

There is considerable mention in the EES reports (regardless of the domain) that plans "are still to be developed".

The agriculture report, 3.2 p. 25 is unable to identify the proportion of the processing equipment which will be imported, and how much will be Australian made.

Again, no clarity, no costings. So how can the community and those assessing the EES document have any respect for the Proponents operation when basics remain 'up in the air'. Particularly as the proponent has been working on the project ~~for~~ since 2014

Promoting community cohesion by funding events promotes division rather than cohesion. Attending events funded by an organisation or company, whose values and impacts don't align with the individual's principles, is tacit endorsement of what that organisation or company reflects.

The Proponent has suggested they will pay staff to participate in volunteer community groups, such as the CFA. This suggestion indicates the lack of understanding the Proponent has for the dynamics and expectations within communities.

Residual effects of the project

Consideration needs to be given to residual effects of the Project on agriculture and the district. These are extensive, and include, but not limited to the real potential for ineffective "full Rehabilitation" (defining parameters for this remain unclear), loss of topography and impacts on water catchment and flow, impacts on the 'clean, green' image of East Gippsland's food production regions, water availability, the project adding to Greenhouse Gas emissions and compounding the climate crisis, changes to an individual's identity with the land and landscape ("solastalgia") and loss of habitat.

These factors are not fully realised in the Report. As mentioned above, 'blind acceptance' that "full rehabilitation" will occur may be considered foolhardy, and to base a premise of achievement on actions that haven't been tested in this scenario is remarkable. Poor rehabilitation will mean the area is unproductive for farming.

Mining companies are notorious for not following through with their obligations or having 'fanciful' and unachievable goals in this domain. The Victorian Auditor General's report was scathing of the Rehabilitation framework, citing conflicts of interest and inadequacy in resourcing to achieve objectives.

Findings released Aug 2020, in summary, include;

The Department of Agriculture, Water and the Environment's (the department's) administration of referrals, assessments and approvals of controlled actions under the EPBC Act is not effective.

- The department's regulatory approach is not proportionate to environmental risk.
- The administration of referrals and assessments is not effective or efficient.
- Conditions of approval are not assessed with rigour, are non-compliant with procedural guidance and contain clerical or administrative errors.
- The department is not well positioned to measure its contribution to the objectives of the EPBC Act.

The Auditor-General Report No.47 2019–20 Performance Audit

From reading this report, how can it be reasonably assumed that the Proponent, a company that hasn't mined before, will be 'one out of the box' and undertake all their obligations with considerable diligence when 99% of mining companies don't do what is required.

The Perry Gully catchment area will be altered in shape, in essence significantly flattening the curvature and diminishing run off in one gully and increasing in another.

This has implications for agriculture, as not all paddocks are equal. Some are more suited for protecting vulnerable sheep (i.e. at lambing and after shearing), some have more availability to water, and such forth. If a paddock is mined, the bloodline stock which uses those paddocks will need to be sold. This means that the mining activity destroys the results of generations of stock breed.

Clean Green image at risk

The 'Clean, Green' image of East Gippsland is acknowledged in the HSC report, and more sweeping comments aim to diminish the real concerns. The report suggests that consumers will purchase food if it doesn't appear tainted, and that consumers have limited concern for local providence.

Agriculture Victoria would undoubtedly have considerable concerns pertaining to contamination risk. The potential for production loss and reputational risk ('clean green image') would certainly be at the forefront when considering their stance on the project proposal. It would be reasonable for Agriculture Victoria to be critical of a venture which undermined the years of work they have put into the industry and be requesting a thorough review of the project and associated economic impacts.

Whilst the EES doesn't indicate if the proponent had discussions with Agriculture Victoria, such an organisations views of the assessment process and potential issues would certainly be appropriate to seek. It would be quite reasonable for Agriculture Victoria to have broader concerns for other Farm based industry, such as Horticulture, given their philosophy around sustainability.
https://agriculture.vic.gov.au/

The experiences of the strawberry industry when needle contamination was found in 2018 (and copycat episodes subsequent to that) which led to the mass removal from sale of the displayed produce, and destruction of produce planned for the consumption. It has impacted both local and international supply routes, and reputational damage was extensive.

A recent Salmonella scare caused by contaminated baby lettuce at Bacchus Marsh, led to local producer Bulmer's' Farms, a major grower, (employing 180 people) were reporting in the local Bairnsdale Advertiser that their baby lettuce market had dropped by 30-50%. https://bulmerfarms.com.au/

The recent 2019/2020 Bushfires, made worse by the impacts of climate change, led to considerable ash travelling 70 km on the prevailing winds at the time. This ash settled on the cauliflower which was ready for market. Vegetable growers were unable to present this for wholesale purchase, and the horticultural business that took a truckload to the wholesalers was turned away because of the soiling.

International export and domestic consumption of meat and vegetable risk of losing market access due to elevated levels of heavy metals and other contaminants in product grown close to the mine.

Whilst HSC declined to comment much on dust, referring to other EES reports, dust still impacts on agriculture and to not explore this identifies a gap in the depth of investigation and reporting of the HSC document.

A "Selection of chemicals of potential concern, based on the project activities identified in Section 5.3, include the Metals: Arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium and zinc – selected based on abundance in tailings soils and toxicity to humans."

Outlined in the EES there are chemicals of considerable concern. There is no definitive and recent study provided by the EES reports around how these chemicals will impact food that is produced for the agricultural business. Organic produce is a growing industry, and certification is at considerable risk due to contamination.

Local organic farmers, Busch, describe their story and soil quality.

"For generations we have considered our soil to be the lifeblood of a successful farming operation. Situated on the rich river flats in East Gippsland, the soil here is highly regarded as some of the best in the country. Plant health begins with soil carrying microbes and bacteria alike. Every opportunity is taken to improve soil structure, which sees green manure crops grown to be returned to the medium loam soil every autumn. By returning important nutrients to the soil we replace those which were removed during the growing season. Worms are always a good indication of soil health, and a stroll down the paddock with a shovel will unearth an abundance of life beneath" https://buschorganics.com.au/

For Glenaladale and East Gippsland, dust laden with silica and other toxins, from the project, will blow over the vegetable growing region, contaminating produce. This will result in significant loss of income and reputation, both of which will be difficult to retrieve, given the anticipated life of the project.

The flow on effect from sullied foods will have profound implications for those employed on farm and in processing, as well as businesses that rely on travellers seeking a 'provincial' experience, embodying quality food with low carbon miles. All this will be decimated by the project. It is mathematically impossible to prevent dust from blowing based on the limited equipment and water the proponent states as using in the EES.

The impacts of dust on grazing ruminants is at the centre of a discussion paper by J. M. Wilkinson, J. Hill and C. J. C. Phillips, who are at the School of Biology, University of Leeds, The article was printed in Proceedings of the Nutrition Society (2003), 62, 267–277

The article discussed the 'food chain' issue, stating "The main factors affecting the accumulation of potentially-toxic metals (PTM) by grazing animals are the presence of the metal, its concentration in herbage and at the soil surface, and the duration of exposure to the contaminated pasture and soil"

The Project will invariably leave this legacy. Those who may doubt need only look to the Douglas Mineral Sands Mine experience, where 500 ha of land is unable to be utilised due to lingering radiation issues.

The article went on to comment "The livers and kidneys of mature livestock that have been grazed on areas of pasture at the legal limit of contamination by Cd (Cadmium) for more than one grazing season should be removed from the human food chain in order to reduce the risk of intake of Cd by the human population."

Cobalt toxicity to animals is another and considerable concern, as Cobalt levels are modelled to be at elevated levels for the 20-year life of the mine.

Dust laden fodder also causes dental issues for ruminants, leading to considerable pain and resulting weight loss as they no longer chew comfortably. This is totally unacceptable. The referenced document by HSC doesn't identify impacts such as sand colic in stock following eating dusty pastures. Or whether this shortened their lifespan.

It is concerning that although issues with heavy metals and dust have been known since the 1970s, and yet the proponent is still being allowed to propose a mine so close to productive agriculture (and horticulture) lands, and compromise the Industry and livestock.

This clearly demonstrates any notion of 'co-existence' is within the realms of fantasy.

'Like for Like' comparisons pertaining to vegetable growing co-existing with mineral sands mining are limited, and those properties put forward share little in common with the proposed project area. This includes geography (impacting winds), proximity to and use of water and the size of the mining operation – both in hectares and depth.

HSC references research papers dated 1992 and 2008, which are both outdated reference and have their own limitations.

As does equating the noise from a music festival (2008 study) with the experience of a mining operation. Music Festivals aren't held 24/7 and for 20 years.

A 1991 study pertaining to F-14 aircraft noise on pregnant mares was undertaken around 20 years ago, and study methods and ethical processes and considerations have developed significantly since.

To suggest that livestock "habituates" and 'just gets used to it' is simplistic in the extreme. Refer discussions pertaining to this in the Noise and Vibration EES submission. In essence, constant noise does affect domestic and wild animals.

Water impacts are not mentioned in the HSC report, despite being a pivotal factor in farming and, indeed, essential for the project. The Proponents EES does not properly address the risks to domestic and stock bores, and also how irrigation water supplies will impact local agricultural industries.

As noted in the EES

"There are also several shallow groundwater bores in the Project Area that are used for stock and domestic use" (Appendix A015 – Agriculture Impact Assessment p.18)

"Most of the identified receptors are reliant or partially reliant, on the shallow groundwater regime" and that the "highest environmental risk ranking was identified for the Boisdale aquifer and the mid-tertiary stock and domestic aquifer, which is used locally in the vicinity of the proposed bore field."

(36_Appendix-A007_Water Supply Options Study Technical Groundwater Assessment)

Domestic and stock bores

These shallow aquifers are critical for livestock producers in the area. Livestock farmers with lactating cattle drinking up to 100-120litres per day rely on these shallow bores to have a viable business.

(https://agriculture.vic.gov.au/farm-management/water/managing-dams/water-supply-in-stock-containment-areas#h2-2)

There were 6975 Registered Stock and Domestic Bores within Gippsland in 2012 each assumed to use 1.3ML/yr.

(http://www.srw.com.au/wp-content/uploads/2016/03/GGA_SmallSize-1.pdf)

Any impact to these bores would severely impact the local livestock producers who rely on these for drinking water and their own domestic use.

Local towns such as Sale and Briagolong also rely on ground water to supply all of its domestic requirement.

“The aquifer that supplies Sale is known as the Boisdale aquifer and is covered by the Sale Water Supply Protection Area (WSPA). The Sale WSPA has a maximum extraction limit of 21,212 ML/year and is generally understood to be overallocated.” The Sale water supply system supplies the townships of Sale and Wurruk with potable water. The current estimated population serviced by the Sale system is 14,758 people.” (Gippsland Water - Water Supply Demand Strategy 2012)

Any risk to this aquifer demands further investigation.

Briagolong which is 25km from the mine site is also reliant on shallow bores.

“The aquifer that supplies Briagolong is known as the Wa De Lock aquifer. Briagolong is serviced by two bores, Bore No. 115384 and Bore No. 136968 which are located approximately 900 metres north of the township. The depths of these bores are 18.4 and 15.7 metres respectively.

The aquifer, being unconfined and relatively shallow, is subject to seasonal variation in groundwater level and its levels respond quickly to drought and rain. Other license holders also utilise this aquifer for irrigation, although average consumption is only about half of total licensed extraction.

Gippsland Water has undertaken modelling of this aquifer that suggests that full utilisation of these irrigation licenses may exceed natural recharge and therefore may pose a risk to the sustainability of the resource.”

Value of ground water to local agricultural livestock farmers & horticulture has been underestimated or omitted from the EES. Figures below obtained in 2012 have only increased in value over the past 9 years.

Wa De Lock aquifer: 252 Licence holders. Estimated 2012 annualised gross value to Agribusiness of $6,868,000 and Domestic and Stock $593,000

WyYung aquifer: 60 Licence holders. Estimated 2012 annualised gross value to Agribusiness of $2,000,068 and Domestic and Stock $122,000.

(Gippsland Ground Water Atlas http://www.srw.com.au/wp-content/uploads/2016/03/GGA_SmallSize-1.pdf p36)

This emphasises the considerable importance and relevance these aquifers have to agriculture for their reliance to domestic and stock and irrigation and there has not been enough focus on the impacts the proponents 3-4GL per annum may pose to existing users.

Water: Winter Fill Licence

The region has experienced significant and ongoing decline of water availability in the Mitchell River catchment and has experienced severe water restrictions over the past 3 years. This has had a serious impact on agricultural production. The Mitchell River area is one of Victoria's major vegetable and meat producing regions. Water availability is having an impact on agricultural sustainability and development.

Climate change will continue to diminish available water. Victoria's 2019 Climate Science Report states that Victoria's climate is changing and will get hotter and drier. If things continue East Gippsland will experience a 9% decline in rainfall, including during winter when the project (and all the other current agricultural users) is relying on winter fill, increasing almost a doubling in days over 35 degrees by 2050.

(Victorian Government Climate Science Report 2019 https://www.climatechange.vic.gov.au/climate-science-report-2019)

In the EES the proponent state they will require up to 3 GL of water per annum and are looking at sourcing it through yet to be released "Winter Fill allocation. This 3GL per annum would represent 50% of the 6 gigalitres of the total allocation and this water should be distributed equally between all users.

"The Sustainable Water Strategy 2011 identified 6,000 ML of new winter fill water entitlements" (http://www.srw.com.au/files/Local_management_rules/Mitchell_River_Basin_LMP_January_2014.pdf).

There has been a moratorium on issuing any of this licence since 2011.

A feasibility study was conducted - The Lindenow Water Security project - which assessed an off-stream storage on the Mitchell River. The current government have decided not to proceed, leaving the 6 GL now available for distribution. The fact that this off stream storage is included in the EES demonstrates the Proponents are providing misleading information.

The EES does not adequately address the potential loss of production to agribusiness within the region, when considering allowing the additional water to be redirected to food production.

Production Induced flow-on. "Estimates are that every GL of irrigation water provides 3-6 jobs in the regional economy". (EES: Horticulture report 4.2.2 page 19)

Farming businesses have been denied access to this additional water since 2011. Prior to 2011, there have only been 7 winter fill licences issued (1.2GL).

The Proponent are stating they will access 3 GL of water from the Mitchell River with a winter fill licence.

This represents inequity in the allocation of available water. Irrigators have established businesses with millions of dollars of existing infrastructure. The district is a livestock and vegetable production area, any additional water allocated should be directed to existing established agribusinesses.

Farming brings more benefits than mining

In reiterating the stance of the National Farmers Federation reports above, farming should have priority over mining.

Farming brings a more sustained and sustainable approach to food security and financial factors that mining could ever anticipate achieving.

Mining is accessing a finite resource, whereas farming provides sustainable resources for the long term.

Greenhouse gas emissions and loss of habitat have been the focus of other submissions.

The project proposal threatens the local agricultural workforce. A mineral sand mine would introduce new risk to the local community, visitors and the agricultural workforce who work outdoors. These new risks include –

Increased dust, noise, emissions from equipment, radiation exposure, visual and landscape change.

Air emissions generated from the use of earthmoving equipment and transportation of HMC.

Noise emissions generated from construction activities (including earthworks and buildings) and mining operations (including the extraction of ore and overburden, operation of the processing plants and temporary use of diesel-powered generators).

Radiation exposure through direct exposure to radioactive material and internal exposure through ingestion or inhalation of radioactive material.

Visual and landscape character impacts from a modified landscape due to the location of project components, including buildings and stockpiles, and provision of lighting on buildings and vehicles.

It could be suggested that it is in the best interests of the proponent to demonstrate, through modelling (which involves selective manipulation of data) the 'benign' or beneficial nature of the mining process.

Mitigation measures in the HSC report reflect the poor understanding the company has of the local nuances, needs and issues.

But one concept which underpins all submissions is that of *Solastalgia*, a term that pertains to the deep sense of loss and grief an individual and community feel when landscape is irrevocably changed and their 'sense of place ' is altered. It's akin to a grieving process, with no end point. And occurs throughout the world when industry, particularly mining, impacts lands. This will be explored further in Human Health Submissions but is a powerful emotional framework to consider when addressing impacts on the land and landholders.

https://www.nationalgeographic.com/magazine/2020/04/climate-change-alters-beloved-landscapes-we-experience-solastalgia-feature/

https://pubmed.ncbi.nlm.nih.gov/18027145/

Put in simple terms, “solastalgia is the distress that is produced by environmental change impacting on people while they are directly connected to their home environment.”

http://www.hpaf.co.uk/wp-content/uploads/2018/11/Solastalgia_-The-Distress-Caused-by-Environmental-Change.pdf

And further to this, many of the farm businesses within the mine’s footprint and close to the boundary, are intergenerational farm businesses. Many of these farms’ heritage extends 5 generations or more. They risk losing their history and the next generation to carry on. They also risk losing passed down generational knowledge of farming in the region. There’s a clear sense from farmers that they need to protect the land for future generations. Displacement brings with its unmitigated grief and distress that can’t be ameliorated by attending a Committee meeting.

Hence, Community Reference Groups present as ‘window dressing’ to the deeper issue of solastalgia.

When considering the Scoping Requirement of ‘Evaluation of the implications of the project and relevant alternatives for the implementation of applicable legislation and policy, including … ecologically sustainable development and environmental protection;’ his presented considerable challenges to HSC and there is no detailed reference to this in the framework within the EES report.

5.1.10 notes environmental concerns and suggests “Dust was raised as a major health concern by one neighbouring landholder” (p..33)

Impacts of dust on stock is mentioned above in regard to ingesting heavy metals.

Capability of Kalbar to manage and protect agricultural values

The Scoping Requirement of ‘a description of the environmental performance regime and track record of the proponent, including relevant experience in delivering and operating similar projects, as well as the organisation’s health, safety and environmental policies’ is a particularly pertinent issues and one that isn’t followed up by HSC in the report.

The Proponent is a relatively recent company in mining business and have never actually mined as a company before.

The project area is one of the most technically challenging topographies for mining and bears little resemblance to the flattened landscapes at other Mineral Sands Mines in Australia. Including Douglas (Vic) and Keysbrook (WA). Douglas Mine has since been abandoned and left without Rehabilitation but provides a legacy of 500 ha of radioactive contaminated land that isn’t available for any purpose, including farming.

Mentioned above is the issue of MRSD 2009 Act, and ‘a fit and proper person’ criteria (amongst others).

The financial dealings of this company, which has been led by four CEO’s since its inception, cause alarm amongst the public.

There are several matters, including, but not limited to the percentage of overseas ownership/control and their Accounting practises. These are not only constrained to the issuing between Aug 2018 and July 2019 of 3.8 million shares without cash changing hands. The result was a reported increase in the value of the company by some $5 million.

But also, “between 24 July and 28 September 2020 Kalbar Operations Pty Ltd was 94% foreign owned and controlled. The position from 20 July 2020 to 22 September 2020. According to ASIC documentation lodged on 23 July 2020, AKNR purchased 5,000,000 shares in Kalbar Operations Pty Ltd on 7 July 2020 – bringing their total share ownership to 11,666,666 of Kalbar Operations Pty Ltd.’s 12,396,668 shares (94.1%).

Around the same time an agreement between the companies entitled AKNR to appoint an extra director (to have the majority of directors) and removed the need for unanimous vote by the Board. This meant Dutch company AKNR had control of the board of Kalbar Operations PL and the future of our area was in the hands of people who were even less invested in our wellbeing than Kalbar Limited.

Mine Free Glenaladale had written several times to Kalbar Operations PL seeking information about relationships between various companies, foreign directorships, etc. but the company steadfastly refused to answer any of those questions.

Mine Free Glenaladale also wrote to the head of the Technical Reference Group, the Minister for Resources and the Minister for Planning seeking clarification as to why Kalbar Limited was allowed to transfer the ‘project’ to an untested and effectively foreign owned and controlled company.

Kalbar Operations was set up as $2.00 company in August 2019. What changed (was that) on 22 September Kalbar Operations lodged two documents with ASIC (to redress the claims of majority foreign ownership).“

In essence, when summarising the proponents share profile, the proponent has changed company names, share registry details (identifying an anomaly to the value of $147,302,737) and now claims ‘apparent’ ownership down to about 88% Kalbar Limited and 12% AKNR. Added to this, the changes in directorships were made, but it seems that Kalbar Operations Pty Ltd is still AKNR controlled.

https://minefreeglenaladale.org/kalbar-operations-no-longer-94-foreign-owned-thanks-to-a-147million-dollar-mistake/#

Not surprisingly, such accounting and share issues for a very small company lends to distrust in the community. The community has a strong moral compass, and this doesn’t align with such corporate dealings and activities.

The whole company Christmas Party could easily fit in the function room of a local hotel.

Coupled with this is the scant policies, both in number and depth.

Policy available to the public to critique on the company website amount to only six (6).

https://www.fingerboardsproject.com.au/about-kalbar/policies

They provide generic comment and aspirational plans, which have the capacity to flounder in translating to practical and achievable outcomes.

In Summary

This proposed project fails to represent a sustainable industry for this region. The Proponent has no experience mining as a company and lacks the support of the agricultural and wider community for what is proposed in the EES.

The agriculture and other associated/established Industries in the area are best placed to drive economic vitality and sustainability. This principle is embedded in both Local Government Policy and State/Commonwealth Legislation.

Providence driven foods, coupled with tourism, are reliant on a systematic and demonstrable framework of providing healthy foods. This proposal threatens all that, and more.

The EES fails to have a solid and evidence-based foundation of data, with anomalies and inconsistencies throughout. It represents a substandard document which has no capacity to deliver the level of scientific and balanced data required to provide an independent, best practise decision on the proposed project.

Underpinning this, the proponent has failed to demonstrate social license and give assurances that they will actively and collaboratively engage with the community and work in a mutually beneficial manner. Despite being 'on the job' for some 7 years or so.

They have not mined as a company before, and the landscape presents challenges which represent considerable, sustained and heightened risk to the surrounding economy and environment.

Damages will be permanent and forever change the landscape.

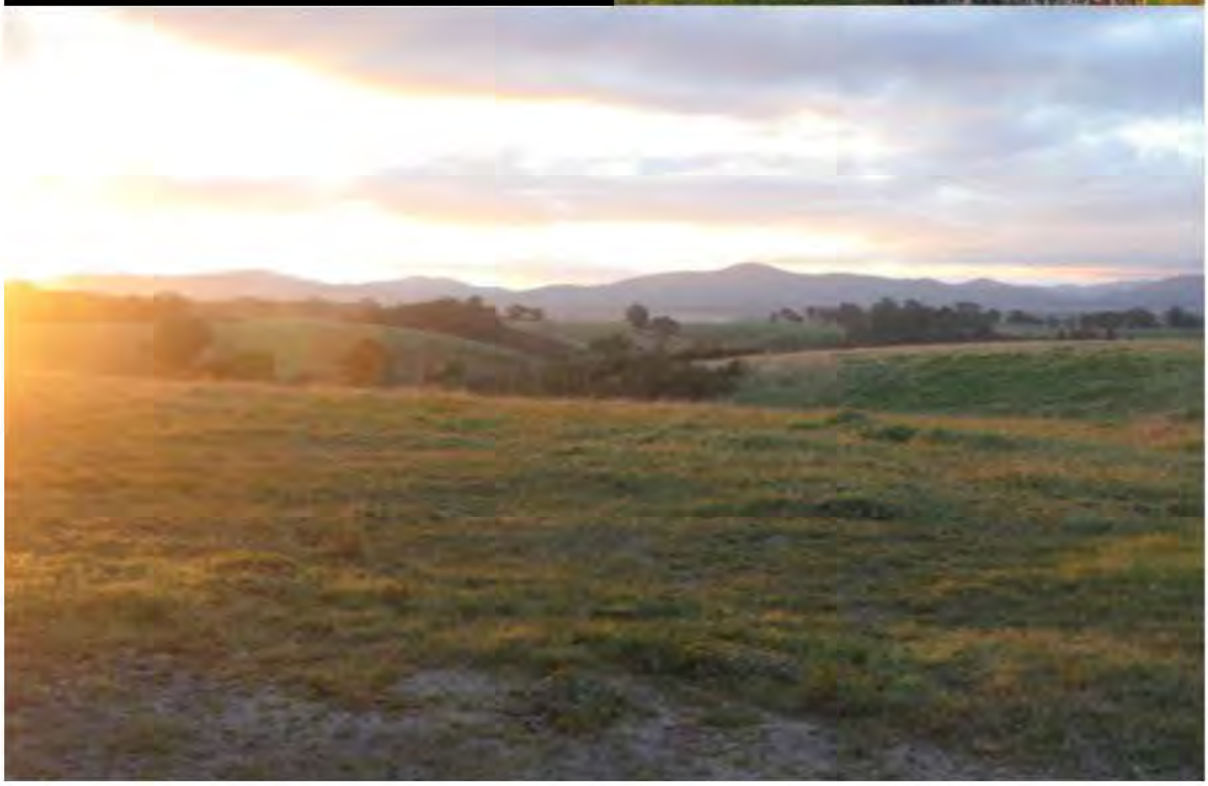
Mitigation measures proposed are untested, and vast areas on the EES identify plans which still require development.

The community does not support this project in this location.

The proponent has not delivered a business plan, with assertions around financial gain in the EES not backed with evidence. Other mineral sands mines have failed due to variances in commodity prices and access to water.

The risks of mining are profound, and this is not the location for a mineral sands mine. The resource is limited, unlike agriculture, and the long-term needs of Victorians and export markets are best met by enabling current regenerative industries, such as Agriculture, to flourish. This cannot happen alongside a mine in this location.

We respectfully remind Panel Members of the gravity of their role and encourage a broad perspective when determining if this proposal deserves endorsement.




9 FERNBANK
FERNBANK - GLENALADALE RD
GLENALADALE SPORTS GROUND 4km
LINDENOW
COONAWARRA FARM RESORT
MITCHELL RIVER NATIONAL PARK 14

Chapter 9: BIODIVERSITY

EXECUTIVE SUMMARY

The placement of the proposed Fingerboards development, if it proceeds, will have far reaching consequences on the environment and the wellbeing of the community. The project area is positioned in an inappropriate location; the boundary is within 350 metres of the Heritage Listed Mitchell River.

Current drilling (September-October 2020) could result in an expansion of the mine footprint. This is turn could consequently impact more of the biodiversity values in the area and could render the EES document invalid.

The outcomes outlined present far too great a risk to entertain. Some of these are:

- Clearing and disturbance of 1350+ hectares of vegetation on private and public land will impact the Environment Protection Biodiversity Conservation Act and the Flora and Fauna Guarantee Act listed ecological communities and species.
- Several unwanted and over 800 ancient large trees, many with hollows, will be removed making habitat and food resources scarce for many species.
- The Perry River and its tributaries which form a unique chain of ponds will be impacted indirectly by mining activities and indirectly by possible contamination and water diversion.
- The RAMSAR listed Gippsland Lakes and wetlands have the potential to be affected by water extraction.
- The proposals for rehabilitation of the site are questionable because of the topography and the inevitability of tunnel erosion occurring once the site has been disturbed.

The Detailed Ecological Investigations (EES document Vol 6 App A005) has failed to fully address the Scoping Requirements. The information pertaining to species and vegetation distribution should be interpreted with an air of caution.

The document itself was very difficult to report on as information contained within was not set out in an orderly way. Each topic was spread throughout different volumes throughout the report.

The proposed project risks severe and irreversible effects on the biodiversity values of the area that the EES documentation does not adequately address.

INTRODUCTION

Prior to European settlement the Gunaikurnai tribes inhabited the area for thousands of years, managing and cultivating the grasslands and maintaining the diversification of flora and fauna species in the landscape.

In 1840 the first European to explore the area, Angus McMillan described the Gippsland Plains as a “fine open plains intersected by occasional belts of forest…. and with grass up to our stirrup-irons”. Subsequent agricultural development has maintained and valued an exisiting significant area of the proposed project area in which many significant ecological values persist and are protected under National and State law. This has neither been adequately described nor studied in the EES documentation, which renders the risk assessment and mitigation measures unacceptable.

Within the proposed Fingerboards mineral sands mine project area and locality numerous vegetation communities and fauna species are present which are threatened and endangered and listed under the Environment Protection Biodiversity Conservation Act (1999)(EPBC) Commonwealth and the Flora and Fauna Guarantee Act (1988)(FFG) Victoria.

The proposed project is in the Gippsland Plains Bioregion which extends from Melbourne to Lakes Entrance and from Moe to Foster. Despite being the most populated area in Victoria, the native vegetation in this region is considered one of the best representative areas in the state. (Bramwell, 2004) The area overlaps between the Southern Cool Temperate Zone and the Warm Temperate Zone; this ensures the region has high biodiversity values.

The 2019-2020 bushfires have had a significant effect on wildlife in East Gippsland as so much of the forest and coastal areas were burnt. The status of many species remains unknown, so it is vitally important that any unburnt areas in the region remain undisturbed to aid species recovery and assist with re-colonisation. Past bushfires (2003, 2006-7, 2014) and the most recent fire (2019 – 2020) should be taken into account when considering any further land clearing in East Gippsland.

1675 hectares nominated for the project doesn’t include the area of the pipeline easement, haulage road and proposed options for the rail sidings. The area of disturbance will be far greater than the proponent has always professed.

1350 hectares of public and private land will be disturbed with a large proportion being cleared. It includes large and small trees and surrounding vegetation and the extensive areas of native grassland on private land.

The land not surveyed, 2705 Bairnsdale-Dargo Road, will have around120 hectares of grassland, mature trees and other established vegetation removed as it is positioned within the mine footprint. This area was not included in the original vegetation clearance figure. Taking all this into account, it would bring the total clearing and vegetation destruction to well over the 1350 hectares that Kalbar has stated will be impacted. (pg 14 RMCG report) It is incomprehensible that this should be allowed in an already fragile environment.

The proposed Fingerboards Mineral Sand Mine at Glenaladale is unacceptable to the East Gippsland community.

DETAILED ECOLOGICAL INVESTIGATIONS

Natural assets in the fingerboards area

Mitchell River (Heritage listed)
Mitchell River National Park (UNESCO listed category II)
Perry River (Chain of Ponds)
Gippsland Lakes and Wetlands (RAMSAR listed)
Providence Ponds Flora and Fauna Reserve
Fernbank Nature Conservation Reserve

Other conservation sites are:
Saplings Morass
Limpyers Rd (site of Biological Significance)
Fernbank Railway Reserve
Trust for Nature properties
Skull Creek Wetland
Iguana Creek Bio-site

EES SCOPING REQUIREMENTS

The evaluation objective 4.2 as outlined in the Scoping Requirements addresses the potential impacts on biodiversity.

“To avoid or minimize potential adverse effects on native vegetation, listed threatened and migratory species and ecological communities, and habitat for these species, as well as address offset requirements for residual environmental effects consistent with state and commonwealth policies.”

The complex and diverse ecological environment, in combination with the size of the project and the need for extensive modification of the landscape, renders it impossible for the proponent to minimise the adverse effects on the ecological values consistent with State and Commonwealth Legislation.

Low rainfall culminating in a severe drought in 2017 - 2020, the lowest recorded rainfall in three consecutive years since records began in 1880, would have had a profound influence on survey results collected at this inappropriate time. The proponent failed to appropriately consider and relate these severe weather conditions on low numbers of terrestrial, arboreal and in particular aquatic species recorded during surveying.

There was scant mention of the 2014 Mt Ray Bushfire fire in the EES document. There was no reference of the effect the fire had on species numbers and diversity during field surveys.

ECOLOGICAL FIELD SURVEYS

In the Baseline Studies (Coffey 2015) 4.3 Biodiversity "... a site visit was completed on 4 June 2015 by Coffey (including a qualified ecologist) to assess the ecological values of the region".

This initial survey by an ecologist, 15 months following the bushfire has not been included in the list of field surveys in the EES document. We must ask why as it was obvious that a severe bushfire had burnt the area of the proposed mine. A greater acknowledgment of the effects of this natural disaster in the EES would have been expected and should have been done.

This bushfire burnt 6738 hectares of land which included most of the project area (approximately 70%), three houses, farm infrastructure and livestock. (Lapsley, 2014)

The mapping of ecological vegetation classes would also have been compromised by fire and drought.

RECORDS OF SPECIES

The absence of records in the immediate Glenaladale area can be attributed to a lack of Departmental surveying.

Many species identities failed to be recorded as residents in the area were unaware of the importance of reporting species sightings and did not know of data bases where species could be recorded.

On four occasions in the past ten years there have been sightings of Spotted Tailed Quolls that went unrecorded at the Fingerboards. More recently two Quolls were observed in May/June 2020 on a property near the project area.

Reliance on desktop data bases can give misleading results as records are not kept up to date and they fail to show the current species status in the environment.

The proponent has stated that "areas within the footprint remain unsurveyed." The size of the total area is not given, nor the location. Whether this only relates to one property or includes other areas is not clear. We must ask what ecological values were missed by not surveying the total project footprint.

List of field surveys

A list of field surveys conducted by the proponent:

Vegetation Surveys

6-10 June 2016
19-21 March 2018
10-14 October 2018

Terrestrial Fauna Surveys

24-28 October 2016
11 November 2016 (collection of remote cameras)
19-21 March 2018
10-14 October 2018

Targeted Flora Surveys and updated Mapping

24-28 October 2016
7-11 November 2016

Targeted Giant Burrowing Frog and additional nocturnal survey

27-30 November 2018

Aquatic Ecology Assessment

6-8 June 2018
Targeted Aquatic Surveys
27-29 October 2018

Additional flora and fauna assessments Bairnsdale rail siding and Racecourse Rd roundabout

January 2019

Targeted Powerful Owl and Masked Owl Survey

26-29 August 2019

Targeted Nocturnal Survey

27-30 November 2018

An assessment of potential offset sites

5-6 September 2019

Many of the surveys were conducted during three years of Victoria's and East Gippsland worst drought in recorded history in terms of both severity and duration.

2014 through to the completion of the surveys in 2020 would still be considered as a time of post fire recovery for species and ecological vegetation communities.

ASSETS OF THE AREA

Why did the proponent not mention the important factor of seasonal conditions influencing the existence and distribution of flora and fauna? Seasonal variations affect species diversity and distribution in grassland communities. Moisture, temperature, length of periods of no rainfall and inundation affects flowering, seed set, growth and abundance of species.

This was very obvious this year. Following rainfall in February 2020, native grasses (Themeda triandra Austrostipa genus Spear-grass, Microlaena stipoides Weeping grass) and other species proliferated over the East Gippsland red gum plains and into the foothills on both private and public land within and adjacent to the project area.

The proponent describes agricultural land in the area as being "highly modified due to agricultural practices and is dominated by pasture supporting non indigenous grasses and weeds". (Vol 1, Chapter 8, 8.2.3) This does not present a true picture of the Glenaladale area as native grassland still persists over large areas of agricultural land as we saw this last summer (2020).

Over winter and spring orchids, chocolate lilies and other grassland species have been observed (photographic location data available) on numerous properties and roadsides in the project footprint. Thus was surveyed by citizen scientists, Sept – Oct 2020.

Many farmers encourage native grasses as a pasture species as they assist with agricultural production.

In an interview with G. Johnston in August 2020 he outlined that he retains one third native species in his pasture as it increases his stock carrying capacity, as many of the native grasses are perennial and don't die off as quickly in dry times. Following summer rainfall native grasses offer green pick to livestock. Geoff's property is situated at the Fingerboards and in the mine footprint.

Other agricultural producers within the project area also value native grasses. With good management practices these grasses flourish and sustain both the soil and the grazing animals.

The proponent has dismissed agricultural land as having very little value.

There are some areas in the mine template that the proponent has described as having "low productivity". This is highly subjective and comparable to what? It rejects any future use; comparable land is highly suitable for a variety of horticulture crops.

Comparable country has seen vegetable growing, citrus and olives. Future farming ambitions and possibilities are heavily discounted and rejected throughout the EES document. Sustainable farming enterprises are far more compatible with biodiversity values than mining development.

Agricultural land in the Glenaladale area contributes greatly to biodiversity. Farms within and adjacent to the project area consist of grassy woodland, both remnant patches and extensive areas of native vegetation, open grassland and numerous large scattered trees, all important habitat for wildlife.

Local Landcare Project Officer M. Stephenson, whose family owns land within the proposed mine footprint has questioned the EES findings. He said that he was surprised to see commentary around the lack of indigenous grasses and herbs, particularly on private land.

He explained that over the last 20 years many species have presented in the landscape, particularly orchids and thick swards of Kangaroo Grass. "We have some paddocks on our place where Themeda (Kangaroo Grass) comprises around 70% of the pasture grass species on a given area. It is not uncommon also to see extensive patches of Yellow Rush Lilies and the following year you will see Chocolate Lilies. These species have bulbs that reside in the soil, so you are often not able to know exactly how diverse the flora numbers and species are on these sites" said Matt.

"Kangaroo Grass (Themeda triandra) is an interesting grass in this landscape, for a number of reasons. "This attractive grass is not only able to be commercially harvested; it is also a host plant for over 13 species of butterfly. The Australian Butterfly Conservation organisation recently put out a report about the importance of retaining this grass in the landscape."

"We plan to continue utilising Kangaroo grass in our pastures, to harvest commercially and to allow it to remain in our paddocks for the biodiversity aspects. We are thankful we have a good reliable percentage cover of over 70% in some of our productive grazing areas."

Vegetated gullies within the farmland provide connectivity and safe refuge for native fauna. The vegetation in these gullies and creek lines act as sediment buffers preventing soil runoff and gully erosion. Farm dams support habitats for a diverse range of aquatic species.

Destruction of the agricultural land by the proposed mine will destroy these important ecological values which the EES documentation neither recognises nor discusses.

DESCRIPTION OF THE BIODIVERSITY VALUES: FLORA

The Commonwealth Environment Protection and Biodiversity Conservation Act 1999

Under this Act a process has been established for the assessment of proposed actions that will impact Matters of National Environment Significance (MNES). Approval is required from the Commonwealth Environment Minister for any impact likely to affect any MNES. Under the Act the proposed Fingerboards mineral sands mine was deemed a controlled Action in July 2017.

The controlling provision under the Act includes:
RAMSAR Wetlands (Sections 16 and B)
Listed threatened species and communities (Sections 18 and 18A)
Listed migratory species (Sections 20 and 20A)
Nuclear Actions (Sections 21 and 21A)

The Gippsland RAMSAR site management plan recognises “decreased fresh water inflows” as a priority threat. (Gippsland Lakes RAMSAR Site Strategic Management Plan, 2016).

EPBC listed Ecological Communities

The proponent has identified 3 ecological communities listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 that have potential to exist in the project area.

- Gippsland Red Gum Grassy Woodland and Associated Native Grassland.
- Seasonally Herbaceous Wetlands of the Lowland Plains
- White, Yellow Box, Blakely’s Red Gum Woodland and derived Grasslands

The Red Gum Grassy Woodland and Associated Native Grassland (GRGGW) was the only one identified by the proponent in the project area whereas the other two were predicted to be in the area but were not identified.

The Red Gum Grassy Woodland and Associated Native Grassland are listed as a Critically Endangered ecological community. It was listed under the EPBC Act in 2009 (Department of the Environment Water Heritage and the Arts, 2010).

The Scientific Advisory Committee listed this because:

1. It has undergone a very severe decline in extent;
2. Has a very limited distribution;
3. Faces continued threats; and
4. Has undergone a very severe reduction in its integrity.

This ecological community occurs in two forms:

Grassy Woodland

This is dominated by Gippsland Red Gum (Eucalyptus tereticornis subsp. Mediana) and a ground layer of perennial tussock grasses and orchid lilies and daisies.

Grassland

Only the native grass cover remains. (60 hectares is all that survives).

In Australia these are the most under represented ecosystems in conservation reserves and are among the most threatened vegetation communities. Less than 5% of its original extent remains.

“The protection, management and recovery of remnants on public and private land is crucial to the future survival of this unique ecological community.” This is stated in many governmental agency strategies (Parks Victoria, DELWP, EGCMA and East Gippsland Shire)

Nationally and State listed threatened flora and fauna are found in these grasslands. Any disturbance in the vegetation communities will affect these species.

The total extent of GRGGW remaining on the Gippsland plains is an estimate of 650 – 5650 hectares (2008 figures); the variation is due to unknown areas on private land.

2008 figures are out of date. Funding cuts to programs, the lack of input by different authorities having the responsibility for the maintenance and upkeep of this ecological community, the 2014 bushfire and the drought have all added to the demise of these grasslands.

Comments by the proponent that patches of grassland failed to qualify due to various criteria considerations did not consider many obvious criteria considerations. Weather conditions, timing of surveying and the 2014 bushfire should all have been considered (Vol.6 5.2.1). Why were these aspects not entertained?

Why were the studies performed and surveys conducted considered adequate? An independent ecological audit in the region to ascertain the extent and condition of the grassland is well overdue. Any audit should be peer-reviewed and be made available for public comment. This fundamental audit is required prior to any assessment of risk of the project. The risk assessment in the EES for the GRGGW ecological community is high; this is under-stated and should be considered as major/extreme.

Table 8.15 - The proponent has commented that the GRGGW is “critically endangered and at high risk of further degradation and extinction. This risk factor provides little capacity for the community to absorb losses and recover from impacts.” This acknowledgement by the consultant suggests strongly that the project should not proceed as the risk to the grassland is too great.

The pipe line, power line, haul road and road diversions will destroy and greatly impact this critically endangered ecosystem.

The Critically Endangered EPBC listed Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains are shallow ephemeral bodies of water, common in depressions and drainage lines on the lowland plains. Only 20% of this ecological community still remains in Victoria. Inundation in these wetlands is variable and they can remain submerged for a few months a year. Vegetation consists mainly of grasses and forbs. The wetlands provide habitat for various fauna species (Cook).

This ecological community was not identified in the field surveys. This was due to the extremely dry conditions.

White Box, Yellow Box, Blakely's Red Gum, Grassy Woodland and Derived Native Grassland a critically endangered EPBC listed ecological community, was also not identified in the project area. This iconic woodland existed across millions of hectares in eastern Australia, less than 5% is now left in the world. This species is an important food source for the Regent Honeyeater and Squirrel Glider. (National Recovery Plan White Box-Yellow Box-Blakely Red Gum Grassy Woodland and Derived Native Grassland, 2010)

The proponent has stated that "Field surveys within the project area and the project locality... confirmed that the surveyed areas do not support the Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains ecological community.

Similarly, the White Box, Yellow Box, Blakely's Red Gum Grassy Woodland and Derived Grassland listed ecological community does not occur within the study area." (5.2.1 p70 Vo16)

This assumption should not have been made based purely on the lack of identification during field surveys. Some of these tree types are on at least one property within the project area and need to be protected.

Water pipeline option A (Vol 11 App A008 3.2.2) The pipeline crossing of Iguana Creek and Moulin Creek will cause damage to existing riparian vegetation and impact aquatic life. Removal of vegetation along the creek edge will cause erosion in the event of flooding. The addition of sediment into the creek from bank disturbance will affect aquatic fauna.

Vol.11 APP.A008 3.4 "Alignment through the road reserve is largely possible with only light vegetation along most of the pipe line length". The proponent fails to mention a substantial stand of Red Gum trees near Moulin Creek, individual Red Box trees, revegetated areas and the critically endangered Gippsland Red Gum Grassy Woodland and Associated Native Grassland along the road verge of the Fernbank/Glenaladale Road.

The pipeline Option B would also require tree removal and destruction of GRGGW.

The preferred transport option, the Fernbank Rail Siding will destroy an area of Red gum trees and part of a designated Significant Vegetation Site which was fenced off to protect GRGGW.

EPBC threatened species listed at this site include both the Purple Diuris (Diuris punctata) and Golden Diuris (Diuris behrii) and Slender Wire Lilly (Laxmannia gracilis). Many other grassland species are also present (citizen scientist surveying Sept-Oct 2020)

Within the project area, surveys were undertaken for 3 nationally listed species:

- Swamp Everlasting xerochrysum palustre

- Dwarf Kerrawang commersonia prostrate

- Gaping Leek Orchid prasophyllum correctum.

These were not detected during targeted surveying.

“Targeted surveys for the Swamp Everlasting and Dwarf Kerrawang found a lack of high –quality habitat for those species”. This statement by the proponent failed to acknowledge the dry conditions at the time.

The Swamp Everlasting was observed this year at Saplings Morass. (Sept/Oct 2020) Of the three species surveyed by the proponent only Swamp Everlasting has been recorded in the project area; the remaining two have the potential to occur within the project area.

The Swamp Everlasting is endemic to SE Australia and Tasmania. It is listed under the EPBC Act 1999. Saplings Morass is only one of two sites in East Gippsland where it is located. The proposed bore field in close proximity to Saplings Morass could impact this species by altering the hydrology of the area. (Carter, 2011)

The proposed haul road will also affect this species. The road will interfere with the drainage line which allows surface water to flow into Saplings Morass. The proponent dismisses any suggestion that the bore field, when in operation, will impact Saplings Morass.

The Dwarf Kerrawang is found around wetlands and swamps. A National Recovery Plan was implemented for this species in 2010. Threats to these two species include modification to hydrology, mining, climate change and soil disturbance.

During the operation of the Iluka mine the Strathalbyn/Glenelg bore field directly lowered the watertable by 2-3m. It killed off understory in wetland areas and many ancient Red Gums. (Ross, 2020)

The Gaping Leek Orchid has a National Recovery Plan implemented to conserve this species. (Coates, 2010) Threats are loss of grassy woodland ecosystems, pest animals and disturbance of habitat from machinery and vehicle movement. Only 150 plants are known in Central Gippsland. There are only two sites on the rail reserve siding at Fernbank East.

The recent bushfire and limitations on surveying has been acknowledged by the proponent, as factors that may have impacted results (4.8.2). No mention was made of the drought conditions.

Proposed vegetation removal will impact the three nationally listed species. (Table 8.15) ”will result in direct mortality of individuals with little or no capacity for recovery or regeneration”.

One of the transport options, the proposed railway siding at Fernbank East, could impact the Gaping Leek Orchid as the only records are from the railway reserve nearby.

The proponent noted that the Gaping Leek Orchid did not have a recovery plan; however the Recovery Plan for this species was developed in 2010. The area surveyed for the Gaping Leek Orchid was not in a known location.

"With the exception of some orchid species flora surveys were largely undertaken during the optimum flowering period for most of the targeted species...."(4.8.2 pg50 Vol 6) Orchid species are difficult to identify unless flowering.

THREATS TO GRASSLAND

The proponent has identified 14.06 hectares of GRGGW ecological community in the survey area. Our community challenges this figure as identification may have been difficult because of the impact of the 2014 fire and the extremely dry conditions.

The destruction of GRGGW by the proponent during construction and operation of the proposed mine of 1.74 hectares of this critically endangered ecological community will be permanent. The EES document does not include the size of the area that will be impacted; it only includes the size of the area that will be destroyed.

"There is potential for viability of this ecological community to be impacted over the project life". (Kalbar 2020) So why is the proponent knowingly sending an EVC on a trajectory to local and possible regional extinction?

The total area of GRGGW impact is far greater than stated as pipelines and other construction outside the project footprint will impact this grassland community. 1.74 hectares of this ecological community is within the project footprint and 5.64 hectares is within the infrastructure options.

The proposed Fernbank East rail siding option will destroy an area of significant vegetation which was fenced off to protect threatened grassland species. Purple Diuris (Diuris punctata) and the Golden Moth Orchid (Diuris Behrii) have both been seen within and outside of the fenced area. (Citizen Science survey Sept/Oct 2020)

"The ultimate outcome for a threatened ecological community is a positive push for conservation and recovery of the plants, animals and other organisms that make up this community. These listings provided national recognition and protection…. Following a listing the Government is required to consider developing a recovery plan and to guard against detrimental impact to the biological community." (www.wildlifelandtrust.org.au, 2007)

The West Gippsland CMA has recognised the importance of conserving the ecological communities on the Gippsland Plains. Recently they were funded to restore Gippsland Red Gum Grassy Woodland on public and private land in the Briagolong and Stratford area. The Australian Government funded this Project from 2013-2018.

Any works contrary to this simply make a mockery of the environmental protection ideology and will produce a "net loss". Environmental net loss contradicts environmental laws, strategies and operations. (wgcma.vic.au/our-region/projects2013, 2013)

The East Gippsland CMA committed to restoring 3 hectares of grassland west of Bairnsdale. "Long term objective for the management of the Gippsland Plain is to increase the ecological functionality of the native vegetation by protecting and improving the quality of the remnants." (https://www.egcma.com.au/what-we-do/regional-landscape-areas/red-gum-plains/) The mine will cause non-compliance with this objective.

Supporters for the recovery and management of the Gippsland Red Gum Plains include the East Gippsland Conservation Management Network, Gunaikurnai Land and Water Aboriginal Corporation, the East Gippsland Shire, East Gippsland Landcare, Trust for Nature, West Gippsland Catchment Management Authority, East Gippsland Catchment Management Authority Gippsland Environment Group, Bairnsdale Field Naturalist Group and landholders.

With all this support for the restoration of the Red Gum Plains it is inconceivable that the Government could approve the destruction of existing, well established threatened ecological communities by a mining company. Particularly after so much public money and community support has been provided for restoration.

In July 2019 the East Gippsland Shire commissioned a report to assess the native vegetation along the Fernbank Glenaladale Road, following community concerns with the impact of road widening on listed Ecological Communities. The vegetation communities at risk were the FFG Act Forest Red Gum Woodland community and the EPBC critically endangered, Gippsland Red Gum Grassy Woodland and Associated Native Grassland. A comprehensive list of plant species is included in this report.

The report Stated: "Roadside vegetation including Nationally Significant ecological communities exist along the majority of Fernbank – Glenaladale Road and therefore extreme care is required to avoid impact to any native vegetation, including native grasses, during road works." (Ethos NRM, 2019). The proposed mine will destroy this roadside.

Drilling by Kalbar Operations began again in September 2020. There are concerns that this current drilling could lead to an expansion of the mine footprint and therefore more species and vegetation communities could be impacted. If this is the case then the EES document will be invalid.

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FAUNA

The Scoping Requirements required the proponent to assess listed species. With so much richness of fauna species within the area the proposed mine should not proceed.

Seventeen nationally significant fauna species have been identified in the project area (Victorian Biodiversity Atlas - VBA) and an additional four in the Protected Matters Search Tool (PMST) and other data bases. Why were only two nationally significant fauna species observed and reported by the report's ecologists?

These were the Greyheaded Flying Fox and the Australian Grayling. Low species numbers during field surveys would have been due to the 2014 bushfire, dry conditions and the lack of time devoted to surveying.

A colony of the Greyheaded Flying Fox is situated adjacent to the Mitchell River in Bairnsdale. This species is important for pollinating eucalypt species and will follow the flowering of the trees throughout the area. Residents in the locality of the project area see these animals on a regular basis feeding in flowering eucalypts and in home orchards.

The proposed removal of more than 1350 ha of vegetation would have a profound effect on the Greyheaded Flying Fox's food sources. This could put pressure on urban areas and horticultural industries, if the Flying Fox were to access other areas for food.

Due to the 2019 - 2020 bushfires many of the foraging areas for the Grey Headed Flying Fox in East Gippsland and New South Wales have been burnt, making the Gippsland Red Gum Plains an essential feeding area as the eucalypts come into flower. Flying Foxes have been seen feeding on Red Gum and other tree species in the local area. (Oct 2020)

Australian Grayling were detected in the Mitchell River. Sedimentation and runoff of pollutants from the proposed mine would have the potential to affect this migratory species. (Land for Wildlife)

Other listed species such as Swift Parrot, Painted Honeyeater, Giant Burrowing Frog and Dwarf Galaxis were not observed during field surveys but have the potential to be in the area. (Ecology and Heritage Partners 2020)

The Swift Parrot is known to be in this area; the latest sighting was in August 2020. Other species recently observed by a land holder in the area include: White Bellied Sea Eagle, Australasian Bittern, Barking Owl, Azure Kingfisher, Lace Monitor, Nankeen Night Heron, Emu and a Sooty Owl.

The survey standards for the Giant Burrowing Frog (GBF) have been proven to be misleading as recent research has found that the frog habits vary from the original guidelines. A GBF was found in the middle of open farmland not in forest locations thought to be their preferred habitat.

The Victorian Biodiversity Atlas (VBA) has confirmed the presence of the GBF, 6.5 km north of the project area in May 2020. Insufficient time was allocated for Surveying of the Giant Burrowing Frog by the proponent.

Surveying for the Giant Burrowing Frog has begun in the project area with community members assisted by a researcher.

The Yellow Bellied Sheath Tailed Bat was the only State significant species identified in the project area by the proponents despite the VBA listing an additional 25 State significant fauna species previously recorded within the project locality. (5.3.3 Vol 6)

A comprehensive field survey in more favourable weather conditions should have been done to determine the full range of species in the mine locality.

Wedge Tail eagles are known to nest in an area adjacent to the project area. Noise, lighting and clearing of vegetation will affect this species.

Platypus and Eastern Water Dragons are sighted regularly in the Mitchell River at both proposed pump sites. Building of infrastructure and other activities in this area has the potential to dislodge these animals.

Destruction of termite mounds will impact goannas, as eggs are laid inside the termite mounds to protect and incubate them. The termites provide food for the young goannas as they emerge from the mound.

Disturbance to water courses and farm dams will affect eels which are a critical component of the terrestrial and oceanic carbon/nutrient cycle. The eel migration begins in late summer, moving from the rivers to the Gippsland Lakes in late March heading out into the ocean to spawn. The leaf shaped larvae swim and drift through the ocean currents until they reach the east coast of Australia. The larvae transform into small baby “glass” eels making their way to the Gippsland Lakes and into the river and creek system.

The eels are present in two of the river systems within the project area that flow into the Gippsland Lakes, the Perry and Mitchell Rivers. They are also present in farm dams and ephemeral streams. Impacts from the proposed mine could affect the eel migration. (eel migration, 2017)

With so many National, State and Regionally listed species recorded in the project locality, the proposed mine will have a devastating effect on not only these species but also those not listed. Consideration must also be given to those species not listed.

The proponent states that “The habitat in the project area is not of high quality and larger areas of better-quality habitat are located nearby, that individuals would be able to move to” (9.1.3.1) This is purely speculation and not based on fact; the location of these “high quality and.... better quality areas” are not revealed, and species are not likely to relocate successfully.

The number and quality of tree hollows within the project area that are to be removed are irreplaceable.

To prevent fauna mortality, the mitigation measures proposed do have some merit. However, the practicability of these are open to question with such a large project, and a 24/7 operation.

Engagement of an ecologist to remove fauna that have fallen into trenches each day is not cost effective for the life of the mine. As the mine is proposed to be a 24/7 operation, checking trenches only once a day will not be effective to prevent wild life mortality and injury.

The standard mitigation for terrestrial and aquatic species states that “all trenches will have escape ramps to avoid fauna entrapment and allow animals to escape.” This is not practical in a large mine operation, particularly if this includes the mine void then it will be a 45 metre ramp.

Many of the 1485 large trees in the project area have hollows which support many fauna species including listed threatened species. Hollows come in many shapes and sizes, with species selecting hollows that fit their needs. These might be depth, entrance size and diameter. Some are permanent refuges and others temporary. Parrots and cockatoos will return each year to the same tree.

With so many hollow bearing trees being destroyed, this will have a huge impact on species survival. Hollow bearing trees are prime real estate in the local landscape.

As a mitigation strategy the proponent has suggested nest boxes be placed in adjoining areas. This is totally unacceptable and impractical; it is not possible to replicate natural hollows in the landscape. Natural hollows in trees give greater insulating properties in extreme weather. The sheer number required to be replaced would be cost prohibitive.

To relocate species to adjoining areas means exposing them to an uncertain future as they will have to compete with already established members of their species for food and shelter. The resultant influx of migrants puts pressure on species already inhabiting the outlying areas. The net result is increased resource pressures that lead inevitably to high mortality rates.

As hollow bearing trees become scarce in the environment it impacts many species. Research has found that a decline in the Gang-Gang population was due to competition for nesting hollows. Sulphur Crested Cockatoos, possums and bees all competed with one another and the Gang Gangs for the hollows. (Loos, 2020)

FLORA AND FAUNA GUARANTEE ACT

Eleven Ecological Vegetation Classes were identified by the proponent during the field surveys, eight of which will be impacted by the project. 34.1 hectares of current wetland as modelled by DELWP will also be affected.

In the project area two state significant ecological communities listed in the Flora and Fauna Guarantee Act were identified; Forest Red Gum Grassy Woodland and Central Gippsland Plain Grassland covering 47.05 hectares. Both these ecological communities are included in the Action Statement 182 for Grassland Protection.

The Objectives of this Statement are:

1. To prevent further loss of significant remnants of grassland and grassy woodland.
2. To improve knowledge of the type, distribution, condition and biodiversity value of remnants.
3. To improve our understanding of the management practices required to maintain, enhance and restore the biodiversity values.

The grasslands are more severely depleted than other ecological communities in Victoria. Many exist only in small remnants on public land. Private land has larger remnants but the status and extent remain unknown.

The proponent has outlined the threats to the grassland communities. Despite the proponent's assurances that the mitigation measure will suffice to counteract threats, the risk is still too great to the grasslands as areas will be totally destroyed.

The status of many flora species remains unknown in the project area as there hasn't been a comprehensive independent survey conducted in the area. Baseline data does not exist.

The proponent has made specific reference to three state significant species which will be impacted by the development, the Slender Wire Lilly, Blue Mat Rush and the Sandfly Zieria.(9.1.3.1 vol 2 Chap . 9)

The statement by the proponent that "the loss of plants will be restricted to a few individuals in the local area" includes the numbers for these three species;

- Slender wire-lily (*Laxmannia gracilis*) (Rare), 33 plants found in four locations
- Blue mat-rush (*Lomandra glauca* s.s) (Poorly known), 3 plants found in 2 locations.
- Sandfly zieria (*Zieria smithii* subsp. *Smithii*) (Rare), 10 plants found in 9 locations, including the timber plantation.

The status of these three species is either rare or unknown. If this is the case removal of these plant numbers could impact greatly on their populations.

Fifty-three State significant flora species have been identified by the proponent as possibly being in the project area .The number of flora species could be higher if surveys had been carried out when conditions were more favourable.

Even though the threats to FFG listed species are recognised the proponent will still undertake actions that negatively affect them. This is legally defined as "reckless" behaviour.

OFFSETS

The proponent has failed to provide a proposed offset strategy that sets out and includes evidence of the offsets that have been secured or are proposed to satisfy Victorian offset requirements.

The proponent doesn't give any details how the offsets will be managed and monitored, including management actions, responsibility, timing, performance measures and the specific environmental outcomes to be achieved in Volume 6 A005 Detailed Ecological Investigations.

An Offset Management Plan required under the EPBC Act for the GRGGW is not in the EES Document. An Offset Management Plan which includes detailed management actions is to be written once the offsets are confirmed/ secured. (Vol.6 pg120) How can an accurate and relevant risk assessment be determined on something that is yet to be considered and written? Surely the four years of the EEs process is sufficient time to have developed an Offset Management Plan?

National approval for offsets will be required for the proposed removal of EPBC Act listed Gippsland Red Gum Grassy Woodland and Associated Native Grasslands. Approval must also be given by the State.

Victorian Government regulations require a species offset due to the vegetation removal and the impact on habitat for rare and threatened species in the project area. (Offsets for the Removal of Native Vegetation)

The overall offset requirements for vegetation removal are extremely high and extremely costly. This will be a major limiting factor for the proposed mine to proceed.

An offset of 8 – 10 hectares will replace the 1.74 hectares of GRGGW. This offset may not be available in the locality of the project which jeopardises the establishment of various species. The proponent has stated that potential suitable offsets are in the "geographical distribution of GRGGW" (Kalbar 2020) but has provided no specifics.

Loss of this ecological community to the East Gippsland Lowlands is unacceptable as it puts at risk the survival of the various species. There will be a loss of 14.54 of Forest Red Gum Grassy Woodland ecological community as a consequence of the project.

While the EES talks extensively about mitigation and offsets, the proponent is yet to have a comprehensive plan for how mitigation for the loss of these communities will occur. No evidence is presented that either of these ecological communities can be successfully re-established outside of the project area.

At this stage the offsets have not been secured. Potential offset sites were assessed on a drive-by during field surveys over two days. Modelling was also implemented to assist with identification of vegetation. Modelling can often be flawed and unreliable. As Premier Daniel Andrews says frequently regarding the Covid-19 situation, actual data beats modelling every time.

It is of grave concern that the offsets are to be "staged" over the life of the mine. There is no guarantee that the offsets will be secured. Who will manage the offsets into the future?

Despite the assurance by the proponent that offsets are available in the locality of the mine, two other options have been proposed. First is the purchase of credits through the Native Vegetation Offset Register. The other option is to secure offsets on Crown land. However, contrary to this the list of offset placement possibilities provided by the proponent demonstrates that offsets are to be situated in places all over the state. Offsets are of no value if there is no guarantee that they are secured prior to vegetation removal, be like for like and established and protected in a reserve never to be mined in the future.

We note that Trust for Nature has been named for protection of offset sites. Trust for Nature listed properties are not secure from mining despite being covenanted properties. (Trust for Nature Covenant Agreement)

An offset has not been included for the 2.5 hectares of swamp scrub, warm temperate rainforest and billabong wetland mosaic that will be severely impacted and probably destroyed as a result of mounding of 0.5 m in Moulin Creek.

8.2.3.2 – In the infrastructure option the 5.6 hectares of GRGGW which is to be impacted has not been included in any offset calculations.

Incongruously the vegetation at the rail siding option at Fernbank was dismissed as not having any ecological value. This area has been included in the offset calculations.

Discrepancies exist between the BAE Economics and other reports concerning the required offsets for the preferred option of the Fernbank rail siding. BAE Economics has listed offsets totalling 1337.208 Species Habitat Units (SHUs) (BAE Economics report page 28) whereas table 9.4 listed the offsets as 1142.146 SHUs.

Why is there a conflict of figures of nearly 200 SHUs? What is the true determination of the offset calculation? BAE Economics has allowed $4.1 million for the price of purchase of offsets. This assessment is an under estimation of the true cost of offsets and brings the risk of the exercise into question.

Appendix 4 – Credit Availability Report (13 March 2020) Vol. 4 of the EES lists identified sites for offsets, many of which are outside of the East Gippsland Shire, scattered in small patches across the State; hardly an intact grassland community. The overseeing of so many areas over such a large area of the State will be impossible for any organisation to care for and administer.

The offset regulations leave a lot to be desired. As remnant vegetation disappears little by little, it is left vulnerable by permitted clearing, thereby undermining the no net loss policy.

The Australian National Audit Office found major flaws in the procurement of offsets for threatened species listed under the EPBC Act, noting that the Federal Government had failed to adequately administer environmental law. Approval has been given for offsets that were not like for like and funding was given for research as a substitute when suitable habitat could not be located. Despite the law, the environmental offset regulations have left threatened species at risk. (Commonwealth Government Auditor General, 2020)

Offsets & EPBC

Doubts exists that suitable offsets for EPBC listed vegetation communities and species, are available in the region. How can the community be confident that the Federal law will be upheld? Isn't it disturbing that Victoria remains the most cleared state in Australia?

An example of failed EPBC offset Regulations was the case of the Whitehaven Mine in N.S.W. The coal company were to offset White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland, but failed to find a suitable offset. The Department has granted the coal company three extensions to locate the offsets. The dispute has ended up in court. (EDO)

The Victorian Auditor General's Office conducted an audit into protecting critically endangered grasslands in relation to the Melbourne Strategic Assessment Plan. (MSA) The MSA Plan manages the environmental impact of urban development in Melbourne's growth areas. Part of the plan was to establish a 15,000 hectare Western Grassland Reserve and a 1200 hectare Grassy Eucalypt Woodland Reserve. The reserves were to be offset against development.

DELWP was found not to have met its commitments. The report found that DELWP had not conducted a condition assessment and mapping of native vegetation values on private land since 2007, some land for offsets was not purchased and the quality of land purchased did not replicate the quality of land that was to be developed.

Changes to government funding models meant that funding for purchases of land had decreased significantly. The enquiry found that the native vegetation funding credits had failed for the MSA Plan. (Protecting Critically Endangered grasslands, 2020)

This example of government failure provides little confidence that the outcome of any credit negotiations between the proponent and DELWP will be acceptable. There seems to be no guarantee within the system that the process will be followed.

THREATS TO ECOSYSTEMS

Weeds and pest species

The proponent has identified the existence or likely presence of any species listed under the EPBC Act the FFG Act and DELWP Advisory list and weed species. The failure is in fully recognizing all threats, pathogens and pest species.

The proponent has described the farmland in the project area as being "Cleared lands containing improved pastures that have been overgrazed and not managed appropriately to contain the greatest weed density". (7.4.4 p 99)

What basis did they have to make the judgement that these farmlands are being inappropriately managed? This is not outlined.

If the land was “over grazed”, how did they manage to identify weed species and yet fail to identify any native grasses? Why was it not recognised that the so-called “over grazing” was due to the extreme drought? (2017-2020). It is also interesting to note that the noxious weed African Lovegrass on the proponent’s own property was not acknowledged.

Weed control in this farming location is very well managed. Local farmers effect weed control on the road verges to prevent weed infestation crossing into their farmlands. Comparable areas on the Red Gum Plains (south of the highway) have large infestations of African Lovegrass.

Many “weed” species have beneficial properties for stock, providing valuable minerals adding to their health and well being. Weeds provide habitat for insects, and their flowers attract beneficial insects, birds and bees which assist with pollination in farm land and the natural environment.

The denigration of the area by the proponent is a constant theme throughout the EES document, portraying it as an area with little value, and very few attributes. The proponent fails to acknowledge the intrinsic values of the area in both ecological and economic terms.

Sambar deer

7.4.4 The detailed ecological investigation in the EES document doesn’t list deer as a threat to biodiversity. Its current status is as a game species. Hog, Fallow and Sambar deer have all been sighted in the project area. Sambar deer present the biggest threat to the environment and in particular to any restoration activities.

Since 1998 numbers of Sambar deer have increased substantially throughout the region, causing damage not only to agricultural land but also native vegetation. They also pose a threat to wetlands as the stags use these moist areas as wallows, destroying aquatic habitat. Sambar deer cause the death of aquatic species because of their wallowing habits in streams and wetlands.

The destructive nature of the Sambar deer is described well in as follows. “Damage by Sambar, particularly by browsing, antler rubbing and physical removal of particular plant species is resulting in serious ecological consequences. Threatening processes instigated or maintained by Sambar include loss of individual taxa, altered vegetation structure and massive widespread removal and prevention of regeneration which is now resulting in loss of plant communities in some areas.” Although this refers to rainforest areas, the same destruction is occurring across the lowland forest and Gippsland Plains. (Peel, 2005)

The presence of Sambar deer in the project area will impact rehabilitation attempts, especially in dry years. In the rehabilitation document there is no contingency to control deer numbers. The simplistic strategy of “professional shooting” is neither workable nor effective.

Only full exclusion fencing of any restored site is adequate, for which the contingency or costs haven't been included. Exclusion fencing is very costly. The proponent's estimated cost of replacement of a "standard" fence of $10 per kilometre is inaccurate by up to 50%; the replacement cost of exclusion fencing is 2.5 – 3 times the cost of "standard" fencing.

PATHOGENS AND OTHER THREATS

Myrtle rust was identified in East Gippsland in 2012, a plant fungal disease which the proponent failed to mention as a possible pathogen. (Agriculture Victoria, 2014)

Rural die back

Rural dieback is another threat to ecological communities. This threat is not also included in the EES technical studies.

The cause of dieback is not fully known, as many factors may contribute to the death of vegetation. "Possible contributing factors include habitat loss, loss of connectivity, loss of predatory species, exposure (especially to wind) and resultant loss of ecosystem function" leading to defoliation by insect pests as a result of a reduction of predators or parasites.

Other causes are addition of fertilizers, drought and increased ground water salinity. Any interference with hydrological function in an area will cause tree stress leading to rural dieback. Rural dieback has been identified in Red Gums in East Gippsland. (Bramwell, 2004)

Insect pests

Another pest in the project area is a leaf skeletising insect Uraba lugens, a defoliator of eucalypts which was identified on the Red Gum Plains by Howett in 1890. A fungus Asperigillis flavus was recognized as a controller of Uraba lugens. The fungus requires humid conditions, moderate temperatures and winter water inundation. The destruction of wetlands and climate change would have an impact on the presence of this fungus. (Bramwell, 2004)

Christmas beetles also persist in the project area, another leaf defoliating beetle. This summer pest is predated upon by sugar gliders, Tawney Frogmouth and Boobook owls. Land clearing and destruction of connectivity will affect these important predators. (Bramwell, 2004)

At present Tawney Frogmouths and Choughs are nesting on the Fernbank road and Sugar Gliders inhabit the large Red Gums on the Bairnsdale-Dargo Road. Two areas of vegetation destined to be removed for road realignment by the proponent.

Land clearing, fragmentation of vegetation and ground water extraction causing loss of predatory species, wind exposure and hydrological dysfunction could contribute to rural dieback as a result of the impacts of the mine project.

Chitrid fungus

Chitrid Fungus is caused by a bacterium (Batrachochytrium dendrobatitis). This pathogen affects frogs, infecting their skin and destroying its structure. Ultimately it causes the death of the frogs. (NSW Department of Environment Energy and Science) Vehicular and foot movement between regions where Chitrid Fungus is present will spread this disease.

Wombat mange

Wombat mange is caused by an infestation of the mange mite causing skin irritation and eventually the death of the animal. It is having a huge effect on the wellbeing of the wombat populations in East Gippsland. (Mange: an investigation of the mange mite)

FLOCCULANTS

Flocculants to be used in water treatment include:

HydraBond HB-2602 produces acute toxicity in fish. It causes suffocation and immobilisation in the species. It is harmful to aquatic life with long term chronic effects. This chemical is rated as Hazard category 3.

HydraPrime HP-1420 creates acute toxicity to fish and invertebrate species. It produces chronic toxicity in fish and invertebrates depending on pH.

Toxicity is maximised at a pH of 5.0 - 5.2 No definitive information is available on bio-accumulation.

HydraPrime HP - 5210 produces acute toxicity to fish. It is hazardous to aquatic environment in the short term (Acute) and long term (Chronic). It has a Hazard rating 3, suggesting the avoidance of release into the environment.

HydraPrimen HP - 5640 also produces acute toxicity in fish.

The use of these flocculants has the potential to affect aquatic species in tributaries, creeks and the two major river systems the Perry and the Mitchell and consequently the Gippsland Lakes.

Invertebrates are also affected by these substances, which in turn will affect those species that feed on invertebrates.

Why has the proponent neglected to mention flocculants as a threat in Vol.6 Appendix AOO5 Detailed Ecological Investigations? This lack of research and attention to detail is yet another unacceptable risk.

NOISE

Anthropogenic noise pollution is affecting a range of species in different ecosystems. Natural behaviours come under threat and animals are forced to relocate. Animals in their natural environment know how to interpret various sounds. Altering the acoustic environment of terrestrial and aquatic species can have adverse effects on their survival. Impairment of hearing can affect normal behaviour as animals rely on this sense to locate food, avoid predators, find a mate and navigate their surroundings.

Noise in water travels five times faster and doesn't lose its intensity as on land. The behaviour of many aquatic species can be interrupted as a result of noise.

Research has shown that some bird species populations can decline or change as a result of continuous noise. Birds rely on vocal communication to breed, signal to their young and to warn of predators. Owls are also acoustic feeders and can be affected by noise pollution.

Disruption and avoidance of nesting sites is also an effect of noise. A consequence of low bird numbers in an area will cause vegetation dieback due to increases in insect populations.

Noise can also shape ecosystems as species that can tolerate noise will remain and increase in numbers, in contrast to those that cannot. This will disturb food webs and influence species combinations.

It has been found that foraging times for bats, which are acoustic feeders, are affected by noise. As these changes occurred in bat behaviour they were more susceptible to predation.

Frogs are highly affected by noise. Research in Melbourne found that some highly vocal frog species increased the frequency of their calls, to partially compensate for the loss of communication distance in noise traffic areas.

The mating calls of pobblebonk frogs can usually be heard up to 800 m by females, this was reduced to 14 m in noisy areas. Noise can affect frog breeding leading to a decline and threat to frog survival. (Parris, Noise Pollution and the Environment)

The proponent has attempted to downplay the effect of noise in the landscape by wrongly claiming that the noise generated by the project will be of a similar nature to what is experienced now. This is a very quiet area, especially at night. The clarity of sound experienced here is superb.

The present noise is spasmodic; the noise from the proposed project will be continuous 24/7, 365 days a year. Apart from construction and processing noise, the noise from heavy haulage vehicles will be heard for many kilometres away.

The impacts on faunal species within the study area, both EPBC listed and FFG listed, will be substantial and should be rated high. The EES document states that no EPBC listed fauna species are likely to permanently or frequently use habitat resources in the study area.

Light

The National Light Pollution Guidelines (Commonwealth of Australia, 2020) (Association) recommend where there is important habitat for listed species. A 20 km precautionary boundary should be set for artificial light impacts. The proponent has failed to provide and Environmental Impact Statement to evaluate the effect of light on specific species.

At present the project area is devoid of light during night time hours. If the construction and processing of the proposed mine begins this would change dramatically. The proponent has commented on the impact of light not likely "to extend far from the light source". (7.4.5.3 Vol. 6) This is contrary to actual fact as light is diffused over the landscape not confined to the source.

Artificial light has negative and deadly effects on amphibians, birds, mammals, insects and plants (International Dark Sky Association). With proposed mine activity 24/7, the natural variation in light and consequently the daily activity of species will be disrupted. The seasonality of light and monthly light cycles will be affected.

Animals depend on natural light cycles to govern their behaviours such as reproduction, foraging for food, sleep and protection from predators. Nocturnal animals are at particular risk as the night time environment is turned into day. Diffused light can disrupt flight patterns of birds impacting on migratory species.

A study of magpies and pigeons has shown the harmful impacts of artificial light on the sleep patterns of these birds. This is the first time neurological responses to light pollution in wildlife have been researched. The researchers compared the effects of white light and amber light on these two species.

Non rapid eye movement and REM sleep cycles were altered with exposure to white light and amber light. Both species reacted in negative ways. It disrupted sleep patterns, forcing the birds to sleep in the daytime, affecting their foraging habits, fighting off predator attacks and attracting mates. (Melbourne University, 2020)

Changes to plant physiology include slower growth patterns and timing of flowering.

Effect of light can be species specific. Glare from artificial light can affect wetland habitats impacting on frogs' reproduction. Night time croaking is part of their breeding ritual.

The proposed project footprint would be lit with artificial lighting at night as it is a 24/7 operation, creating daylight conditions throughout the night. Despite this, the claim made that the daylight conditions will be spasmodic. (pg 100)

It cannot be agreed that light pollution is expected to be low. With the amount of infrastructure and vehicular movement on site and on the haul road, light pollution will affect species in the area.

The EES fails to adequately identify the effects of light on biodiversity in the project area and has not identified EPBC listed species that might be affected. The EPBC Act regulates any action that will have, or is likely to have a significant impact on any MNES, or any other species in the vicinity that are not listed.

Radiation

The project has been classified a Nuclear Action under section 21 and 22 of the EPBC Act 1999. The risk to the environment will be ever present in dust, water and soil if the proposed project should proceed.

Plants need some types of non ionizing radiation like sunlight for photosynthesis but other forms of radiation can be harmful to plants, affecting plant growth and germination.

Damage by radiation to chromosomes within the cells of plants will hinder cell reproduction, increasing the chance for cell mutation. Disruption by radiation of the stomata, small air holes within the leaf, will affect control of water levels in the plant resulting in stunted plants with prolonged damage and eventually death.

Soils exposed to radiation can become compacted. Nutrients can be depleted, affecting plant growth. If the soil around existing plants becomes contaminated with radiation it will prevent germination of future generations.

Radionuclides adhere strongly to soil particles. Radionuclides increase the mutation in plants and radioactive elements accumulate in sediments, air and water, putting at risk not only terrestrial but also aquatic species.

Trees and shrubs vary in their sensitivity and reaction to radiation, size and chromosome number influence this. Those plants with a lesser number of chromosomes will be affected more than those with a larger number.

Wind would disperse radioactive substances in dust over vast distances with the presence of Monazite and Thorium in the soils and this threat is downplayed in the EES. The proposed mitigation methods are unsatisfactory and present a high level of risk. Despite all the proposed mitigation measures the dust will be impossible to control.

The proponent proposes to use processed mine water for dust suppression. As soon as this dries out any contaminants in the water will be in the dust.

Low levels of radioactive isotopes can become concentrated in mine tailings. Radionuclides become airborne and will disperse in dust from the stockpiles of overburden.

Leakage, over topping and releases from the tailings dam can contaminate water sources and soil, accumulating radionuclides in plants and the soil. They then become part of the food chain affecting the entire ecosystem.

Monazite is one of the minerals identified in the Glenaladale deposit. Due to the effects on the environment by radionuclides, Monazite mining has been banned in China and America. America has imposed tightened restrictions which almost disallow this mineral to be mined. (Diksha)

Monazite dust from the Iluka mine at Kanagulk impacted a residence, which had to be industrially cleaned including the ceiling space. This whole incident was denied a radiation risk. (Ross)

Other residents up to 7-8 kilometres away from the TSF had their rooves covered in red dust (local surface dust is grey). Tanks and spouts had to be cleaned up to twice a year. DHHS tested the water, it came in just under the safe levels for radium but the sample was micro-filtered by DHHS before testing.

As a direct result of the Iluka mine there are now 500 hectares of polluted land that no one can ever build a house on because of the radiation risk. (Ross)

The lack of appropriate rehabilitation following the mine closure could cause contamination of soil, groundwater and surface water from radioactive isotopes. These will continue to persist in the environment for a long time. Appropriate rehabilitation cannot be guaranteed and the cost of repatriation would be placed on the taxpayer and our future generations who have had no say in this mine proposal issue.

The proponent has down played the risk of radiation in relation to the proposed mine.

Road construction

Road construction, road diversion roundabouts and the proposed underpass under the Bairnsdale- Dargo Road pose a massive threat to ecological vegetation communities and habitat for threatened species.

Biodiversity will be compromised as large areas of vegetation are removed. Fragmentation of vegetation will not only cause wildlife corridors to be interrupted but also has the potential to cause wind tunnelling. This concentration of wind will lead to existing trees being blown over resulting in further vegetation loss. The interruption of connectivity of vegetation will subject fauna to predation as protective cover is removed.

Haul road construction in close proximity to Saplings Morass has the potential to impact the species that rely on this area for foraging and habitat. Noise, light, vibration and oil spills from heavy vehicles are the main threats. As Pygmy Perch have been identified as being present in Saplings Morass, they could be impacted.

Sedimentation runoff during construction of the haul road will impact aquatic species. Water diversion during and after road construction will affect the natural drainage lines with the potential to dry out existing wetlands and cause erosion. Any contaminants in this water have the possibility of affecting vegetable farms and communities further downstream.

Culvert construction will concentrate water flows which could cause erosion and sediment runoff into streams and wetlands. The fact that overland water flow and infiltration will be so heavily modified throws doubt on the accuracy of any mitigation strategy.

Roads can prevent species from moving freely between different areas of habitat. Habitat isolation can lead to lack of genetic diversity which means species are less likely to reproduce, affecting their survival. (Parris, 2015)

Frogs are very susceptible to this as their populations decline or disappear altogether from isolated areas. It prevents new frog populations from recolonising. Some species of frogs use different areas within their habitat depending on dry or wet conditions. Road networks can prevent them from accessing these areas freely.

Existing road easements are where the higher ecological values are situated. The destruction of these within the project and infrastructure areas presents a loss that contradicts laws and local land management strategies. No attempt has been made in the design of the project to avoid these areas of ecological significance. Therefore the Bairnsdale -Dargo Road and the Fernbank-Glenaladale Road diversions should not be constructed due to the inherent risks.

Traffic

With increased traffic there is more chance of wildlife mortality and injury despite mitigation measures proposed by the proponent.

Noise from vehicles, vehicle lights and very bright driving lights which are used by most heavy vehicles will disorientate and confuse wildlife making them more vulnerable to death and injury. The slower moving species such as reptiles, echidnas, frogs and arboreal marsupials often become road kill casualties.

Other traffic statistics include birds, especially during the breeding season when young ones become casualties. Owls are often hit by vehicles at night as their prey is attracted to vehicle lights.

Mitigation measures proposed may go some way to resolve road kill of wild life, but the sheer volume of traffic is the main risk.

An accident en route involving one of the haulage vehicles poses a great risk to the environment and any waterways in the vicinity if any toxic radioactive substance should escape

Climate change

This proposed project will not assist with eliminating green house gas and other emissions with the amount of diesel, electricity, road making and building of infrastructure all adding to emissions. The area of vegetation to be removed will also add to green house emissions.

Climate change impacts both animal and plant populations. Extreme weather events, drier seasons and increases in temperature are predicted to get worse. CSIRO scientists predict that by 2030 average temperatures will rise above 1990 levels by around 1-1.2 centigrade. This temperature rise could have major ecological impacts.

Extreme weather conditions will place existing vegetation under stress, leading to denuded areas being colonised by species which are able to spread rapidly. It could also lead to weed infestation. (CSIRO) Aquatic species will be impacted if minor changes in rainfall occur due to variability in water quality and quantity.

The summer of 2020 has seen devastating bushfires due to extreme drought conditions following record dry years. High temperatures cause physiological stress on animals and plants, and low rainfall slows vegetation growth and decreases available food, water and habitat.

This will then effect breeding cycles, creating increased mortality amongst species. Observations and modelling reported over the last two decades provide compelling evidence that the impacts of climate change will only worsen.

Evaporation changes of 1% will affect soil moisture, runoff and stream flow leading to a decrease in freshwater availability. Snow melt which assists with stream flow into the early summer months, maintaining water availability for the environment, is predicted to decrease substantially in the future. Already snow depth has decreased by 40% at Spencer Creek in the Snowy Mountains since 1962. (Dunlop and Brown)

Lack of snow has implications for the proposed mine project. The Mitchell River is fed by mountain streams which sustain the river into the summer months.

Increase in carbon dioxide and other green house gases changes the temperature, rainfall and occurrence of and intensity of storms and wind speed. Flooding, droughts and fires will become more common with the advent of climate change.

Grassland regions are more sensitive to water availability and will be severely impacted by extreme weather events. (Dunlop and Brown) An increase in winter temperatures will increase weed species and introduced grasses which could smother grassland species.

The proponent has not taken into account the seriousness of climate change and the implications this could have on the project area. Extreme weather events have the potential to impact the mine footprint and lead to a high risk of devastating consequences for the local environment.

Water availability is one of the greatest challenges facing the environment and a major risk for the proposed project. Climate Change could affect the mitigation measures proposed by the proponent, such as dust suppression, fresh water releases into the river and establishment of vegetation during rehabilitation.

THE SITE AT 2705 DARGO RD

Detailed Ecological Investigations; Appendix 9 Desk Top Assessment

Potential Impacts

This agricultural property of 290 hectares (not 29 hectares as incorrectly stated in the EES) has 49.925 hectares of native vegetation of Plains Grassy Forest and 0.340 of Plains Grassy Woodland according to the proponent. This is a substantial area of vegetation compared to other vegetated areas on private land in the project footprint. The figure quoted does not account for native grasses and other species that are in pastured areas.

The vegetated areas act as important corridors for species movement, linking areas of native vegetation, allowing fauna to move freely from and between surrounding areas. Following the 2014 bushfire it also provided the connectivity needed for re-colonisation of species from surrounding unburnt country.

Surveying by citizen scientists in September and October 2020 found a variety of grassland species including several species of orchids. Grassland species were also found along the roadside adjoining this property. All species sighted were photographed and photo location data was recorded. Surveying is ongoing.

The pasture on the property contains a high proportion of native grasses and grassland species with excellent ground coverage.

A spring dam (GDE) on the plateau, in the project footprint, is extremely important for the viability of this farming property as it provides the only water source in severe drought conditions (2017-2020). Any disruption to this spring would be devastating for the landowners. This spring, together with other dams on the property are important for terrestrial and aquatic fauna and aquatic reliant vegetation.

The proponent has identified the potential presence of significant fauna and flora on this property. It has been suggested by the consultant that a comprehensive survey is required before any vegetation clearance is undertaken. There is no guarantee that this would occur. If significant vegetation was found, would mining not be considered?

The owners of this food-producing property have implemented regenerative agricultural practices to maintain the land across a raft of areas. They value the existing vegetation, as did their forefathers, realising and valuing the benefits derived from retaining native vegetation on farmland.

It would be devastating to this family and the rich, complex eco-system of the area that the existing valuable vegetation is proposed to be destroyed by the mining company and could not be replaced in the short term. The large trees on the property are irreplaceable. These factors demonstrate the risk of the proposed project has been significantly under estimated; both on the property in question as a stand-alone entity, and on the eco-system of the entire area. The economic value of this and other properties in the area is very high due to the under estimation of the value of the existing biodiversity and the appropriate significance of this being not recognised.

GROUND WATER DEPENDENT ECOSYSTEMS

The proponent did not meet the EES Scoping Requirements for characterising and identifying the Groundwater Dependent Ecosystems; very few were identified in the project area. The change in seasonality of the watertable and rate of change of mounding would normally be assessed.

“Potential impacts to GDEs in the project locality are negligible-low as changes in the water table are typically well within seasonal water table variations and risk can be managed through monitoring of the water table and water quality.” The proponent can only manage risk if adaptive management is implemented based on monitoring results. Monitoring in and of itself does not mitigate risk.

Appendix 8 page 14 states that “It is assumed that intervening aquitards provide sufficient barriers to protect the shallow alluvial aquifer.” On this assumption they have not assessed potential impacts of groundwater draw-down from groundwater extraction on vegetation that may be accessing the shallow alluvial aquifer.

GDEs fall into 3 categories:

1. Ecosystems dependent on the surface – rivers wetlands springs – surface expression.
2. Ecosystems dependent on the sub surface expression of ground water vegetation and riparian areas – phreatotypes.
3. Aquifer and cave ecosystems (subterranean)

The proponent’s assessment focused on GDE categories 1 and 2.

Category 3 (subterranean) “Springs and caves/aquifer GDEs were not included in the mapping and assessment (none were mapped for the study area in the GDE Atlas)”

8.2.2.6 The proponent has made the comment that “... groundwater modelling has inherent uncertainties that arise out of necessary simplifications in model design”.

8.3.4 It has also been stated that “... water dependent ecosystems and species GDEs are likely to be limited within the immediate project area due to the elevated topography and significant depth to water”.

The topography has not influenced the presence of GDEs as springs are present on the plateau in the project area and provide the only source of water in times of drought (as experienced in 2017-2020). The dams fed by springs support a variety of aquatic species.

Drone footage over the landscape during the drought revealed green patches along drainage lines and creeks which indicated a series of GDEs. Does this mean because GDEs were not identified by the proponent that they believe they do not exist?

Caves are located on Iguana Creek and in the Mitchell River National Park within the project locality.

The Scoping Requirements required that the GDE assessments consider impacts associated with the dewatering i.e. from the pit. This has not been mentioned in this report.

It is proposed to monitor the watertable, water quality and riparian/in stream health in lower Moulin Creek and the Mitchell River for mounding. Our question is just who is going to monitor this for the life of the mine? Monitoring for hydrological change to EVCs from groundwater mounding, leading to water logging, is not the answer as soon as impacts become apparent, it may be too late to halt the effects. This mitigation risk is unsuitable.

It is an unavoidable consequence of the proposed mine that 2.5 hectares (quantified by Austral Research and Consulting 2020) of the endangered environmental vegetation community, Swamp Scrub/Warm Temperate Rainforest/Billabong Wetland Mosaic (EVC 701) will be destroyed due to permanent (20 years +) water logging caused by groundwater mounding in the lower Moulin Creek.

This impact has been acknowledged by the proponent in their risk assessment and in the detailed ecological investigation. It has also been cited in the peer review (Austral) in the groundwater dependent ecosystem impact assessment. This unavoidable consequence cannot be avoided or minimised and as such poses an unacceptable risk.

Using the figures supplied by the proponent, pre 1750 there was a modelled extent of EVC 701 of 1812.52 hectares within the project locality which represented 0.054% of the EVCs in the project locality. In 2005, EVC 701 had decreased to only 48.04 hectares in the project locality. Alarmingly this represented only 0.0026% of total EVCs in the project locality.

The estimation of the EVC 701 is based on 2005 figures, 15 years old. There is no mention that this EVC 701 may have declined since. This EVC is not listed as occurring elsewhere in the Gippsland Plains Bioregion or the East Gippsland Lowlands Area. This endangered EVC has not been included in the offset figures.

The proponent mentions that a section of Moulin Creek has a high risk of impact from ground water mounding (pg 98). Then contradictorily states in the summary that there is a very low likelihood that the project will impact any GDEs.

GROUNDWATER

DELWP commissioned a detailed groundwater condition report two years ago in the East Gippsland region. It acted as a pilot study to roll out across Victoria. The findings showed a trajectory of a major decrease in quality and quantity of water. Also mentioned is the demand for water out of the Latrobe aquifer for the Latrobe Valley open cut coal mines for the next 25 years. The competition for water will be a major issue in years to come.

The independent review (ACEOM) of the original water study, and subsequent follow up material supplied by the proponent, has raised questions regarding the conceptualisation of the groundwater systems. Both the nature and extent of impacts have been under estimated. It is also noted that the level of design for key element of water management also limits the assessment of impacts, enhancing risk.

The ACEOM review identified a possible oversimplification of the Coongulmerang Formation which could impact modelling results to the extent that potential for seepage to mound from a much higher elevation, with undesirable resultant impacts such as:

- Groundwater day-lighting as seeps higher up the escarpment and sub catchments;
- Saturate the ore body and flood active mine pit areas, with implications on site water management; and
- Potential for mounding to interact with various engineered structures (for example TSF and water storage embankments) with implications on their stability.

A second hydrological issue raised by ACEOM relates to the nature of the permeability of the Balook Formation which lies below the Coongulmerang Formation and into which mine seepage water will enter. The ACEOM review suggests that the Balook Formation is dominated by high plasticity clay and as a consequence the hydraulic conductivity would be at least 2 to 3 orders of magnitude lower than that assumed. The potential implications are:

- Nature and extent of the local mounding in the Coongulmerang Formation will be significantly greater, and take significantly longer to dissipate; and
- Less flow (if any) into the groundwater system that is connected to the Mitchell River ASR scheme.

SURFACE STRUCTURES

The lack of detailed information on the construction and management of the Tailings Facility Structure (TFS) and water management dams and the impact of the mining activities on soil structure and sediment flows could have unacceptable long term impacts on the surrounding landscape and rivers. Insufficient information and water modelling scenarios have been provided to assess the environmental effects in this area.

The proponent has not addressed in sufficient detail the critical issues raised in the ACEOM Independent Review to assess the effects and risk. In particular issues relating to:

- The conceptualisation of the groundwater systems;
- The absence of design for the proposed water management structures to allow assessment of their Consequence Category;
- Design aspects of the TSF namely: spillway requirements; freeboard depth; foundation preparation; liner requirements (if any); and/or embankment volumes/properties; and
- Design aspects of diversion drains such as key design features for diversion drains such as: achievable grade based on proposed alignment; storm event capacity; erodibility/ issues/risks, the location and key design of discharge/outlet structures (such as storm event capacity, energy dissipation, and erosion control).

Tailings Storage Facilities (TSF) do fail as we have seen lately in Brazil and British Columbia with devastating and tragic consequences. The threat of a TSF failure should not be taken lightly. The mitigation measures should reflect the seriousness of this threat and not just assume it won't happen. This unfounded assumption is an unacceptably high risk.

REHABILITATION

The effects of a mine can be far reaching and can continue after the mine has ceased operation. In Victoria only one mine has been appropriately rehabilitated.

In East Gippsland the copper mine at Benambra has proved costly for the Government following the abrupt closure of this mine. A leakage from the tailings dam remained undetected for many years. Despite the expenditure of $6.7m of tax payer's money on considerable earth works to counteract the problem, it is still leaking at an unacceptable rate into the Tambo River.

A mine rehabilitation booklet written in collaboration between government and industry has identified three main objectives (Department of Foreign Affairs and Trade, 2016):
1. The long term stability and sustainability of the landforms, soils and hydrology of the site.
2. The partial or full repair of ecosystem capacity to provide habitats and biota and services for people.
3. The prevention of pollution of the surrounding environment.

There is no guarantee that rehabilitation of the proposed Fingerboards project will achieve these objectives, be successful and not present ongoing issues well into the future. History has shown us that mine rehabilitation efforts worldwide leave a lot to be desired.

The problems associated with such a large area of site disturbance include the mixing of subsoils. Each strata of soil has its own properties and microbial life. Destruction of the complexity of soil life could affect the re-establishment of vegetation. The very important stygofauna and mycorrhiza fungi which plants rely on for their growth and wellbeing will take many years to re-establish. There is little confidence in the mitigation measures the proponent has outlined for re-establishment to be successful.

Vol 14 Ap.A020 7.2 The vegetation communities to be re-established are based on Ecology and Heritage Partners assessment of the environment. As previously discussed, they failed to identify native grasses and emerging grassland communities on private land. They have also been challenged on their identification of vegetation communities. Restoration based on this defective information will be flawed.

Gippsland Red Gum Grassy Woodland and Associated Native Grassland have not been included in the rehabilitation schedule; re-established areas along roadsides will not have the same diversity of species post-mine compared with those that were there before.

Different vegetation types have specific soils in which they grow. This has not been considered in the rehabilitation of the site. Red Gums grow on heavier soils whereas other species are specific to sandy soil. With such diversification the replication of vegetation communities within this landscape will be impossible.

There is no mention of the importance of large trees in cleared land to provide shade and refuge for both livestock and wildlife. The ancient trees spread across the landscape now cannot be substituted by a mere seedling.

7.5.2 With regard to establishment of pasture the proponent has failed to include native pasture seed in seed mixes. Native pasture species are important for the viability of farming enterprises in the area. Native grasses combined with pasture species are important as they extend foraging areas for native fauna.

The use of the fertilisers proposed could prevent establishment of native grasses as they are intolerant of such inputs and many other like input products. Re-establishment of native grasses in pasture will be difficult as introduced pasture species grow more vigorously than native grasses.

7.5.2 The proposed revegetation of native grassy woodlands is relying on research and future development of this vegetation community after the project commences. This information should have already been available, particularly given that the proponent has been working on the EES documentation for the past four years. A detailed plan should have been included in the EES.

Leaving this important essential component until after the EES assessment (and after construction has commenced) ensures that the proposal cannot be satisfactorily and comprehensively assessed for risk.

The proposed Plains Grassy Woodland rehabilitation of 200 hectares which was planned for the burnt blue gum site - and put forward at the proponent's public meetings - has not featured in the EES document (Rehabilitation). It was planned to be part of the offset requirements. It is not known whether this is still planned, or was just a concept put forward as a publicity exercise. Repeated requests to the proponent have failed to elicit information about this.

This area of land planned for grassland re-planting should not be considered as part of the offset requirements as there is no guarantee that it will be successful. It doesn't meet the offset requirements and should be disqualified.

Grassland rehabilitation on this scale would be difficult as there are many critical factors in the establishment stage. The largest area of grassland to date that has been restored in Victoria has been 9 hectares (2014 figures). It is notoriously difficult to successfully achieve, and even more so on the scale required. Has the risk been effectively considered?

Dr Paul Gibson-Roy has commented that restoration is costly; from the scraping of topsoil and removing offsite of topsoil, the cost of seeds and growing of tube stock and the seed collection.

Establishment of vegetation and grasslands will be dependent on weather conditions. Any losses will need to be re-planted, thus adding more costs to re-establishment. Cost is not the only consideration; the time for re-establishment and the time lost to failure must also be factored in.

Consideration must be given to the collection of seed as care must be taken not to extract too much seed from an existing site. This can deplete the seed bank, making future recruitment difficult. Ongoing management of the site once established can also be costly for weed control, fencing and reseeding or replanting. (Gibson-Roy, 2015)

At a community meeting Dr Paul Gibson-Roy gave an estimate for the restoration of the grassland. Industry personnel and other groups such as Landcare believe he has significantly under estimated the cost.

The more heavily destroyed and modified a site is the more costly it is to repair, the longer it takes and the more likelihood of failure. (Gibson-Roy, 2015)

Who does Kalbar envisage will look after this site into the future?

Restoration of a grasslands site near the Organ Pipes National Park in Victoria was initiated in the 1980s. It was monitored from 1989 – 2003 to assess whether native plant populations had established and persisted on site.

Of the 85 species planted either by seed or tube stock only 33 was still present in 2003. Some of the grasses had become dominant, including Kangaroo Grass (Themeda Triandra), Spear Grass (Austrostipa ssp) and Large Headed Groundsel (Senecio Macrocarpus). Weeds now persist.

It requires ongoing management for weed control, fire regimes and supplemental plantings to maintain the site. Grasslands are difficult to maintain and manage. (Establishment of Grassland Vegetation at Organ Pipes National Park, 2005) So the question must be asked again; who is going to undertake the active, time-consuming and costly monitoring and reparation activities? Where is the risk assessment of this?

7.5.1The proponent has suggested as a mitigation measure to counteract destruction of vegetation by browsing animals, that replanting will occur over a large area. This strategy has already failed on landowners' properties in the locality.

Expensive full exclusion fencing is the only way to counteract browsing animals. Deer haven't factored in, nor European hares; sufficient attention been not been paid to the other native animals and introduced species' propensity to browse on new plantings. Insect damage to young trees must not be under estimated as well.

Another measure that has been mentioned by the proponent to prevent destruction of revegetated areas includes the use of sprays to deter kangaroos. Sprayings need to be carried out on a regular basis as rain will wash it off. So who is going to conduct this activity, and how often? Over how many years will it continue?

This is not practical for large scale plantings and has not been a success on properties in the locality that have already tried the method. There is an underlying assumption that the proponent's suggested strategies will be efficacious.

Kangaroos are usually not browsers of shrubs and trees. They eat grass; the consultant appears to be unfamiliar with the eating habits of kangaroos.

Planting of larger trees to assist with vegetation re-establishment is not always successful. Particularly so with natives; the trees struggle to survive because of the size of the root ball compared to the rest of the tree. The larger trees, despite their size, will be at risk from browsing especially deer and wallabies.

High density vegetation planting of riparian areas to prevent animal browsing is another fallacy. Where is the consideration and proposal regarding the replanting of aquatic species? They have not been included as part of the restoration.

The prevention of erosion is relying on the re-establishment of vegetation. Seasonal conditions will influence growth and therefore the success of this mitigation strategy. It will take years for this to be effective.

Following inspection of the project area the consultant found no evidence of wide-spread tunnel erosion in the area. Limited tunnel erosion was reported in locations within the project area and a large tunnel discharging into the Perry Gully. (8.1.4.1)

The identification of this serious and debilitating aspect of our landscape was grossly over-looked. There are significantly more active tunnels in the proposed project area than reported. This supports community concerns that this site is inappropriate for a mine, and that tunnel erosion will occur with any disturbance of the slopes and clearing of vegetation.

The Government and community have spent considerable time and money on tunnel erosion control on properties in the project locality, most of which was not successful due to the sodic, dispersive soils. The confidence the proponent has in its proposed tunnel erosion mitigation has to be questioned and considered alongside the risk of a momentous destruction of the landscape due to this existing and dangerous problem.

History in our area clearly demonstrates that soil disturbance is the worst activity that can be undertaken in tunnel erosion prone soils; this risk has been ignored in the EES. Given that the Department of Primary Industries (now DELWP) could not solve it, the risk is unacceptable.

The filling in of Perry Gully as part of the rehabilitation process will alter the hydrology of that particular area, destroying an amazing and complex aquatic ecosystem. It is an important tributary of the Mitchell River.

The proponent has mentioned that flows will be increased in Simpson Gully which could lead to erosion causing sediment run off into the Mitchell River.

7.7.1 There is an admission that there are knowledge gaps in the Rehabilitation planning.

Experience at Kanagulk in the Western District, at the Iluka mineral sands mine, has shown, 12 years following mine closure that many of the pits have not been rehabilitated. Pit 23 has now become a radioactive waste dump.

The Iluka mine was to be a moving footprint with rehabilitation occurring as the mine progressed; it just became a growing foot print without restoration until the cessation of mining. (Ross, 2020)

In the EES document planning for progressive rehabilitation over 15-20 years doesn't provide the estimated time that destroyed habitats would take to return to their pre mine state. Hollow bearing trees can be hundreds of years old; how does the proponent intend to mitigate the risk of this destruction?

There is no contingency mentioned for the settled sediment once the dams are decommissioned as part of the rehabilitation stage. (Pg.118)

Of particular concern is a recent report (August 2020) by the Victorian Auditor Generals' Office (VAGO) into the regulations governing mine rehabilitation. This examined whether the Earth Resources Regulator through the Department of Jobs Precincts and Regions (DJPR) "was minimising the states exposure to rehabilitation liabilities.' (Victorian Auditor General, 2020)

VAGO concluded that DJPR was not effectively regulating operators' compliance with their rehabilitation responsibilities. This exposes the state to significant financial risk.

The report stated ERR was:

- Using outdated cost estimates;
- Not periodically reviewing bonds for their sufficiency;
- Failing to assure that site rehabilitation had actually occurred;
- Approving inadequately specified rehabilitation plans; and
- Lack of enforcement activities (DJPR)

Given this damning report, what assurance does the community have that the Regulator will protect the environment and the well being of the people, by enforcing the regulations regarding rehabilitation?

GIPPSLAND LAKES

RAMSAR listed Gippsland Lakes and Wetlands are another MNES located 25km south of the project site (not to the east and not 500 m from the project area.) (Ecology and Heritage Partners)

The Gippsland Lakes RAMSAR site meets six of the nine RAMSAR criteria. Extensive wetlands form part of this unique environment providing habitat and foraging grounds for many fauna species.

The lakes are home to the Burrunan Dolphins which were only identified as a separate species in 2011. Only 150 individuals have been found in two locations, one in Port Phillip Bay and the other in the Gippsland Lakes. (Marine Mammal Foundation) At certain times of the year the dolphins swim up the Mitchell River as far as the Port of Bairnsdale.

Pollutants inadvertently discharged from the proposed mine site could harm these animals. Research has shown that dolphins at the top of the food chain are susceptible to pollutants that accumulate in fish.

Apart from pollutants poisoning dolphins, long term effects include compromising of the immune system and changes to the reproductive system. (How Does Pollution Affect Dolphins?/ sciencing)

Reduced fresh water inflows and water extraction from rivers and creeks feeding into the Lakes system is one of the factors contributing to high salinity levels in the Lakes. Estimated water use by the proponent of 3 gigalitres a year could add to the salinity levels in the Lakes and also contribute to the salt wedge that comes up stream from the mouth of the river each summer.

Has the proponent under estimated the water usage for the construction, processing and rehabilitation of the proposed mine? The 3 g L was a very conservation figure and not inclusive of all water usage. All water extraction from groundwater and the river will add to the existing salinity levels, affecting the ecology of the lakes system and surrounding wetlands.

Dieback of vegetation on the lake's shoreline caused by increased salinity will exacerbate erosion. High salinity levels have destroyed reed beds, fish breeding grounds and increased the number of marine species seen in the Lakes. Salinity levels need to be reversed - not increased.

Tailings dam failure and seepage from this proposed facility and filling the mine void with tailings will cause contaminated water to flow into the river system from the project area. Will this in turn add to the demise of the Gippsland Lakes and all land and waters downstream, with unknown effects to estuarine and oceanic ecosystems?

CORNER INLET

One of the transport options is to transport half of the concentrate in bulk by road to Port Anthony at Corner Inlet, a MNES site. (Vol 6 p25) This unique natural area is RAMSAR listed due to the extensive wetlands. This 600 sq km bay in South Gippsland consists of intertidal mud flats, mangroves, salt marsh and seagrass meadows. 40 sandy barrier islands shelter the inlet from Bass Strait.

Corner Inlet is an important migratory bird site with its intertidal mud flats. (West Gippsland CMA)

The proponent has not acknowledged nor included details regarding any possible threats or impacts from the project to this second RAMSAR site upon which the proposed project will impinge. Therefore all risk factors have not been considered and a proper risk assessment cannot be undertaken; there is no consideration of any impact to this second RAMSAR site. Will this require another EES if this option is to be implemented?

MITCHELL RIVER

The Mitchell River will be only 350 m from the project area boundary. The development poses a great threat to this Heritage listed river. It is the lifeblood of the region. It supplies water to all towns east of the project site from Walpa to Nowa Nowa and coastal towns such as Paynesville, Metung and Lakes Entrance.

The river supports agriculture and horticulture in the area worth millions of dollars. Vegetable producers draw water directly from the Mitchell River to make ice in which to pack their fresh produce. Vegetables that are washed are washed with water from the Mitchell River.

Numerous and significant recreational activities depend on the river, white water rafting, fishing and other tourism pursuits. The river also contributes to the ascetics and visual appeal of the area.

A large wetland, Jones Bay, is situated at the mouth of the river. This bay supports many migratory bird species and a nursery area for fish species. The world renowned silt jetties are also located at the mouth of the river; these are the largest silt jetties in the world.

Aquatic species rely on the clean water of the river for their survival, including platypus and threatened fish species.

Concerns over the proposed mine include water extraction, sedimentation and pollution. All of which could lead to increased degradation in the lower reaches of the river, wetlands and the Gippsland Lakes.

Sedimentation runoff from the proposed mine will affect aquatic species. Why have mitigation measures to prevent this failed to fully acknowledge the severity of east coast rain events? This major omission makes a risk assessment not possible.

Contamination of the river from seepage from the tailings storage facility and from the mine voids once filled with tailings could affect the whole of the river system and the Gippsland Lakes.

In the event of the tailings storage facility failing the Mitchell River will be severely impacted as the dam is to be built on the headwaters (as well as the headwaters of the Perry River). The community has no guarantee that accidents will not occur.

There have been many failures of tailings dams throughout the world. The Benambra mine tailings storage facility has leaked into the Tambo River for years despite attempts of an insufficient nature to fix it.

The reduced runoff from the project area due to the construction of dams over every gully and tributary of the Perry and Mitchell Rivers will have a huge effect on flows into the river and the aquatic life. The release of water from the fresh water storage dam may not be sufficient to compensate for this loss, especially in low rainfall years. As water is stored it becomes de-oxygenated; water released from the fresh water dam will not be the same as rain water runoff.

The Mitchell River stopped flowing in the summer of 1997-98 due to low rainfall in the catchment. Years of low flows in the river, will mean that environmental water allocations are necessary to maintain the health of the river and the Lakes.

The concern is that the proposed mine will make a bid for this water which is also vital for the multi-million dollar long-term horticultural industry. Has the proponent fully factored in the current needs of the existing agricultural industry, necessary water flows for the environment and the stress placed on the water supply with the proposed mine's water needs?

The Iluka mine at Kanagulk was supplied with environmental water to the detriment of the river during 2006. This was a very dry year and the water deprivation resulted in Platypus kills in the Wimmera and McKenzie Rivers. (Ross)

Flooding in the Mitchell River occurs regularly as the catchment extends into the mountains incorporating the Howitt High Plains and the Dargo High Plains across to Mount Hotham

The proponent has failed to include the major 1990 and 1998 flood events in the Flood Table. This makes a risk assessment difficult as essential information has not been provided.

PERRY RIVER

The Perry River is situated to the west and south west of the project area, flowing through the Providence Ponds Flora and Fauna Reserve to the Avon River which in turn flows into the RAMSAR listed Gippsland Lakes.

A feature of the Perry River is the unique Chain of Ponds formation. This consists of large pools of water inter-connected by shallow flood ways. The Chain of Ponds supports a diversity of aquatic species enhancing the survival of listed threatened species within its surrounds.

The West Gippsland CMA (WGCMA) secured funding through the “Our Catchment Our Communities Incentive”. This program was designed to highlight the importance of this rare ponds system and to assist with the restoration and ongoing management.

At a forum organised by the WGCMA community concerns were expressed about the proposed. Notably, the effect the mine proposal would have on the Perry River including water availability and quality, changing land use, and the Tailings Storage Facility in the catchment. (WGCMA)

The proposed Tailings Storage Facility (TSF) is of greatest concern as it is situated in the head waters of Honeysuckle Creek which flows into the Perry River. The TSF poses a huge and untenable risk; any failure of this facility could do untold damage to downstream environments. As the TSF is being built on dispersive unstable soils, leakage from the dam (90 hectares), and the height of the containment wall (20 m) the contents of the tailings and proposed discharges when the facility is at its full capacity, have heightened the fears of the community.

Mining proposed in the West of the project area (pine plantation) will occur in steep gully systems which are part of the Perry catchment. Sediment runoff from the proposed mine site will add contaminants to water bodies; this will be unavoidable.

Why have sediment catchment dams not been planned to the south and south west of the processing plant and tailings dam? Any contamination will runoff into gullies and further afield into the Perry River system.

Significant vegetation will be affected if contamination of the river occurs. This includes: aquatic vegetation in the chain of ponds, nationally endangered Red Gum Grassy Woodlands and State listed Swamp Scrub, Damp Sands Herb Rich Woodland as well as Coast Banksia Woodland and important estuarine wetland and salt marsh at the southern end of the river.

Trust for Nature has worked with landholders to covenant properties along the length of the river to protect this very significant area. A landholder with a Trust for Nature property on the Perry River has identified the Diamond Firetail, Lace Monitor, Dwarf Galaxia and Pygmy Perch. (Trust for Nature)

The Perry River forms a corridor between the forested Great Dividing Range and the Gippsland Lakes enabling movement of species.

Very little emphasis and has been placed on the threats to the Perry system by the proponent. GDEs have not been assessed for this waterway. Given this, we consider this lack of information detrimental to any form of risk assessment.

ECONOMIC VALUE OF THE ENVIRONMENT

The quality of the environment influences our economic and social wellbeing. "Victoria's environmental assets are fundamental to the Victorian economy and society. A healthy environment has unique intrinsic values and contributes to the State's liveability and sustainability, by providing clean water and air and habitat for species, as well as being the basis for many regional industries such as tourism and agriculture." (DELWP, 2015-2020)

The local area around Glenaladale and the East Gippsland region contributes to the State's liveability and sustainability because of the natural assets and ecological diversity.

Glenaladale is the gateway to the Mitchell River National Park, Alpine National Park and the Victorian Alps. Disturbance by the proposed mine will destroy this visual gateway to the mountains and discourage our valuable tourism industry based on our natural assets.

Valuing and Accounting for Victoria's Environment Strategic Plan 2015-2020 acknowledges that "many Government decisions are taken without recognising fully the value of outcomes and trade-offs affecting the environment and the linkages between the environment and socioeconomic objectives for Victoria's communities."

Ecosystem health is responsible for clean water, air and soil and biodiversity values providing many benefits which should be preserved and valued.

To reconcile the financial and ecological values of the environment an assessment can be made by averaging a dollar figure per hectare for different ecosystems. The value will depend on the status of the ecosystem as to whether they are irreplaceable or depleted etc.

In the long term the project area will attain more value if left as it is than if a mine was to proceed. The environmental assets of this land will be seen to have far more value than what the proposed mine can provide.

The implementation of carbon credits and direct payments to farmers for ecosystem stewardship is a way of ensuring private enterprise values the natural assets in our environment. The importance of the grasslands is gaining momentum, with restoration happening throughout the country; grassland seed will be a valuable commodity into the future.

Why has the economic value of the environment not been a consideration of the proposed mine development? How can a risk assessment of the project be undertaken without weighing up the proposed mine and the risks attached to it against the existing economic value of the environment and its significant and plentiful biodiversity?

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Chapter 10: CLIMATE CHANGE & EMISSIONS

Contents

Amenity and Environmental Quality Objectives

The Minister's decision to require an EES included the procedures and requirements applicable to its preparation, in accordance with section 8B (5) of the EE Act. These requirements included the following matters for the EES to examine:

- potential effects of project construction and operation on air quality and noise on nearby sensitive receptors (especially residents).
- solid and liquid waste that might be generated by the project during construction and operation.

The evaluation objective with regard to amenity and environmental quality was *"To protect the health and wellbeing of residents and local communities, and minimise effects on air quality, noise and the social amenity of the area, having regard to relevant limits, targets or standards."*

The EES was to consider;

- The potential for diminished social wellbeing due to exposure to dust, air pollution, noise, vibration, lighting, radiation, hazardous materials and public safety (including fire) and transport hazards during construction, operation, decommissioning and rehabilitation of the project.
- The potential for public health risks that could arise from elevated levels of airborne pollutants and noise during construction, operation, decommissioning and rehabilitation of the project.

Climate change effects of the mine

Victoria's 2019 Climate Science Report states that Victoria's climate is changing and will get hotter and drier. If things continue East Gippsland will experience a 9% decline in rainfall, including during winter when the project (and all the other current agricultural users) is relying on winterfill, increasing almost a doubling in days over 35 degrees by 2050. (Victorian Government, 2019)

The Victorian Government has positioned itself to be a world leader in tackling climate change and has enshrined its intention in a legislative framework that commits to a zero net emissions by 2050. [3]

It is therefore surprising that such scant attention is paid to the impact of the project on climate change. The challenges climate change poses for are increasingly evident with reduced water availability, increased extremes in weather and as we've observed over the past few years, longer and more destructive fire seasons.

[3] See Appendix 3: Legislative Framework

Two things critical to the amelioration of climate change are retention and improvement of vegetation and tree cover and managing soil to retain carbon and water. The mine does the exact opposite to this and in doing so exacerbates climate change on a local scale by establishment of a landscape denude of vegetation, and by capturing gigalitres of water for processing that should have been going to maintaining soils and the ecosystem. At the same time those actions are reducing the capacity of existing landholders to effectively manage the challenges of climate change by depriving them and the environment of precious water. This extends to those users relying on bore water who will find have to manage the additional costs and stress of having to drill bores deeper because of the mining companies massive draw down of the aquifer.[4]

Interestingly, in the report looking into 'Matters of National Environmental Significance' the company acknowledged that the project would account for 0.07% of Victoria's greenhouse gases but claims that it could not find a 'risk pathway' to allow it to consider the 'risk of exacerbating climate change risks in the local

Climate change	Sea level rise, increased rate of erosion, increased drought	The project is anticipated to emit 1,074 ktCO_2-e of GHG over its full life. The maximum annual GHG emissions (Scope 1 and Scope 2) represents 0.02% and 0.07% of national and state emissions respectively. The risk of the project exacerbating the climate change risks facing the area was not assessed as part of the EES risk assessment, as a risk pathway was not identified.

Figure 34: Climate change risks identified in MNES report

area. This is rather surprising given the very nature of the operation with its removal of more than 700 mature trees and denuding 1100 ha of land over the 15 years operation will in and of itself lead to profound microclimate changes in and around the project area. These will be further exacerbated by capturing of water on site that would normally go to the underlying gravel recharge aquifer (which will be destroyed by the mine), thus reducing downstream flows of the Mitchell (particularly in summer months), and the depletion of the Latrobe Aquifer by up to an estimated 12-14 metres for some kilometres around the project site.

Omissions of emissions

The creatively forgetful reporting by the company of greenhouse gas emissions has been made possible by a very broad interpretation the UN convention on climate change reporting that allows Scope 3 emissions to be ignored.

This has resulted in the company excluding such things as the additional passenger vehicle trips, disposal of site waste, import of plant, equipment and materials, and costs associated with transporting HMC to port and with shipping the product to the customer. That the emissions associated with shipping the product to its final destination is excluded is perplexing as Kalbar have previously stated they were 'partnering' with Chinalco to undertake further processing of the HMC in China.[5]

[4] Reference 12-14 metres draw down at edge of the aquifer.

[5] The following Scope 3 emission sources were considered but subsequently excluded from the assessment as they were deemed to be immaterial in accordance with the framework set out in the NGER Act: Employee travel

How are greenhouse gases supposed to be adequately accounted for and amelioration attempts made if there are so many gaps in the calculations.[6] Are the GHG emissions associated with transport of the product 'owned' by anyone if Kalbar doesn't take responsibility for them.

The 'accounting' for emissions from land clearing is likewise perplexing and indicates Kalbar's sense of extreme (some might say unrealistic) optimism in relation to its rehabilitation plans. [7] Given their accounting for land cleared bears no reflection of the 1100 acres and more that is to be destroyed, it is difficult to know if the consultant had ever even been to the area, and if so, if they had any idea what they were looking at. The most cursory glance at the landscape would indicate that the hundreds of mature native trees constitutes a bit more than 'plantation' and their removal would have profound effects on CO_2 emissions. the description of land cleared is not at all akin to what Given that every mineral sands mine in Victoria has 'committed' to 'progressive rehabilitation' and not one has achieved that, one might be forgiven for believing Kalbar – a company that has never mined before – might suffer from unfounded confidence that it will be the first. Indeed, even Iluka, the foremost mineral sands company in Australia finished mining at both the Douglas and WRP/Kulwin mines with no evidence of any attempt to rehabilitate progressively, despite that being a commitment in the EES that appears to have been believed by the Panel assessing it. Good faith in a company to honour those commitments appears to be unfounded when blatant avoidance of the commitment or a simple variation to Work Plan allows what eventuates being completely different to what the Panel recommended.

Finally, the assumption was that the company would be able to access 66KV lines to replace diesel generators during operations has been factored in to keeping the GHG emissions unrealistically low. It is unlikely that that getting 66kV power to site can be done within the allowed budget given that there appears to be some confusion about the distance involved and that a consultant for the company that previously held the licence noted at least $14.5million would be needed. (Rio Tinto, 2013) In the interests of acknowledging business risks, the consultant should have included estimates of GHG if the company was forced to rely on diesel generators instead of power from the grid. The mitigation of using solar where possible is laughable as solar systems of the size needed would be completely uneconomic and given the amount of dust they would be exposed to, be thoroughly inefficient.

Figure 2 below shows the 'sources' included in the GHG figures. It illustrates just some of the exclusions in those figures. Exclusion of transport to Port costs can only be assumed to have occurred because the proponent considers those emissions as 'belonging to' the trucking contractors.

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to and from site, International delivery of plant, equipment and materials, and Emissions from disposal of site waste.

[6] For more information on what was included in the emissions see Appendix 1

[7] GHG emissions from vegetation clearance have been estimated accounting for the mine progression and progressive rehabilitation.

Table 9.22 GHG assessment emission sources

Scope	Description*	GHG emissions
Scope 1	In relation to a facility, refers to the release of GHG into the atmosphere as a direct result of an activity or series of activities (including ancillary activities) that constitute the facility.	• Diesel combustion: – Heavy machinery and site vehicles. – Processing plants and equipment. – Diesel generators. – Haulage vehicles used to transport HMC offsite to first delivery point. • Land clearing.
Scope 2	In relation to a facility, refers to the release of GHG into the atmosphere as a direct result of one or more activities that generate electricity, heating, cooling or steam that is consumed by the facility but that do not form part of the facility.	• Electricity use: – Processing operations. – Lighting. – Offices and amenities.
Scope 3	In relation to a facility, refers to the release of GHG into the atmosphere as an indirect consequence of the activities of a facility but from sources not owned or controlled by the facility.	Scope 3 emissions are not required to be reported under the *National Greenhouse and Energy Reporting Act 2007* and have been excluded from the assessment.

* As described by the National Greenhouse and Energy Reporting Act 2007.

Figure 35: Sources of GHG included in calculations

Appendix 1 'details' how the consultant assessed emissions from various sources and some of the machinery considered. A cursory reading illustrates just how 'flexible' the interpretations of different aspects of reporting requirements are. As an example, to consider land clearing not only on the fanciful (and never been done before) assumption of progressive and rapid (one year!) rehabilitation, but also on the assumption that the land is grazing, grassland and plantation timber, completely denies the reality that the land in question attracts some of the highest offset requirements because of the unique values therein, including the removal of more than 750 figure mature native trees. It would appear that the consultant may have relied on the proponent for information about sources without checking on its validity. Table 1 below shows the companies estimates of emissions based on its ignorance of Scope 3 and other sources that could realistically be expected to be included. We contend that the total Life of Mine figure, though apparently quite large at 1,074,321 tonnes – and accounting for 0.07% of Victoria's total emissions – is in fact seriously underestimated and that at least another 266,085 tonnes should be added to the figure

taking the total to at least 0.089% of the State's total emissions. Were proper considerations given for land clearing – in light of what other reports, and in particular those relating to biodiversity, surface and groundwater and in line with the true nature of the land in question and the unfortunate historical realities of the history of mine rehabilitation in Victoria the figure would have been significantly higher again.

Table 8: GHG emissions from Air Quality and Greenhouse Gas Report (BAEconomics: , 2020)

Emission source	Total emissions (t CO_2-e)
Mining Equipment	500,971
Rehab	4,656
Light Vehicles	9,141
Generators	87
Electricity	501,895
Land clearing highly questionable approach	57,575
Total Scope 1	572,426
Total Scope 2	501,895
SCOPE 3 EMISSIONS EXCLUDED	Employee travel to site, Disposal of site waste, international delivery of plant, equipment and materials, trucking and shipping emissions
Total emissions	**MISLEADING FIGURE DUE TO OMISSIONS AND UNDERESTIMATES 1,074,321**

Table 2 below shows that an additional 266,085 tonnes CO_2 would have been included in the emissions estimates if just the costs of trucking the HMC to port was included.

Table 2: GHG used in trucking HMC to Port of Melbourne over Life of Mine

Greenhouse Gas used in getting HMC to Port					
		To (l)	**Return (l)**	**Total litres**	**CO2 (2.7kg/l)**
Per truck	1	300	150	450	1,215
40 Trucks/Day	40	12,000	6,000	18,000	48,600
Days/Year	365	4,380,000	2,190,000	6,570,000	17,739,000
					0
LOM years	15	65,700,000	32,850,000	98,550,000	266,085,000

The final figure would of course have gone up considerably if the other 'Scope 3' sources, such as solid or liquid waste, that most people would consider should be, had been included in the estimates. Given that Katestone calculated that waste produced for each of years 5, 8 and 12 is expected to be well over 10,000,000 tonnes, (Katestone, 2020) it is surprising that no estimate of this was considered in the GHG emissions chart given that waste is produced purely as a result of the operation.

Table 3: Excerpt showing waste during operations

Parameter	Units	Year 5	Year 8	Year 12	Information Source
Waste products	tpa	10,568,569	11,094,555	12,044,129	Calculated

One wonders how many other sources were omitted on the basis that they were 'someone else's responsibility'.

Costs outweigh the benefits

The annual emissions from the project are massive and, even on the proponents rather questionable estimates will account for 0.07% of Victoria's total emissions.

The real GHG produced is likely to be double that and even if the proponent's underestimates are accepted, raise doubts about just about how serious the government is in its commitments to reduce GHG by 2050.

According to the BAEconomics report the project is only looking at adding a net of 135 jobs to the Victorian economy. (BAEconomics: , 2020) Using 2018 figures the number of jobs will go from 2,730,332 to 2,730,467, an increase of only 0.0049%. That means the project, if approved will only add one extra to every 13,000 jobs across Victoria. Using the state-wide factors so much favoured by the risk assessments in this report, based on population figures alone, that is the equivalent of only one extra job for the whole town of Bairnsdale (assuming everyone in that town was in a job) to come from the project.

In 2016 Victoria's Greenhouse Gas emissions were 114Mt CO_2 - around 41.75 tonnes per job. (Victorian Government, 2019) Should the Fingerboards mine be approved those emissions will increase by a minimum of 1.074Mt. Even on the consultant's underestimates, for every job at the Fingerboards an additional 5,371 tonnes CO_2 will be produced – more than 127 times the emissions of every other job – and this at a time when Victoria has enshrined its commitment to zero net emissions by 2050. (See Appendix on relevant legislation).

So for a minimum 0.94% increase in emissions the State only gets a 0.0049% increase in jobs from the project. Every job on the project will be responsible for 127 times (12,700%) more emissions than other jobs across Victoria. The grand total assigned to the cost to Victoria of that massive increase in greenhouse gas emissions over the life of the project is $10,000. (REMPLAN) **Small wonder industry takes no notice of climate change and pollution laws when so little value is place on them.**

Uses global comparison to cost GHG

It appears that a lot of finessing of figures has gone into trying to bring the project's emissions to less than those that trigger National Greenhouse and Energy Reporting (NGER) threshold. (Katestone, 2020) However, even without the Scope 3 and other emissions that are directly attributable to the project and would not occur without it, the project is still predicted to emit in excess of 1,000,000 tonnes CO_2-e over the life of the mine. The costing of that would be expected to be in excess of $16,000,000 under the emissions with the true costs more likely in the range of $30,000,000 according to the latest Emissions Reduction Fund figures. Regardless of the carbon price used, the approach used to price emissions is yet another example of the dexterity with which figures can be manipulated and the freewheeling manner in which Kalbar uses different benchmarks for assessing impacts.

Using global figures to minimise costs of emissions

The economics consultant claimed that in costing the external effects associated with emissions their evaluation approach was to use monetise damages using a market price for emissions. They go on to explain how this was done to come up with the grand sum of **$10,000 for more than 1.07 million tonnes CO_2-e the life of the mine**.

"The impact of GHG emissions are global in nature and generate an externality on that scale. To measure the impacts on Victoria, it is appropriate to scale the externality back from the global scale. The typical approach is to apportion the externality generated in Victoria, as a ratio of Victorian population to global population which has been undertaken in these calculations.
The externalities arising from GHG emissions associated with the Project are derived by taking the year-on-year emissions estimated by Katestone Environmental Pty Ltd (2020) and
multiplying these figures by the $13.52 carbon price under the ERF over the life of the Project." (BAEconomics: , 2020)

Efffectively they are comparing Kalbar's emissions against total global emissions when in every other instance they have used either a local, regional or state scale for such comparisons. The effect of this approach is to consider the emissions against total global emissions to come up with a laughably low figure of $10,000 for the life of the mine. (Alan Jones 'grain of rice' metaphor for justifying not doing anything to address climate change comes to mind.)

Cynical mitigations

The company makes the 'motherhood statement' that 'the project will be managed to maximise energy efficiency and reduce greenhouse gas emissions where possible. Mitigation is proposed to reduce diesel and electricity use. An energy consumption and greenhouse gas emission monitoring program will be developed prior to operations and implemented throughout the project life.'

This is – or should be - no more than normal business practice. Any company would look to managing things that are going to cost a lot of money as closely as possible – and even more so for a company where margins are relatively low and small changes can make a substantial difference to liquidity.

The reality however is, there is little the company will do to reduce emissions unless there is a financial benefit – or at least no cost – for doing it. The 'mitigations' are no more than what would be expected of how even the most marginal business would manage its operations. Perhaps the most glaring exception though, is what would be realistic for it. For example 'using solar where possible' is highly unlikely to be an option given the likely reduced efficiency that will be caused by the constant dust on the project site.

Other inane ‘mitigations’ put forward such normal practices as using fuel efficient equipment and optimising their scheduling and logistics. Any business who thinks those things are special and not standard practice might struggle to stay afloat for long.

Out of step with legislation

The Climate Change Act (2017) enshrines the framework for climate action to reduce emissions to net zero by 2050.

The framework identifies the effect a warming climate will have on the environment, the economy and vulnerable sectors of the population and specifically mentions encouraging the agricultural sector to reduce emissions.

How then can the government support a massive opencut mine to take over productive farmland and remove the very thing that encourages carbon sequestration (good vegetation cover) thus changing microclimate that will affect farms for miles around and imposing an unwanted emission load on the local community.

At the same time the government is encourage the destruction of 1600 of vegetated landscape and the associated changes to the microclimate that will result, as well as the biodiversity and environmental impacts that cumulatively will pose enormous threats to a landscape already threatened by the impacts of climate change.

Appendix 1. Energy and GHG Emissions Estimation

The following information outlines the approach the consultant has taken to estimate emissions. Further information in the input data used for calculating the emissions is available in the report. Whilst some of that data is industry sourced, the consultant understandably relied heavily on advice from Kalbar on actual operations and presumably on what emissions to include in the report and what not to.

APPENDIX H – ENERGY USE AND GHG EMISSIONS ESTIMATION

Detail is provided below explaining how the energy consumption and GHG emissions inventories were derived.

- Diesel use has been calculated using the utilisation rates and fuel rates for each equipment type from the Caterpillar Performance Handbook, Edition 38 (2008) (presented in Table H1) and an assumption of all equipment operating 24 hours per day. The utilisation rates are reproduced in Table H2. Diesel use is presented in (Table H3 and Table H4).
- Kalbar has estimated the project's electricity use to be 3.7 MWh per annum during operations.
- Energy use has been calculated from diesel and electricity usage and the energy content factors from the NGER Determination and presented in Table 34.
- GHG emission rates due to diesel and electricity use have been calculated using the emission factors presented in Table 34.
- GHG emissions from vegetation clearance have been estimated accounting for the mine progression and progressive rehabilitation.
- The area of land cleared per year has been estimated based on the extent of cleared land in site layouts from Years 5, 8 and 12, and allocated evenly on an annual basis over the period from one site layout to the next. **Land cleared during the first ten years of the Project has been determined to be predominantly grazing land/grassland** while **land cleared during the remainder of the Project has been determined to be a mixture of grazing land/grassland and plantation forest**. The amount of **carbon available per hectare has been determined** from FullCAM (DEE, 2014)1, **for grazing land/grassland and plantation forest, see Table 34.**
- A conservative estimate of GHG emissions has been determined by assuming that all carbon contained in vegetation is converted to carbon dioxide. Annual progressive rehabilitation has also been estimated from the Year 5, 8 and 12 site layouts. It has been assumed that rehabilitated land will be restored to grazing land/grasslands.
- **Grazing land/grassland has been assumed to return to steady state one year after rehabilitation** (IPCC, 2006). The total GHG emissions have been calculated as the difference between the GHG emissions from land clearing, and the GHG sequestered due to rehabilitation.

Appendix 2 Greenhouse gas mitigation register ((Kalbar , 2020)

Greenhouse gas	
GHG01	Where practical, solar photovoltaic technology will be used to supplement electricity requirements for applications such as lighting.
GHG02	Energy efficient technology will be used where practicable, including low energy lighting (e.g., LEDs).
GHG03	Electricity usage will be conducted in accordance with the power factor limits specified in Table 2 of the Victorian Electricity Distribution Code.
GHG04	Vehicle diesel consumption will be reduced where practicable through equipment selection, load and route optimisation and production scheduling, and minimising idle time.
GHG05	Equipment will be maintained and operated according to manufacturer/supplier guidelines and recommendations.
GHG06	Generator diesel consumption will be reduced by selecting a flexible configuration that allows for electricity output to be adjusted in line with demand.
GHG07	The amount of land clearance will be minimised as far as practicable to reduce greenhouse gas emissions.
GHG08	Kalbar will regularly consider and implement new greenhouse gas mitigation opportunities and/or technologies, where practicable.
GHG09	Energy efficiency principles will be integrated in building and facility design.
GHG10	Materials and equipment will be sourced locally wherever feasible to minimise fuel use for transportation.

Appendix 3 Legislative framework

The Environment Protection Act 1970

The *Environment Protection Act 1970* (Victoria) (EP Act), authorises the EPA Victoria to issue works or other development approvals and environmental licences. The Project is classified as a scheduled premises under the EP Act. GHG are defined as a waste and specific conditions relating to the management of GHG for both new development and operational sites are defined in the SEPP (AQM) and the Protocol for Environmental Management (PEM): Greenhouses Gas Emissions and Energy Efficiency in Industry (PEM GHG).

Climate Change Act 2017

The Climate Change act was established to provide a statutory foundation for action in Victoria to reduce greenhouse gas emissions to net zero by 2050; and to ensure the state's economy, community and natural environment are resilient to the impacts of climate change.

The **Act**: establishes a long-term emissions reduction target of net zero by 2050. requires five yearly interim targets, to keep Victoria on track to meet this long-term target. The act was intended to be a 'crucial step in positioning Victoria as a leader in climate change action'.

The Act 'introduces a new set of policy objectives and an updated set of guiding principles to embed climate change in government decision making' and to encourage industry and local government to do the same.

The targets are intended to guide decision making. The motherhood statement in the framework says that "All our actions sustain and enhance our natural environment and ensure that our lands, waters and seas are resilient to climate change."

There is a strong focus on reducing energy emissions but also reducing non energy ones such as landfill and other wastes
(Interestingly the framework talks about integrating climate change into planning for Victoria's water resources for the decades to come.)

The framework recognises the challenges of climate change including'

- More frequent and intense extreme weather will likely have adverse downstream effects upon the determinants of health and wellbeing such as housing, urban liveability, food security and employment.
- Disadvantaged and vulnerable communities and people are at greater risk from climate change. The economic consequences of climate change could cause more disadvantage, affecting population health and wellbeing.
- Degradation of the natural environment will occur at an unprecedented rate, which will likely compromise air quality, water supplies and soil health.
- Climate change is increasing the incidence and duration of drought, which can affect regional and rural economies, affect community cohesion, and increase the incidence of mental health problems.

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Chapter 11: SOCIO-ECONOMICS

Introduction

The proponent arrived in our area a mere two weeks after the devastating Mt Ray bushfire; everything was black and some trees were still burning. It is now over six years since Mine-Free Glenaladale Inc (MFG) and our community have been dealing with the mine proposal and all of its multi-faceted ramifications.

MFG is totally committed to participating in the EES process. Through a high level of knowledge, experience and skills MFG is well placed to represent our community's concerns.

Our community consists of individuals, groups and businesses with a diverse range of expertise and is able to draw upon the knowledge and experience of the broader community. Our technical, practical, analytical and local knowledge, gleaned from generations of working this land through the good and bad times (drought, flood, fire and economic downturns), places us in an ideal position to work together and present a strong and united front in our community EES response.

We are committed to ensuring the best outcome for the land in which we live, work, play and farm. This includes a vast and multi-million dollar food production area supplying Australian and overseas markets with the food and fibre it produces. This is deservedly and commonly referred to as the "Food Bowl" or "Salad Bowl".

Our Mitchell and Perry rivers flow unimpeded through RAMSAR listed wetlands, through the world heritage listed silt jetties and on into the Gippsland Lakes system. These beautiful and much-visited areas are the foundation of our valuable tourism industry.

We appreciate this platform to voice our significant apprehension and disquiet. We need to ensure that decision makers hear our concerns, that they understand the unique values of the area and fully comprehend what and just how much is and will be at risk to the community and the region.

Socioeconomic impacts

Dust

Of great concern to the residents and landowners in the vicinity of the proposed mine is the impact of dust. The proponent's mitigation measure "to stop work on windy days" is highly inadequate and improbable. Its efficacy is questionable given the proposed vast expanse of open exposed surfaces including haul roads, stockpiles, mine void etc at any given time.

The weather monitoring system was out of order for a considerable length of time whilst gathering data for the EES. Therefore there is an estimation of the results. This reinforces our concern that 'if you cannot measure it you cannot manage it'. Increased dust deposition on pastures, households, water supplies, horticultural areas within our Community cannot and should not be tolerated for the health of people and animals as well as the agronomic consequence.

The mine may create opportunities for shareholders and 'imported' staff. However it will considerably reduce the quality of life enjoyed by our current residents and consequently will impinge on our areas extensive, viable and sustainable agriculture. This has been our region's life-blood since First Settlement and is still the foundation and strength of our community and it economy.

The use of a wetting agent as a dust suppression measure and the potential negative impacts on the groundwater, surface water, GDE, aquatic life and biota at the end use and accidental discharge into the environment is of great concern.

Dust deposition from the mine site on an elevated plateau above the adjoining horticultural land is a heightened risk that we believe cannot be mitigated. All produce harvested on the Mitchell River flats is not washed prior to sale to remove dust. Many of these vegetable by their nature will have the dust entrained within them.

Water drawn directly from the Mitchell River is used to make the ice used for packaging and transporting vegetable produce. The impact of prevailing winds will carry dust particles, depositing it not only into the Mitchell River but also on growing vegetable crops for human consumption.

This will seriously and irrevocably compromise our large, significant regional employment and revenue earning horticultural industry. The consequences of this will directly flow on to the numerous subsidiary horticultural industries and create momentous negative impacts on employment and the economy in general at a local, state, and national level.

Previous cases of *perceived* problems with products saw a significant drop in local sales and downturn in demand for that specific commodity for many months. Such as was the case with recent baby leaf lettuce contamination issues in another Victorian horticultural region which had a seriously negative flow-on effect to our local horticultural produce. Baby lettuce sales in our local region plummeted as a result for an extensive period of time.

Most residents in the vicinity of the mine utilise tank water as their only household water source. Annual dust deposition of up to 6.1kg per 10,000- litres (as calculated in the EES) accumulating over a number of years in the tanks until they are cleaned out will impact on the health of the residents.

With 81 residences within 3 km of the project area a significant population i.e. 81 x 4.5 = 365 residents (82 residences containing 2 adults plus 2.5 children per household as a conservative estimate) will be impacted. There is no remediation suggested in the risk register for this potential health problem.

Radioactive gases

Residences within proximity of the project area will be impacted by uncontrolled gases from tailings and overburden. How is this cancer-causing risk to be avoided?

Noise

With the mine expected to operate 24/7 the elevated and continuous noise levels will be problematic. These will affect wildlife, stock, pets and residents, posing potential health impacts. Unacceptable risks of constant noise are sleep disturbance (which impacts the cardiovascular system, physiology and mental health) impacts to vulnerable groups such as the elderly, chronically ill, individuals with vision/ hearing impairment, pregnant women and young children who are less able to cope.

The suggested mitigation strategy of shutting the windows to reduce the noise will be ineffective and is not taking either the genuine concern or the problem seriously. Will the proponent provide double glazed or triple glazed windows for residents? How are farmers, who work outside for many hours on end supposed to deal with the constant and increased noise? Where is the mitigation strategy for that and for the farm animals and wildlife?

Climate change

As we encounter a warmer, drier climate a whole raft of problems are predicted. These include the accelerated loss of soil nutrients, increased salinity, random intense rainfall and flooding along with its subsequent and increased soil erosion risk and downstream impact of sediment deposition into rivers, lakes, and Ramsar wetlands. An increase in both the frequency and intensity of bushfires is problematic. The proponent has paid insufficient attention to this important issue and its flow-on effects.

Recreational

Our astoundingly beautiful area with its natural assets attracts numerous tourists. These include visitors who participate in various recreational activities such as canoeing/ kayaking, bush walking, fishing, bike riding (including regular regional and state social and competitive cycle races, including the Great Victorian Bike Ride), cultural heritage trail tours, horse trail riding, field naturalists, walking groups, vintage and classic car clubs, football, golf club, cricket, tennis, netball, lawn bowls, hunting etc. The impact of the proposed mine within the community should not be permitted, it will diminish participation in and detract from the public's enjoyment of their recreational activities and severely impact our tourism industry.

Existing environment

The negative consequences of the proposed project to human populations will alter the ways in which people live, work, play, relative to one another, organise to meet their social needs and generally cope as members of society. We believe there will be a cultural impact involving changes to norms, values and beliefs that guide and rationalise the way residents think about themselves and their society. Assessment of some social effects is more subjective and less quantifiable and this has not been adequately performed.

Human beings operate with a range of sensory receptors. Impacts of visual and landscape changes from noise, light and vibration individually and collectively alter the 'natural world' in all its senses. This means landscape, colour, smell, sound and perceived safety. Our collective mental health and wellbeing are stable when these aspects are in balance. The proposed mine will decimate the environment that we so cherish, the reasons why we live where we live. No modifications or ameliorations can reinstate what we will lose.

Our currently experienced quiet rural lifestyle, acceptable natural noises, the fundamental principles of intergenerational equity, environmental protection, community engagement and assurance that the ecological balance of the natural world is safeguarded for the benefit of subsequent generations and species must be safe-guarded. The proponent's suggested mitigation measure of forming a "committee" demonstrates their lack of understanding of the depth of the problem and the concern the negative impacts of this mine will create and inflict upon this community. The proposed mitigation measure does not address the issues and as such the risk to our community is too high.

Rehabilitation

Stockpiling large areas of sterile topsoil and the suggestion of incorporating large amounts of fertilizer and nitrogen for long periods of time will compromise plant growth. It will also ensure a prolific weed strike.

No trial vegetation sites have been established, which the proponent indicated would occur at public meetings. This would have been a sensible and necessary exercise in determining the viability of soils and to properly study and identify modifications and amendments needed to establish a successful germination.

The suggested sacrifice crops to be planted might be just that, rather than establishment of pastures with suitable root systems to bind the soil, able to survive and maintain longevity, integrity and sustainability.

The soils within the project area are dispersive in nature with high sodium content in the clays, highly susceptible to riling and erosion. We who live and work with these soils day in and day out know that the tunnel erosion will be exacerbated after being disturbed during mining. The remediation of this has not been adequately covered.

The questionable ability to replace soil profiles at correct depths, appropriate thicknesses and compaction rates to maintain integrity will result in subsidence and tunnel erosion. The ability of the sand to filter water will change as the property of the sands will be modified once processed. What impact will this have on the return of these materials to the mine void and their water filtration properties?

Why did the proponent not discuss these issues with landowners that have had experience in working with and improving the soils of the area; knowledge learned and gained over time? Instead studies have not been undertaken ("to be determined later"). This is unacceptable and completely inappropriate as a mitigation strategy and as such the risk cannot be assessed and must therefore be considered high.

The removal of "over 800 mature trees" and the suggested replacement of tube stock sized substitutes shows no regard for the established, functional eco-systems that are within this landscape. These currently provide shade, shelter, food, habitat, roosting, habitat corridors and feeding environments for a variety of species. The number of mature trees is grossly understated; another issue with accuracy which must be taken into account when assessing risk.

Cultural Assessment

The suggested salvage and management plan to be established at a later date is inappropriate and makes a proper risk assessment at this point in time untenable. This highlights both inadequate consultation and lack of awareness of numerous and significant indigenous cultural heritage that exists in our area. The proponent has missed some very obvious cultural heritage in plain sight on the roadsides, as well as on many properties within and adjacent to the proposed area.

Tailings dams

The proponent's ability to successfully seal the tailings dam wall and base structure both in the temporary and long-term tailings dams are contestable. The structure of the soils and the ability to bind and seal the tailings dam surfaces so seepage and weakening is prevented is unlikely because of ground surface movements.

This is particularly pertinent in newly formed profiles. Where is the recognition of the severity of the impact of burrowing native animals and the slumping of profiles? The proposed location of both tailings dam locations is environmentally dangerous.

The temporary tailings dam is located at the headwaters of the unique Chain of Ponds which form the Perry River system. Any impact on this significant watercourse must not be allowed. The relocated tailings dam will be within the mine void, positioned on feeder gullies leading into the Heritage listed Mitchell River. As the stability of the constructed tailings cells, impacts from seepage, ground slumping and subsidences are not suitably mitigated, the risk must be considered high.

Changed Topography

The obvious gullies within the project area should indicate the potential volume of water that at times flows through this landscape. The suggested reinstatement of gullies to 30% inclined slope raises troubling questions as to whether this altered landform configuration will adequately handle the surface water flows. Of particular relevance is during times of East Coast Lows. These can result in 10 inches of rain in a 24-hour period.

The ability for this altered landscape to withstand the heightened impact of increasing sediment loads, the sheer force of the water creating erosion, vast sheet water flows traversing the paddocks and gauging through the soils ultimately ending up in the creeks, streams, rivers and across the flood plain is seriously questionable. Local landowners' knowledge of the soils and stream flows has not been taken into consideration. The risk cannot safely and adequately be assessed without adequate data on the surface water flows.

Groundwater impacts

The project area is under-laid by shallow aquifers. This is either ignored, dismissed or paid lip-service to with a one line acknowledgement. These existing and essential water bearing gravels/sands yield water this is relied upon by food producers within and adjacent to the project area. They are used for stock and domestic bore supplies, particularly so in drier periods. As the proponent has failed to identify and study these, the impact the mine will have on these shallower aquifers, including draw down, poses a high risk.

Community consultation

Impacts of the project as listed or identified in the risk registers were issues or concerns raised at Community meetings or at landowner one on one discussions. These latter were very exclusive affairs; very few landowners within the project area were consulted.

All these risks were only identified from the public's knowledge of the mine and the mining processing at that point in time. The proponent has changed, ameliorated, or altered the project numerous times but has not updated, informed or given the community the opportunity to comment on the altered and the final submitted project.

An example of this is the amendment to the Planning scheme and public acquisition overlay. The vast majority of the community would not have been aware of this, nor the consequences of how these two factors will immensely impact on their homes, properties, daily activities, travel routes, health, and water supplies both for households, animals and the environment.

Another example is the filling of Perry Gully and the impact that will have by diverting/impeding/altering the volume of water entering the river. As the updated processing and mine layouts present significant risks, then concerns and alterations should have been considered.

The number and type of meetings held is of little consequence (only to tick the boxes) but the outcomes, information delivered, community satisfaction with presented material/discussion should have been specific. As a direct result of the proponent's limited and biased community consultation, the importance of Mine-Free Glenaladale Inc. has grown significantly in representing the views and concerns of thousands of residents (and other Victorians) intent on protecting sensitive eco-systems and the communities that surround it.

In a survey of directly impacted landholders 85% responded that they wanted their land mineral sands mining free.

Proper and fulsome consultation (not preferential interaction with adjoining landowners and the provision of different information delivered to individuals depending on their perceived interests or lack of interest) should have been undertaken. Most food producers inside the proposed mine footprint have never seen the survey in the agriculture report upon which the proponent has produced many inaccurate assumptions and inaccuracies. Most directly impacted landowners are extremely unhappy and angry about the inadequate landholder consultation.

Risk register

The risk mitigation register identifying 172 individual risks and the likelihood of them occurring is broken down as: low (43%), moderate (30%), high (20%) and major (6%). This is both questionable and unacceptable. Risks have been downplayed due to underreporting, too many desk top studies being used, insufficient on ground studies, observations done at inappropriate times/ seasons/ frequency and not enough science-based decisions and conclusions.

To suggest mitigation measures such as relying on discussions with the community or forming a Consultative Community should normally be encouraged. However the majority of our community has a very negative reaction to the mine project due to its current experience of the proponent's unsatisfactory and ineffective community consultation.

Our community's low trust in the proponent is generated by a number of factors. These include the lack of integrity reflected in the proponent's conduct and actions to date, its failure to adequately address our concerns about the economic and environmental impacts, the history of the company as mine developers rather than operators, and their inexperience and lack of knowledge of the local environmental and ecological conditions.

Repetition of similar strategies is totally unacceptable to a community and the public at large who are seeking more clarification and assurances about how the significant environmental risks will be managed as this particular location that poses unique challenges, with potential major catastrophic consequences if failures occur. Little confidence is given from review of the EES documents. Our experience of the proponent to date gives us little confidence in this and is a major consideration to be evaluated when attempting to assess the risk of the project.

At public meetings when the community asked pertinent questions about the project, the proponent regularly failed to answer these questions and trotted out the mantra that "...it would be in the EES".

Interaction and discussion with the proponent would have been more persuasive and beneficial for all through the process. The EES is using predictive estimates based on questionable data with no consideration of accumulative impacts, accompanied by no follow-up on assessments of impacts listed in the listed mitigation strategies. This is neither a suitable nor safe method to evaluate the risk.

Water

The proposed mine's high water demand for operations such processing and dust suppression, along with the need to acquire a supply of water from sources such as the Mitchell River winter-fill allocation, deep aquifer licences and the removal of surface flows from the watershed of all catchments (within and adjoining the project area) to be stored in storage dams for the mine's requirements is unbelievable and unacceptable.

It demonstrates that the proponent has no regard for other users and that serving their own needs is the highest priority. Any water that is to be released back into the creek and river systems will impact on the GDE and aquatic biota with the changes in temperature, sediments, change in pH, algae, bacteria and altered hydrology of the area.

Relocating of Roads

The risks to road users are significant. We consider the relocations are purely for the proponent's benefit over that of other road users. The increase in heavy vehicle movements, daily mine workers traffic, increased traffic in an agricultural rural community, increased traffic in adjoining towns, right turning vehicles, a four-legged roundabout, vehicles giving way to mine traffic in the middle of nowhere are unwelcome and unacceptable.

The outcome will result in deteriorating road surfaces and an unwelcome potential increase in accidents. Farmers loss of access to certain paddocks is problematic. The impact, inconvenience, travel time delays, cost to the rate payers following a hand-back of a degraded road surface begs the question, was the modelling of traffic safety and predicted usages comprehensive enough? The risks associated with all these road re-locations are not in the community's or tourists favour.

Impacts on the land use in the vicinity of the project

Impacts on the land use in vicinity of the project	Extent of impact	Duration	Likelihood	Implications of effects
Reduced capacity to produce income/ productivity from removed land	Horticultural, Agricultural, Tourism	25+	High	Loss of opportunity to expand existing land holdings and economies of scale. Inability/loss to remain viable to immediate landowners, reduced income. Intergeneration inequality. Reputational damage/adverse public perception. Selected properties within the project boundary will yield exorbitant prices but surrounding real estate prices will fall dramatically as the area will be undesirable to prospective buyers. Competitive tendering for available water licences would make it cost prohibitive for some producers resulting in a competition for access. EES scoping requirements are not met.

Airborne dust	Pasture, dairying, horticulture, dwellings, animals, environment. Impacting on Human and animal health, household water supplies.	25+	Very high	Reducing photosynthesis and transpiration through cells of plants. Loss of produce quality for human consumption due to impacts by dust particles. Question whether suggested remediation measures as stopping work on windy days would be sufficient to prevent impacts of dust emanating from other exposed surfaces, resulting in reduced income, contamination of fibres, bio- accumulation of dust in soil deceasing productivity. EES identified up to 6.1kg per 10,000 ltr dust deposition in household water supplies which is unacceptable.
Reduction in immediate vicinity's workforce	Horticultural workers, landowners (50+yrs) – What are they to do in the future?	15-20+	High	Land taken out of production (mining), loss for auxiliary industries, people out of employment and needing to compete with others for available jobs.
Flow on $'s to local business from existing landowners	Sprayers, fertiliser, stock and station agents, machinery and farm equipment dealers, rural suppliers	15-20+	High	Increase in unemployment, impacting on towns economy, loss of income to region, reduction in taxes paid and GST.
Dislocation/severance from properties because of road diversions	Residents, landowners	20+	High	Inconvenience to public road users, increased travel timeframes, prohibiting livestock movements on roads = impact on contiguous land parcels.

Intergenerational equity – loss of opportunity	18 stakeholders and other landowners in the project area	20+	High	Irreplaceable loss of opportunity for future generations, loss of land stewardship, land husbandry and pride in where you live.
Severance from neighbours and Community	Loss of known or learned experiences, significant loss of community members	20-25+	High	Dysfunctional or disconnected community members, new residents would not move to the area if the impact of the mine is apparent. Isolation from neighbours will lead to loneliness, greater dependence on the services in town, impact on mental health providers with depression, stress, loneliness, and loss of community interaction. Loss involvement in membership from local emergency service providers (i.e. CFA) and participation in recreational activities. Loss of friendship or camaraderie with team players in sports such as cricket and tennis who travel from Bairnsdale, Lindenow, and other communities.
Air quality – visibility	Residents, public, tourists, animals, vegetation	25+	Very high	Visibility (particle concentration reducing visibility) is the primary means by which a community judges whether air quality is acceptable. Impact on human health, decrease in number of visitors to area, loss of views and landscape value.

Noise	Residences, Community, workers, animals, wildlife	25+	Very High	Impact on physical and mental health on humans as well as animals, amenity, land values, recreational activities and leisure time, serenity, relaxation, need for amplification of voice while speaking. Auditory nuisance, children's learning and development; environment impacted with noise distraction. Human tranquillity and enjoyment outdoors in natural areas spoilt. Interrupted sleep. Change from acceptable sources and levels of noise to unacceptable and incompatible levels expected within a rural environment – change from agricultural to heavy industrial.
Social amenity	Public	25+	High	Diminish recreational enjoyment of the environment in its natural condition. Compromised feelings of personal safety, feeling safe when driving on roads, feeling safe in one's homes, fear of "Stranger Danger" in the community, change in demographics of existing residents.
Soil erosion	Landowners, environment, recreational users of the river	25+	High	Caused by climatic events flood, heavy rains, wind, drought, significant East Coast Low rain events, unstable/incomplete/ not adequate rehabilitation, compromising aesthetic value of landscape and loss of productive land

Loss of soil nutrients	Horticultural, Agricultural growers, biodiversity, wildlife	25+	High	Impact on groundwater dependant ecosystems, degradation of soil profiles, sediment loads in river from feeder gullies, dust deposition, reducing production of food, fibre, and flora
Loss of population including younger generations	Residents within the project area, adjoining properties	25+	Moderate	Some existing residents will leave the area due to the mine. Loss of rates revenue paid to the council. Loss of population diversity, impact on cultural and demographics. As identified in the EES, the percentage of impacted Local Government areas population needing assistance with core activities is above the state average; stress, depression, anxiety, health issues resulting from this project will further exacerbate the demand on supporting services.
Increased demand on available housing	Residents, workers	25+	Unlikely	Question if there is available housing within the Community because areas EES assessed were outside the area including Bairnsdale, Stratford & Sale. Demand for available housing will be limited. Existing rental properties will be highly contested, impacting on availability and affordability. Transient workers will be living out of area and commuting to work.

Increase in greenhouse gases produced	Used for the mining of the resource, processing, rehabilitation, workers vehicles, pumping water, electricity supply	25+	High	Huge use of carbon fuel in the mining operation increasing greenhouse gases, exacerbating climate change. A stable climate system is necessary for human development, life, health and wellbeing, protection the ecosystems and biodiversity.
Rehabilitation or the lack of it	Whole of project area, including infrastructure corridors, bore field, adjoining land	25+	Very high	Impacts of mining only ameliorated if the Company meets the legislated requirements to a sustainable or acceptable long-term outcome. Questionable whether soil profiles can be reinstated with long term sustainably and viability, landforms returned to acceptable topography, suitable control, or avoidance of spreading of weeds and pathogens from mined area.

Road safety	Elderly drivers, tourists unfamiliar with the area, regular road users, school buses, tourist coaches, pedestrians including children at bus route stops, cyclists, agriculture machinery	25+	Very high	Speed, unfamiliar road users, substandard road surfaces, tired workers and those working to timeframes (running late), distracted children, increase in road crashes including minor accidents, health, visibility, increase in noise, imposition and inconvenience for parents to drop children off at differing locations & bus stops, scenic cyclist routes impacted by large vehicles sharing roads. In case of road structure failures or modifications to existing surfaces what are the alternative routes? These are not identified in the EES. These are particularly needed in times of emergencies (fire, accidents, highway diversions). What are the alternative routes, and can they cope with the volume of traffic? Are the impacts on unfamiliar drivers recognised i.e. poor light, sub-standard road surface (narrower), insufficient signposting, impact on vision from sun, driver's ability to notice other road users' walkers, cycling, running on edge of road? Impacts of increased 80 B double trips on country roads (i.e. increase of 108% heavy vehicles in the township Lindenow South).

Loss of rural lifestyle – changed to industrial landscape	Power poles, water pipelines, changed visual amenity, working machinery, earth bunds, lighting, change of current landscape use, denuded landscape loss of biodiversity	25+	High	Loss of aesthetic value of the area, loss of vegetation, impaired rural views, dust, vibration, night lighting, increased noise from machinery; long term impact from industrial environment losing desired natural landscape. Decline in tourists returning to and through the area. Visual impact from powerlines, water pipelines, diverted roads, mine traffic, B double trucks, bunds, processing plants, machinery, haul road and an additional railway siding.
Stress	Local community, Residents, service providers, animals, wildlife	25+	Very High	Increased demand on already insufficient numbers of health providers. Reduction in recreational enjoyment due to the changed landscape for users of rivers, bushland, and natural environment. Stress on native animals impacted by noise, light and change in their homeland environment – may cause them to flee the area. Strained family relationships due to stress.

Fire hazards – capacity of local brigade volunteers to effectively manage emergency - (fire, spills, road accidents, flooding)	Local Brigade volunteers, Immediate community who were impacted in previous bushfire. Residences, surrounding communities	25+	Very high	Decline in community membership due to exodus of some residents because of the mine – remaining members unable to cope with increasing emergency demands. Despite the mitigation measures proposed in the ESS that mine workers be trained and attend fires, their 12hour shifts will preclude their involvement in an emergency. An example is leaving work to go home, tired after a long shift, not wanting to assist with fires/emergency at any given time of the day and night for enduring lengths of time. Paid mine workers involved in fire suppression/ emergencies will be resented by unpaid community volunteers; it is against volunteer CFA policy to be a renumerated.
Reviewing environmental performance	Earth Resources Regulation, residents, Community	25+	Should happen but not likely to	The mitigation response seems to rely on the community taking on the assessment, identification of impacts, risks, and environmental breeches to the mining legislation. EES consultation has not provided adequate opportunity for the community to have input into the environmental performance of the mine.

Waste generated – solid/ liquid/ adequate disposal of	Chemicals, fuel, sewage, packaging, chemical containers, sediment load, accidents, leaching into water table, rubbish carried by wind	25+	High	Flocculants seeping into groundwater impacting aquatic environment, and groundwater dependant ecosystems, rivers, and streams. Proper storage and disposal of mine produced wastes (carefully following manufacturer's instructions) ensuring there is no contamination to the environment. Extra care taken to avoid chemicals spilling/leaking into soils and groundwater systems.
Chemical hazards on site/transported to and from site	Long term onsite stored chemicals, fuel supplies, identification of hazard i.e. for impact by fire, safe transport, following approved OH&S handling requirements	25+	High	Procedures in case of accidents, fire extinguishers, first aid, CPR instructions, induction training. Contaminants must not adversely affect the surrounding agricultural produce, quality, or yield. Transportation, storage, and containment of chemicals following OH&S safety guidelines, ensuring correct dosage rates are applied and not impacting the environment. Impacts on other roads users of hazards while transporting HMC material in case of accidents and spillages.
Chemical/toxin accumulation in human bodies	Residents, visitors, workers	25+	High	Accumulation in soils, on adjoining pastures of commercial animals and wildlife and households water supplies.

Water including reuse, discharge, treatment, volume required – impacts on other beneficial users	Residence, landowners, horticulture growers	25+	High	Is it truly a closed water system? How much water will be recycled given that water will be lost to evaporation, seepage, treatment or discharged water? Identification and correct assessment of actual volume of water required including 20 surface water dams to be constructed which will take away surface water flows from other beneficial users. Assessment in the EES did not identify back up or alternative strategies in case of failure, excess water volumes or unplanned events occurring.
Health		25+	High	Significant, prolonged, compounding, unknown, latent health risks. Compromised air quality, impacts on fresh water, household rainwater supplies, psychological effects on the community, provision of clean water for the environment and animals. Concern of use of specific chemicals and suppressants on the site. Disposal of waste and potential environmental impacts.
Vibration	Animals, wildlife, residents, roads	25+	Moderate	Degradation of road surface, requiring regular maintenance. Building and infrastructure stability compromised. Animals will not graze in the vicinity.

Light	Residence, drivers, animals including nocturnal	25+	Moderate	Disturbs residents' sleep and driver safety; increasing accidents. Nocturnal animals' unnatural environment changing/destroying their feeding habits, breeding or locations.
Disaster/hazard prevention	Mine workers, surround Community	25+	High	Flood from surface water, tailings dam, freshwater dams compromised. Fires, drought, environmental disasters, man-made disasters. Road accidents including impacts with wildlife. Mine accidents; chemical spills, tailings dam failure, landslide, water pipe failure, power failure, site fire, chemical accidents, OH&S accidents, vehicle accidents. Health hazard -Pandemic such as COVID-19.
Gender imbalance in community	Minor	25+	Low	No identifiable impacts on the community. Mine workers tend to be male.
Decrease in surrounding property values	Landowners, residents, surrounding Communities.	25+	High	Properties in the project area and adjoining postcodes will see reduced property values, people's financial security; i.e. superannuation, accumulated assets reduced.

Impact on known/unknown cultural heritage	Indigenous populations – first nations people	25+	High	Mining will decimate existing Indigenous cultural heritage within the area. This area has great cultural and historical significance to the traditional owners Gunaikurnai tribe; the rich cultural history, including dream- time stories, spiritual connection to land, environment, journeys, food gathering and artefacts.
Impact on known/unknown European heritage	History of early settlers and land developers	25+	High	Destruction of community's meeting places, local historical site, safe refuge area, wayside stop, community/Landcare replanting of reserve as a conservation area and used for the way finder/directional/community information board. This area has contributed significantly to the history of the region and helped lay the foundation of what we have today. If the mine is approved there will be nothing to look forward to, only to remember what we once had. Prime examples of this are Communities of Driffield and Hernes Oak which were displaced so Morwell open-cut could proceed.

Flora and Fauna	Flora and fauna of regional significance	25+	High	Removal of EVC's, listed EBPC species, an under-estimation of over 800 old established trees including habitat and hollow bearing trees, diminishing biodiversity, loosing landscape values and aesthetics. Monitor toxic effects (such as heavy metals) on organisms which can adversely affect environmental values when levels are too high or too low (low oxygen). Increased light, sound, vibration, traffic, removal of water sources and dust impacting on their habitat. Extreme destruction of habitat, eco- systems removed, species forced to relocate, excavation, transformation of existing environments biota.
Diversion or roads	Community, tourists	25+	High	Inconvenience during construction, increased travel times, lengthy delays, travel routes changed during diversions; unfamiliar routes forced to be taken. Severance of adjoining properties. Additional nose, truck movements, more traffic, increased signage, reduced speed limits, traffic lights/ management, increased accidents, impact on environment and landscape values

Powerline upgrades	Residents, Community	25+	Moderate/High	Increase pole and power lines on the landscape, increase in greenhouse gas, removal of treed vegetation for construction of power line corridor; reinforces the visual impact on a changed landscape from rural to industrial outlook.
Increased demand of already stressed medical practitioners /hospital system	Community, mine workers, Medical providers	25+	High	Increase demand on already stressed health service providers; many of which are not taking new patients. Increase in already long waiting times at Hospital Emergency departments.
Traffic management – roundabouts, peak flow times	Drivers, Community, Emergency workers i.e. CFA, SES Ambulance	25+	High	Drivers will not be anticipating or accustomed to imposed traffic conditions in a rural environment i.e. a Right turning lane, Roundabout, Traffic lights, reduced speed limits, increased road signage and B Double Trucks crossing in front of them.
Changed topography - impacts on surface water flow, capturing and drainage	Landowners, residents, Community, recreational users	25+	High	How can we be guaranteed the permanent changes to landscape topography, despite being engineered and designed to lessen the environmental impacts are successful? Potentially significant impact with sediment/nutrients, toxins, diminished flows of surface and groundwater

Characterisation of existing land use

The local population comprises mainly of vegetable growers, dry land farmers, including dairying, beef cattle and viticulture, those seeking a peaceful rural area to raise their families, retired farmers down-sizing from larger properties to lifestyle farms and retirees from all over Victoria and interstate looking for a 'tree change'. They tolerate the twenty-minute drive to Bairnsdale for the sake of the peace and quiet of a beautiful natural environment.

For many of the landholders their superannuation and retirement incomes are in the value of their homes and properties. For others, their properties will be handed to the next generation of their family to ensure the continued viability of their farming businesses.

In the local Secondary Colleges in the East Gippsland and Wellington Shires many students speak of their plan to assist with or take over the family farming business. Some leave the area to attend Agricultural training schools and then return home to the farm; others take jobs as 'jackaroos' on cattle and sheep stations interstate to gain experience before taking over the reins of the family farm. Loss of viability of the farm due to loss of productive land forcibly taken over by the mine will mean they will lose this opportunity and be forced to leave the area for other work; or compete with others for the limited availability of employment in the region.

Some remaining blue gum plantations in the Fernbank area, from a failed investment scheme have been on sold to farmers prepared to clear them, returning them back to productive pastures and turn-out paddocks for dairy farmers. Within two years over 96% of the plantations in the Fernbank area will be returned to their original use as dryland farming.

The proponent suggests in the EES that the land in the Fernbank/Glenaladale region is marginal and therefore of lesser value. Had the proponent sought information from the local farmers, or conducted more extensive research, they could not possibly have reached this conclusion.

The soils west of the Fingerboards intersection are ideal for raising merino sheep, whose fine wool attracts top prices at wool sales. Land to the North, East and South East of the Fingerboards (Glenaladale) has heavier soils and some of these long-term productive grazing properties have licences to irrigate from the Mitchell River. The proponent's denigration of the value of the land and soils based on flimsy data and inaccurate assumptions and not comprehending what they were looking at. No consideration was given of the Mt Ray bushfire or the extensive drought during when the few studies that were done were conducted. There is no justification for the change of land use for the development of an extensive open cut mine which has the risk of irreparably damaging the existing land profiles.

Figure 1 Local dairy farm in full production

Change of land use

This mine proposal will create a loss to the community in the way landowners currently use the land, the loss of future opportunities related to the use of this land and the good reputation of the existing sustainable industries.

With 1675ha encompassed in the mine footprint and with 433ha out of production at any one time, this is a substantial loss of productive farmland. This will result in reduced income for those whose land has been impacted, reduction in earnings for farm workers, shearers, and services providers to these enterprises including stock agents, farm supplies, rural machinery and equipment and supporting industries.

Rates revenue to local Councils will decrease as mining companies do not pay rates. The financial shortfall for costs of services funded by the rates and municipal charges will have to be met by the remaining ratepayers.

If an appropriate bond figure is not set, the ratepayers will be left to pay the shortfall in rehabilitation costs and endure long-term legacies of a compromised road infrastructure following mining. The risk of this is very real.

Opportunities of further expansion of our tourist industry (in the areas of Ecotourism and adventure tourism) would have to be forfeited within the impacted municipalities. This beautiful area is a tourist and adventure magnet.

Figure 2 Balmoral Western Victoria mineral sands mine - abandoned

(Source: Johnston collection)

Impact of the project on the horticulture industry

If the horticulture crops are impacted by dust, lack of water or contaminated river water, the growers will lose income, there will be a loss of workers from the industry which employs over 2,000 workers annually, and Victoria will lose the contribution of around $150 million dollars to the State's economy per annum.

Adverse public perception due to the location and proximity of the proposed mine site, due to risks of airborne dust and contaminants in the river water which irrigate the crops (used to wash those crops that are washed and prepare the products for sale and export and from which ice is made to keep the vegetables fresh), is not adequately considered in the EES. This assessment of risk has been neglected and its importance has been undervalued in the EES reporting.

Growers fear their businesses will suffer from reputational damage. One of the biggest growers, an intensive 1500 acre property operating on the fertile flats of the Lindenow Valley grows leafy greens, broccoli, and is major supplier of lettuce to the fast food industry. Mr Bulmer is concerned about the likely impacts a nearby mine would have particularly on the salads vegetables grown here. A loss of these contracts would drastically affect the income of the business. "The size and scale of mining they are talking about could have huge impacts of dust. There is no way of stopping those westerlies blowing down in the Valley and onto our product," said Mr Bulmer. Perception is critical to the buyers of his produce.

"I don't know whether that's true or not, but if it is there is no way to stop those westerlies blowing down in the Valley and into our product.

"There is a thing in mineral sands called monazite which is slightly radioactive.

"How minute (the quantities) are we're not sure, they tell us it's very low levels and wouldn't have an impact."

He says perception is critical to buyers of his produce.

"I'm sure if I wanted a marketing edge on someone else's product and said, listen, will you take my nice clean green product or will you take the product from the Lindenow Valley that might be covered in a radioactive dust...."

Around ten kilometres from the Lindenow Valley, a proposed mineral sands mine is worrying farmers *(Tim Lamacraft)*

Lindenow Valley vegetable grower Bill Bullmer says a nearby mineral sands mine is unwelcome *(Tim Lamacraft)*

Figure 3 Source: ABC Gippsland

In its EES, the proponent mentions growers' concerns about the image and sales of vegetables being impacted by community perceptions of the quality and freshness of their produce being affected by dust. This is summarily dismissed them by claiming that the vegetables are either sold in bulk to supermarkets or are packaged in 'no name' containers so that consumers won't recognise where they have been grown.

This is misleading as the salads and vegetables grown here are packed in clear wrapping and have the name of the grower clearly labelled with the use by date. In the fruit and vegetable shops and markets in East Gippsland and Wellington Shires, locally grown vegetables are highly sought after for their quality and freshness and are clearly labelled 'locally grown'.

Community perception that certain products from an area are harmful to health can all too easily extend to the wider community perception that "...all the products from that area are harmful". This will have a negative impact on many businesses in the area. Picnic Point Apples grown on land alongside the Mitchell River, and organic vegetable growers like Busch also worry that the location and proximity of the mine. Negative public perception will become a major issue if the mine is approved.

Two years ago, punnets of strawberries grown in Queensland were found to have needles in them. The sale of strawberries nationwide plummeted; a perfect example of the impact of negative public perception. Another case of baby lettuce leaf crop at Bacchus Marsh was found to be contaminated.

In its assessment of the social impact of the mine, the proponent has under rated the role of perception and in particular the impact of negative perception. This has the potential to play a huge role in shaping the reaction of people as far away as Melbourne to products sourced from East Gippsland, currently the third largest food bowl in Victoria and renowned for its clean green fresh produce. The proposal is a real risk to our food producing farmers and this risk has not been properly considered or studied.

Figure 4 Baby lettuce grown in horticultural area

Cauliflowers

Impacts from dust

The EES acknowledges that the dust will be blown down the valley over vegetable farms. What it does not do is define how far the contaminating dust will be blown, nor map its path.

The proponent's experts on dust deposition have minimised the risks of mining dust being deposited on vegetable crops, paddocks and in the water of the Mitchell River. They have averaged the wind strengths recorded by its meteorological station, placed on its own property in a known wind-protected area. This flawed data was used for modelling to determine wind strength and the distance the dust will travel.

The failure of the meteorological equipment to provide results for several months, and the proponent's decision to average the remaining wind strength measurements recorded, has led to incomplete and wrong data being used to determine the wind speed. That in turn has led to a significant under-estimation of the distance that the strong winds prevalent in this region will carry mine dust, leading to deposition of dust at far greater distances than predicted. This is just too big a risk to ignore, let alone contemplate.

The inaccurate data also led the proponent to underestimate the distance airborne dust particles can travel to residences, water tanks, dams and the Mitchell River. The distance that noise from the mining operations and trucks will be carried by strong winds was also not properly considered.

Impacts from competition for water

The EES acknowledges a decline in the water table of up to 5 metres, resulting in increased costs extracting water for irrigating crops. The Latrobe aquifer is already declining by over one metre per year as a result of mining, severely impacting previously viable farms near Yarram and affecting Sale's water supply bores.

The EES fails to acknowledge the impact that extraction for the proposed mine's requirement of 6 gigalitres of winter-fill will have on aquatic species, the rivers, aquatic environment and the Gippsland Lakes system. Past water restrictions placed on Lindenow Valley irrigators will see direct competition with the mine for this finite resource if the project is approved.

It is concerning that it appears the proponent is not confident about being able to acquire the 3 gigalitres of water it needs for dust suppression. In appendix A008 the size of pipes and type is suited to an anticipated flow rate of 25Ml per day from the Mitchell River. In Appendix A006 the maximum intake of water from the Mitchell River is increased to 37.5 Ml per day to compensate for the days during dry spells when pumping from the river is not allowed.

This begs the question of whether they only intend to suppress the airborne dust arising from haul roads. If this is the case, vegetable crops cannot fail to be impacted by dust created during the mining operations. The proponent has also not allowed for the potential impacts of climate change during the planned 15-20 years duration of mining and rehabilitation. Predicted rises in temperature and lower volumes of rainfall over the coming decades should have been taken into consideration. Conflicting information and lack of consideration of consequences are unacceptable; the assessment of the risk cannot be based on flawed information.

Figure 5 Mitchell River

Figure 6 Facebook post

Figure 7 Mitchell River – Drought of 1983

Impacts of the project on Agriculture

Loss of Agricultural land and income

According to Tim Bull, our local MP, "our farmers and rural communities are not only the backbone of our local community here in East Gippsland but are critical to our State and Nation." Premier Daniel Andrews made the comment that "*our farmers produce some of the world's cleanest and freshest food."*

Impacts of dust on sheep (meat and wool production) & cattle

Significant amounts of dust during construction, processing, and transportation of HMC in B-Double trucks will impact the *quantity, micron, tensile strength, and quality of wool*, reducing gross margins by 2kg per head and reducing wool yield by 30%. (Wool Managing Director Rowan Woods of Forbes) Both sheep and cattle are at risk of ingesting significant amounts of dust blown from mining activity onto the grass, bioaccumulation of chemicals, toxins, or pollutants, ingested will compromise the animal's health.

Impacts of dust on dairy production

There are three dairy farms in close proximity to the project area. Their animals will be impacted by noise, light, vibration and dust depositing on their pastures and water supplies. This will reduce milk yields, production and create health issues and stress, interrupting milking and breeding cycles. One farmer said that his cows were very domesticated, very set in their routine, are easily upset by change and disturbed by unexpected noises. Contamination of his pastures from dust could render the grass unpalatable to animals. Dairy cows won't graze on dirty pastures; dust emanating from mining processes, exposed earthen bunds, constant vehicle movement and noise from machinery will gradually lead to a loss in milk production.

Impact on Agriculture from loss of trees from the land

Mature trees are both an asset and amenity, removal of over 800 mature trees providing shade, shelter for animals and residents, refuge for birds and animals and help reduce wind speeds which cause erosion. Wind erosion removes particles from the soil that are rich in nutrients and organic matter. The removal of hectares of vegetation by the proponent will cause acidification of the soil which create physical and chemical changes within the soil structure progressively reducing pasture growth.

Social impacts of the project upon community and societal change

Impact on wellbeing of the community

Wellbeing refers to a person's physical, emotional and financial condition. Determinants of wellbeing include personal circumstances (housing, income and family relations), social influences (social contact, peer pressure, discrimination) and changes in people's daily routines and lifestyles. All have to be considered in the concept of wellbeing. ['Refining the attribution of significance in Social Impact assessment' Marilee Rowan]

Most people in the communities surrounding the Fingerboards have a strong identity with the land and their environment, whilst most residents in Bairnsdale have a strong affinity with and appreciation of the rivers and Gippsland Lakes. The proposed mine project which has been hanging over the heads of so many people in the region for the past six years has already taken a heavy toll on their wellbeing and caused stress, anxiety, and depression.

Outdated legislation urgently requiring reform has added to frustration and anger. This has been exacerbated by the lack of timely, open and honest consultation from the proponent.

Residents who believe they will be impacted by noise, dust, inconvenient travel times due to re-routed roads, believe that they will ultimately be forced out of their homes. For direct stakeholders it means the loss of all their hard work and money spent over the years to enhance their holdings and increase their profitability; they are faced with the uncertainty of whether their land will be properly and fully rehabilitated and whether they can in fact operate at all.

For others, the prospect of employment in the mine regardless of the consequences to the environment or to some stakeholders, overrules all other concerns and this attitude also creates anger and friction.

Summary

The mitigation measures and strategies suggested in the EES reflect their failure to recognise the extent of community opposition, lack of trust and lack of confidence in the proponent. Not just because of the proponent's attitude and behaviour, but it also has no confidence that this proponent has the knowledge, experience, professionalism and skill to recognise that this would be a mine in the wrong place.

The proposed mine will do untold damage to the environment, the amenity of the area, the pre-existing long-term sustainable industries, and the opportunities for East Gippsland to expand its tourism, agricultural and service industries. There is little understanding of this in the EES.

What is presented is an inappropriate denigration of the area in order to minimise the perceived effects and risks of the project. The EES contains flawed and inconsistent information, data and assumptions, it fails to meet EES scoping requirements and its risk assessment lacks robustness leading to grave concerns about the negative environmental consequences.

Chapter 12: SOCIAL LICENCE

Table of Contents

Executive summary

In Australia, community concerns strongly influence the way the minerals industry operates and how governments regulate it. The industry is required to fulfil its formal regulatory conditions, which is its licence to mine, as well as taking into consideration community concerns, which is its social licence to operate.

Social licence is granted by the community, which is composed of a network of stakeholders that are either affected by the mine proposal or that can affect the mine's operation. Social licence occurs when trust and confidence has been developed.

It is contended that social licence has not been acknowledged nor addressed in the Fingerboards mineral sands project EES because Kalbar failed to develop the necessary trust and build confidence within the community.

Evidence demonstrating the lack of social licence is provided such as:

- the lack of trust and confidence in the mining proponent and their project;
- community surveys and landholder views;
- implications of sensitive receptors not being reported (not all residences and a school);
- petitions;
- organisations opposed to the mine project; and
- additional facts and figures.

Community survey results show there is no social licence for this mine project with 85% of the directly impacted landholders who live within 3km of the project boundary opposing the mine project.

The mine footprint is not secured as all of landholders have not signed land access agreements.

The fact that 60% of the sensitive receptors were not identified, (residences and one school) has major implications for all EES impact assessment studies that relied on monitoring of sensitive receptors such as noise, vibration, horticulture, light and air quality (including dust). Most importantly, the impact on those families and horticulture/agricultural businesses has not been assessed in any of the studies that referred to sensitive receptors. Therefore, any of the conclusions drawn about impacts on sensitive receptors is severely flawed and cannot be relied upon. The EES scoping requirements were not met.

Other facts and figures are presented to provide evidence of there being no social licence for this mine project.

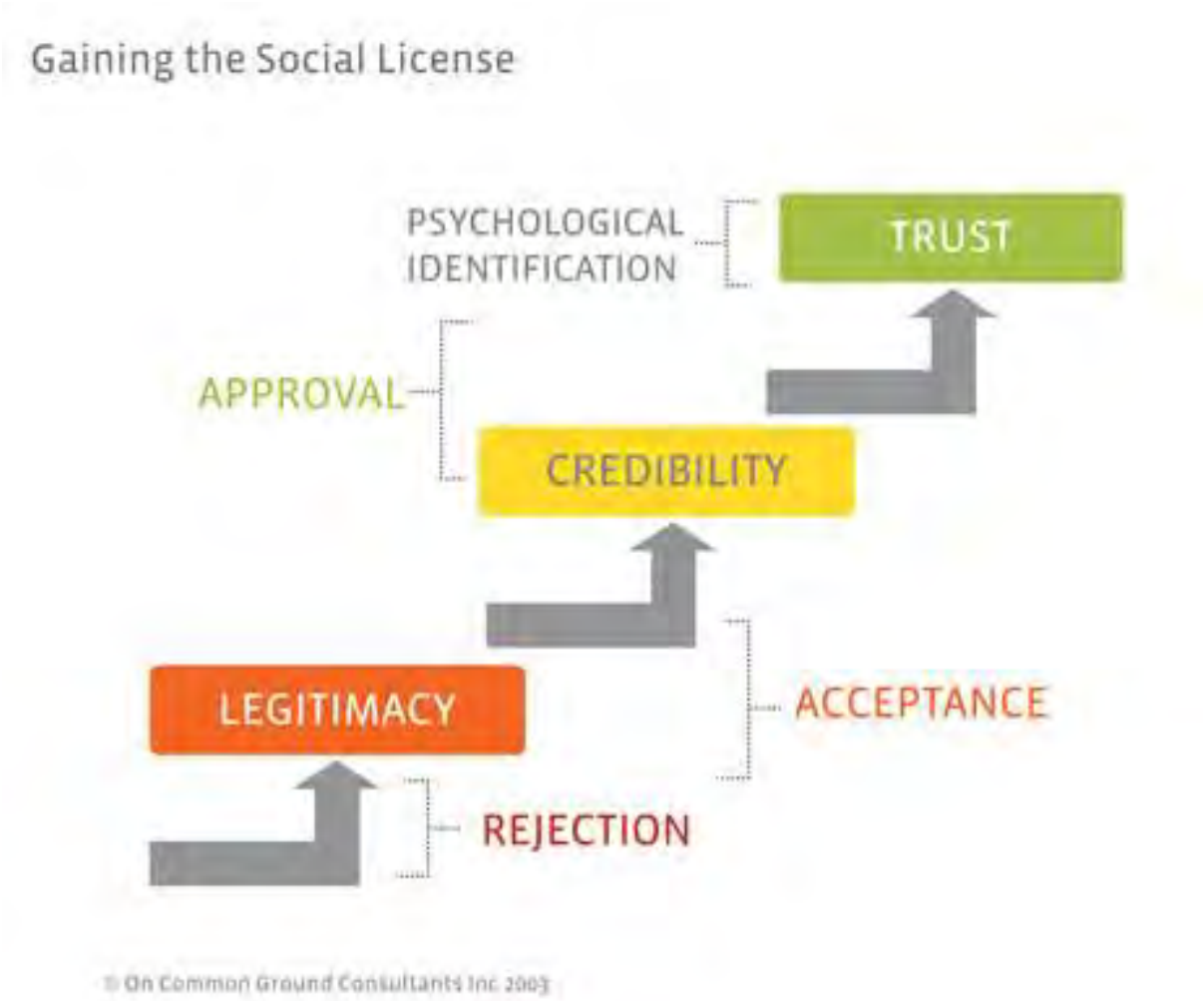
What is social licence

According to CSIRO (2020):

> *In Australia, community concerns strongly influence the way the minerals industry operates and how governments regulate it. The industry is required to fulfil its formal regulatory conditions (its licence to mine) as well as taking into consideration these community concerns (its social licence to operate)*.

Shinglespit Consultants (2020), a Canadian company specialising in assisting resources companies to gain a social licence depicts the stages that are involved and defines it as:

> *Existing when a project has the ongoing approval within the local community and other stakeholders. The social licence is granted by 'the community'. In most cases, it is more accurate to describe the granting entity as a "network of stakeholders" instead of a community. Calling it a network makes salient the participation of groups or organizations that might not be part of a geographic community. Calling them stakeholders means the network includes groups and organizations that are either affected by the operation or that can affect the operation.*



In relation to social licence, The Ethics Centre goes on further to say:

> *'But if the mine is using up precious natural resources without taking due care of the environment or local residents, it will have failed to gain the trust and confidence of the community in which it operates'* (The Ethics Centre, 2019).

It is very significant that social licence is not mentioned in the 208 pages of the Socioeconomic Impact Assessment report (Coffey, 2020). Why is that, given it is a subject matter known to Coffey's Senior Principal Environmental and Social Impact Consultant, Ms Carolyn Balint who Kalbar engaged to undertake that Assessment?

Ms Balint spoke at the 16th Annual Mineral Sands Conference on 15 March 2016 about: what is a social licence to operate; why is a social licence important; and how to know if you have a social licence to operate. Ms Balint gave reasons why a social licence was needed, although the reasons cited were about negative financial repercussions for businesses rather than a company's responsibility to be a good 'corporate citizen' by engaging with the community in an open and transparent manner to develop trust:

- *'Minimises disruption to the project*
- *Allows companies to get on with operations*
- *Minimises cost to the company*
- *Enables companies to pursue projects or expansion opportunities*.'

It is contended that the importance of social licence has not been acknowledged nor addressed in the Socioeconomic Impact Assessment technical study because Kalbar failed to develop the necessary trust with the community and build confidence.

Lack of trust and confidence with the mining proponent

This lack of trust was exacerbated when a new company, Kalbar Operations Pty Ltd was created to operate the mine project despite Kalbar Resources Ltd claiming at several community meetings they would be operating the mine. The community was not advised of this significant corporate change to who the mining proponent would now be, nor the fact that it was overseas controlled for a period of time until an accounting error was found. Despite repeated emails to Kalbar Operations CEO, our questions about these matters were only answered after our concerns were raised with Government.

Mr Patarica is the fourth CEO appointed during the life of this mine proposal. MFG requested that interactions with Mr Patarica be conducted in writing, advising this was our preference for stakeholder communication so there was a formal record; many of our email exchanges with Mr Patarica have been experienced as bullying in nature, which was reported to the Minister for Planning and to Departmental officers. Trust has not been developed with Kalbar Operations, reinforcing there is no social licence, so that is probably why social licence was not mentioned in Coffey's report.

Over the six years of this mine project there are countless examples of issues concerning transparency and accuracy in reporting that have led to a lack of trust and confidence with the mining proponent.

As indicated in the reference at the start of this section, mining companies are required to fulfil their social licence as a necessary pre-condition to operate. That social licence has not been granted for this mine project, as further explained below.

Community surveys and landholder views

The Socioeconomic Impact Assessment referred to community surveys that were conducted in 2017 and 2018. (Coffey, 2020; p 7). These surveys had extremely small sample sizes and are now several years old so their results lack currency and reliability.

As reported by Kalbar Resources CEO, Dr Hugo, at the East Gippsland Shire Council meeting on 11 December 2018, the November 2018 survey was a random telephone survey of 152 people in the East Gippsland Shire (60% of respondents) and the Wellington Shire (40% of respondents). Dr Hugo reported that 65% of the respondents were yet to make up their mind and were waiting for the EES process (East Gippsland Shire Council, 2018).

In assessing the community response to the mine project, it is most important to obtain the views of the people who are most directly impacted. Mine-Free Glenaladale (MFG) commissioned a survey of landholders who have property within 3kms of the boundary of the mine project. That survey was completed earlier this year.

Landholders within 3kms of the mine boundary were contacted to ensure they were aware of the mine project. Landholders were also surveyed and asked the question, '*Do you want your land mineral sands mining free*' with 85% replying 'yes', 10% replied 'no' and 5% were 'unsure'. Landholders considered to be in support of the mine weren't contacted however they were counted as a 'no' response to the question. These results show there is no social licence for this mine project with 85% of the directly impacted landholders opposing the mine.

It is also very important for the Panel to be aware that Kalbar has not secured landholder access agreements for all the property on the mine footprint where mining is proposed to occur. Therefore, not all of the 1,675 hectares of the mine project area is secured and will not be secured, with landholders prepared to contest access to their land via legal proceedings.

75% of the horticulture/viticulture business owners of the Mitchell River Valley were not waiting for the EES report to be released to speak out against the mine project (the remaining 25% indicated they were waiting for the EES to be released to state their position - refer to Impact on Horticulture Industry chapter).

Sensitive receptors

Map 5.1 (Coffey, 2020; p 52) and also 8.25 (Kalbar, 2020; p 106) show sensitive receptors identified by Kalbar that are within and around the project area. Table 8.33 (Kalbar, 2020; p 107) provides details of the 49 sensitive receptors (residences) and their location less than 3km from the project boundary. Additional sensitive receptors further than 3km from the project boundary are also shown on the above maps and at Figure 1 below.

MFG did not investigate the location of sensitive receptors beyond 3km as there was insufficient time to do this. Nevertheless, we are aware there are more residences beyond 3km that weren't identified as sensitive receptors on those maps.

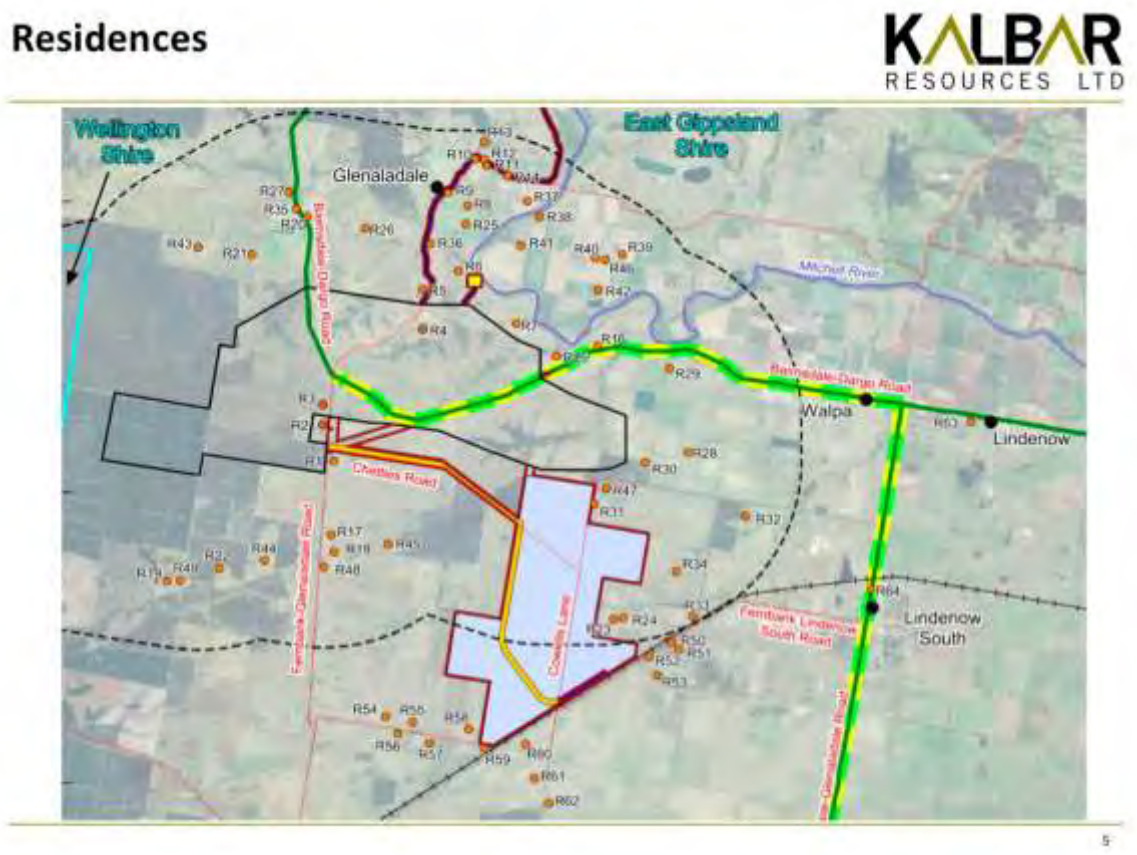


Figure 1 Sensitive receptors within 3km of project boundary as shown by dotted line (Kalbar, 2019)

Our research as reflected in Figure 2 below, identified a total of 82 sensitive receptors (81 residences and 1 school) within 3km of the project boundary compared to 49 sensitive receptors and no school in Kalbar's EES reporting. Therefore, Kalbar identified only 60% of the sensitive receptors and most significantly, failed to identify a school. **This is an unacceptably high error rate**.

The fact that 60% of the sensitive receptors were not identified, including one school, has major implications for all EES impact assessment studies that relied on monitoring of sensitive receptors such as noise, vibration, horticulture, light and air quality (including dust).

Most importantly, the impact on those families and horticulture/agricultural businesses has not been assessed in any of the studies that referred to sensitive receptors. Therefore, any of the conclusions drawn about impacts on sensitive receptors is severely flawed and cannot be relied upon.

It was claimed by Kalbar that:

'no sensitive receptors other than residences are within a 5km buffer of the project area' (Kalbar, 2020; p 114).

This statement is incorrect as the Woodglen School is within approximately 2kms of the project boundary.

As shown on our map below (Figure 2), there is a golf club, several recreation reserves, CFA sheds, schools/kindergartens and local community halls that are less than 5kms from the project boundary.

Figure 2 Map of 82 sensitive receptors from MFG's survey. Schools/kindergartens, recreation reserves, community halls, a golf club and CFA sheds shown.

Therefore, the Fingerboards EES report failed to identify all the dwellings and schools impacted by the mine project, as well as the impact of the mine on all possible sensitive receptors, resulting in Kalbar's failure to meet the EES scoping requirements.

Many of the horticulture businesses/residences located in the Lindenow Valley that are less than 3km from the project boundary were not identified on Kalbar's map. This has significant ramifications for those businesses as the EES technical reports that referred to sensitive receptors such are noise, light and air quality (dust) did not consider all the impacted horticulture businesses, shown as the pink shaded area on their map (Kalbar map 8.25; pg 107) in addition to all the landholder residents.

Petitions

A petition with 4,558 signatures asking the Hon Richard Wynne, Minister for Planning to oppose the mine was presented to the Legislative Assembly by Dr Tim Read MP on 19 June 2019 (MFG website, 2019). Over 100 people made the early four-hour trip to Melbourne to participate in a rally on the steps of Parliament that morning to ask the Victorian Government to protect the Lindenow Valley food bowl and oppose the mine project.

As at 18 October 2020, 4,248 signatures have been collected on two on-line petitions (Change.org, 2017 & 2018).
Another active petition with over 240 signatures has been collected from local business owners and community group leaders, asking the East Gippsland Shire Council to oppose the mine.
A group of young students have recently commenced a petition expressing their concerns about the potential impacts of the mine project on future generations.

Organisations opposed to the mine project

Over 30 community groups/associations have signed a document indicating their opposition to the mine. The Organic Agriculture Association (OAA) which has over 150 members is one of those Associations.

The East Gippsland Alliance (EGA) which is composed of 26 member groups was formed in response to community concerns about the proposed Fingerboards mine project.

The East Gippsland Community Action Group has placed several advertisements in a local newspaper on a fortnightly basis since 1 July 2020, raising their concerns about the mine project by speaking about various risk areas. They have also placed several advertisements in another major East Gippsland newspaper called The Greater Eastern Mail (The GEM).

MFG has been collaborating with Friends of the Earth (Melbourne) who have been raising concerns about the risks of the Fingerboards mine project with their members and Government officials.

Additional facts and figures

Over 210 people attended an East Gippsland Shire Council Meeting on 11 December 2018 where a decision was made by Council to write to Government officials to raise community concerns about the Fingerboards mine project (East Gippsland Shire Council, 2018). A number of community members representing a wide range of interests spoke about their opposition to the mine; no community member spoke in favour of the mine. On ABC Gippsland radio the following morning the Mayor stated it was the biggest audience to attend a Council meeting.

Momentum against the mine has been accelerating as evidenced by full house attendance of over 200 people at the many community information meetings organised by MFG. As at 18 October 2020 there are over 2,440 followers on MFG's Facebook page (MFG Facebook, 2014).

There are over 750 contacts on the MFG email list including individuals who are members of community groups who forward MFG emails to their members.
495 orange gate signs against the mine have been purchased and displayed across the East Gippsland Shire. Large billboard signs have also been displayed in locations in the East Gippsland and Wellington Shires until Kalbar intervened asking the respective Councils to write to landholders to have the signs removed.

Community members have participated in a number of 'spot actions' including placarding on the highway outside DELWP's office when a landholder had been inappropriately called to a meeting with the Mining Warden concerning access to their land. Placarding has also occurred outside the Hon Tim Bull MP's office. The last instance of placarding was outside the Kalbar drop-in session held at the Bairnsdale TAFE on 11 December 2019. Due to the major bushfires in East Gippsland shortly after that and COVID-19 restrictions, group actions have not been possible since.

On the MFG website there are over 115 letters, television and radio interviews posted (not all of these had been collected for posting as the website was only recently created). There is also a photo gallery from various meetings and events (MFG website, 2019). These demonstrate the level of involvement by the community opposed to the mine.

Minister Wynne's Chief of Staff should be requested to advise about the amount of correspondence received opposing the Fingerboards mine project from MFG's postcard and letter writing campaigns as a further measure to confirm community concern and a lack of social licence for this mine project.

Community members have been trained in 'Non-Violent Direct Action' reflecting the level of concern by the community about this mine proposal. This training will continue.

Conclusions

For the reasons given above, there is no social licence for this mine project to operate due to:

- the failure of Kalbar to develop the necessary trust, transparency and confidence in its dealings with the community, nor does the community have confidence in the Fingerboards mine project proposal;
- the large number of individuals, businesses, community organisations and associations opposed to the mine as reflected in the figures and details provided above; and
- the preparedness of a large part of the community to participate in non-violent direct action should the mine project be approved.

The close proximity of the mine to where so many people live, farm, work and children go to school makes this a dangerous and inappropriate location for a mine, given the substances that are proposed to be mined and the toxicity of the ore body.

The fact that Kalbar failed to identify 60% of the impacted sensitive receptors is a huge failure that not only reflects poorly on their ability to report accurately, it also raises questions as to whether this was intentionally done to minimise the appearance of the mine having a negative impact on such a large number of people.

Kalbar's failure to identify all of the sensitive receptors was reported to Government officials and the Minister for Planning earlier this year before the adequacy review of the EES was completed, however no action was taken to require Kalbar to review its results.

The fact that so many sensitive receptors were not identified means that the impact on sensitive receptors from matters such as air quality (dust), noise, light and vibration did not consider all the possible ramifications on all landholders and businesses. Therefore, the impact assessment results from those technical studies must also be considered invalid.

The EES scoping requirements were not met as the Fingerboards EES report failed to identify all the dwellings and schools impacted by the mine project, as well as the impact of the mine on all possible sensitive receptors.

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Chapter 13: CULTURAL HERITAGE

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ACKNOWLEDGEMENTS

Our community acknowledges the Gunaikurnai, Monero and the Bidawel people as the Traditional Custodians of the land that encompass East Gippsland Shire.

We pay our respects to all Aboriginal and Torres Strait Islander people living in East Gippsland, their Elders past and present.

A heartfelt thank you, for contributing to this submission under the most trying of circumstances, and without payment, to:

Staci Timms:

A multi-skilled professional with 15 years of experience in Geographic Information Systems (GIS), 10 years experience in environmental management and 5 years experience in cultural heritage management, a registered Heritage Advisor with Aboriginal Victoria and listed with DEWLP on the Vegetation Quality Assessment (Habitat Hectares) Competency Register.

Alan Solomon:

Gunaikurnai and Traditional owner, Trainer in the Koori Education Department, TAFE Gippsland

Numerous Others:

Grateful thanks are also extended to many individual persons and community groups for continuing to show and express not only your love of East Gippsland, but also your love of the culturally-heritage rich Fingerboards region in particular.

EXECUTIVE SUMMARY

Numerous concerns have been identified in relation to the information presented in the proponent's Kalbar Operations' EES documents for the Glenaladale fingerboards mineral sands mining proposal. Many unacceptable risks to significant cultural heritage (CH) sites existing within the mine footprint and broader Fingerboards area have also been indentified and not addressed within the EES.

The local agricultural community and MFG do not represent or presume to speak on behalf of the First Nations Peoples in this submission.

However, we have been working closely with numerous individuals and groups, indigenous and non-indigenous. These are fully informed and aware of this submission and its contents and have confirmed their concerns with the proposed project. These can be summarised by the following:

- The fingerboards industrial mineral sands mine proposal's potential for adverse effects and destruction of indigenous and non-indigenous cultural heritage values and connections to Country is too great;
- The EES documents do not accurately and properly identify the extent of the Aboriginal cultural heritage in this area;
- The EES documents do not adequately emphasise the nature and significance of the Aboriginal cultural heritage in this area; and
- The proponent has not fully explored the oral history or acknowledged the area's broader connection, immense importance of the cultural heritage existing with the Mitchell River National park and surrounds, much of which still remains unknown.

POTENTIAL HARM

The proponent should not be allowed to take actions that will result in significant impacts to the heritage values of the Mitchell River and the surrounding plains, including deeply connected indigenous heritage values.

The proposed mine is a heavy industrial operation that will completely and irrevocably change all aspects of the landscape as well as inherent cultural values. The very real risk of serious and irreversible damage to cultural heritage, the environment and human health exists throughout this proposed project.

A lack of full scientific knowledge and details of proposed mitigation measures means the company is unable to contain or take remedial steps, prove feasibility or even model the potential for devastating costs to human health, cultural heritage and the environment.

GOVERNMENT POLICY ISSUES

Our submission demonstrates the Project directly conflicts with numerous State Government policy objectives, feasibility and intent, including but not limited to:

- The local RAP Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) Whole of Country Plan;
- Intangible heritage;
- Shared cultural knowledge;
- Acknowledgment that existing laws are inadequate in protecting cultural heritage and traditional owners' rights and non-indigenous heritage;
- Addressing inequity in delivering stronger outcomes for and with Aboriginal Victorians;
- The broader focus on more than physical places and objects within the Victorian Aboriginal cultural heritage management system;
- Acknowledging extensions beyond closing the gap and long-term generational change; and
- Improved outcomes for all Victorian Aboriginal people.

SCOPING REQUIREMENTS NOT ADDRESSED

The proponent has not adequately or appropriately fulfilled the scoping requirements set out by the Ministers *Scoping requirements for the Fingerboard's Mineral Sands Project EES March 2018* for the following reasons:

1. The EES document is confusingly described as an appraisal, a technical report, a present study or a cultural heritage impact assessment report - depending on which page of the document one is reading.

2. The technical reports do not provide a clear integrated analysis of the extent and importance of existing cultural hertiage that will be affected by the proposal, nor the permanent loss of those significant heritage values and associated connections and therefore cannot:
    a) Negate the potential for adverse effects on known and unknown Aboriginal and non-Aboriginal cultural heritage values, including those of the heritage listed Mitchell River;
    b) Negate the potential for permanent loss of significant heritage values;
    c) Identify and characterise Aboriginal cultural heritage sites or areas of sensitivity within the project area, particularly in the vicinity of Mitchell River, in accordance with the requirements of a cultural heritage management plan (CHMP) under the Aboriginal Heritage Act (AHA); and
    d) Meet community consultation requirements.

3. The defined activity area is not clear and the archeological consultants have not accessed the many identified areas identified by landowners, therefore the proponent:
    a) Cannot outline and evaluate proposed additional measure to manage risks; and
    b) Cannot assess potential effects or relevant alternatives.

4. There is a clear disconnect between indigenous community members, archeologists, the Registered Aboriginal Party (RAP) and Aboriginal Victoria (AV) - which still holds decision making powers after GLaWAC (RAP) was put into administration.

> GLaWAC was not acting as a RAP at the time a notice of intent to prepare the CHMP was formally submitted to AV 11 April 2017 and for this reason will be evaluated by Aboriginal Victoria. (Page 36)

Many community members we have spoken to and consulted find this highly disturbing. Particularly considering the RAP as intended is the voice for East Gippsland's First Nations peoples living in the area, and also for those who still have connection to country living in other areas and interstate and who have not been consulted.

POINTS OF SIGNIFICANCE THAT MUST BE CONSIDERED

A Pleistocene sand dune associated with significant sites and old burial areas have not been taken into account. These are typically classified as highly sensitive landforms in the Southern portion of mine footprint.

Initial desktop investigations undertaken by AECOM in 2012 as part of the preliminary constraints, opportunities and process assessment report (AECOM, 2012) established that an area to the south of the project area (as per the project footprint at the time of the desktop study) had been recorded as a sand dune feature which is believed to be Pleistocene in age. Pleistocene sand dunes are associated with significant sites and old burial areas and are therefore typically classified as highly sensitive landforms. (Ref 1)

This highly sensitive feature is within 200m of higher order streams and rivers, all of which equate to a very high level of sensitivity for the area. This is not mentioned again and no details are provided. The question needs to be asked; was any research and ground work conducted by the proponent to check this potentially important site?

No registered historic Aboriginal CH places or historical references to the activities of Aboriginal people are located with the activity area or wider geographic region. (Attachment A) (Ref 1, page 51)

There is a whole section on historical references (Ethno-historical and historical accounts) about Aboriginal people within the wider geographic

region, and possibly in the activity area. This section is poorly written and very broad. It is also inaccurate, considering the recent finding of numerous marker ring trees, and evidence of extensive First Nation's camps throughout the associated area (from a preliminary report prepared for AV, 2018 by Gunaikurnai Man Alan Solomon - at his own expense, time and resources).

There is little knowledge about these marker ring trees beyond the community, and they are currently afforded little in the way of formalised heritage protection.

This extract explains marker ring trees:

"Watti Watti (sometimes spelt Wadi Wadi) Elder Aunty Marilyne Nicholls describes family and community connections to the river red gum forests along the Murray in the following way:

"Often, we visit to pay respect to the **sacred sites that are earthed on the land among the red gum trees.** In the forest are some really old red gum trees that are known as markers and often can be seen near a heritage site. These huge old red gum trees have massive trunks and big branches that are joined together to make a ring."

"These highly significant ring trees clearly show the extensive and important cultural heritage contained in the area with further work needed to educate and build knowledge of their connection to the broader area."

"Watti Watti Elder Uncle Doug Nicholls has explained to me that ring trees **demarcate boundaries and mark special areas on Country.** The trees mark significant cultural locations in the landscape and have been found at **"water junctions and inlets, campsites and burial grounds."**

"Knowledge of these important places which the ring trees mark could then be conveyed to visitors to Country involved in trade and ceremony. A defining feature of the Watti Watti landscape is the mighty Murray River (miilu is the traditional language term of this area for river), its tributaries, and associated floodplains." (Ref 2)

What special and important places, boundaries could the East Gippsland Red Gum Plains ring trees mark with its defining feature of the Mitchell River and associated floodplains.

“Water remains an important story associated with the ring trees, including ‘cultural flows’ - the right to water for cultural purposes. Elder Aunty Marilyne Nicholls has explained that the ring trees all hold stories and have spiritual and cultural significance.”

The Ring Trees of the Watti Watti people article shares pertinent points that directly correlate to the concerns and issues at the proposed Glenaladale Fingerboards Mineral Sand mine site:

“Its context has been disrupted by colonisation, cut-off from the broader environmental and cultural landscape, and is flanked by a road and a paddock.”

“Due to the disruption of its context, this tree has become a single “site”, rather than part of the wider cultural landscape - isolated and dislocated from its complete story. It is now a stranger in an agrarian landscape. The tree is no longer alive, impacted by the drought and lack of access to the river, although its heart-shaped ring remains visible.”

“While we don’t know how long the Ring Tree making practice has been taking place, it is likely that it halted during colonisation, which proved destructive to the continuation of cultural practices.”

“However, ring trees continue to play an extremely significant role for the Watti Watti community. According to Uncle Doug Nicholls, ring trees form a recognised place where important cultural ceremonies can take place.”

There is some work still being done by a local indigenous man to map and discover much more at the time of writing this, and it is hoped this information will be conveyed in other submissions.

The photographs are a small example of what has been discovered recently. While not directly in the mine footprint, all are within the same broader area in some cases like ring tree (1), stand alone on the roadside less than 3 km from the Fingerboards crossroads. (See map attached)

Although the specific site of the Skull Creek massacre is not known, Skull Creek is located only 6km away from the mine footprint. The catchment is within the proponent's plans to extend towards an associated railway siding transport option. This is a significant site that has never been identified, fully researched or assessed. It is possibly one of many unknown massacre sites given some of the known history and the presence of settlers such as Angus McMillan and Frederick Taylor having taken up runs in the area.

The highly significant *Den of Nargun* and *Deadcock Den* sites are less than 15km away in the Mitchell River National Park.

Approximately one third of the proposed project area is covered under the Cultural Heritage planning overlay (Attachment B).

"The region includes a number of national parks and reserves jointly managed by Aboriginal Traditional Owners, the GLaWAC and Parks Victoria. The Gunaikurnai Corporation recognises that archaeological research can be a fundamental tool in understanding relationships in past landscapes and managing places within Country. In 2017, the Gunaikurnai Corporation initiated a long-term collaborative study of Gunaikurnai Country with university-based scientists, with the management of Country through informed decision-making in mind.

> "A small-scale archaeological excavation of Wangangarra 1, a rock shelter that was not previously recognised to hold archaeological evidence, has revealed highly significant deposits spanning from before the Last Glacial Maximum to recent times, including evidence of occupation by the Old People. The results contribute to a better understanding of the Park as a cultural landscape, and demonstrate the success of respectful partnership research with local Indigenous groups as Traditional Owners." Ref (3)

EUROPEAN HISTORY

The proposed project intends to scar some of the best grazing land in East Gippsland, and threatens the viability of the rich and highly productive land on the Mitchell River Flats. This land has significant European history and First Settlement connection over the last two hundred years.

The Fingerboards has historically been a meeting place for local people and local commerce. There were extensive stockyards where the local district and its surrounds cattle and sheep were sold. Trapped rabbits were held over to be sold to buyers.

More recently it has been the staging area for emergency response vehicles and crews preparing to fight fires that have, and will potentially in the future, threaten the area.

ECOLOGY EFFECTS

The proposed heavy industrial operation of the 1600Ha Mineral Sand mine will remove significant areas of temperate grasslands and grassy woodlands. These plant communities are among the most under-represented ecosystems in Australia's conservation estate, and are recognised nationally as among the most threatened vegetation types.

The Gippsland ecological community represents one of Victoria's most threatened and fragmented endemic ecosystems. The ecological community was formerly widespread across the central Gippsland plain, but now less than five per cent of its original extent remains. Most known remnants are small - less than 10 hectares - and comprise isolated fragments surrounded by a mostly cleared, agricultural landscape.

The many old trees are culturally significant and they support totems, the birds, lizards, bats, possums, insects, fungi and water. The trees have supplied shelter and shade, food, warmth, clothing, transport and tools.

The area includes edible orchids, lilies, tubers, grains and grasses. These plants are themselves rare and or threatened and or endemic - many of them protected under State Governments Flora and Fauna Guarantee Act and federal Governments Environment Protection and Biodiversity Conservation Act.

The mature Gippsland red-gum and red-box trees are the oldest living things that remain on this fragmented landscape, they are a living link that amounts to tens of thousands of years of tree years and lives.
These old trees have antibodies and survival knowledge, built over centuries - child trees growing up under this parent tree benefit from all its knowledge of survival and thriving. Trees hold the earth and draw up the water.

CONTRADICTORY INFORMATION

There are discrepancies, contradictions and poorly worded elements contained within the document. It is missing large amounts of critical information that would be needed to determine the risk to cultural heritage and the overall feasibility of the project, rendering an assessment decision impossible.

"There are no mature native trees, notable rocks, caves or overhangs within the activity area, and so no possibility for scarred trees, rock art sites or quarries." (Ref 1, page 75)

The document then goes on to state:

> "Where access was available all potential mature trees, caves, rock shelters and cave entrances within the activity area were examined. No Aboriginal scarred trees were identified during the survey."

1. The modelling, mapping and information collection of archeological deposits to date from the proponent's cultural heritage advisors Long and Associates is somewhat confusing. It presents numerous gaps and predictive modelling limitations that they themselves have identified. (Ref 1, page 20)

a) No specific input was received on the creation of the site predictive model from relevant Aboriginal Traditional owner groups or the RAP GLaWAC.
b) Cultural value workshops were limited to a project inception meeting attended by one representative of the RAP.
c) No cultural values spatial mapping was prepared for non-archeological and or intangible heritage places.
d) Other relevant data sets known to exist were not accessible for various reasons.
e) The inherent assumption that the use of parent datasets adequately reflects the entire period of which aboriginal people were present in the area.
f) Expert knowledge of Aboriginal activities within the activity area and surroundings is based on a highly incomplete archeological record. Consequently, there are limitations to expert assessments.
g) The preliminary predictive model is limited by the fact that it represents a single modeling iteration and has not benefited from systematic ground truthing.
h) Gaps occur in the existing data sets that will likely require ground truthing

The local community fully supports GLaWAC's position that when you lose a site, it's gone forever.

The arguments presented for working within an already degraded landscape cannot stand and do not stand. The "degraded landscape" description is belied by hectares of productive agriculture and well managed native grasses, trees, other plants and considerable native fauna.

The local community will be walking beside First Nations Peoples affected by the Project and individual Gunaikurnai custodians concerned about the annihilation of cultural values. This includes concerns for the destruction of any remaining integrity of the archeologically sensitivity of cultural heritage, defined and unknown, within the proposed mine footprint and associated infrastructure.

The attitude and opinion of the Traditional Owners and GLaWAC about this industrial development on Country is critical. Should Traditional Owners reject the proposal and it is approved by the government, it will set back the fundamentals of recognition of First Nation rights and place commercial values higher than truly caring for country.

The proposed project is highly speculative in nature, unfeasible in scope with a high degree of uncertainty and complexity; not just for cultural heritage but also for destruction in the broader context of other environmental, social and economic issues. The inherent risk of this project should not allow it to proceed.

Everything is connected

Every bit matters

Don't wait until it has gone

Ref (4)

PRECAUTIONARY PRINCIPLE:

The Precautionary Principle defined as follows should most certainly be followed in this instance:

> *When human activities may lead to morally unacceptable harm that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. Morally unacceptable harm refers to harm to humans or the environment that is*
>
> - *threatening to human life or health, or*
> - *serious and effectively irreversible, or*
> - *inequitable to present or future generations, or*
> - *imposed without adequate consideration of the human rights of those affected.*

REFERENCES

1) https://www.planning.vic.gov.au/__data/assets/pdf_file/0017/9134/Fingerboards-Mineral-Sand-Project_Referral-2016-06_Baseline-Report_Attachment-2.PDF

2) https://theconversation.com/the-ring-trees-of-victorias-watti-watti-people-are-an-extraordinary-part-of-our-heritage-91310

3) https://www.researchgate.net/publication/342376418_Community_research_in_a_public_place_Wangangarra_1_rockshelter_Mitchell_River_National_Park_East_Gippsland_Australia

4) https://www.gunaikurnai.org/wp-content/uploads/gk_whole-of-country%20plan%20LR%20FINAL%20270815.pdf

ATTACHMENTS

A. Map Attachment aboriginal cultural heritage places in wider geographic area.

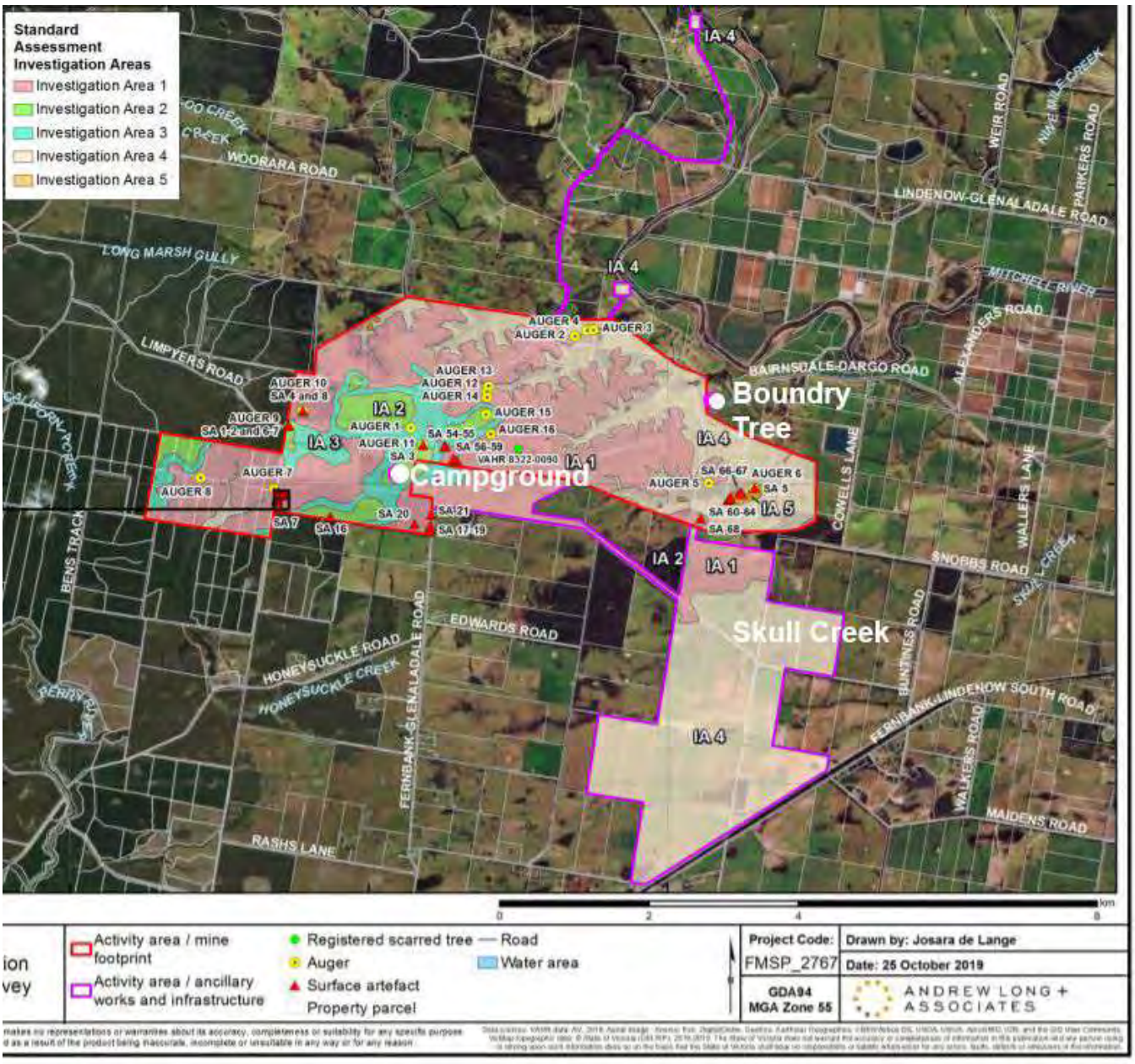


Figure 36: Original from EES document (Ref 1), additional markings by Alan Solomon

Attachment B: Culturally Sensitive Areas Overlay

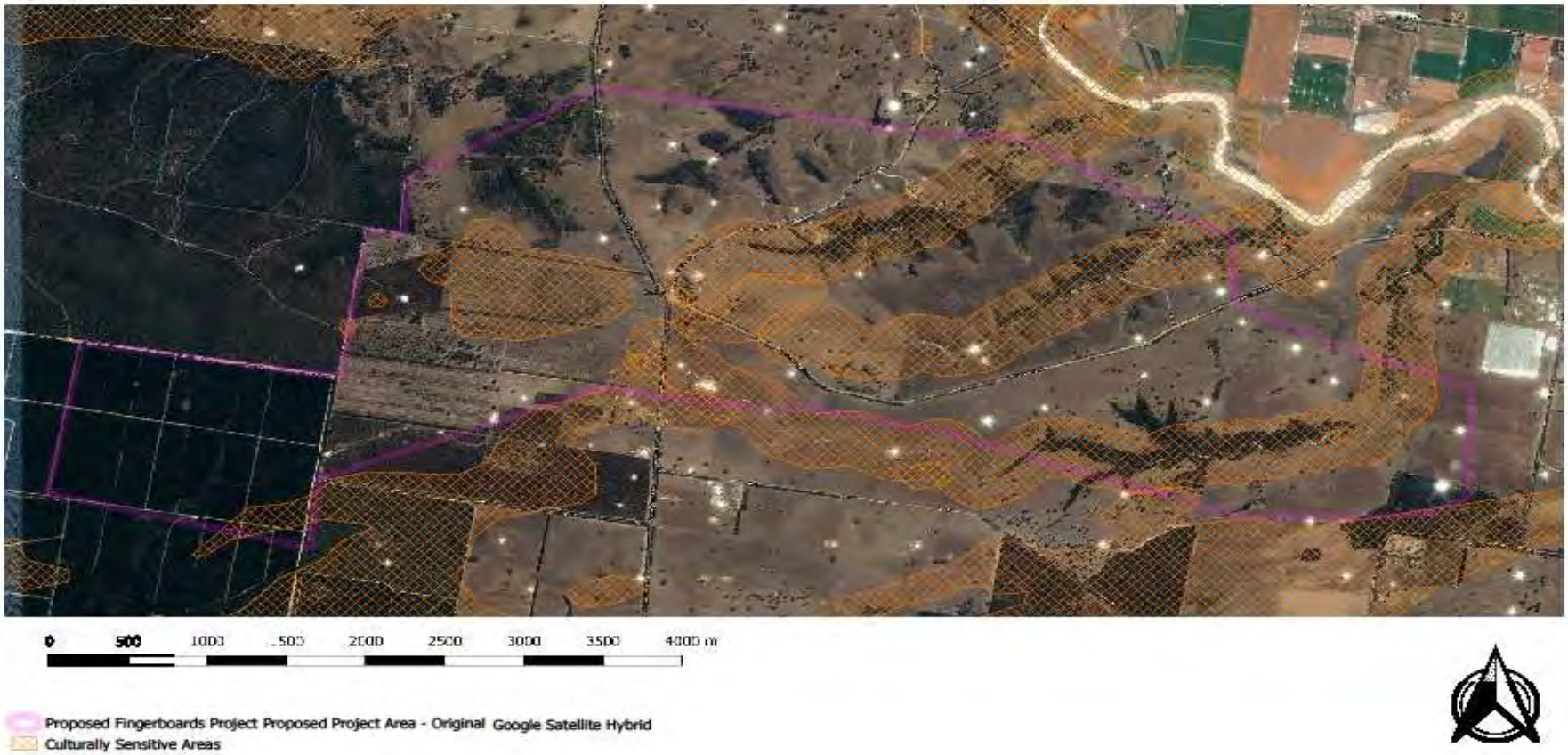


Figure 37: Data from Victorian Government Open Data Port

Chapter 14: NOISE

Table of Contents

Background

The location of the project is within close proximity to where a large number of people live. Driving through the area, the initial impression is of a rural country setting however there are many family homes interspersed down rural roads.

The community is representative of many regional communities. This region of East Gippsland, and the Fingerboards area, is known for its quiet ambience. Sounds tend to be natural and any manmade unnatural noises travel considerable distances.

The source of sound is vital when assessing the physiological and psychological effect. Regardless of volume, the calls of warbling magpies trigger a very different physiological and psychological response than does an annoying/stressing human generated noise such as a chainsaw or revving motorbike or bulldozer.

And noise itself has physiological and psychological implications for people. This is well researched, documented and also identified by Marshall Day Acoustics (MDA) the consultants engaged by Kalbar to undertake the study pertaining to noise in the EES report. It must be noted that the risk of diminished wellbeing is considerably higher than their report would suggest.

Failure to address scoping requirements

Kalbar and Marshall Day Acoustics (MDA) failed to address the full scoping requirements of the EES, rendering the document incomplete and not appropriate for an effective and full assessment to be undertaken.

They have omitted information which is relevant to ensuring an accurate assessment, and have relied on what we assert as flawed data from Kalbar on which their modelling was based. MDA have also failed to fully assess the tonal variances to noise and the impact that will have on surroundings including wildlife.

Marshall Day Acoustic were appointed by Kalbar when Dr Victor Hugo was CEO, to complete an assessment for the purposes of the EES.

The disclaimer in their report states:

"*Reports produced by Marshall Day Acoustics Pty Ltd are based on a specific scope, conditions and limitations, as agreed between Marshall Day Acoustics and the Client. Information and/or reports(s) prepared by Marshall Day Acoustics may not be suitable for uses other than the specific project. No parties other than the client should use any information and/or report(s) without first conferring with Marshall Day Acoustics. The advice given herein is for acoustic purposes only. Relevant authorities and experts should be consulted with regard to compliance with regulations or requirements governing areas other than acoustics*."

Minister's directions

The Scoping Requirements from March 2018 (Page 19, 20) follows.

4.4 Amenity and environmental quality draft evaluation objective:

To protect the health and wellbeing of residents and local communities, and minimise effects on air quality, noise and the social amenity of the area, having regard to relevant limits, targets or standards.

Key issues (edited for this submission to include only those related to noise and vibration):

- The potential for diminished social wellbeing due to exposure to … noise, vibration… during construction, operation, decommissioning and rehabilitation of the project.
- The potential for public health risks that could arise from elevated levels of …. noise during construction, operation, decommissioning and rehabilitation of the project.

Priorities for characterising the existing environment:

- Identify dwellings and any other potentially sensitive receptors (e.g. community centres, schools, recreation facilities, agricultural and tourism businesses, etc.) that could be affected by the project potential effects on… noise or vibration levels.
- Identify flora and fauna that could be affected by the project potential effects on … noise or vibration levels.
- Monitor and characterise background levels …. noise and vibration in the vicinity of the project, including adjacent sensitive receptors and along potential transport routes.
- Evaluate the existing road/rail conditions and traffic (type, volume and timing) conditions on key proposed transport routes for the project.
- Identify potential and proposed design responses and/or other mitigation measures to avoid, reduce and/or manage any significant effects for sensitive receptors, during the project construction, operation, rehabilitation, decommissioning and post-closure, arising from: … noise, vibration and lighting;
- Assess likely noise increases, vibration … impacts at sensitive receptors in the vicinity of the project and along the proposed transport route.
- Assess likely traffic volume increase in the vicinity of the project and along proposed transport routes.
- Assess likely effects to the social cohesion, health and well-being of the communities in the vicinity of the project.
- Assess potential safety hazards to the public arising from the project. Approach to manage performance.

- Measures to manage other potentially significant effects on amenity, environmental quality, health and social wellbeing (including stability of mining landforms), should also be addressed in the EES, including a framework for identifying and responding to any emerging issues."

Variance to scoping requirements as interpreted by MDA

MDA have listed on page 4 of their report that their Scope varies slightly from the above, and that "*an interactive design and modelling process was therefore required to identify conceptual operation and design measures to manage noise emissions from the site."*

"*This study presents baseline noise and vibration measurement data, derives applicable environmental criteria, and predicts noise and vibration levels from proposed operations at nearby sensitive receivers. Predicted noise and vibration levels have been compared to the environmental criteria to determine compliance*," (pg12).

Compliance is referenced often in the report and refers to *EPA Publication 1254*, released 2008, which states that:

"*These guidelines are primarily intended to be used by municipal officers to assist in the resolution of complaints or to avert a possible noise nuisance. Some guidelines have been prepared so that they could be incorporated into a permit condition of a development or embodied as a local law. The guidelines are designed, however, to be the basis of assessment and not the last word. This replaces publication TG302-92, issued July 1992*," i.e. the EPA document is a guideline only and does not set compliance levels against which a development can "pass or fail".

The other reference used in the report is *Noise from Industry in Regional Victoria (NIRV)* released 2011 which advises:

"*These guidelines provide the methods to set noise levels for industry in regional Victoria. They aim to provide a balance between protecting community wellbeing and amenity near industrial premises and supporting the social and economic value of industry in regional Victoria. The guidelines set out recommended maximum noise levels ('recommended levels'), which can be applied to manage the impacts of noise on the community*."

Unstable foundational data and absent aspects

Increased truck movements. (pg. 5)

There is also no reference to the operations of mining which is incontrovertibly a dusty and noisy industry.

While the EES report by MDA appears on the surface comprehensive, we assert that it is deficient as it is, in part, the result of flawed information being provided by Kalbar to the consultants.

Examples include, but are certainly not limited to:

- the mining itself.
- the use of the six (6) diesel generators outlined in the Landloch Rehabilitation report (Appendix A020, pg. 19) used to provide power, pending the installation of 66kV power lines to the site.
- the twenty-eight (28) portable transformers with booster pumps for slurry are cited as creating 92dB each (10.2.3 pg.72) but from our review are not included in collated data for modelling.

Heavy equipment noise levels listed in Appendix J (pg. 168) with proposed mitigation factors in place only pertain to the "top ten noise contributing sources".

Appendix G (pg. 126) references Octave Band Centre Frequency (Hz) using "manufacturers guidelines" and purported comparable equipment to what the project may utilise. The lack of consistency between measuring formats presents challenges when comparing theoretical like with like for community members who are not technical experts.

Appendix G (pg. 126) notes the gaps in modelling. Terrain data was "provided by the client for the subject site in digital format for construction and operation conditions". It is inappropriate for Kalbar which has a vested interest in the outcome to be the provider of measurement data on which conclusions have been based. MDA should have been required to gather their own independent data on which to base their assessments.

Contestable assumptions

MDA has assumed all trucks operate between 30 - 40km/hr on haul routes. There are expected to be 80 B-Double movements a day. These vehicles can be up to 26m long.

The Noise modelling information lacks reference to B-Double trucks travelling at the speed limit on open roads, or accelerating from a stationary position, as is identified as a risk mitigation intervention (TT28) in Attachment H (pg 23).

Modelling in the EES document also does not include all aspects pertaining to the proposed Fernbank Railway Siding, which is stated in the EES to be preferred by the proponent (7.3 pg. 46). The Fernbank siding has homes within close proximity, on largely flat land.

The noise emanating from the project area will vary immensely by the type of equipment being used – dozers, dump trucks, excavators, scrapers, large haulage trucks, graders and the location where they are working taking into account the elevation and varying weather conditions. The soil types they are working on range from soft sandy soils, harder denser formations, gravel and clay soil horizons – all requiring different methods and machinery requirements for extraction.

Some soils deaden the noise, but others will exacerbate the volume with the machinery needing to work "under full load" in the heavy conditions. Removing gravel generates large volumes of noise requiring the use of excavation buckets, tracks, loaders, tipping, the clattering and grinding on the hard surfaces and loading mined product. Some of the gravel and rock will need to be ripped with pneumatic rippers on dozers or excavators which can be heard many kilometres away. All of this mining is on an elevated plateau from where the noise will radiate out across the surrounding landscape.

Other mining experiences salient to this project

There is one aspect of many from the Bendigo experience that can be referenced when considering the consequences of enabling mining to occur at the Fingerboards.

The Bendigo Mine experience illustrates how tonal noise variances, regardless as to whether or not the noise levels are within guidelines, can have a profound effect on resident's health. The reports detail how the sound of laden ore trucks coming up from the mine void every 6 minutes, 24/7, created much distress due to the tonal variances. Residents demonstrated impaired cognition and judgement. It wasn't until after a concerted campaign of calls to authorities and to overnight 'on call' mine staff, that an EPA representative attended the site and experienced what nearby residents had spoken of. Change was immediate, and the operations were required to significantly reduce operating hours, enabling residents to have some sleep. The Fingerboards project intends to operate the mine 24 hours daily seven days a week which should not be permitted in such a populated area.

Noise from the Keysbrook Mine in WA had such a profound effect on nearby residents that the EPA conducted an Inquiry, publishing the results in Dec 2018 (Department of Environmental Regulation, 2018). That inquiry cited "noise characteristics such as impulsiveness, modulation or tonality may be intrusive or dominant to receivers. Where noise emissions are found to exhibit those characteristics, regulation nine provides specific decibel adjustments to be imposed on Keysbrook Mineral Sands Mine."

Acclimation as a mitigation measure

There appears to be an underlying assumption in the EES by MDA and Kalbar that those living near the proposed mine would become accustomed to the constant background noise. This is an unacceptable and an incorrect premise which relies on the surrounding community modifying their lives rather than the mine controlling its impact on surrounding residents. The proponent identified 49 sensitive receptors but MFG has identified 81 residences within 3km of the project boundary. If an average residence had 4.5 occupants in it that would equate to 365 people residing with 3km of the project. This is morally reprehensible to rely on neighbours to absorb the impacts of the proposal rather than eliminate the source.

The EES has very limited (5 paragraphs) reference in the Noise study pertaining to the health of staff and contractors. Appendix G2 (pg. 129) references the Mining Contractor Workshop internal noise level and suggests "*some form of hearing*

protection may be provided", implying that this workplace may generate a significant level of noise.

Declaration of human rights can't be ignored

Noise from mining also fails to align with basic human rights as outlined in the United Nations Declaration. (United Nations, 2020)

The International Covenant on Economic, Social and Cultural Rights further extends this. When discussing the impacts on the community around noise, the concepts of 'wealth' needs to be reiterated "In no case may a people be deprived of its own means of subsistence." (OCHCHR, 1976)

A farmer/those working the land for their subsistence rely on their senses in a manner which people living in cities never need to. Farmers use their vision, hearing and smell in particular and this provides an invaluable 'early warning system' for when things are amiss.

They need to hear to be able to hear stock in distress, identify the likes of machinery malfunctioning and note vehicles travelling on their land. At night, when vision is

reduced, hearing acuity is essential. Mine trucks at night, in constant movement, impact on a person's ability to pick the sound of vehicles which shouldn't be nearby. Or stock in distress, particularly at lambing season when fox kill is brutal and rife. (Dept of Agriculture WA, 2018)

Or to hear wild dogs, which live in the nearby Mitchell River National Park, attacking sheep. A farmer needs to avoid this happening to their stock. www.agric.wa.gov.au

This then extends to the likes of 'keeping an ear out' for thunderstorms to know when to turn off irrigation, for example, or to move stock to shelter.

Animals, such as cattle dogs, have highly attuned hearing. Several studies suggest that prolonged exposure to loud noises can cause hearing impairment or even total loss in humans. Because the auditory systems of humans and dogs are similar, noise levels that damage human hearing may have similar adverse effects on dogs. Despite the similarities, dogs able to detect sounds ranging in frequency from 40 Hz to 50 kHz, while humans can hear up to only 20 kHz. That suggests dogs may be even more at risk of noise distress than people experiencing the same environment.

Exposure to hazardous noise levels can not only cause hearing damage but lead to behavioural and physiological responses, such as a suppressed immune system, insulin resistance, cardiovascular disease and intestinal problems. (Garvey, Stella, & Croney, 2016)

Noise stress to livestock

For the farm animals themselves, as outlined in Slovak J. Anim. Sci., 47, 2014 (2): 111-123, there are significant and adverse stress reactions with animals exposed to prolonged noise and at a physiological level.

"*The most obvious effect is a general stress reaction with higher secretion of ACTH giving an increase of adrenocortical hormones in the blood (Burrow et al., 2005). Reactions occur in the circulatory system and in the gastrointestinal motility via the sympathetic nervous system. Other effects are sleep disturbances, changes in the glucose metabolism of the liver, changes in the enzymatic activity of the kidneys, and an increase of eosinophils percentage in blood, and immunosuppression."* (Algers et al., 1978; pg.115)

"Indeed, cattle, with an auditory range between 25 Hz and 35 kHz, can detect lower pitched sounds than other farm species (Heffner and Heffner 1993). Dairy breeds are more sensitive to noise than beef breeds." (Lanier et al., 2000)

http://www.cvzv.sk/slju/14_2/8_Broucek.pdf

And there's also implications for fauna. Their survival is reliant on hearing both threats approaching and detecting food sources. MDA acoustics have not assessed this factor in their EES technical report.

Summary impacts of noise

This issue with noise reiterates the impacts on wellbeing to the community. If noise levels are constant, as proposed over the 20-year life of the project, there will be no escaping the noise for the animals. And that impacts their health, thus the income generating opportunities for farmers.

Equally, quality of life for those working on farms is diminished due to tonal variances and the constant nature of the mining noise.

Mining noise and activity robs the individual on the land of their capacity to listen to their surrounds. A sense that is vital for the wellbeing of the individual, the livestock, and it impacts on wildlife in the area.

So, when summarising the scoping requirement of "Assess likely effects to the social cohesion, health and wellbeing of the communities in the vicinity of the project," it can be stated that noise will have a significant impact on the health and wellbeing of residents. An extraordinary amount of stress has already been generated in response to the mine project which is expected to be exacerbated if the mine project is approved, noise as a contributing factor.

The MDA report in the EES omitted any reference to these deeper and more complex issues and demonstrated a lack of empathy and/or understanding of what it means to be living on the land around the project site.

Failure to identify all sensitive receptors

The scope of the EES extended to "Identify dwellings and any other potentially sensitive receptors (e.g. community centres, schools, recreation facilities, agricultural and tourism businesses, etc.) that could be affected by the project potential effects on… noise or vibration levels.

Identify flora and fauna that could be affected by the project potential effects on … noise or vibration levels."

The MDA assessment identified only 13 homes within 1km of the project boundary which would be potentially impacted by noise and vibration. There are many more homes in that area. The Woodglen Primary School also wasn't identified (refer to Social Licence chapter with the map of sensitive receptors).

Birds and animals not included

There is no reference to the impact on flora and fauna in the MDA report and this translates to scoping requirements not being achieved in this domain.

Parris, K. M., and A. Schneider 2008. Impacts of traffic noise and traffic volume on birds of roadside habitats. *Ecology and Society* clearly identified the issue with increased noise and ecology.

"Traffic noise could affect bird populations in a number of ways. Acoustic interference from noise could hamper the detection of song by conspecifics, making it more difficult for birds to establish and maintain territories, attract mates, and/or maintain pair bonds (Reijnen and Foppen 1994, Habib et al. 2007, Swaddle and Page 2007). This, in turn, may reduce breeding success in noisy roadside habitats. When begging for food, nestlings may need to call louder to elicit the desired response from their parents (Leonard and Horn 2005), thereby increasing the energetic cost of obtaining food and potentially decreasing fitness.

High levels of traffic noise may also interfere with the detection of alarm calls such as those signalling the presence of predators, which could lead to higher rates of predation." (Parris & Schneider, 2008)

Of note is the presence of both nationally significant and vulnerable species. These include, but are not limited to: the Australian Grayling, Rufous Fantail and the Yellow Bellied Sheathtail Bat.

But birds aren't the only fauna species within the area. The ecological survey completed by Ecology & Heritage Partners, EES report A005, lists 117 species during their limited field surveys. And there is real concern these surveys are incomplete despite the reported hours in the field. Surveys do not account for seasonal variations given the limited timeframe in which they were undertaken.

"A high diversity of mammals was detected, including microbats, arboreal and small ground dwelling mammals and macropods. Several reptiles … were found in woodland and wetland habitats. Common frog species were detected from within tributary streams, dams and soaks across the project area.… Three conservation significant fauna species were identified within the project area ... It is important to note that additional fauna species to those listed … are expected to use habitat resources within the study area..." (pg. 54)

Noise monitoring deficiencies

The EES scope includes "Monitor and characterise background levels …. noise and vibration in the vicinity of the project, including adjacent sensitive receptors and along potential transport routes."

Importantly, MDA mapping throughout the report does not include the twenty dams which are proposed to be constructed over the mine site and takes no account of these when calculating noise transmission from the pumps used to shift the required water around the project area.

By limited MFG would maintain incorrectly placed monitoring devices were sited about the area. Monitoring was for a limited time, with vibration monitors (4 only) on site for a brief 7 days in Oct 2018. Noise logging occurred for around 12 days in May 2017 and around 14 days in Aug 2017.

MDA were provided data by Kalbar to complete this task (3.7 pg. 29). Only 6 noise monitor locations were used in assessing levels. They were as described below.

L1 is located on the project area, land owned by proponent, a house that will not be occupied during the mining process.

L2 is located on the project area, land owned by proponent, a house that will not be occupied during the mining process

L3 is located on Lucas Creek, at the eastern end of the project area. Monitor is located within a gully with two steep sided gullies on the north and south side and dense vegetation to the downhill slope – any traffic noise would have been buffered.

L4 is located on Lucas Creek along the Bairnsdale/Dargo Road.

Monitor located in a gully area where noise from the mine will pass over the top and be buffered because of existing vegetation and topography. *Pictures below show existing vegetation at L4*

> After several emails seeking details, on 22 Sept 2020 Kalbar replied, "Regarding noise monitoring – L3 was placed quite a way from the fence line (approx. 1km) and L4 right on the fence line."

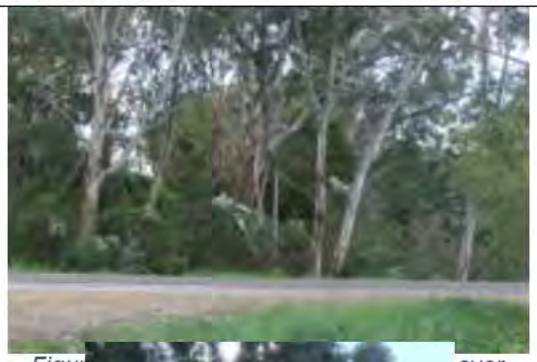
Walking 1 km through this property would have been challenging, and it's unclear if consent was obtained.

L5 in the township of Lindenow at the top of the steep road cutting coming into town.

L6 located in the township of Lindenow South.

Noise monitoring location L 4

Figure 3 ng shed



Figur over

Figure 2 all photos pertain to the one location L4 (2025 Bairnsdale-Dargo Road) – it is located in a hollow, wooded gully part of Lucas Creek

There are multiple reasons based on the information provided in the EES why the reported noise measurements are disputed as they are not representative of the experience of those who have lived in the area for many years. We suggest that measurements were taken at times of unusual activity and are not representative of the area and thus should not be accepted when making decisions with respect to the noise impacts of the mine and the current pre-mine baseline. The location of the meters would not capture accurate noise data.

Problems with location receptors and modelling

Receptor coding numbers have been kept consistent throughout the EES, as identified by Kalbar in their Summary, but the location of receptors is inconsistent between measuring for noise monitoring and air quality change.

None of the measurements reflect a consistent distance comparing chart to chart and thus raise doubt as to the relevance of some of the assessments based on this information.

Table 8.33 Air quality-sensitive receptors

Reference	Location
R1	100 m south of the project area boundary.
R5	300 m north of the project area boundary.
R6	600 m north of the project area boundary.
R7	200 m northeast of the project area boundary.
R15	300 m east of the project area boundary.
R16	900 m east of the project area boundary.
R21	900 m northwest of the project area boundary.
R29	1,100 m east of the project area boundary.
R30	300 m southeast of the project area boundary.
R31	600 m southeast from the project area boundary.
R43	1,500 m northwest of the project area boundary.
R44	1,700 m south from the project area boundary.
R47	330 m southeast from the project area boundary.

Table 8.37 Noise-sensitive receptors

Reference	Location
R1	145 m south of the project area boundary.
R5	230 m north of the project area boundary.
R6	560 m north of the project area boundary.
R7	230 m northeast of the project area boundary.
R15	220 m east of the project area boundary.
R16	920 m east of the project area boundary.
R21	920 m northwest of the project area boundary.
R29	1,140 m east of the project area boundary.
R30	230 m southeast of the project area boundary.
R31	610 m southeast from the project area boundary.
R43	1,390 m northwest of the project area boundary.
R44	1,670 m south from the project area boundary.
R47	360 m southeast from the project area boundary.

The weather conditions used in modelling are one dimensional, and don't account for specific prevailing wind conditions, i.e. speed and direction. The Fingerboards area which is on a plateau can be very blustery.

Gale and strong wind warnings are common, particularly at specific times of the year. Temperature is cited at 10 deg C in the report, but much colder conditions are common in winter. The modelling is limited and fails to provide calculations of the impacts of temperature inversion on sound transference over distance.

Vibrations and estimations

Vibration monitoring occurred at 4 locations, including alongside the railway line. The railway line to Bairnsdale has been functioning since 1888, and towns have grown around this corridor. Three (3) return trains run each weekday. There were only three other monitors, and none were located along highly populated potential transport routes, including around the Bairnsdale railway siding.

This aspect of the Scoping Requirements was not fully met "along potential transport routes" as a result of limited placement of a limited number of monitors.

Section 9.0 of the EES on pg. 64 has calculated vibrations based on British Standard BS 5228-2:2009.

2.3 pg. 5 of Assessing Vibration, a Technical Guide (2006) published by the Department of Environment and Conservation NSW, articulates the "*Orthogonal axes for assessment of human exposure to vibration*" which provides for a more thorough assessment of impacts, based on the positioning of a person (sitting, lying, standing).

"*Evidence from research suggests that there are summation effects for vibrations at different frequencies. Therefore, for the evaluation of vibration in relation to annoyance and comfort, overall weighted rms acceleration values of the vibration in each orthogonal axis are preferred.*" This is not reflected in the EES study report.

Chain of custody

One aspect not addressed in the EES is the chain of custody. Given the gravity of decisions made around this project, this is an important 'due process' in the collection, interpretation and presentation of data.

It is absolutely essential that there's total transparency around the data. Failure to provide this transparency renders the data analysis invalid in the view of the community.

"*In practice, a chain of custody is a chronological paper trail documenting when, how, and by whom individual items of physical or electronic evidence—such as cell phone logs—were collected, handled, analysed, or otherwise controlled during an investigation*." (Longley, 2019)

MDA demonstrate no 'chain of custody' in respect to the resultant graphs provided in the EES.

What evidence is there that the readings in the document actually occurred at the site? Particularly given doubts that battery life of the instruments utilised are much less than the claimed measurement periods.

Evaluate existing road/rail conditions and traffic (type, volume and timing) conditions on key proposed transport routes

For this aspect of the Scoping requirements, MDA relied on data provided by Kalbar, which raises the risk of bias in the assessment.

In essence, Kalbar have briefed Arup Consultants, who undertook the Traffic and Transport assessment and from the proponent supplied data MDA have based their predictions.

Upon examining the EES Traffic and Transport data, information from which those predictions are based is data from 2006-2012, which has been mathematically adjusted.

Section 5.3.1 Appendix A011 pg. 22 states "*While no information is available to confirm the duration for the traffic collection it is assumed that the supplied data represents AWDT*." (average weekday traffic).

These and other related notes illustrate the potential gaps in appropriate data availability identified by the consultant, and then how comparative assumptions have been used to extrapolate data which is potentially 'fit for purpose'.

MDA failed to extend their assessment to roads outside the nearby vicinity of the project area. Whilst there is mention of the proposed routes, no monitoring data is provided from along these routes. MDA stated the number of B-Double truck trips (pg. 113) as "*20 trips from the mine site each day … and the same number of trips back to site*."

And yet in 3.4 pg. 28 they cite "*no more than 40 trucks containing concentrate … are expected to leave the project area every 24 hours*," double the number stated on page 113.

Likely increases of noise and vibration on receptors in the vicinity of the project and along the proposed transport route will increase exponentially more than the proponent has identified. Not only with the B-Double trucks but associated mine traffic including mine workers vehicles, auxiliary vehicles, water pumps, lighting, slurry pump motors, and power generation adding to the increase in volume and frequency of the noise.

MDA have relied again on data from Kalbar when addressing this. Kalbar have identified B-Double trucks but 'Project traffic' fails to include increased traffic related to change of shift, supplies being delivered and such.

Whilst the Traffic and Transport report in the EES suggests, rather optimistically, that staff could catch a bus out to the site, there is no bus service available.

Whilst ride sharing may occur on an ad hoc basis, it is not expected to be the predominant means of transport. A workforce of around 120 is quoted in parts of the EES. With shifts planned for 0600 – 1800hrs.

The Traffic and Transport EES Report identifies where proposed staff might live, providing a percentage breakdown of travel direction. This, again, illustrates a high degree of assumption.

The MDA report is largely inconclusive, citing limiting factors such as at 11.2.8 (pg. 94) "*Further uncertainty with this calculation method arises due to the relatively low traffic flows on roads where the monitoring was undertaken. The measured noise levels are not likely to represent noise due to continual flow of traffic; as such they may be unsuitable to represent a 'base noise level' of traffic*."

Regardless, MDA note "*the projected increase in noise level due to truck traffic ... is significantly lower than the 12 dB threshold specified by the 'Relative Increase Criteria' contained in the NSW Road Noise Policy, for each case presented in Table 38."*

But this table pertains only to L4, L5 and L6. Kalbar, when questioned repeatedly, finally advised L4 was located around 1km from the road, which equates to being deep within the Lucas Creek area.

MDA referenced the Fernbank East Railway Siding. This is proposed to be constructed on land that is actually not owned by Kalbar.

Fig 3, (pg. 31) indicates some properties close to the proposed siding. Reporting on sound levels pertains to the movement of rail stock. There is no clear projected noise and vibration calculations for the construction phase, although the works, such as slab pouring, and railway line placement are identified.

Those living along the proposed Lindenow South route are numerous. Houses tend to be closely positioned next to the roads, and based on data from MDA, these families will experience sleep disturbance as B-Double trucks rumble by. Again, the lack of monitoring by MDA is apparent and the report relies on broad assumptions.

WHO guidelines versus NSW road noise policy

The WHO is very clear with maximum noise levels before sleep is impacted cited as "*indoor guideline values for bedrooms are 30 dB LAeq for continuous noise and 45 dB LAmax for single sound events. Lower levels may be annoying, depending on the nature of the noise source*."

Pg. 58 of the WHO document is also very specific about sleep disturbance. "*If the noise is not continuous, LAmax or SEL are used to indicate the probability of noise induced awakenings. Effects have been observed at individual LAmax exposures of 45 dB or less. Consequently, it is important to limit the number of noise events with a LAmax exceeding 45 dB. Therefore, the guidelines should be based on a combination of values of 30 dB LAeq,8h and 45 dB LAmax.*

To protect sensitive sleepers, a still lower guideline value would be preferred when the background level is low. Sleep disturbance from intermittent noise events increases with the maximum noise level. Even if the total equivalent noise level is fairly low, a small number of noise events with a high maximum sound pressure level will affect sleep."

https://www.who.int/docstore/peh/noise/Comnoise-4.pdf

The NSW Road Noise Policy 2011 also provides Guidelines on potential for sleep disturbance. This document is what MDA have used. Whilst this Policy states "*maximum internal noise levels below 50 – 55 dB LAmax are unlikely to cause awakening reactions*."

MDA cite this document which goes on to claim, "*one or two noise events per night, with maximum internal noise levels of 65-70 dB LAmax are not likely to affect health and wellbeing significantly*".

This submission would be strongly contested by the residents around the Bendigo Mine at Kangaroo Flat, as would those at Keysbrook in WA.

Page 33 of that document speaks of the impact of noise on sleep quality, and therefore mood and function. "*Both subjective and measured physiological responses have been observed following exposure to road traffic noise and low frequency noise during sleep. Subjective responses include a negative mood, reduced task performance, irritation, tiredness, less social orientation, anxiety and tension. Measured differences include an increased length of time to accomplish the transition from full wakefulness to sleep, reduced duration of deep (slow-wave) sleep, corresponding increases in rapid eye movement sleep and nocturnal awakening, and a variation in cortisol levels during sleep and after awakening in the morning, indicating a potential disruption of the body's circadian rhythm*. (Waye, 2004)

Hence, there is a discrepancy between WHO and NSW Road Noise Policy. Given the quiet rural environment where the project is located, and the wealth of experience and research behind a WHO document, MFG propose that WHO document reflects best practice and it should be benchmark used when assessing noise impacts.

Other scoping requirements

- Identify potential and proposed design responses and/or other mitigation measures to avoid, reduce and/or manage any significant effects for sensitive receptors, during the project construction, operation, rehabilitation, decommissioning and post-closure, arising from: … noise, vibration and lighting;
- Assess potential safety hazards to the public arising from the project. Measures to manage other potentially significant effects on amenity, environmental quality, health, and social wellbeing (including stability of mining landforms), should also be addressed in the EES, including a framework for identifying and responding to any emerging issues.

MDA didn't focus on this area of the EES Scoping requirements in full. However, some mitigation measures were formulated and are outlined in the EES. These measures are proposed to reduce noise impacts and need to be critiqued and explored.

Appendix G1 outlines the inputs for noise modelling, and significant information provided by Kalbar in a digital format. Of note is the (digital) terrain data, from which the Noise contour maps were generated.

The mitigation measures outlined by MDA in consultation with Kalbar assume that Kalbar will be undertaking progressive mining and rehabilitation. Whilst this has been a consistent theme during the EES, there is no guarantee this will occur.

If the rate of progressive mining and ore extracted from that area doesn't provide sufficient financial gain, there is the real potential for the mining proponent to undertake mining in a 'pock mark' manner, strategically removing the higher value ore. This change in mining activity would render the touted mitigation measures redundant.

However, for the purposes of assessing the MDA prepared mitigation measures and being mindful they may well not translate to an effective intervention, the following is a summary of the current plan.

There are 36 noise mitigation measures outlined in Attachment H.

NV03 The use of Echobarrier or FlexShield barriers may be a worthwhile intervention, but the level of dB difference these make is variable, depending on the model, installation and length of the panels. In the Echobarrier promotional video, a *very small generator* has a noise reading of 92.8 dB. Outside the barrier, which is tightly wrapped, there's an 18.7 dB drop.

However, what assurances are there that Kalbar will be able to access and install enough barriers for large 500 kVA pumping units? (MDS Barriers, 2019)

NV06, like many other mitigations, has vague references to interventions, along with comments such as "where practicable" … "be considered" … "where feasible". This leaves considerable space for interpretation by the mining company. Particularly given their hesitancy to fund an electric fence (cited elsewhere in the EES).

NV09 acknowledges that no noise and vibration sub plan has been formulated, which is remarkable given the Brief and expectation that an EES embodies evidence based best practise and has considered all contingencies. Given Kalbar were unable to correctly identify the number of Sensitive Receptors (family homes) impacted, there is doubt about that a sub plan will be formulated.

A noise complaints system is identified and the EES cites that noise complaints will be attended to within 14 days. Hardly adequate. And certainly, ineffective if past experience at Bendigo and Keysbrook are considered as evidence of a flawed system of accountability.

The experience of the Douglas Mine in Western Victoria, which has subsequently closed, noted that monitors were located in positions which diminished the reading, to the advantage of the mining company.

A Community Consultation Strategy is stated as being required. The 'consultation' processes demonstrated to date by Kalbar have been lacking. The EES has no indicators of what this might 'look like' and its accountability or function.

NV12 and NV19 relies on the assertion by Kalbar that the mining will be progressive pits, rather than a pock marked approach to extract high value ore as a priority. Earth Bunds in Bendigo were ineffective, and the mining company simply placed hay bales on top with an optimistic and misguided belief that this would diminish sound transmission. Which, as expected, was ineffective as a mitigation measure. *CSIRO Minerals Report DMR 1642A Feb 2002 pg. 35*

A suggestion that the overburden haul route will be dug 3m won't screen the vehicles which are taller than that.

NV15 suggests nearby residents could be provided with acoustic treatment, but there's no certainty as mitigation is "to investigate the need" rather than install. And even with treatments on houses, the residents move around outside, and sleep with windows open and such. It is unreasonable to expect residents to sleep with windows closed in the heat of summer to isolate themselves from noise generated by the mine's night-time operation.

NV17 features "where practicable" twice, which lacks assertive and prescriptive assurances. Particularly for works of an evening and during the night.

NV23 has "plant will be turned off when not in use" which is quite different to the proposed 24/7 operation.

NV25 has vehicles turned off after no more than five minutes of idling "where practicable". And again, how is this implemented? It relies on the drivers remembering.

NV28 with adequate and functioning mufflers is a basic requirement of any vehicle.

NV31 and the permanent power supply. There are no timelines for this and the six (6) large generators weren't part of the modelling of noise.

NV33 acknowledges that equipment will be selected based, in part, of not exceeding noise allowances. The mining company has yet to put forward a business plan, and given that, how committed are they to focus on noise generation over economics when choosing equipment?

NV34 provides no noise mitigation measures for the Fernbank East construction beyond limiting hours of work. This disregards the residents, many of whom would appreciate not being woken at 7am Mon – Sat. The land is very flat and considerable heavy works need to be completed if this option proceeds. The land isn't owned by Kalbar.

Conclusion

Kalbar, and those associated with the Noise and Vibration report, have demonstrated a lack of due diligence when compiling this document.

Some data gathering techniques are contested as being inadequate.

There is insufficient identification of the multitude of sources which will be emitting noise within the mine site, adjoining service corridors and designated transport routes.

The validity of the baseline data and modelling of the impacts of the operating facility are questioned.

Mitigation measures are considered inadequate. Should progressive rehabilitation not occur (based on the track record of other companies this is a real possibility as there is no legislated requirement for this to occur) the mitigation strategies have not addressed this possibility.

Having an industrial mine that will be operating 24 hours daily located within a residential area is unacceptable and will arise in significant noise complaints and health impacts for residents, animals and fauna. This is an unacceptable situation and must not be allowed. Mineral sands mines in other locations such as in Western Australia were not allowed to operate throughout the night.

Chapter 15: TRAFFIC AND TRANSPORT

Contents

Executive Summary

The relevant draft evaluation objective for traffic and transport is 'Social, land use and infrastructure: *To minimise potential adverse social and land use effects, including on …transport infrastructure.'*

Reviewing the relevant EES documents, the Proponent has not adequately addressed and mitigated risks relating to traffic and transport for this project. Mineral sands are available for extraction in other locations that pose significantly fewer risks pertaining to transport infrastructure. The Proponent has not adequately addressed the Scoping Requirements required by the Minister which are detailed below.

Data related to Traffic and Transport is ineffectively or incorrectly gathered and risks not fully assessed, identified or effectively mitigated. This renders the Traffic and Transport assessment by the Proponent incomplete and an informed recommendation on the proposed transport route for the heavy mineral concentrate was not determined as a result. Given these factors and the overwhelming and serious concerns from impacted landholders and the wider community, this project is unsuitable to proceed.

It is the legislative role of the government as outlined in their Scoping Requirements (2018, p 13) to safeguard the community by ensuring the Proponent will "*minimise potential adverse social and land use effects, including on agriculture, dairy, irrigated horticulture, tourism industries and transport infrastructure.*" There is no confidence in the Proponent's ability to meet this requirement.

Primary concerns and issues are outlined below.

Kalbar and their paid consultants have demonstrated a poor understanding of the local community, their needs, current infrastructure and other pivotal aspects of concern in their EES submission. Impacts include: loss of existing road use and risk of dislocation of residents in the mining footprint; loss of access to move stock and recreational vehicle users; and loss of cultural, financial and social significance of current road infrastructure.

Safety issues are not sufficiently addressed around vehicle movements, with the potential for catastrophic crashes and environmental damage from spillage or dust and mud contamination. In some cases, the risks are not addressed at all.

Kalbar and their paid consultants have minimised the very real risk to human and environmental health due to their proposed infrastructure changes, increased traffic volume impact as well as transportation of dangerous materials over the life of this project.

The Proponent's plans are highly likely to continually damage road surface integrity, adding an extra danger to road travellers and costs and responsibilities to repair, which are not clearly outlined in the EES.

Costs associated with the traffic and transport requirements of this project are not clearly demonstrated including an absence of clarity around how Kalbar propose to fund their infrastructure claims. It is not clear what costs for road and rail creation, upgrade and long-term upkeep will be paid by Kalbar/the mining company themselves, the relevant shire (East Gippsland, Wellington etc.) therefore ratepayers, or the State Government in Vic Roads.

Environmental aspects are of serious concern with the loss of vital roadside vegetation, wildlife corridors as well as the risk of roadkill of native birds and animals.

By not addressing the above key concerns and others, it questions the risk analysis and formulation of mitigation. Doing so identifies gaps, minimisation and contradictions in the Proponent's key claims. Scoping requirements related to the above concerns are not met. Appropriate data collection, relevant legislative reference and resources are heavily lacking by Kalbar and their paid consultants in the EES report. There is a severe lack of transparency of data in the EES.

The Traffic and Transport report was commissioned by Kalbar utilising Coffey Services Australia to liaise with Arup's team from the Melbourne office. Coffey were tasked with collating the EES documents on behalf of Kalbar. Coffey/Kalbar cites in their EES report the following disclaimer '*this report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party*.' Given this disclaimer, it raises serious questions about what instructions were given and the adequacy of those instructions. If the information cannot be relied upon, what use is their report and indeed how valid are their findings?

When analysing the merit of the EES report it is prudent to focus on the definition of '*Effects*', as stated in the Scoping Requirements for this project outlined by the Victorian Government (Department of Planning) which states: "Effects include direct, indirect, combined, consequential, short and long-term, beneficial and adverse effects" (2018, pg. 8). The information contained within the EES fails to acknowledge and address this definition in its entirety. This definition clearly identifies that effects can be profound and long-lasting.

In the Introduction, pg. 8, EES, the scope of study 'investigates the traffic and transport impacts of the proposed mineral sands mine and associated infrastructure during the construction and operation phases of the project.'

The stated objectives of this traffic and transport impact assessment study are to:

- Define the criteria relevant to the study, including standards, legislation and guidelines
- Characterise and describe the existing road network, traffic conditions and existing transport infrastructure in the study area
- Provide an overview of the project and impact assessment approach
- Identify potential impacts on traffic, roads and transport infrastructure associated with the construction and operation of the project
- Identify and propose appropriate measures to avoid, reduce, manage and mitigate the identified impacts.

These stated objectives do not adequately cover the requirements stated in the EES Brief as requested by the Minister. This is critical and the deficiencies are brought out here.

Specifically, the study does not comment on, or analyse to an adequate standard:

- Dislocation effects to local agriculture and horticultural businesses, recreational and social activities and access to the Mitchell River National Park.
- Potential for impact on current and future uses.
- Partially identifies effects on potential for changes to local infrastructure like roads.
- Partially identifies effects on expected damage to local roads and influence on safety.
- Limited detail on costs and responsibilities relevant to creation, upkeep, maintenance and rehabilitation of traffic and transport aspects.

When assessing a project of this size and complexity, a balanced and 'real time' understanding of the nuances of the area is essential. This isn't reflected or evidenced in the bulk of this report. The risk register repetitively provides a self-determined assessment of 'low risk' on crucial major risk aspects of the project without providing sufficient evidence and rationale as to how that was achieved.

Existing Community, Traffic and Transport Conditions, Infrastructure and Needs

Kalbar and their paid consultants have demonstrated a poor understanding of the local community, their needs, current infrastructure and other pivotal aspects of concern in their EES report. Scoping requirements that the Government has specified related to these concerns have not been met, in particular Kalbar were required to:

(p. 10)

- Detail worker travel

(p. 19)

- Evaluate the existing road/rail conditions and traffic (type, volume and timing) conditions on key proposed transport routes for the project.
- Identify dwellings and any other potentially sensitive receptors (e.g. community centres, schools, recreation facilities, agricultural and tourism businesses, etc.) that could be affected by the project's potential effects on air quality, noise or vibration levels.
- Assess likely effects to the social cohesion, health and well-being of the communities in the vicinity of the project.

(p. 20)

- Assess likely traffic volume increase in the vicinity of the project and along proposed transport routes.
- Characterise the current traffic conditions (including site access) and road infrastructure (including arterial and municipal roads) and road users in terms of capacity, condition and structural integrity, travel times, safety and accessibility.
- Describe proposed transport routes and infrastructure, its ability to accommodate traffic generated by the project, as well as other predicted future demands.

- Describe he potential for dislocation due to severance causing reduced access to farmland, businesses, social networks, community facilities and the Mitchell River National Park.
- Address the potential for adverse effects on the existing and future land and beneficial uses, including agricultural, dairy, irrigated horticulture, forestry, tourism and local businesses.
- Characterise the social structure of the local communities including population, demographics, employment, infrastructure, community groups, housing/accommodation availability, etc.

(p. 21)

- Outline measures to minimise potential adverse effects on local communities and infrastructure.
- Outline measures to minimise potential adverse effects to local businesses and to enhance potential benefits to local and regional businesses.
- Describe any further measures that are proposed to mitigate, offset or manage social, land use and economic outcomes for communities living within or in the vicinity of the project area, as well as proposed measures to enhance beneficial outcomes, including in the context of the EMF (see section 4.9) in view of the project's expected long-term operations life.

(p. 22)

- Describe changes to the landscape (including from vegetation clearance and likely changes to landform) and associated visual effects, as well as public views from roadways used by tourist traffic and other significant vantage points, in particular on the Mitchell River National Park.

Kalbar have failed to address any of the above scoping requirements to a satisfactory standard. Throughout Kalbar's preparation for the EES and their so-called 'Community Consultations' they have repeatedly ostracised and enraged affected landholders, local residents and the broader community. Looking at the top news results from a Google search on Kalbar Glenaladale gives an indication of those reactions. Some examples are shown below:

- "Kalbar mine proposal sparks worries for Lindenow Valley's vegetable farmers," ABC Gippsland, 26 Oct 2020
- "Glenaladale and Mossiface residents protest mineral sands exploration," The Weekly Times, 3 Dec 2014
- "Resource Wars: Communities take a stand against new quarries," The Age, Jul 19, 2020 accessed 26 Oct10 2020
- "Mine plan divides Gippsland community with claims of harassment and intimidation" ABC Gippsland, 28 May 2018, accessed 26 Oct 2020

Many impacted landholders have never been contacted or consulted by the company and often learn of major road changes over their properties 'second hand' after Kalbar releases a new planning map. The overwhelming majority (85%) of landholders and nearby residents within 3km of the mine boundary oppose this mine and believe it will only damage the local area long-term.

In relation to Traffic and Transport, key impacts on the community are as follows.

Loss or relocation of existing roads which are of cultural, financial and social significance: These roads are deemed 'fit for purpose' for current use. These roads, such as the Fernbank-Glenalalade Road are used by local traffic and tourists to enjoy the visual aspects and familiar sites of the area, on the way home, to work, or visiting key sites such as the Den of Nargun, on the way to key tourist destinations such as Paynesville, Lakes Entrance or Dargo. For many local residents the familiar landmark of the “Fingerboards” is incredibly significant. Familiar routes are used to get to 'town' (Bairnsdale), for trips to Melbourne and visiting family and friends in the local area. Timeliness and route of convenient travel with a pleasing road aesthetic is very important to local landholders.

Loss of access to move stock (droving) on foot between properties and for recreational and farming vehicle users: Historically much of the mine footprint belonged to a few families who held station runs of land. Over time these plots have been divided but many remain within the same families, meaning stock are transported on foot between family properties and key infrastructure such as shearing sheds, yards and loading ramps are shared as needed. This is a key aspect of farming and maintaining social and family cohesion and tradition.

Roads in their existing layout play a vital role in relation to social structure of community: For generations these roads have served as tangible routes for social and family networks. Local children became friends with the kids a couple kilometres down the road who they could ride their bike or horse to visit. Being able to walk or ride to the local Cricket Club (The Glen) provided key social independence for generations of teenagers to enjoy sports and functions. Exploring the quiet roadsides and vegetation is key to building life skills for local children and teens. Travelling safely in packs on the roadside on foot, bike or horseback is an idyllic memory of most Glenaladale residents for many generations. Never too far from a familiar farm if help was needed.

The existing network of roads is obliterated with destruction of significant cultural and historic sites: This plan dislocates residents and reduces access to farmland, businesses, social networks, community facilities, agricultural transport (e.g.: droving and transporting stock, vegetable and hay movement), recreational road use and tourism use such as to the Mitchell River National Park. The Fingerboards junction will no longer exist. There will be adverse effects on the existing and future land and beneficial uses of existing road infrastructure including travel and transport for agricultural, dairy, irrigated horticulture, forestry, emergency services as well as travel for residents, tourism and local businesses.

The destruction of the Fingerboards intersection is unacceptable for a number of important reasons. It has been a cultural, social and locally significant landmark and point of intersection for the last century. It has been easy to access for locals, a meeting place fit for current purpose. Visitors to the Den of Nargun, Mitchell River National Park and Echo Bend Caravan Park frequently use the scenic Bairnsdale to Dargo road and stop off at the Fingerboards pullover when meeting up with others, or to gain greater local knowledge of the importance of the area through the information on display.

The EES boldly claims the Fingerboards intersection is 110 km/hr which is incorrect, and that it is dangerous. However, there is only one accident on the Arup charts near that location, and it's east of the intersection. It is considered these matters were incorrectly stated in the EES report to justify moving the road and introducing a roundabout.

The important role of the Fingerboards intersection for emergency services (as outlined under Road Safety concerns section below) has not been addressed.

Proposed drastic changes to the existing infrastructure in the project area and in its vicinity, particularly the proposed changes to local and regional roads or rail which will not only ruin the area for existing amenities but also permanently alter the landscape: In their EES Kalbar have failed to characterise the existing and planned land use and the existing beneficial uses within and in the vicinity of the proposed project. They do not have local knowledge of the current traffic conditions (including site access) and road infrastructure. They also have not demonstrated any understanding of road users in terms of capacity, condition and structural integrity, travel times, safety and accessibility. There has been limited to no consultation with locals and this shows with the lack of local knowledge. For example, the roads currently used that they seek to permanently alter are for agriculture – transport of vegetables, stock movement (including droving stock along the local roads), machinery and for everyday commerce and social use. The study does not mention current use except as figures in a table.

The assertion that the 'majority of intersections remain the same in principle' is absolutely not correct: Permanent road changes including the proposal of a roundabout on nearly every major intersection. Proposed changes are permanent and hugely impact the current fit-for-purpose usage of the local roads.

Lack of local knowledge results in unrealistic mitigation measures: Another blatant example of lack of local knowledge of traffic is the repeated key recommendation that the mining workforce can travel by bus to the mine site. This presents challenges as there are no public buses which travel to Glenaladale. This proposal is mentioned as a mitigation measure in the self-assessed register. Again, it's a moot point as there is no public bus to Glenaladale. '*The construction environmental management plan and environmental management plan will include measures to encourage personnel to travel to and from the mine site by bus, or to carpool,*'(TT22).

In the EES report (p 44) indicates further the poor understanding the Proponent's consultant has of local conditions, and the absence of effective consultation with stakeholders, an issue also identified in Peer Reviews. 'Overall impact is expected to be low.' There has been no consultation with locals impacted who feel that the impact will be significant with the transfer of vegetables, stock, machinery and for social events and commerce. 'Impact on overall travel times is minor,' is just an unfounded statement.

The Traffic and Transport EES report has failed dismally to address the assessment process: Again, the definition of 'effect' must be brought to the fore: "Effects include direct, indirect, combined, consequential, short and long-term, beneficial and adverse effects." Land use and existing beneficial users were defined in a particularly narrow scope, with reference to schools and sporting events.

But no consideration was given to landholders who may move stock or equipment at a slow pace. The roads are used to move stock on foot between Glenaladale and Fernbank. “In addition to delay on road links, road diversions that are proposed to facilitate mining activities will potentially introduce delay to road users on particular segments of the network.” Indeed, current roads are fit for agricultural purpose. Why do local residents have to suffer significant delays, inconvenience and loss of stock transport routes on foot at the expense of a mining company.

The Traffic EES (3) omits key traffic data including the existing usage. There is limited and sometimes no details in the EES of existing use for droving sheep and cattle between family farms and to shared shearing sheds, to yards for care and loading areas for transport to market. The cost to truck this livestock is prohibitive and unnecessary when local roads are fit for purpose. Agricultural vehicles are not mentioned. Nor are tourism drives to Dargo and the Den of Nargun seeing sleepy roads filled with convoys of tourists on weekends and holidays. No mention of cyclists who frequently use the Fernbank Glenaladale/Bairnsdale Dargo roads for training and competition. Motorcyclists are not mentioned even though most-weekends they use the Fernbank Glenaladale Road to tour to the Den of Nargun as well as recreational road users (4WDs) who use the Fingerboards as a key meeting point to continue their adventure into the high country.

Kalbar have not outlined measures to minimise potential adverse effects on local communities and infrastructure. They also have not outlined measures to minimise potential adverse effects to local businesses and to enhance potential benefits to local and regional businesses. In the EES Kalbar have provided a grossly substandard assessment of likely effects, based on their own risk matrix and irrelevant legislation and data. In their EES Kalbar have addressed the wrong year of legislation, citing the “Transport Integration Act 2010” when the current Act is 2020. It appears the most recent Act has not been utilised. The purpose of this is to facilitate “an integrated and sustainable transport system that contributes to an inclusive, prosperous and environmentally responsible State” (part 2, Section 6, pg. 31). The Act discusses a coordinated approach to services and enables equity of access. In not applying this legislation Kalbar has demonstrated poor understanding of community needs, current infrastructure and other pivotal elements.

Traffic volumes noted in the EES claim to identify 'peak traffic generation' for volumes which is incorrect: There is no calculation for the peak school holidays/public holidays when traffic is dense and persistent. Over Christmas and Easter, the Princes Highway and roads through Bairnsdale are at a stand-still or crawl pace. How will the mine traffic impact on this? With scant regard for the established traffic volumes and behaviours, to consider the impact of 3 – 4 extra B-double trucks each hour as “negligible” reflects a metro-centric view of traffic volumes and community expectations. And with increased traffic comes a range of heightened risks, which seem to have been mostly ignored when formulating the EES. Current traffic conditions were assessed using vague or incomplete data, and a combination of 2 site visits (2017, 2018), desktop data and information provided by the Proponent. For example, travel times didn’t feature in the narratives or graphs.

Their risk measures have been examined (see Appendix 1) and fall short of feasible interventions: Kalbar have not described the potential effects on communities living within or near the project area in terms of potential for dislocation, severance or disrupted access to social networks, community facilities and valued places. Kalbar have not assessed the potential effects on the land use in the vicinity of the project, in terms of the extent, duration, likelihood and implications of effects. Kalbar have not described any further measures that are proposed to mitigate, offset or manage social, land use and economic outcomes for communities living within or in the vicinity of the project area, as well as proposed measures to enhance beneficial outcomes, including in the context of the EMF (see section 4.9) in view of the project's expected long-term operational life.

Further afield there are gaps in provision of detailed assessments of impacts on vaguely detailed multiple proposed transport routes outside of East Gippsland with Barry Beach and unsuitable seaport because of its depth: These roads are the Princes Highway (outside of EGSC), South Gippsland Highway, Barry Road and Alexander Road. Local communities and road users in these areas deserve a right to respond to proposed routes through their towns and on these roads. Even with no local knowledge of these alternative transport routes you can quickly identify serious flaws in Kalbar's proposal. For example: with the Barry Road/ Alexander Road proposal it is stated by the Proponent that the proposed route aligns with their 'strategic role in the transport network' so this not assessed. However, it is not detailed what legislation they refer to. Interesting that this route is dismissed as somehow 'pre-approved' for such transport to port. When – most importantly, the port is not even suitable for this purpose. Barry Beach is a known shallow water port with vessels only up to 7000T allowed to dock. For Kalbar's purpose they need a deep seaport. So why Barry's Beach is even listed as an option is mind-boggling. When details and justifications are not forthcoming it is impossible for residents local to these areas to prepare a response.

Traffic and Transport – Road Safety Concerns

Throughout the EES, the Proponent continually fails to address safety issues and concerns. Key road safety issues outlined in the Scoping requirement and voiced by local and community residents include large increases in vehicle movements, potential for catastrophic crashes and environmental damage from spillage or dust and mud contamination. Other key road safety issues are risk to locals and other users from increased volume of light and heavy vehicle traffic to the mine site. Another key issue is emergency access consideration.

Scoping requirements detail the following requirements relevant to road safety of the Proponent Kalbar in their EES to:

(p. 9)

- Detail plans for transportation and storage of hazardous material on-site and off-site.

(p. 16)

- Describe further potential and proposed design options and measures which could avoid or minimise the risk of spills or failure of the mine infrastructure (i.e. transportation spills).

(p. 19)

- Assess potential safety hazards to the public arising from the project.
- Potential for diminished social well-being due to exposure to dust, air pollution, noise, vibration, lighting, radiation, hazardous materials and public safety (including fire) and transport hazards during construction, operation, decommissioning and rehabilitation of the project.

(p 20.)

- Describe existing emergency response infrastructure and resources.

(p 21)

- Identify in detail the proposed transport routes' impacts on road safety and operational performance of the existing road infrastructure, considering all project vehicle types, traffic volumes and movements and need for installation of any proposed mine infrastructure along or across the public road network during the project construction and operations.
- Describe and evaluate the proposed traffic management and safety principles to address changed traffic conditions during both construction and operation of the project, covering (where appropriate) road safety, temporary or permanent road diversions, different traffic routes, hours of use, vehicle operating speeds, types of vehicles and emergency services provisions.

(p. 25)

- Detail the proposed objectives, indicators and monitoring requirements, including for managing or addressing: - traffic during construction and operation.

In the Traffic and Transport EES report: Kalbar have failed to meet the scoping requirements. They have not demonstrated real consideration or understanding of increased safety risk to local users and wildlife due to increased volume of light and heavy vehicle movements. Language throughout the report is deliberately and offensively minimising with regards to the potential impact the proposed increase in traffic will have on local users. Road infrastructure plans detailed in the EES are not suitable to local conditions and purposes, in fact they obstruct local landholders from ease of access to their properties and increase the risk of travel in the local area.

There is anticipated to be a significant increase in traffic on the Princes Highway plus local roads leading to increased risk to safety in terms of possible collisions, accidents and road degradation. Kalbar estimates 150 return vehicle trips per day during peak construction activities, the majority of which will be light vehicles travelling to and from site from Bairnsdale, Stratford, Briagolong and further afield. During the operations, the EES Traffic report (p. 15) describes that there will be 120 return light vehicles and 40 return B-doubles. This is a huge increase from current use of these roads and will lead to 24/7 traffic. This is considerable additional strain on the roads, which would reasonably lead to significant delays and increases in risk to local traffic.

In Section 6, the proposal acknowledges most likely staff will drive themselves to work, rather than ride share. This adds to the burden of traffic and increases in road safety risk. Desktop analysis of information provided by Kalbar and Coffey (table 10) on page 29 with broad assumptions about where staff will come from.

Interestingly, the notes around Assessment Methodology for 'intersection performance' are based on US Department of Transportation, Federal Highway Administration (FHWA) Capacity analysis for planning of Junctions (Cap-X) then used SIDRA (Australian software). This is not an Australian Reference, with Austroads a more relevant option: https://austroads.com.au/

As characteristic of other reports in the EES, significant deficits exist in data and graphs. Appendix B 1 All projected traffic movement graphs is a projection and not based on current data. Assumptions made around traffic increase on the Princes Hwy and assessment based on Yr 10 of the Project. Data "based on factored 15-minute surveys," (taken Oct 2018).

Appendix B2 is so poorly presented it defies belief that this is representative of best practise. It appears to be a series of screen shots, with limited identifying data. Of note is that truck volumes have remained largely stable, and the Proponent is expecting to add 80 x return trips per day to the road volume load. To suggest the increase in Double B traffic will be negligible is inaccurate. Questions arise around the method of collecting data, and the location at which vehicle traffic was assessed.

Appendix C is around workforce Origin Distribution and "based on advice from Coffey/Kalbar". To suggest that either of these companies can predict where their workforce lives is amazingly optimistic.

Of note Briagolong, which according to 2016 Census has 301 families. The Proponent describes a projected 32 workers coming from Briagolong. Whilst average age is 43 years (6.7%), there are 123 (11.3%) aged 55 -59 years, and 100 (9.2%) aged 60 – 65 years. The home location of potential staff seems an arbitrary measure, with little reflection of what might actually be, and fails to acknowledge the potential for FIFO (fly in/fly out) workers. The FIFO option has been raised by the Proponent in discussions with the local airport and EGSC, as noted in the new Bairnsdale Aerodrome Master Plan.

Chapter 3 of the EES reflects projected traffic 10 years after the project begins, but there is no reference to the years before this.

Existing emergency management infrastructure is not detailed. Real emergencies have found the existing infrastructure serves the local community in case of emergencies. Kalbar has not demonstrated their proposed road changes will meet the needs of the local area with traffic changes in case of emergency e.g.: major traffic incident, bushfire etc. Bushfires were experienced in 2014 with the Mount Ray fires plus historical bushfires and traffic incidents where the Fingerboards intersection served its purpose with ease of access for Emergency services to Glenaladale, Woodglen, Fernbank, Dargo and upper Glenaladale.

The Fingerboards is used for emergency access for vehicles and a major point of reference and access to linking properties. It has been a vital staging area for the Alpine fire 2003, Great Divide fire 2006/7, Mt Ray fire 2013, Dargo fires 2018 and the Black Summer fires 2020.

Figure 1: Fingerboards crossroads Intersection. Signage clearly landmarks directions for Emergency Services.

Figure 2: Fingerboards Shelter – Emergency meeting point and Information

Coupling the Proponent's proposed major road changes, destruction of the Fingerboards significant landmark and intersection, slow traffic, B-Double trucks and mining traffic to a disaster could make it catastrophic in terms of response time and further risk to respondents to access local areas safely and in a timely manner.

There are no details on the impact of road barriers on the Princes Highway and safety/visibility issues and impacts of the failed road upgrade – causing numerous accidents including trucks and truck fires.

And this raises a life-threatening issue with emergency access. There is a clear risk of major car accidents and this hasn't been identified in the risk assessment. The risk assessment omits to include reference to what happens in the case of an emergency and one of their trucks is on the road, or overturns and there's spill. Emergency response infrastructure and resources was limited to advising emergency services when roadworks were to occur, and give them priority access, which is helpful in a life-threatening situation, and standard practise. Indeed, a legal requirement. No mention of management plans for accident, breakdown, or spills.

Kalbar has not satisfactorily met the scoping requirement to describe and evaluate the proposed traffic management and safety principles to address changed traffic conditions during both construction and operation of the project, covering (where appropriate) road safety, temporary or permanent road diversions, different traffic routes, hours of use, vehicle operating speeds. This is because their report is lacking in relevant data and local knowledge of traffic conditions.

Another key safety issue not met by Kalbar is addressing road safety in relation to road topography, roadside environment and other road users including slower agricultural vehicles. There was no mention of stock on roads moving from paddock to paddock and for treatment in yards and sheds as is common in this area and how that might be impacted by increased road traffic.

The mitigation measures provided in the EES are generic in nature and relate to "minimum practice or legislative requirements" (pg.15) before additional measures were recommended. The EES has presented frequent examples of substandard assessment and documentation, and one of these being risk mitigation measures for the Forge Creek Rd area identified what would be undertaken at Lindenow South. This changed the risk rating from major to high, and it wasn't even at the correct location! (pg. 7). In their EES Report the Proponent and their funded consultants have failed to address the scoping requirements and serious concerns of the local community in their Traffic & Transport report. Therefore, their report does not provide a solid foundation to make an assessment relevant to the local community, their needs, current infrastructure and pivotal aspects relevant to traffic and transport.

The desktop survey has failed to appropriately address local road limitations. Kalbar's Traffic EES Report (p. 2) states that 'while the Racecourse road (route) is not currently B-Double approved, it is the only option which avoids passing through the major activity areas of Bairnsdale,' (p. 2). The same report goes on to state that the Cemetery bend on Racecourse Road is not capable of B-Double truck movement in a safe manner including risk of head on collision and veering into oncoming traffic. It then goes on to detail that further investigation, stakeholder consultation and design is required prior to finalisation.

Therefore, there is no point speculating on a non-determined or remotely planned route option (2). Further assessment of this route fails to demonstrate the local knowledge of this incredibly busy stretch of road which takes commuters from Sale, Paynesville, Forge Creek to the 'top end' of Bairnsdale every day. Locals know that traffic is backed up on this road and care must be taken at the roundabout due to heavy traffic loads.

The EES document provides no indication for how driver risks such as drug and alcohol testing, driver fatigue will be tested in the proposed Transport Operational Management Plan (3) so how can the community be assured that mine drivers will be using local roads safely?

Proposed risk mitigation for truck transport includes not travelling during 'school drop-off and pick up' when events such as the footy and races are on. How is this feasible in an operation? Given there are a varying number of schools on any given proposed route – of 4 vastly different options! Depending on the route at any given time during the day mining trucks and workforce light vehicles will be travelling through school zones. It is not a feasible or practical mitigation measure, therefore leaving the risk to pedestrians including children and parents open.

The multiple (four) options of different transport routes and the vagueness of detail of each is a real weakness of Kalbar's transport plans and puts the whole proposal to increased scrutiny. Contradictory and assumptive arguments in the EES of 'might be' plans leads the community to have no faith in Kalbar's plans. Nor does it provide any assurance as scoping requirements are not close to being met. It is incompetence. And reiterating that along with the EES report being invalid, the risk mitigation measures are insufficient, negating their purpose as a risk assessment tool for liability purposes.

Long term – Human and Environmental Health Risks

Kalbar and their paid consultants have minimised the very real risk to long-term human and environmental health of their proposed infrastructure changes and increased traffic volume – noise, pollution, air quality, lights and vibration impact as well as transportation of dangerous radioactive materials and potential of exposure to residents and travellers.

Scoping requirements (2018) by the Victorian Department of Planning detail the following relevant requirements that the Proponent must plan for:

(p. 9)

- Detail extent of areas to be disturbed during site establishment and construction, including total area expected to be cleared, particular requirements for traffic and floodwater management, dust and noise management, as well as for sensitive environmental locations.

(p. 10)

- The technical feasibility and environmental implications of alternative construction, mining, ore processing, tailings management and site rehabilitation methods; and relevant alternatives for electricity, water, gas and fuel supply, transport of products and workers and solid and liquid waste disposal.

- Identify potential and proposed design responses and/or other mitigation measures to avoid, reduce and/or manage any significant effects for sensitive receptors, during the project construction, operation, rehabilitation, decommissioning and post-closure, arising from: — specified air pollution indicators; — noise, vibration and lighting; — adverse changes to the background radiation levels in the vicinity of the project (including the radionuclide content of vegetation, surface water and groundwater);
- Public safety hazards.

(p. 19)

- Identify flora and fauna that could be affected by the project potential effects on air quality, noise or vibration levels.
- Monitor and characterise background levels of air quality in accordance with PEM requirements, including air pollution indicators (dust, PM10, PM2.5, crystalline silica, metals, and greenhouse gas emissions from equipment) in the context of the dispersive soils within the project area, noise and vibration in the vicinity of the project, including adjacent sensitive receptors and along potential transport routes.
- Potential for diminished social well-being due to exposure to dust, air pollution, noise, vibration, lighting, radiation, hazardous materials and public safety (including fire) and transport hazards during construction, operation, decommissioning and rehabilitation of the project.
- Potential for public health risks that could arise from elevated levels of airborne pollutants and noise during construction, operation, decommissioning and rehabilitation of the project — public safety hazards.
- Assess likely noise increases, vibration and lighting impacts at sensitive receptors in the vicinity of the project and along the proposed transport route.
- Assess likely radiation effects associated with the project during operations, rehabilitation, decommissioning and post-closure.
- Assess likely traffic volume increase in the vicinity of the project and along proposed transport routes.
- Assess likely effects to the social cohesion, health and well-being of the communities in the vicinity of the project.
- Assess potential safety hazards to the public arising from the project.

As shown in the above scoping requirements, Kalbar was expected to provide sufficient details of their measures to minimise long term risks to health and well-being of impacted humans, the environment and flora and fauna. This has not been demonstrated to any suitable standard in the EES.

This project has already seen significant anxiety in the local community around potential for radiation increases, risks in traffic increases as well as long term damage or destruction to the roadside environment and habitat. Locals have repeatedly stated grave concerns about impact of traffic noise, vibration, dust and pollution. The area is presently appreciated for being dark and quiet at night-time. 24/7 traffic on and off-site will ruin the peaceful amenity of the area. It could also lead to serious health concerns.

Human health and well-being is likely to be negatively impacted from the effects of increased traffic movements on roads. Noise is a concern with tonal variances a pronounced issue. The Noise and Vibration report in the EES notes there will be "no need for dedicated noise mitigation along the route (acknowledging) there will be short term increases in dB levels. Large articulated trucks are expected to produce 87-89 dB within 5m of the road. Sleep will be affected as well as amenity and the serenity for locals and travellers compromising physical and mental health. Reading the report this sound range is equivalent to standing next to a lawnmower or within one metre of a food processor so it will be very disturbing.

Our EES submission relating to noise articulates the effect of noise on well-being and the ineffectiveness of mitigation strategies and public engagement on outcomes for residents. Add to this dust (as per Air Quality Submission) and Human Health dimensions and the result is a community of disgruntled and distressed residents who feel encumbered by the mining process, and with very limited option for redress. The Keysbrook experience and Douglas Mine both come to mind as examples.

As not all of the sensitive receptors were identified by Kalbar (60% were missing) the impact on all of the residents was not assessed which will have major consequences.

The Transport summary is insufficient, with a narrow focus and no assessment of how traffic and transport will affect locals near the mine site and transport routes related to dust, air pollution, noise and vibration. Conflicts in the EES exist around identification of dust levels, with some documents citing effective dust suppression and the Traffic and Transport report stating dust as a risk issue for visibility. Stock near the mine site or transport routes may suffer permanent effects from ingestion of this dust (p 5). This has been noted in the Agriculture submission. Yet another omission in the risk assessment that hasn't been fully considered.

Road Surface Damages and Integrity – maintenance costs and responsibilities

The Proponent's plans are highly likely to continually damage road surface integrity, adding an extra danger to road travellers. Potential damage will occur to local and regional road surfaces along transport routes and increased risk to road safety on transport routes. Kalbar detail limited approaches to manage road performance. Costs are not stipulated for damages to roads and responsible authorities for each of the proposed (potential) transport routes. Additional B-Doubles and other truck traffic from the mine will further impact the integrity of the road surface and brings to question issues of covering cost of repairs.

Scoping requirements by the Victorian Government outlined the following requirements of this EES document for the Proponent:

(p. 20)

- Potential damage to local and regional road surfaces along transport routes and increased risk to road safety on transport routes.

(p. 21)

- Outline the required transport infrastructure upgrades and additional road maintenance regime to address adverse impacts of the project construction and operation (e.g. road, rail and port).

This naturally leads on to the next section regarding planning costs, liability and rehabilitation. We have chosen to specifically pull apart the road surface damages as it is repeatedly stated by local road users as being a serious concern. Especially with the proposed 80 trips of heavy trucks per day on roads that are already lacking maintenance. Many local road users are painfully aware of the damage that trucks do the road surface of the highway, near logging coups and quarries in the Gippsland region. This then poses cost to locals in terms of vehicle maintenance and increased risk to safety due to uneven road surface, potholes etc.

In assessing the Proponent's substandard addressing of road surface concerns, it is amusing that their data relates to Arup inspecting the area between May 2017 and May 2018. This EES is now released in 2020. Since Arup visited there have been considerable change to the Princes Highway with the installation of safety barriers and road widening. These works have been an abject failure with issues of road integrity and camber. There have been significant concerns around the current surface and substructure to be adequate for needs of heavy mine truck traffic. It is evident of Kalbar's dismissal of local concerns that they have not commissioned an updated assessment since the Princes Highway works were 'completed' as this changes a number of safety aspects including road surface integrity.

These concerns extend to the calibre and quality of the road surface proposed which has not been detailed. The existing road surfaces are largely intact, with established roadside vegetation providing stability to the surrounding landform. Erosion is not an issue at present along roadside verges.

The risks identified don’t include increased risk of accident due to the unsealed surface, large vehicles and changed traffic conditions.

Who pays when roads are damaged is a repeated concern of local residents, especially when road use is specifically related to a particular company or project?

The Road Management Act 2004 (Sect 112) details there is a “right to recover costs for damage to Road – damaged as a result of extraordinary traffic or excessive mass along a road.” Does this therefore mean that Kalbar can be charged for damage to the road on their transport route? If so, how is there going to be a baseline if the EES is flawed in its data related to road surfaces.

Section 112 pertains to the Right to Recover for damage to roads. This is particularly relevant given the number of extra vehicles (regularly) on the roads, in addition to oversize/overmass loads. It is inevitable that the project will lead to increased road surface damage and therefore incur costs related to this. The EES doesn’t clearly define Kalbar’s responsibilities with road network use and damage. The risk register is very vague on the financial obligation of Kalbar.

Kalbar's report also does not sufficiently detail the impact on the road surface that the weight of a laden B-Double vehicle will have. What is cited on the graph on page 15 is Equivalent Standard Axle ESA based on single axle dual tyre exhibiting 80kN (8T) of force on road and conversions for different axle configurations. There lacks further evidence of the application of this to the project and vehicles used. This makes it difficult to measure what road damage is apportioned and therefore liable to the Proponent.

Discussions transpired with East Gippsland Shire Council via teleconference, after an earlier in person meeting with Wellington Shire Council to determine local government concerns on roads. These were primarily noted to be safety and changes to road surface, but this is information not supported by documentation. Regardless, this would present issues under the Road Management Act 2004. Costs associated with road maintenance and clarifying who is responsible, is omitted in the EES. This is a significant and serious issue. The EES also doesn't identify the frequency of these meetings and agreed outcomes. The EES identifies that Latrobe City Council hasn't been involved with discussions with Kalbar, which seems remarkable given the lead in time to the finalisation of the EES.

From Section 4, Page 15, Arup describes how desktop analysis featured for a range of tasks, such as collation and interpretation of traffic volume and seasonality data. Surprisingly, Arup were able to undertake traffic survey spot counts at selected intersections using this method. The validity and accuracy of this work must be verified. Aerial images were used to determine intersection geometry and road alignment compliance. If it was Google Earth that was used, there are limitations to the clarity of the images. This also doesn't enable the viewer to see topographical changes with the road surface or determine its surface i.e. the presence of gravel, potholes, camber which can only be accurately described by onsite analysis.

A field investigation occurred in 2018 which noted "generally, declared roads (which are the responsibility of VicRoads) in the study area appeared serviceable. No major cracking or potholes were observed." More detailed technical analysis is required considering the quantity of material that has to be moved 24 hours a day and all year. This must include a full road analysis including compaction and likely service life under very heavy traffic. The road configuration will change over time and investigations, from which the EES data is based, was in October 2018. There is a significant lack of detailed costs and absence of a business plan to support any of the claims in the EES relevant to traffic and transport.

Existing conditions involved desktop review and site visits in May 2017 and October 2018 (p. 1). There have been marked changes in the road structure since then. Especially to the Princes Highway which is considerably degraded. Degradation has occurred to the surface and safety of the Princes Highway due to abjectively faulty road widening and barrier works which are under inquiry and have resulted in several accidents including those with heavy vehicles. Many other roads in the EES are stated to be currently "sub-standard" with the implication that Kalbar will improve these by adding their proposed measures such as roundabouts. These blanket statements are made without evidence to support that assessment. And in the absence of this, there's no clarity around how made this assessment has been made and if it is indeed correct (within the accepted guidelines for categorising road integrity).

What is important to note are the broad and sweeping assumptions which frequently underpin the data presented. There is no space for assumptions when considering a project of this nature. It would be a foolhardy person who would ever make a profound decision based on loose assumptions, especially when foundational data is flawed and/or outdated guidelines are used.

Planning Costs, Liability, Construction, Maintenance and Rehabilitation

Costs associated with the traffic and transport requirements of this project are not clearly demonstrated including an absence of clarity around how Kalbar propose to fund their infrastructure claims. It is not clear what costs for road and rail creation upgrade and long-term upkeep will be paid by Kalbar/the mining company themselves, the relevant shire (East Gippsland, Wellington etc.) therefore ratepayers, or the state Government in VicRoads.

Scoping requirements (2018, Victorian Department of Planning) are for Kalbar in this EES to meet the following:

(p. 9)

- Details of all the project components, to the extent practicable, including: necessary works directly associated with the project, such as an infrastructure and services upgrade and relocation, or augmentation of existing plant and facilities, including potential construction of roads and other linear services required for transporting ore and heavy mineral concentrate on and off-site;

(p. 13)

- Establish safe progressive rehabilitation and post-closure stable rehabilitated landforms capable of supporting native ecosystems and/or productive agriculture that will enable long-term sustainable use of the project area.

(p. 19)

- Evaluate the existing port facilities for storage of heavy mineral concentrate.

Concerns are raised that the EES report does not satisfactorily outline the responsibilities and commitment of the Proponent regarding costs associated with works, infrastructure, transport upgrade including roads as well as commitment to safe and progressive rehabilitation. Furthermore, there is no assessment in the EES Traffic Report regarding transport to suitable port for storing heavy mineral concentrate.

In relation to the legislative responsibility for costs and liability for this project, the following relates to local council responsibilities. As detailed below these are not all sufficient to use as resources in assessing this project. Namely because mining of this nature is very new to East Gippsland.

Local Government Act (2020) has overarching Governance Principles for our local councils including priorities such as achieving the best outcome for the community, including future generations and also enable economic, social and environmental sustainability (with reference to climate change risk). It is our assertion that the proposed project does not reflect this ethos.

Road Management Act (2020). Kalbar states a superseded Act (2004) – this Act identifies particular rights and responsibilities of road users, along with outlining the roles, functions and powers of a road authority. Importantly, it also provides for making a Code of Practice which provides practical guidance in relation to road management.

Victorian Freight and Logistics Plan (2013). There is very little reference to East or Central Gippsland in this document, which was published 7 years ago.

Gippsland Freight Strategy (2013). Is focused primarily on movement of Coal from the Latrobe Valley, so not particularly relevant for this project.

The Victorian Mining Act (MRSDA, 1990). Has conditions which all Proponents must satisfy. That includes clauses pertaining to being “a fit and proper person”, there be an “accessible, economically viable body of ore”, that the project can be funded to develop and operate, and that a Rehabilitation Bond is provided - in cash, not a bank guarantee.

Of note is that mining companies are exempt from paying rates on the land they use. EGSC is responsible for a range of roads in the Shire, including maintenance and upgrades. For road realignments requested by Kalbar, Council are required to undertake the estimates process and then recover these funds from Kalbar. Council also need to facilitate a bond process to cover costs associated with damage to roads. This process hasn’t been successful in other regions, with Shires, thus ratepayers, required to cover remediation of the roads once the mining project has been abandoned.

The Rehabilitation plans proposed by Landloch, thus Kalbar, are substandard and present a broad plan which omits to consider fully real-life barriers and consequences. Victorian mines overall have a very poor record of rehabilitation. Earth Resources Regulation prove largely ineffective in their monitoring and enforcement roles according to an audit that was released by the Victorian Auditor-General’s office in August this year. The Douglas Mine in the Wimmera, and Bendigo Mining Limited at Kangaroo Flat are two examples of similar open-cut mining operations with demonstrated inadequate rehabilitation that continue to negatively impact on communities and the environment.

Whilst Mining companies are meant to pay Royalties to the Government, the revenue gained for local Councils from rates, including EGSC, is absent. The Proponent will not contribute towards the cost of infrastructure and services locally as other ratepaying business and individuals do. In a recent Federal report (DIRDC, 2017) jurisdictions expressed an interest in monitoring the costs of pavement maintenance and rehabilitation works. Maintenance comprises a large and growing component of State and Territory agency costs. Developing maintenance benchmarks would entail consistently defining maintenance activities across Australia. Jurisdictions (DIRDC, 2017) provided comments on factors affecting the costs they face for roads. These factors include the effects of high demand for construction services on road construction costs and a reduction in the number and quality of responses to tender as well as utility relocation costs on overall costs, which require monitoring.

Critically, there are glaring gaps in all EES reports with the absence of financial information. This raises huge question marks as to the viability of this project and assurance of financial liquidity. Kalbar have not included a Business Case or Economic Model in the EES. The absence of this financial data, along with issues around issues of Shares without payment occurring, raises questions about integrity. Between Aug 2018 and July 2019, over 3.8 million shares were allocated which increased on paper the value of the company by around $5million.

An ‘accounting error’ to the value of $147.3 million dollars took 2 months for the Proponent to realise had occurred and was closely tied to concerns about overseas ownership, which the public raised. This background of ‘fluid and adaptive accounting skills’ raises significant questions around the Proponent’s executives being “fit and proper” for the role of managing a long term (20 year) project such as this and seeing it to completion. It should not be the task of a submitter to provide information around specifics of costs. That is expected to form the basis of a Business Plan, which is missing in this situation.

In the omission of financial data from Kalbar - what is of interest is the publicly available document from Rio Tinto Exploration Pty Ltd. Its Annual Report 2012-2013 reviewed this location and has some costings. Taking into consideration inflation and some variance such as in truck numbers and proposed personnel numbers this provides a broad cost estimate including transport and port fees, where Kalbar has provided none. What is important to note is that large and established mining companies chose to walk away from this deposit after completing mineral sampling and cost analysis. However, the Proponent persists despite the evidence of a flawed and hugely unpopular project proposal.

Of concern to local residents and the wider community is that this is a new company, and as such has never operated a mine before. They propose to undertake a project in what is an incredibly complex location environmentally with a range of factors which heighten risky outcomes. Even if it were to proceed with this proposal the proposed timeframes are unlikely given that there is often a 2-year delay between infrastructure procurement and processing.

Further to this the costs of roads for projects cost on average $5.4 million per lane kilometre for freeways/highways and $3.8 million per lane kilometre for rural arterials (DIRDC, 2017). Reporting by Oresome allocated $6 million for a 3km stretch of road. Locally, the modest Bosworth Rd/Forge Creek Rd intersection in Bairnsdale cost some $232,000 and it is not sufficient for a B-Double to manoeuvre safely.

Kalbar propose a multi-lane roundabout at the Fingerboards, plus other sites depending on which route you choose to believe they will decide upon. Costs for these will be massive with an approximately 34 diameter roundabout at the Fingerboards. Kalbar have demonstrated little real-life understanding of how this project could manifest in reality. In the absence of a Business Plan, what assurances does the rate paying public of East Gippsland have that Kalbar will contribute to the cost of these upgrades.

What capacity does the Proponent demonstrate when meeting bond requirements for EGSC to offset additional maintenance costs, which will be a direct result of additional mine generated traffic. Interestingly, there lacks reference to moving infrastructure such as powerlines which is mentioned in the DIRDC report. This whole lack of financial data brings into question the Proponent's ability to meet the 'fit and proper person' requirement of such a complicated project.

Environmental Considerations

Environmental aspects are of serious concern with the loss of vital roadside vegetation, wildlife corridors as well as the risk of road kills of native birds and animals.

Scoping Requirements outline several points for the EES to deliver on:

(pg. 16)

- Potential for indirect significant effects on biodiversity values as a result of off-site activities including transportation and storage of heavy mineral concentrate;
- Identify flora and fauna that could be affected by the project potential effects on air quality, noise or vibration levels.
- Potential for other indirect significant effects on biodiversity values including but not limited to these effects associated with changes in hydrology (including surface and ground water changes), hydro-geology, water quality (i.e. on water dependent ecosystems), contaminants and pollutants (including nuclides), dust emissions, weed, pathogen and pest animal, and risk of significantly increasing mortality of FFG and EPBC Acts listed flora and fauna species of national significance MNES species resulting from mine-related activities (e.g. road traffic).
- Discussion of all potential direct, indirect, on-site and off-site effects as result of the proposed action. The description and assessment of effects must not be confined to the immediate area of the proposed action but must also consider the potential of the proposed action to impact on adjacent areas that are likely to contain habitat for MNES, including conservation reserves, and along proposed transportation routes and facilities used for off-site storage of heavy mineral concentrate.

In the context of plans by the Proponent to move major roads, destroying habitat and water drainage, the project does not comply with the sustainability requirements.

Kalbar cite in their report the Transport Integration Act 2010. Again, they have used outdated legislation. The current Act is 2020. This Act discusses a co-ordinated approach to services and enables equity of access. It focuses on Environmental Sustainability including “protecting, conserving and improving the natural environment”, reference to “transport related emissions and pollutants and the loss of biodiversity” and “preparing for and adapting to the challenges presented by climate change”. This is particularly relevant given anticipated massive loss of remnant vegetation and ancient trees, carbon sequestered with associated habitat if the mine goes ahead. Along with general roadside vegetation destruction proposed by Kalbar's changes and realignment of roads – their repeated design of multiple roundabouts (depending on what transport route you pick to look at) extends the width of existing roads considerably, with more loss of established trees, biodiversity and vegetation.

Photos below are evidence of roadside vegetation in the mine-site area:

Figure 3

Figure 4

Figure 5

Regarding the Greenhouse Gas Emissions, the Proponent appears to have grossly understated GHG Emissions. Their EES report states GHG accounts for 0.07% of Victoria's total emissions, however this figure omits emissions that would not have been incurred were it not for the project. These include such things as additional passenger vehicle trips, transporting HMC to port and shipping to the customer, and disposal of site waste.

There is poor clarity of the proposed road topography. Risks fail to recognise the loss of land stability by the removal of established vegetation, including ancient gums and the subsequent use of other gravel and road base materials. The cost of the environmental changes can't be easily quantified with the loss of carbon storage by removal of trees and vegetation (as above), and the social impacts of changing the landscape from rural to industrial are on a compounding scale. The environment at the end of the mine life will be significantly different to the natural state with the old trees removed, the landform changed, houses and sheds gone as well as the local people. The environmental aspect with the loss of roadside vegetation, wildlife corridors, risk of road kills and such is ignored in the risk assessment.

The risks of increased roadkill are not identified in the EES report for traffic collisions with larger wildlife (native and introduced) such as kangaroos and deer. This hasn't been adequately assessed.

With shifts listed as 12 hrs, issues of driver fatigue are significant. Starting at 0600hrs, the workforce is moving most during times of greater animal movement, during times of reduced daylight hours when visibility is lowered. In addition, bright lights of cars increase stupefying wildlife causing crash/death.

Wandering stock have not been accounted for in the risk assessment.

Unnatural lighting is planned for the mine site and key intersections (pg. 5). Plans for permanent road lighting is also another issue for wildlife and stock in adjacent paddocks. There is considerable well researched data around the impacts on wildlife behaviour, including foraging, breeding and more. This will be addressed in greater depth in the Visual and Landscape submission.

Conclusion

Summarising Kalbar's EES and proposed traffic and transport changes - the EES provides persistent and generally exhausting examples of how poorly the consultants have completed their assessment and associated risk matrix with matching mitigation measures. It is anticipated that the information provided above gives some sense of how far 'off the mark' the report is when comparing to the reality of road users' needs. This will be discussed more at the Panel Hearing. In review, the key issues remain largely unanswered.

There is no understanding demonstrated in the EES of the effects of severance to land access and the implications from a business or practical perspective for the landholder or business.

Effects for agriculture, dairy and more are noted in a cursory and passing manner at best, with an assumption underpinning the project that others 'will just get on as best they can' with the interruptions the project brings.

There has been limited attention to the changes for existing infrastructure and road surfaces, but hardly sufficient for a project of this scale.

Road structures in the mine site are precluded from the report. The high potential for subsidence, due to tunnelling and other erosive actions, has been omitted. The flattening of topography, particularly around Perry Gully, seems to not warrant mention in this report, even though it is part of the requirements.

Upgrades are outlined, but with limited understanding of the effects on traffic flow and associated risks. i.e. roundabout at Racecourse road involves disturbance to endangered flora and consequences with the nearby rail crossing.

Traffic management is composed of sweeping comments.

There are no clear measures in place to 'minimise adverse effects on local communities' beyond referencing being aware of school buses and school hours and to know when the races are on in Bairnsdale. Communities not within close proximity of the project area receive little reference in the report.

Benefits and effects on local business is not discussed, in much the same manner as the Proponent's own business plan is absent.

Social and other severance issues are not addressed in a meaningful manner. Certainly, there is no specific section of the report devoted to this.

'Out of action' timelines are poorly articulated. No mention of the risk of post mining subsidence with regards to roads or the landforms as a whole, which is a massive oversight given the dispersive nature of the soils.

Listing of legislation and guidelines doesn't translate to evaluating the consistency of the project with the policies and provisions of the impacted Shires. Legislation listed is frequently outdated and therefore not relevant,

The approach to manage performance lacks any clarity, depth or value.

And, in summary, the final assessment requirement around enhancing beneficial outcomes whilst mitigating/managing negative consequences for communities is largely dismissed. Which aligns with the unstated assumption that the community had best just 'learn to live with it'.

The report, and thus the Proponent, fail abysmally to provide a document which is based on solid, evidenced based data which is pertinent to the project and scoping requirements. Mitigation measures are cursory or misguided and fail to address the wider effects (per the EES Scoping requirements definition). There is no 'chain of custody' with data and the provision of information by the Proponent to Arup is a significant contributor to bias. Should the Panel Members rely on this report for an informed decision, they risk being severely misguided and not meeting their responsibilities fully.

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Appendix: Risk Report discrepancies and inadequacies

"Roads, traffic and transport" Specialist Study Row Numbers	Issue raised	Proponents response	Community concerns
1, 7, 8 and 16	various	A traffic management plan will be prepared in accordance with industry standards to address general driver awareness and safety for the project workforce and the inherent risks associated with driving; the plan will be updated as required based on annual driver surveys of the project workforce and in response to recommendations from relevant incident investigations (TT02).	If a traffic management plan isn't already created, how can this be considered an appropriate risk mitigation?
2	Significant traffic delays during busy periods (e.g., long weekends and school holidays) due to B-doubles turning right into and left out of Lindenow-Glenaladale Road	Oversize and overmass vehicle movements will avoid peak hours and school bus operation hours (TT06).	The Proponent completely ignores many parts of the issue that are very clearly indicated (e.g., long weekends and school holidays) and in steed just suggests that the oversize and overmass vehicles will "avoid" peak hours and school bus operation hours. As anyone local to the area (and a lot of people who visit the area) would know. The Princes Hwy, and all other arterial roads leading to tourist destinations around East Gippsland are incredibly busy on holidays and long weekends, often with traffic backed up for kilometres.

4	Significant traffic delays at the intersection of Princes Highway and Lindenow-Glenaladale Road during busy periods (e.g., long weekends and school and public holidays) due to B-doubles turning right onto Princes Highway from Lindenow-Glenaladale Road	Oversize and overmass vehicle movements will avoid peak hours and school bus operation hours (TT06).	As above (2nd time) - The Proponent completely ignores many parts of the issue that are very clearly indicated (e.g., long weekends and school holidays) and in steed just suggests that the oversize and overmass vehicles will "avoid" peak hours and school bus operation hours.
5	Increased risk of pavement deterioration, resulting in reduced pavement life and uneven and dangerous road surfaces on Lindenow-Glenaladale Road, Bairnsdale-Dargo Road and Barry Road	Where any pavement damage occurs and requires immediate treatment, remedial pavement works will be undertaken as agreed with the responsible road authority (TT26).	The Proponent only addresses emergency works required, and not the increased risk of deterioration resulting in reduced pavement life and uneven and dangerous road surfaces. It appears as if the Proponent has just given a generic response, that once again, doesn't actually address the issue.
6	Pavement deterioration, resulting in reduced pavement life and uneven and dangerous road surfaces on: • Lindenow-Glenaladale Road. • Bairnsdale-Dargo Road. • Racecourse Road. • Forge Creek Road.• Bosworth Road.	Where any pavement damage occurs and requires immediate treatment, remedial pavement works will be undertaken as agreed with the responsible road authority (TT26).	As above (2nd time) - The Proponent only addresses emergency works required, and not the increased risk of deterioration resulting in reduced pavement life and uneven and dangerous road surfaces.

8	Traffic delays due to increased light vehicle traffic associated with the project workforce travelling to and from the mine site:• Along Princes Highway, Bairnsdale Dargo Road, Lindenow Glenaladale Road and Fernbank Glenaladale Road.• At the intersections of Princes Highway and Bairnsdale Dargo Road, Princes Highway and Fernbank Glenaladale Road, Bairnsdale Dargo Road and Lindenow Glenaladale Road, and Bairnsdale Dargo Road and Fernbank Glenaladale Road.	• The construction environmental management plan and environmental management plan will include measures to encourage personnel to travel to and from the mine site by bus, or to carpool (TT22).	The Proponent suggests that they will “encourage” personnel to carpool, or catch a bus, Though this will just be a suggestion to the personnel, and as many will have experienced in their work lives, most people will prefer the convenience of their own vehicle, rather than relying on others for transport, so we feel this isn’t a valid mitigation strategy.
9	Increased risk of crashes at the intersection of Fernbank-Glenaladale Road and Bairnsdale-Dargo Road due to the proposed four-arm roundabout	The proposed new Fingerboards roundabout will be designed so that the angle between each leg is approximately equal, such that the legs are distributed generally evenly around the roundabout (TT15).	The Proponent fails to take into consideration the landscape and surrounding flora in the area and mentions nothing about visibility between the adjacent legs of the proposed roundabout.

11	Increased risk of crashes on public roads due to dust generated from project roads impeding visibility and mud tracking onto public roads	Rumble or shaker strips will be provided on approach to the new Fingerboards roundabout and on the Fernbank East rail siding access road to prevent mud tracking onto the public road network (TT14).	The Proponent suggests that rumble or shaker strips, on a public road, will prevent mud tracking onto a public road. This does not in any way mitigate the increased risk of crashes where they have put the rumble strips (and theoretically where all of the mud will be falling off). The suggestion that this will be located at a major intersection, and not before the project vehicles get to the public roads suggests that once again the Proponent has ignored the main issue indicated. Dust has been completely ignored.
12	Increased risk of crashes on the private haulage road due to dust generated from Chettles Road and Cowells Lane impeding visibility and mud tracking onto crossings of public roads	Rumble or shaker strips will be provided on approach to the new Fingerboards roundabout and on the Fernbank East rail siding access road to prevent mud tracking onto the public road network (TT14).	The Proponent continues to ignore the issues indicated, by not even addressing the issue of dust, and also not mentioning the roads indicated in the impact, in the mitigation.
13	Increased risk of crashes at the intersection of Lindenow-Glenaladale Road and Bairnsdale-Dargo Road due to B-doubles turning right from Bairnsdale-Dargo Road onto Lindenow-Glenaladale Road and left from Lindenow-Glenaladale Road onto Bairnsdale-Dargo Road	The no overtaking line marking west of the intersection of Lindenow-Glenaladale Road and Bairnsdale-Dargo Road will be extended to just west of Lindenow-Glenaladale Road to reduce the risk of vehicles trying to overtake B-doubles on the approach to the crest of the hill near the intersection (TT12).	The mitigation doesn't even make sense – no overtaking line markings, that are already WEST of the Lindenow-Glenaladale Road, will be extended to JUST WEST of the Lindenow-Glenaladale Road. They are already just west of the Lindenow-Glenaladale Road.

14	Increased risk of crashes due to B-double movements at the intersection of Princes Highway and Lindenow-Glenaladale Road due to the high number of B-double right-turn movements (from Lindenow-Glenaladale Road) and the high volume of public traffic on Princes Highway	The intersection of Princes Highway and Lindenow-Glenaladale Road will be upgraded to roundabout control to increase road safety and avoid excessive slowing of traffic due to B-doubles turning right from Lindenow-Glenaladale Road onto Princes Highway (if required under the Bairnsdale rail and road and rail scenarios) (TT01).	No mention is made of holiday traffic along the Princes hwy. As mentioned above, this is a very busy road at those times, and putting a roundabout in would only exacerbate the already congested road during these periods.
17	Increased risk of crashes on public roads due to the movement of oversize and overmass loads	Oversize and overmass vehicle movements will avoid peak hours and school bus operation hours (TT06).	As above (3rd time) - The Proponent completely ignores holiday times and in steed just suggests that the oversize and overmass vehicles avoiding peak hours and school bus operation hours will mitigate the risk.
20	Increased risk of crashes at the Lindenow-Glenaladale Road level crossing due to the large number of B-double movements expected over the project	Boom gates will be installed at the level crossing on Lindenow-Glenaladale Road in accordance with AS 1742.7 Manual of uniform traffic control standards, Part 7 Railway crossings (TT13).	Who will be paying for the installation and ongoing maintenance of the level crossing? Both while the project is ongoing and after.
21	Decreased pedestrian safety within Lindenow South, especially during times of high activity and school pick-up and drop-off times	Oversize and overmass vehicle movements will avoid peak hours and school bus operation hours (TT06)	Here we go again, as above (4th time) - The Proponent completely ignores holiday times and seems to suggest that only peak hours and school bus hours are important for pedestrian safety.

23	Increased crash risk at the intersection of Princes Highway and Racecourse Road due to excessive slowing and safety concerns for general traffic as a result of the number of B-double turning movements and the traffic volumes on the Princes Highway	For B-double movements to Bairnsdale rail siding, the intersection of Princes Highway and Racecourse Road will be upgraded to roundabout control to increase road safety and avoid excessive slowing of traffic due to B-doubles turning right from Princes Highway onto Racecourse Road (if required under the Bairnsdale rail scenario) (TT31).	The issue indicated is the increased risk due to excessive slowing. Placing a roundabout on an 80km/h road, unless it is an incredibly large roundabout, will require excessive slowing. A roundabout will also dramatically affect the west bound traffic leaving Bairnsdale along the Princes Hwy, as they will be required to give way to slow/heavy B-doubles turning right from Princes Highway onto Racecourse Road.
24	Increased risk of crashes at the intersection of Princes Highway and Lindenow-Glenaladale Road due to the number of B-double right-turn movements (from Princes Highway) and left-turn movement (from Lindenow-Glenaladale Road) expected to occur through this intersection and the high volume of eastbound public traffic on Princes Highway	The intersection of Princes Highway and Lindenow-Glenaladale Road will be upgraded to roundabout control to increase road safety and avoid excessive slowing of traffic due to B-doubles turning right from Lindenow-Glenaladale Road onto Princes Highway (if required under the Bairnsdale rail and road and rail scenarios) (TT01).	As above – Without dramatically reduced speed limits, or a change to the topography of the intersection of the intersection of Princes Highway and Lindenow-Glenaladale Road, there will still be a great risk of crashes from slow moving, and slow accelerating, loaded B-doubles.

28	Increased risk of crashes on Fernbank-Glenaladale Road due the introduction of B-doubles crossing Fernbank-Glenaladale Road	• For B-double movements to Fernbank East rail siding, an operational overlay to the traffic management plan will be introduced that requires B-doubles to stop before crossing Chettles Road and Cowells Lane (TT28).	The Proponent yet again ignores the issue and in steed suggests a mitigation that has nothing to do with it. Requiring B-doubles to stop before crossing Chettles **Road** and **Cowells Lane** WILL NOT reduce the risk of crashes on **Fernbank-Glenaladale Road**
30	Decreased road and rail safety due to the risk of B-doubles queueing back onto the Princes Drive level crossing near Maryvale rail siding	Measures developed in consultation with the Department of Transport will be implemented to minimise the risk of B-doubles queuing onto the level crossing at Maryvale rail siding, such as shorter cycle times, leading and lagging right turn phasing and coordinating signals with a detector on the rail line upstream of the crossing (if required under the road and rail scenario) (TT24).	Will the details of this plan be made available before a decision is made on the EES, or are we all to just take their word for it that it will be suitable to mitigate the risks?

Chapter 16: LANDSCAPE AND VISUAL

Contents

We respectfully assert that Urbis, and therefore Kalbar, have failed to meet the full Scoping requirements of the EES as per the Minister's requirements (pgs. 14, 21). this project remains totally inappropriate for the Location. On a background of sustained and systemic failures of the Mining industry, evidenced in the Auditor General's Report Aug 2020, endorsement of the Project by the Panel would represent extreme negligence and a failure of duty of care. In addition, the Project does not align with current Legislative objectives around environmental protection or enabling the long- term wellbeing of all Victorians.

Ministers requirements

Kalbar sought Consultative services from Urbis for the purpose of addressing the Ministers requirements for the Environmental Effects Statement (EES) March 2018.

Those Ministers requirements include :

- Effects on the land uses and landscape values of the site and surrounding areas, including the implications with respect to the Mitchell River National Park
- Effects on land stability, erosion and soil productivity associated with the construction and operation of the project, including rehabilitation works
- Effects on Aboriginal and non-Aboriginal cultural heritage values in the vicinity of the project site
- Potential effects of project construction and operation on air quality and noise on nearby sensitive receptors (especially residents)
- Both positive and adverse socio-economic effects, at local and regional scales, potentially generated by the project, including indirect effects of the project construction workforce on the capacity of local community infrastructure, and
- Solid and liquid waste that might be generated by the project during construction and operation.

With specific regard to the EES Scoping requirements for Landscape and Visual Amenity, the Minister has also requested (page 21, 22)

" 4.6 Landscape and visual Draft evaluation objective

To avoid adverse effects on the landscape and recreational values of the Mitchell River National Park and minimise visual effects on the open space areas.

Key issues

• The potential for effects on the landscape and recreational values of the Mitchell River National Park and visual amenity and character of region from the project.

Priorities for characterising the existing environment Fingerboards Mineral Sands Project – EES Scoping Requirements 22

• Characterise the visual character and associated landscape values of the project site including in the context of the Mitchell River National Park.

• Describe changes to the landscape (including from vegetation clearance and likely changes to landform) and associated visual effects, as well as public views from roadways used by tourist traffic and other significant vantage points, in particular on the Mitchell River National Park. Design and mitigation measures

• Outline and evaluate the proposed mine design options, staging of works and management measures that could mitigate project effects on landscape and visual amenity during mining.

• Describe and evaluate the potential and proposed measures to restore and rehabilitate the landscape and visual amenity values of the project site after mining. Assessment of likely effects

• Assess the effects of the project and relevant alternatives on landscape and visual amenity values of the project site and the Mitchell River National Park, including with respect to views from public vantage points and where possible representative local residences during construction, operation, rehabilitation, decommissioning and post-closure. Approach to manage performance

• Describe and evaluate plans to monitor effects on landscape and visual amenity values and implement contingency management measures, including in relation to:

— the configuration and staging of works and rehabilitation; and

— progressive reinstatement and rehabilitation activities, including a landscape shaping reflective of the pre-mining landscape and preliminary identification of land use options.

• Describe any further measures that are proposed to manage risks to landscape and associated recreational values for communities living in the vicinity of the project that are to be included in the EMF (see section 5).”

Urbis assessment framework

The EES document provided by Urbis includes variations to Ministers requirements. Those ‘matters to be examined’ are noted in 1.1.1 EES Scoping Requirements and below.

“The EES Evaluation objective is to avoid adverse effects on the landscape and recreational values of the Mitchell River National Park and minimise visual effects on the open space areas. “

The Key Issues addressed are

The potential for effects on the landscape and recreational values of the Mitchell River National Park and visual amenity and character of region from the project.

The Consultants Brief from Kalbar requires the assessment to

Define the criteria relevant to the study including legislation, standards and guidelines

Undertake a site inspection to identify potentially sensitive viewpoints within the vicinity

Prepare a characterisation of the existing landscape features and of landscape character and scenic quality within the regional setting

Prepare visual simulations of the mine during development and at end of life from primarily publicly accessible locations, or locations where access to private land was able to be negotiated with a small number of landowners
Assess the potential visual impacts of the proposed operations on identified sensitive receptors including potential night lighting impacts
Identify and propose design responses and measures for the reduction, mitigation and management of potential visual impacts
Prepare a visual impact assessment report for inclusion in the EES.

This Brief reduces and narrows the focus of the reporting requirements considerably, as it doesn't fully address the Scoping Requirements per the March 2018 EES Scoping Requirements document. (pg 14)

"Effects must include discussion of all potential direct, indirect, on-site and off-site effects as result of the proposed action. The description and assessment of effects must not be confined to the immediate area of the proposed action but must also consider the potential of the proposed action to impact on adjacent areas that are likely to contain habitat for MNES, including conservation reserves, and along proposed transportation routes and facilities used for off-site storage of heavy mineral concentrate." (EES Scoping Requirements, March 2018)

East Gippsland cover 31,740 square kilometres, with this EES report focusing on the area only around Glenaladale.

Urbis background experience, limitations and resources

The report from Urbis Pty Ltd, which evolved to Version 20 of the document, was released for publication July 2020.

Urbis are based in Brisbane, Melbourne, Perth and Sydney. https://urbis.com.au/ Their website identifies "Here at Urbis, we have one simple goal – to shape the cities and communities of Australia for a better future." The website identifies predominantly stand- alone Urban projects, and there appears no previous involvement with Mineral Sands Mining Projects. https://urbis.com.au/projects/?fsec=0&fser=0&floc=0 A solar farm at Naring, Vic, for Lighthouse BP in 2018, seems their only foray in to Regional Victoria.

The Disclaimer cites "This report is dated 22 July 2020 and incorporates information and events up to that date only and excludes any information arising, or event occurring, after that date which may affect the validly … Urbis prepared this report **on the instructions, and for the benefit only, of Kalbar Operations Pty Ltd** … for the purpose of LVIA .. and not for any other purpose or use … Urbis expressly disclaims all liability … In preparing this report, Urbis was required to make judgements which may be affected by unforeseen future events, the likelihood and effects of which are not capable of precise assessment … Whilst Urbis has made all reasonable inquiries it believes necessary in preparing this report, it is not responsible for determining the completeness or accuracy of information provided to it. … "

The disclaimer would suggest intrinsic bias, as they took instruction from Kalbar. And it could be postulated that the outcome was 'fit for purpose', particularly given the instructions provided.

Urbis based their assessment on a range of parameters and guidelines, referenced and listed below, and also located on page 102 of their report.

Of surprise was the overwhelming reliance on international documents, with Leonard, M, Hammond, R., (1984) Landscape Character Types of Victoria being the only Australian reference.

And that was published some 36 years ago. The use of International documents seem rather outdated.

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The Landscape Institute with the Institute of Environmental Management and Assessment, 2013. Guidelines for Landscape and Visual Impact Assessment – Third Edition. (UK based)

The Institution of Lighting Engineers (ILE) , UK,(2011) Guidance Notes for the Reduction of Obtrusive Light GN01:2011

United states Department of Agriculture Forest Service (1974) National Forest Landscape Management, Volume2, Chapter1, The Visual Management System. Agricultural Handbook No. 462

United States Department of Agriculture Forest Service (1995) Landscape Aesthetics – A Handbook for Scenery Management Agricultural Handbook No. 701

Zube, E.H., Anderson, T.W. and MacConnell, W.P. (1976) Predicting Scenic Resource Values. In: Studies in Landscape Perception, Edited by Ervin H.

Surely more contemporary references are pertinent for 2020 – and references that relate to agricultural land. Particularly given the magnitude of the Project and its potential ramifications.

Within the Lighting sphere, Urbis, on page 95 of the EES, report utilising the Australian Standards AS4282 1997 however this has been superseded by the 2019 version.

https://infostore.saiglobal.com/en-us/standards/as-nzs-4282-2019-1141358_saig_as_as_2703687/

On the basis of the resources utilised by Urbis, it is not surprising that their assessment of landscape and visual impact fails to reflect the local conditions, both in Australia, and more importantly, around the Project area.

Indeed, Fig 4, page 13, outlining the Project Location and Regional Context identifies the Lindenow South and Fernbank railway stations, both of which were closed in 1981. Glenaladale, located on the river flats just below The Fingerboards, is not prominent on almost all maps, although Walpa, a greater distance away often is.

Examples include absences of the Mitchell River from many maps, incorrect referencing of photographic images, variances to reported Mine Pit size, and inconsistent timelines for the likes of Tailings Storage Facilities.

And this further brings in to question the relevance of their final report, version 20. It is highly suggestive of limited 'due diligence' when accessing their framework on which Urbis build their report.

Urbis utilise a Risk Matrix, on Page 4, that is not based on the Australian landscape, "The methodology used for this Project is described below and *conforms generally* to the direction offered by the above guidelines as well as other proven assessment methodologies". This is a seemingly broad parameter and fails to identify other methodologies.

It could be reasonably suggested that Urbis had a narrow focus on the concepts of Landscape and Visual Impact, tending to give most attention to the physical topography, particularly around the proposed mine site, as evidenced in their Consultant Brief (above). They were inclined to minimise or disregard concerns around changes to landscape as it changes from Rural to Industrial. This includes increased traffic flows, including frequent Double-B trucks on roads, dust, mining machinery and the mine pit itself. The issue of emotional connection to landscape wasn't mentioned in the report, with physiological benefits well researched and documented pertaining to green space and wellbeing.
https://www.internationaljournalofwellbeing.org/index.php/ijow/article/view/449

The Minister noted The Key Issue involved

"the potential for effects on the landscape and recreational values of the Mitchell River National Park and visual amenity and character of region from the project"

Ministers Priorities for characterising the existing environment

Characterise the visual character and associated landscape values of the project site including in the context of the Mitchell river National Park

Urbis have summarised this goal as

> Prepare a characterisation of the existing landscape features and of landscape character and scenic quality within the regional setting

East Gippsland is known for its enviable lifestyle, natural beauty, environmental focus and tourism. East Gippsland Shire Council (EGSC) identifies and endorses the intrinsic worth of the Region in its Strategic Plan, with particular note to A Liveable Region (pages 24 – 26). The EGSC marketing campaign leans heavily on the 'Naturally Magic' appeal of the region.

https://www.eastgippsland.vic.gov.au/files/assets/public/documents/corporate_directorate/council_plan/draft_-_council_plan_2017-2021_year_three.pdf

This is also reflected in the East Gippsland Planning scheme which identifies the unique and appealing characteristics of the topographical landscape. https://planningschemes.delwp.vic.gov.au/__data/assets/pdf_file/0004/463945/East_Gippsland_PS_Ordinance.pdf

The Project is located around 20km west of Bairnsdale, the major regional town for the East Gippsland area. The Bairnsdale Dargo Road, which the Project will fully impact, is identified as a Scenic Road of considerable note, as it transverses the approximately 85 km between these towns.

The Bairnsdale Dargo Road is popular, particularly on weekends and during holidays, and it, along with many other nearby roads, are frequented by local motorcycling enthusiasts, cyclists and those seeking 4WD activity. The Glenaladale Roads are popular with cyclists in particular, and it is where several competition rides are regularly scheduled (although Covid has resulted in cancellation for 2020). These include Cycling Australia for their Tour of East Gippsland and Towards Zero Victorian Road Series, and events staged by the Wellington Cycling Club and Bairnsdale Cycling Club. The route is also promoted on www.discovereastgippsland.com.au and Gippsland Cycling Facebook page. Strava, a popular cycling app, has segments along the road, including the climb up from Glenaladale to the Fingerboards crossroads. Ulysses motorcycle club regularly tour the area, several times a month. Urbis weren't aware of the extent of this use when questioned on 20 June 2019 during a Community Information Session. And this perspective remained absent in the final (version 20) report. https://www.fingerboardsproject.com.au/news/community-information-session-20th-june-2019 refer Questions and Answers

This level of user activity demonstrates the scenic value of the roads, landscape and topography. Another omission in the EES is acknowledging Stock movements between paddocks using these quiet roads. The Mitchell River National Park is close by, and readily accessed near the Project area. The Mitchell River, absent on Urbis Fig 1, page 3, was listed as a Heritage River in 1993.

https://en.wikipedia.org/wiki/Mitchell_River_(Victoria)
https://egcma.com.au/rivers/mitchell-river/

The Mitchell River National Park covers some 12450 ha and is described here in glowing terms.

" Mitchell River National Park has impressive river scenery, serene rainforest gullies, rugged landscapes and some of Victoria's more unusual vegetation communities. From open forest to remote river gorges, the park is home to a vast array of indigenous flora and fauna, some at the furthermost extent of their range. The park is an exciting destination for outdoor enthusiasts and boasts unspoilt natural beauty and remoteness."

https://www.visiteastgippsland.com.au/mitchell-river-national-park

It is not surprising that the Park is frequently accessed and forms an integral part of the region. Urbis undertook Visual assessments of potential impact of the Mine from popular destinations within the Park. These were all located in gullies, such as the Den of Nargan (which has profound significance for Aboriginal women in particular). What Urbis did miss in their report was the views travelling to and from other areas of Mitchell River National Park, and the impact the Project will have on the current vista. They failed to generate a topographic profile to give context to those reading the EES who may not be familiar with the region.

Tourism is a considerable source of income for East Gippsland, with the Mitchell River flowing in to the Gippsland Lakes and out to Bass Strait. Any negative impacts on the health of the river has a direct consequence to tourism. Lakes Entrance is a popular destination, particularly over holiday times. It's usual population of around 7,000 swells to 60,000 or so. The attraction and success of businesses in Lakes Entrance is directly linked to the health of the waterways.

The Project plans to use *8 million litres of water a day* . State Government organisations continue to work towards ongoing improvements to the health of the river system. East Gippsland Catchment Management Authority have undertaken restoration and other works https://egcma.com.au/rivers/mitchell-river/ This is additional to Parks Vic works and East Gippsland Shire Council actions, which is often undertaken in conjunction with recreational fishing clubs. At present, habitat is being introduced to waterways to support the fingerlings being bred and released.

The Fingerboards intersection itself is a significant landmark, utilised by many as a meeting point, and was pivotal during the 2014 Bushfires for the needs of Emergency Services. A CFA specific water storage tank is onsite at The Fingerboards.

It also has deep connections with the local Gunai Kurnai First Nations People, and embodies considerable spiritual significance and artefacts.
https://www.gunaikurnai.com.au/about/our-people

The impact of the Project on the Fingerboards area, the local community and the wider region will be, on the whole, Catastrophic. Wide ranging implications around water, air quality, noise, contamination risk and the like will be raised in other Submissions. However, given this Submission is purely focused on 'Landscape and Visual', the core issues around that will be discussed here.

Landscape and Visual

The Glenaladale Region, of which The Fingerboards Landmark is integral, comprises rolling hills, fertile multi generational farming land, deep and steep gullies, magnificent and ancient Gums, important roadside vegetation corridors, along with unique microclimates that support a range of rare and endangered Flora and Fauna. Plantations of Eucalypt and Pine are within the Project footprint, and stand in stark contrast to the surrounding landscape.

The area provides a migratory corridor for fauna as they slowly travel between the mountains and lower altitudes, depending on the season. Food, shelter, mating opportunities are all realised within this important vegetation.

Distant hills of the Great Dividing Range provide a majestic backdrop. The clarity of the air enables snow to be visible on distant peaks during the Winter months. Urbis in their report 3.4.2 page 15 doesn't recognise this, stating "The distant Eastern Highlands are occasionally visible … but in most cases the topography and trees tend to block long range views"

Within 500m of the Project is Victoria's Food Bowl, an established Vegetable Growing industry which contributes $150million annually to the economy and ensures the meat, milk and vegetables on Australian dinner plates is affordable and healthy. All this is underpinned by a dynamic and cohesive Community who value the environment, each other and their lifestyle. The photographs below gives some indication of the current landscape.

The glaring deficit in the report by Urbis is the failure to articulate the potential working landscape both within the mine footprint and the surrounding area. This area, once productive farming country, will be transformed to an Industrial site. Within this context, there will be multiple areas of continuous 24/7 activity, linked by very busy roads and services like water pipelines and power infrastructure. Dust will invariably be generated by this bustle. Mitigation measures identified are mathematically impossible to translate to reality, given the resources, water supply and size of the void/roads.

The Mining operations expect to move a massive 1,500 tons of ore material every hour, which equates to 12 million tons each year. The landscape must then be composed of heavy machinery working and moving, many trucks and management vehicles crossing the Industrial site and workers moving about in a heavy working environment. This visual working environment will have the corresponding industrial noise and dust and activity of an industrial site. The site will be best described as visual pollution.

1500 tons is filling one of these trucks (left) every 5 minutes. Which is around 11 of these every 60 minutes

Boonanarring Mineral Sand Mine, WA

Illuka Mineral Sands Mine, Douglas Victoria – which, 8 years after mining finished has still not been fully rehabilitated.

Most of the Urbis report is a static and technical summary of the current visual environment. The impact description of the actual mining operation is confined to the specific trenching for the ore. While this is useful, it conveys only a limited impression of what locals and the many travellers will see, hear and have to respond to in what is a very active heavy Industrial site.

The sites chosen to assess the current and changed visual environment are largely irrelevant and the Industrial area not visible or barely visible. The Consultant's report would have been more valuable concentrating in the immediate work area and actually describing what the industrial activity impacts would look like. Not sure if it was adequate or actually that you wanted in this sentence

The landscape travelled to access Bairnsdale or Fernbank will be significantly altered, sharing the road environment with heavily laden trucks. The roads, which now are quiet, will be characterised by Double B trucks, up to 26 m long, and other heavy vehicles. In doing so, changing the visual environment from serene to heavy Industrial.

Likewise, visitors along the designated scenic road to the Mitchell River National Park and Dargo will travel through the Industrial landscape of the mine. The Consultant's report concentrated largely on a very select number of receptors that was not reflective of the many individuals and groups who deeply appreciate the unique and benign landscape at and around the Fingerboards. The loss of the natural landscape through the industrial conversion will be seen by the growing number of visitors to the Mitchell River National Park and Dargo.

The loss of trees and other vegetation will be significant. The many old Box and River Red Gum trees will be removed with the Industrial operation, bringing with this loss of landscape values (and ecological values). Wide easements will be required for utilities as required along Chettles Road. The new road will require tree and scrub clearing and easements widened to carry the large trucks and service utilities.

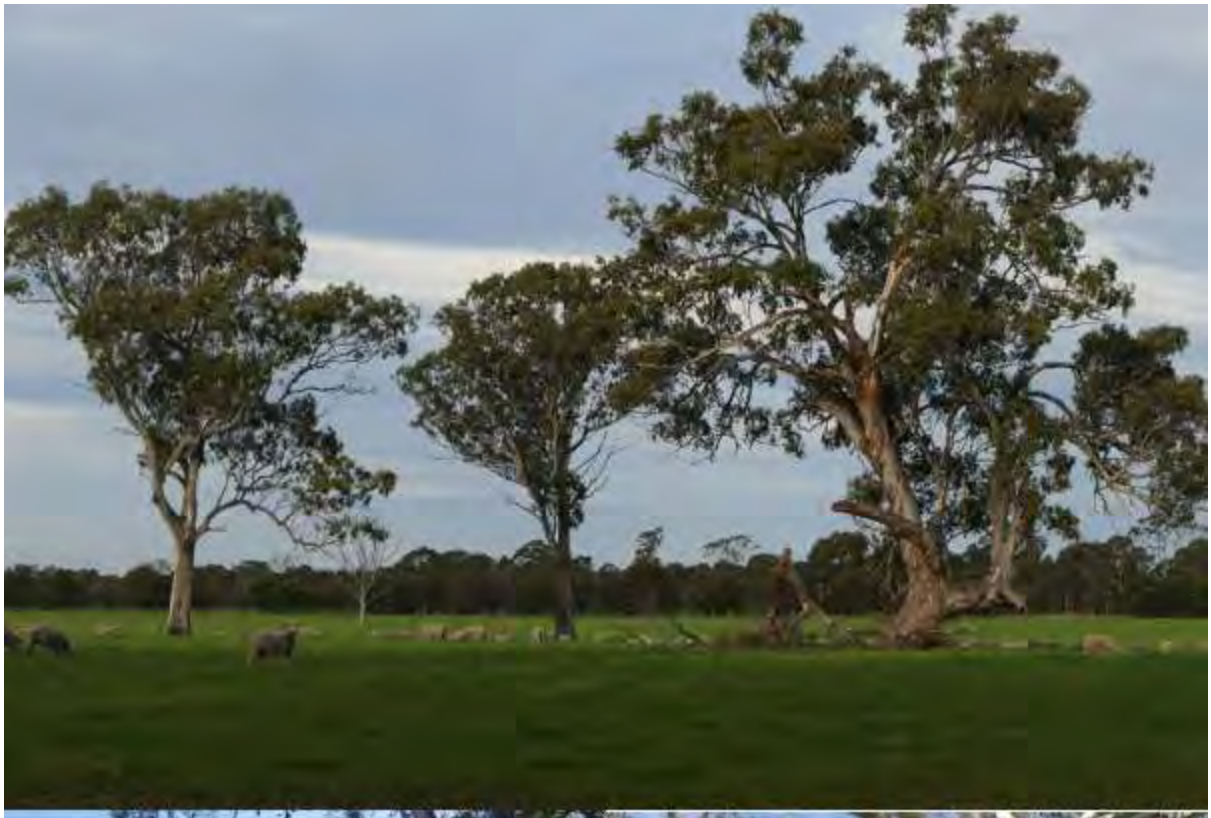
Impacts on Flora and Fauna are not articulated. A large portion of the clearing will be of the identified 'restricted' and 'threatened' River Red Gum Plains vegetation community. Existing corridors from the Red Gum Plains vegetation community to the foothill forest will be lost. Replanting will take centuries to replace the current treed landscape and can never replace the natural structure of the remaining woodland and forest.

The landform and the landscape will change after mining and it will be absolutely and utterly impossible to replicate the natural rolls, gullies and slopes of the current form. Subsidence is expected and gullies will not flow as before mining. This is acknowledged in the EES despite comments around "returning the land to pre-mining use".

Tree planting around the operating plants and service facilities is really only 'window dressing' and cannot replace the current environment. Replanting is not equitable to revegetation.

The report further fails to acknowledge the pressure the landscape will be under with climate change and the now common severe droughts and bush fires. If stressed and denuded, the worked over land will erode. With the hot northerly winds and the strong southerly changes, and change to a barren landscape. The planted young vegetation will be very susceptible to stress and climate effects will be a significant factor in trying to restore the natural vegetation on the Industrial area after mining. Revegetation failures must be expected with prolonged loss of landscape values. The landscape post mining will irrevocably change. No longer will it be 'Naturally Magic', as EGSC currently promotes.

Current Landscape and Visual Amenity




KOORIE
LAND
NOT
KALBAR
LAND


Glenaladale Recreational Reserve
District Emergency Assembly Area


Amcal
GLENALADALE
RECREATIONAL RESERVE
Bulmer FARMS
HINE CONTRACTING
Home of the Glen
Planning Central
ALTAR ESO
Crowe Horwath
NO SPIKE'S IN HALL
District Emergency Assembly Area
This District Emergency Assembly Area has been established in consultation with the Country Fire Authority, East Gippsland Shire Council and Department Environment Land Water and Planning as a location where the community may gather in times of an EMERGENCY
GLENALADALE
TENNIS CLUB

Inconsistencies in Assessment Process

Urbis's report presents an impression of land which currently has limited visual appeal. It does not reflect the reality of the landscape.

The visual settings described in 3.3 and following sections under describe the local landscape value around the Industrial mine site. The vistas of the eastern highlands are exceptional, forming an important backdrop for the area. Likewise, the views over the Mitchell River valley from the Industrial mine site are spectacular and rate as some of the best views in rural Victoria.

The current agricultural landscape is varied and always interesting. There is a mix of old trees, winding roads and farm housing, shearing sheds and yards and many farm dams in the working environment. The ever-changing cropping of the Mitchell Valley is anything but boring and gives a vista of a highly productive landscape.

Numerous comments on the report are particularly subjective, or outright incorrect. Rather than sequentially list them, indicators of these themes are as follows.

For example, a Subjective assessment page 18 under Agriculture "River Plain Horticultural landscapes are found in the flat areas adjacent to the Mitchell River. They consist of large crop fields which have a distinctive geometric pattern in aerial view. But because of the large scale of these field and the flat topography, the landscape *tends to appear monotonous* when viewed from the ground"

The Lindenow Flats are a patchwork of changing colours

Page 7, section 2.4 Residual Impact incorrectly describes a rate of tree growth “The effectiveness of the measures are demonstrated by comparing the visual impact during initial operation with the residual impact when the proposed landscape measures have mostly matured, which is *typically ten (10) years following initial establishment*. “ The landscape around the Project has been eons in the development, and a great many trees pre-date European settlement.

The picture above shown an ancient tree the in foreground. The smaller diameter ones behind were planted 20 years ago by landowner. Urbis cite trees reaching maturity within 10 years – they clearly have no understanding of the landscape at Glenaladale.

This comment, on page v of Executive summary, demonstrates the astounding ignorance Urbis have of agricultural practices at Glenaladale. "During the mining process … the disturbance to the landscape setting will be similar to the disturbance created by broad scale soil cultivation associated with agriculture, *which can often be visible for a number of years until surface vegetation establishes depending on seasonal rainfall".* That comment is absolutely untrue of the land targeted for mining which is grazing country that is pastured and not cultivated for crops. Perhaps this is reflective of their primary works being around the Urban landscape.

The proposed mine-site is on the rise above the Mitchell River. The ploughed paddocks in the foreground have been prepared eadiness for planting vegetables, are on the Lindenow Flats, not on the Fingerboards area. Those paddocks are usually planted to seedlings and produce mature produce within three to six months. Where did the Urbis consultant get the information used in his report? It clearly wasn't obtained from people who live in the area. Not only is it misleading it is patently incorrect. It is particularly disappointing that Kalbar staff who should know the landscape have allowed it to be submitted without correction.

As expected, these deficiencies then set the tone for the remainder of the report.

Anticipated changes to Landscape

The Minister Scoping requirements require the proponent to;

"Describe changes to the landscape (including from vegetation clearance and likely changes to landform) and associated visual effects, as well as public views from roadways used by tourist traffic and other significant vantage points, in particular on the Mitchell River National Park, and to

Design and identify mitigation measures.

The Project will decimate the landscape, destroying ancient trees which are ecosystems within their own standing, removing insects and microbes from the landscape. It will alter the topography post mining, changing waterways, destroying hydrology systems which sustain spring fed waterways, and losing important gullies. It risks erosion impacting on soil structure, sediment flow to rivers and also plans to alter the landform permanently.

The project disrupts the current symbiotic balance and undermines the works of Environmental Groups, including (but not limited to) the State funded East Gippsland Catchment Management Authority.

The Mine footprint, and adjacent borefield and service corridor, is important to the local Aboriginal People, and has multigenerational connections with the current landowners. Indeed, one family has been farming the area for 8 generations.

The project destroys the intergenerational equity referred to in the MRSD Act.

The Urbis assessment demonstrates deficits in data collation and interpretation. And also how inappropriate the Project is for the location. It is quite clear that Kalbar want to present the project area in as poor a light as possible so as to make it appear that there is 'nothing much to lose' if the mine is approved.

Urbis have provided a matrix around Visual Sensitivity and Visual Modification, based on 'last century' references from UK and US.

Urbis was unable to thoroughly and effectively undertaken the tasks around documenting anticipated changes to landscape . Of note is recognition by Urbis of the limited access they had to residential properties (Executive report pg iv). It cited "a number of residences have been purchased by Kalbar) but these are only 3 of the 12 listed and they make less than a fifth of the area to be mined. The limited access to many properties (5.1 page 33) resulted in photographing the site from the roadside, and then extrapolating from there. It is highly likely the refusal of access is reflective of the lack of support local residents have for the Project. An independent survey commissioned by Mine-Free Glenaladale showed more than 85% of people living within 3km of the project area are opposed to the mine.

Urbis also elected to undertake a study of "key sensitive viewpoints within 2.5 km of the Project". This limitation doesn't align with the Scoping Requirements and Guidelines above. (Urbis Assessment Framework).

Desktop analysis

Again drawing on the various outdated and International References, listed in 'Urbis background experience, limitations and resources' above, Urbis further categorised individual residences by referencing the extent of "homestead vegetation". It went on to suggest "The presence of 'tools of the trade', such as materials storage areas, farm equipment, silos, sheds etc which can take up a considerable portion of the view shed around a house, can have a greater contributing influence on visual modification than other more distant elements".(5.2 pg 33)

In essence, stating that the home and yard will block views of the Project, then suggested "while impacts to visual amenity also occur for work areas, such as agricultural production land, there were considered to be less sensitive than the other viewpoints" .

Both these assumptions are invalid, as vegetation around any home is a dynamic factor. And Urbis dismisses the reasons people choose to work outside in East Gippsland, which includes opportunities for quality views and the mobility working outside allows.

Table 7, page 41, indicates distances of Viewpoints from the Project, but doesn't indicate elevation above sea level.

Local knowledge is a useful adjunct when reading this report, as the likes of VP 06, Farm Resort, is located down a notoriously steep driveway to the valley floor below. The presence of elevations above sea level would have provided Panel members with greater clarity as to all VP readings. This lack of detail is indicative of the suboptimal information provided for in the EES report. It is unfortunate the desktop modelling didn't include a profile of the topography – data that is not difficult to obtain - for completeness and transparency. Urbis have noted in 6.2.1 that they based (desktop) viewshed analysis on 'availability of reliable digital topographic data". How do they determine what is reliable?

There is no mention in the Urbis report of the 20 Dams which will be located over the Project area, and these are also absent from Maps in the EES. These present immediate risks to the health of vegetation and water flows downstream of the dam wall, along with the potential for dam wall failure. Dams vary in size, with the largest proposed to be 2.2Gl in size and more than 19 others stopping

However, changes to fencing, road signage and the installation of 66 V Overhead High Voltage electricity feeder lines along a dedicated service corridor are identified as significant impacts to the Project area and beyond.

Page 31, Section 4.2.9 articulates the expected service corridor, describing it as "typical" rather than confirmed. To that end, more infrastructure than listed may be added.

From a local perspective, in the area of The Fingerboards, one of the most pronounced and immediate Changes to Landscape will be the removal of over 188 ha of Remnant Vegetation, including along roadways, 763 large trees (also known as Ancient Trees, hundreds of years old) and over 130 smaller scattered trees. To give perspective to this, the MCG oval in Melbourne is around 2 ha.

The Fingerboards intersection, below, showing ancient trees, nesting hollows. Road falls to land below

Roadside reserves, ancient gums and ecology

Conceptual photo simulation images provided by Urbis for Kalbar to use in seeking approval for the Project are just that – Conceptual, and Computer Generated. They illustrate a monotone, rounded topography, populated by mono species of generic 'cut and copy' trees. The images fail to replicate the rather aspirational Rehabilitation plans put forward by Landloch, a company based in Qld and WA (Section A020 of the EES). The Urbis report states the landscape will be reliant upon natural rainfall for trees to become established, with Landloch citing Tube Stock as preferred choice for replanting.

Climate changes have already impacted on rainfall amounts, reducing what has previously been received. (refer Submission Greenhouse Gases) Based on the rate of growth of many species, and assuming survival of the tubestock, including the River Red Gum, it will be another 200 years or more before those trees are at a maximum, and can fully represent their current valuable contributions to the visual landscape and surrounding ecology.

The other change will be to actual topography, with Kalbar anticipating significant infilling, impacting Perry Gully and Simpsons Gully. (Landloch EES report page 70) The proposed realignment of roads will result in landscape which is largely bland in nature, with limited/absent natural features. Roadside vegetation, in its current form, won't exist for many roads

It must be understood that removal of vegetation and established trees then impacts all level of the ecosystem. From fungus and ants, to moths, birds, reptiles and mammals, all depend of an established ecosystem. The profound changes to the landscape, coupled with the actual mining works, will negatively impact the capacity of the ecology to function. Biodiversity and a balanced Ecology ensures plants are pollinated. And that translates to sustainability of supply chain for foods we eat.

The proliferation of birdlife and other animals along the roadside will disappear. The capacity to see wombat, kangaroo, emu, birdlife, reptiles and the like will be rare, further impacting Visual Amenity.

This Mining Industry document around Rehabilitation, which identifies the challenges, acknowledges that the establishment of vegetation won't translate to fauna spontaneously returning. "Experience has shown that some key components of fauna species' habitat requirements might not be present in rehabilitation areas for many decades" (pg 40)

https://www.industry.gov.au/sites/default/files/2019-04/lpsdp-mine-rehabilitation-handbook-english.pdf

Emu at The Fingerboards.Their chicks recently moved on, having grown sufficiently to fend for themselves. .

One of many Wombat holes in the area. This is one of many in Perry Gully, proposed site of a temporary tailings area.

Moving further afield, as befitting the Brief of the EES, landscape changes to the surrounding roads and residences will be the significant increase in Double-B truck movements. The 'Industrial' and frequent nature of these heavily laden vehicles is in stark contrast to the occasional gentle chugging of a tractor along the road, whose driver whom you most likely know.

Various factors has been identified as an impact on Landscape and Visual amenity. Section 4, Description of Project, has some anomalies. Table 5 has Construction cited as 9 months where other parts (4.1.2) of this Urbis report, along with other EES reports, list it as 2 yrs.

It is widely reported that 360 ha (equivalent to around 180 x MCG ovals) will be disturbed for actual mining activity at any time. Earlier documents list the area as 280 ha. And this, rather remarkably, then reduces to 100 ha in section 6.1 Page 37 of the Urbis report. The mine void will be between 29 – 45 m deep and a range of heavy earth moving equipment will be active throughout the continuous 24/7 mining process. Section 4.2.3 has a Tailings Storage Facility "will occur for approximately three years" whereas 4 ½ is stated elsewhere in the EES.

Urbis have recognised Lighting as a concern, nominating 2 types, and listing 3. (4.2.7) They provide a helpful catalogue of some available lighting options. Appendix B is the Guidance Notes for the Reduction of Obtrusive Light (from 2011 UK reference) and discusses the Scottish experience. Those references also cite UK Standards, rather than Australian.

Rural nightscape has significant and obvious differences to the Urban experience. Urbis have been involved with lighting for major Melbourne infrastructure projects, where the existing levels of background lighting are already elevated. To stand outside at Glenaladale, where there are no street lights, is a very different experience. Any passing vehicles, or Agricultural equipment working in to the evening, is of a transient nature. Standard street lighting infrequently exist in the areas around the Project, outside townships.

As indicated above in 'Urbis background experience, references and limitations', Urbis fail to reference the current Australian Standards in this report when discussing Impacts of night lighting (6.4 page 95)

The Project site will have moving vehicles with constant headlights and flashing hazard lights for OH&S purposes. Despite the movement of light sources, Urbis are surprisingly confident that the Project will be identified by a "soft glow" or "slight luminescence" overnight. Given the number of vehicles, fixed lighting and reflecting light from Mine void walls, 'soft glow' is very subjective. There is no clear reference range of the amount of light expected from the Project area.

Urbis reliance on desktop modelling has intrinsic flaws, and is not balanced with more extensive site visits.

Dust generated during the Project is not mentioned at all, and this is pronounced feature of Mining Projects, which require considerable suppression, using water or chemical suppressants. Adequate suppression is mathematically impossible. Along

with progressive rehabilitation areas which may lack effective ground cover. Winds in the area can be ferocious. By their own admission, Kalbar have stated their wind monitoring equipment at The Fingerboards (attached to a tank, located in a wind shadow where stock shelter in storms) failed to function beyond 77% of the time, only recording up to 40km/hr wind speeds. Vic Emergency App regularly has alerts for High and Gale force winds for the district, and The Fingerboards is located on elevated land 130 metres above sea level.

It is with some consternation to note that anomalies continue to occur in the report, particularly given the consequences of miscalculations and misrepresentations, should this Project continue beyond the Panel hearing.

Kalbar describe Industry Best Practise in one of the only six (6) Policies listed on the website, but this report is not reflective of that level of detail and accuracy. https://www.fingerboardsproject.com.au/assets/files/2020/Policies/kalbar-risk-management-policy-v1.1.pdf

Mitigation measures

The Minister requests

Outline and evaluate the proposed mine design options, staging of works and management measures that could mitigate project effects on landscape and visual amenity during mining. Describe and evaluate the potential and proposed measures to restore and rehabilitate the landscape and visual amenity values of the project site after mining.

> Urbis reduce this to
>
> Identify and propose design responses and measures for the reduction, mitigation and management of potential visual impacts

Measures to reduce the impact of the Project have been outlined in 4 ½ succinct pages within the report, section 7. Each of these theoretical interventions have reality based complications which Urbis fail to explore further.

Screen Planting of trees and other vegetation has been clearly identified as from tube stock, thus the plants will be very immature. There's an expectation from Urbis that screening foliage, which replaces the removed established and ancient trees, along with lower vegetation, will be at maturity within 10 years. Such a suggestion if folly in East Gippsland. Urbis also acknowledge this maturation rate is dependant on natural rainfall. "given the local climate, speed of revegetation will be dependent on natural rainfall" (7.1.2 pg 97)

Species selection is the other factor, along with controls which enable maximum healthy growth.

As anyone who has implemented a planting program can advise, native and introduced animals are particularly fond fresh shoots. And will progressively nibble until the plant is unable to survive. Regardless of the use of protective plant shields.

Revegetation efforts thwarted by animals nibbling at the new shoots, despite high guards surrounding the plants.

Landcare notes describe issues with the need for regular watering, impact of pest species, foraging animals and fungus growths all having a detrimental impact.

Landcare have identified more than 20% of tubestock won't grow despite maintenance and due care.

The notion of mass screening plants being established also relies on the principles of progressive rehabilitation being enthusiastically adopted over the anticipated lifespan of the Project.

Erosion again presents a considerable concern, particularly once the topsoil is disturbed. And difficult to ameliorate.

What will the Mine site Void appear like, as it is on a greater scale than this dam and gully?

Auditor General report

The Auditor General's report released Aug 2020 reveals systematic failures of the Mining industry around rehabilitation, with inadequate bonds and intrinsic issues due to self regulation.

" The Auditor-General's report found that DJPR "is not effectively regulating operators' compliance with their rehabilitation responsibilities", exposing Victoria to "significant financial risk". According to the report, frequently, mining sites have been poorly rehabilitated or not treated at all, presenting risks to Victorians and the environment."

https://www.sustainabilitymatters.net.au/content/sustainability/article/auditor-general-report-reveals-vic-mine-rehabilitation-failures-62344776

Such a scathing indictment of the practises of the Industry, coupled with the calibre of the Urbis report and no established 'track record' of Kalbar (a recently formed Company who now has its 4th CEO), brings to the fore real concerns that the Changes to Landscape and Visual impacts of the Project will be detrimental. The goals and processes touted in the EES will most likely fail.

The other risk factor not mentioned in the EES, including in Urbis report, is around the business model and what risks that might bring. The flow on effect would be an abandoned project and the expectations around improving amenity not achieved.

Absence of a Business Plan negates 'fit and proper person' criteria

Kalbar have not included a Business Case or Economic Model in the EES. The Victorian Mining Act (MDRS) has conditions which any Proponent must satisfy. That includes clauses pertaining to be "a fit and proper person", there be an "accessible, economically viable body of ore", that the Project can be funded to develop and operate, and that a Rehabilitation Bond is provided. In cash, not a bank guarantee.

Incomplete planning

Urbis cite in 7.1.5, pg 97, that "Landscape Plans and a Landscape Management and Maintenance Plan will need to be prepared prior to commencement of works …" This doesn't provide any specific details on which a Panel could reasonably be sure that the aims and objectives have a identified achievable outcomes.

Lighting impacts on wildlife

Lighting impact mitigation measures include sweeping statements around selecting appropriate directional light, supported by the indicative types, Appendix B, page 9 onwards.

This has little regard for the need of the natural world. Royal Astronomical Society of Canada, in their Journal Environmental Impact of Light Pollution and its Abatement | December 2012 (pg. 9) describes "More wildlife is active after dark than during the day. One could then argue that darkness is more critical to life on Earth than light! Many foraging species eat primarily plants, scavenge, and take advantage of the anonymity of darkness to avoid predation. They also seem to interpret the longer nights as a cue for winter" .

The article goes on to say “Although nocturnal species are comfortable at night, they still need to navigate across their foraging grounds. Insects use distant lights to determine direction. Birds use the … stars for orientation during migration resorting to secondary cues only when it is cloudy. Artificial lights are misinterpreted as stars or can alter the appearance of the ground navigation markers, which confuses wildlife. Precious foraging time is lost as they try to find their way, and this delay may be lethal if they are caught in the open by predators…”

Of importance is noting that “Although complex organisms may tolerate the initial environmental change, the more basic organisms, on which the ecosystem depends, may not.”

And we are all interdependent beings, relying on a balanced environment and ecosystem for our survival.

In summary

Urbis, and therefore Kalbar, have failed to meet Scoping Requirements, and this renders this report inadequate for the purposes of making a Decision/Recommendation pertaining to the Project continuing.

And on a background of persistent and systemic failings within the Mining Sector to translate work plans and mitigation measures in to action, a process hampered by the lack of enforcement capacity for Panel Report recommendations/conditions, to consider this Project as fitting within the Legislative frame works which aim to bring generational benefit to Australians and the Environment, is fundamentally flawed.

The painful lessons from mining failures at Douglas, Ouyen, Bendigo and Benambra (and further afield) provides absolute clarity around the issues.

The rich and varied landscape at the Fingerboards should not be decimated for a very marginal mine and the short term gain of a few.

Chapter 17: PLANNING SCHEME AMENDMENT

Land affected by the proposed planning scheme amendment

The amendment applies to land associated with the Fingerboards Mineral Sands Project outside of the proposed mining licence area and which is coloured green on the map below. It covers more 2,774ha – almost twice the project area in the original proposal put to the public when the EES scoping requirements were set.

It covers areas to the north (barely noticeable on the map) relate to pumping arrangements at the Mitchell River, a large area abutting the mine and hundreds of hectares to adjacent to the Fernbank-Lindenow South Road and two other areas, so small they can barely be seen on the map, located in and at the outskirts of Bairnsdale.

Summary

The amendment will allow Kalbar to have unfettered access to many hundreds of hectares of private land outside the mining area. Owners of that land have not been advised of the amendment or consulted about it in any way. Many of those who have land around the proposed railway sidings may not even be aware that the amendment has been proposed – yet they are going to be deeply affected by it.

The proposal is intending to industrialise a rural farming area and is completely unacceptable. The mine itself is fraught with problems, including the effects it is going to have on people who rely on groundwater. Economically it is not a sound proposition and environmentally and socially it is a disaster. The amendments were never part of Kalbar's original proposal and there has never been the opportunity for the public to make comment on them.

The public should not have to carry the burden for a proposal that is so economically marginal that the approval of the PSA cannot be considered to be in the public interest.

If the amendments proceed people's farming businesses are going to be affected by such things as compulsorily imposed easements to enable Kalbar to construct powerlines and pipelines from water sources (borefield and Mitchell River) to the mine-site and roads from the mine-site to the siding. Those easements are 30 metres wide and the miner is expecting to be able to take over land at will for compensation that will not reflect the current uses of the land and its importance to owners. Pipelines are massive and will spit agricultural land. Farmers will not only have reduced useable land, but will have the expense of installing infrastructure necessary to feed, water and handle stock that will not be able to get past the pipes. For many farmers – particularly those with paddocks that Kalbar are planning to put easements and roads through - it will significantly reduce their stocking capacity and for some, make their paddocks useless.

Those farmers have been paying rates and contributing to the shire for many years. Many are intergenerational. Income earnt is spent in the Shire, families have been raised here and there is a deep attachment to place and a strong commitment to the greater good of the Shire.

The proponent's PSA demands favourable treatment for a proposal that will negatively impact on the landholders and is contradictory to the objectives for farming zones.

There has been absolutely no consultation or discussion about it with any of the affected farmers. The proposal itself is hidden within the EES's more than 11,000 pages of complex technical information. It is inequitable and unjust to attempt to gain advantage over others by denying them information that is critical to opinion formation and decision-making.

The proponent states that the Amendment is required because in the current East Gippsland Planning Scheme this type of development would require planning permission or are prohibited under the current scheme.

The East Gippsland Planning Scheme encourages Agriculture within the municipality, acknowledging the economic benefits it has historically and will in the future bring to the region. The miner has provided an analysis that uses incorrect figures, poor modelling and inconsistent comparisons to deliberately downplay the economic value of agriculture in the area

There are good reasons why developments require planning permission or are prohibited under the planning scheme.

To grant the miner carte-blanche under the amendment indicates that the scheme is unnecessary and should be removed or altered to allow anyone with a personal wealth-creating idea to do what they like without regard to the consequences of others. It would discourage strategic planning that considers the greater social, community and environmental good.

The proponent claims they have done assessments of the area involved but there is no evidence of those. Where is the information about habitat of national, state or even regional significance? Where is the information about the effects on local users or even the long-term and often permanent impacts on ground and surface water? Where is the evidence of consultation with affected residents and users, or with traditional owners?

The mine is far from a development of state or national significance. The miner has not demonstrated economic benefits that outweigh the costs of granting them the unfettered right to interfere with so many people's lives and livelihoods. In fact the 'economic' reports presented indicate the project is marginal at best. For example, the miner states that even the intention to mine the Bairnsdale-Dargo Road is only considered for 'cash-flow' purposes. Cash flow that will only provide $6.17 per tonne of ore extracted! Costs for overburden removal, processing, transport to end user and for road replacement have to be deducted from the 'cash-flow'. The economics do not make sense.

To grant a PSA for such a marginal proposal would be folly. Attempting to save the miner time and money by doing so is a very poor investment with next to no likelihood of return for the shire.

This PSA and PAO proposition is yet another example of Kalbar's lack of social licence – their inability to discuss and answer questions asked of them at public meetings preferring to default to their standardised statement of …" *it will all be in the EES",* shows they have failed their community consultation requirements.

Restricting comment on the PSA to the EES submission process and Panel Hearings adds to the sense of injustice and inequity already experienced by the community in relation to the Fingerboards project. The community of East Gippsland, the Shire and the newly elected councillors must have a fair opportunity to examine the proposal fully before being locked into an amendment that could have extremely negative consequences for the region.

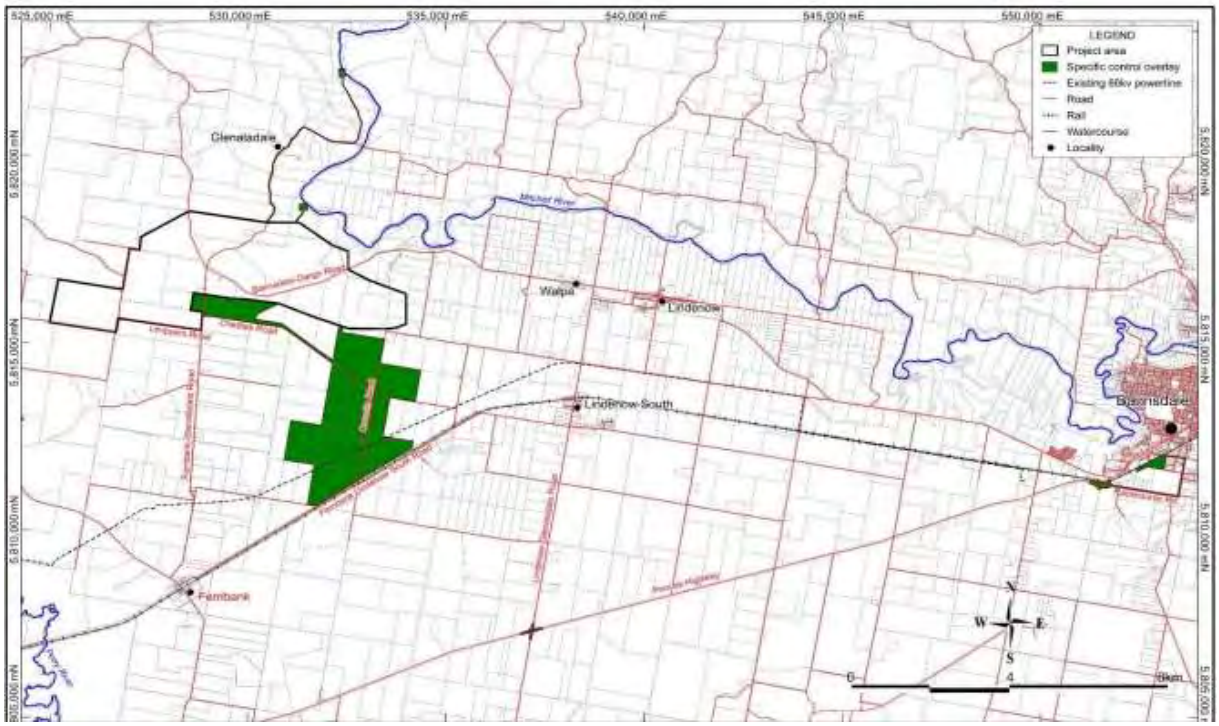


Figure 1 Kalbar map of land affected by the amendment

How does the amendment implement the objectives of Victoria's planning scheme?

Rationale	Effects	Impact What and Why	Unacceptable Risks (residual, potential)
Amendment implements the objectives of Victoria's planning scheme -economic -sustainable use of land -providing for its fair and orderly development	Economic	What is the Whole of Life Economic analysis of this mine (over 30/50/100 years) does the mine have a net economic benefit? Both long and short term economic, environmental, social and equity considerations should be effectively integrated into decision-making Project identified as an "extraordinary" circumstance – it is a one-off mining project. (EGSC planning scheme 45.12 purpose)	In the long-term, loss for the Shire is expected based on other mining experiences. If there are any negative impacts arising from harm to the tourism and agriculture industries this will have a negative effect on the local and State-wide economy. Every direct job in agriculture creates 4 indirect jobs so any loss of a job creates a 4 times loss effect. One mining job only creates one indirect job. Invariably mining companies recruit far fewer positions than proposed.
	Sustainable use of land	There is nothing sustainable about this mine	Justify how the mine is – "sustainable development" it is not renewable, environmentally nor sustainable
	Development of land	This is farming land that produces food and fibre that feeds the nation and its produce is exported overseas.	Mine cannot co-exist with current land use because of dust, competition for surface and groundwater, bio security impacts, increased traffic, destruction of existing biodiversity, changed amenity of landscape, questionable if rehabilitation would be successful. Mining is not considered in East Gippsland Shire Council's Lindenow Community Plan. Mine is too close to $150

			million vegetable industry and two major river systems.
Provide protection of -natural -man-made resources -maintenance of ecological processes -genetic diversity	Natural resources	Over 700 mature trees to be removed, soil profiles mined and re blended if at all rehabilitated it is questioned if the success/viability of long-term pastures can be achieved	Unless long term application of artificial fertilisers can be applied to soil profiles productivity will not be achieved. The topsoil is likely to be rendered useless. Trees that provide shade, habitat, refuge take a long time to grow.
	Man-made resources	Farmland has been improved over generations, adapting to variable seasons, and establishing pastures selected from species which are successful in this area.	Knowledge will have to be learned working with the reconstituted soils. Long term health risks impacting on the Community – dust, noise, stress, increased traffic
	Ecological processes	20 surface water catchment dams will lessen the downstream flow to other beneficial users including freshwater ecosystems, potential discharge of untreated water into streams increasing turbidity, temperature, and pH	Flow regime altered, impacting ecosystems, resulting in less groundwater recharge
	Genetic diversity	Rare and threatened flora species exist within the impacted area	EVC areas should not be removed, biodiversity must be retained.

Balance present and future interest of all Victorians	Food production	Adjoining horticultural area valued at $150M per annum. Sheep and beef farmers produce protein/meat. Sheep produce natural fibres (wool). These are pre-existing industries that contribute to the economy via direct and indirect employment	Dust will foul pastures, dirty fleeces, impact animals drinking water and health, contaminate vegetables produced on surrounding land. Three times more jobs could be created in horticulture if the water the mine requires was redirected to grow vegetables.
	Tourism	East Gippsland has a significant tourism industry, jeopardising this leading employer and regional attraction would be a great financial loss to the region.	With over 2.788M visitors to East Gippsland contributing $4,695,680 per year this industry should not be jeopardised with any negative impact from the proposed mine on the rivers and Lakes system
	Lifestyle choices	Altered landscape, diverted roads, disruption to travel times, increased traffic, 24/7 noise, increased demand on health services, facilities, and existing infrastructure	Ensure intergenerational equality. People choose to live here because of amenity, fresh air, clean water, rural lifestyle– if a mine proceeds it will be an unfavourable place to reside. Mine workers accommodation will have an increased demand on available housing and affordability.
Mine will utilise significant natural resource	Natural resources	Resource will be mined in a supply and demand scenario, if it is not economically viable production will scale down or stop. You can only mine it once, the surrounding industries are renewable, environmentally friendly, sustainable, and long-term.	Local Shire will be left with a long-term liability for roads, if insufficient bond is not held, they must pay remediation costs.

Figure 2 Vegetation along existing road (Bairnsdale-Dargo Road) that will be removed as the mine path progresses through *Photo source: Johnston collection*

How the amendment addresses environmental, social, and economic effects both within and outside the mining licence area

Rationale	Proponents study outcomes	Direct impacts	Indirect impacts (including residual)
Ecological assessment identified – terrestrial and aquatic -flora and fauna values (threatened, rare and migratory species)	Surveys assessed extent/condition of native vegetation communities, conservation significance, threatened, rare, migratory	20 surface water dams constructed over site will lessen the environmental flow to ecosystems and other beneficial users	Question if acceptable environmental outcomes can be achieved, having regard to legislation, policy, best practice, and the principles and objectives of ecologically sustainable development

Groundwater impacts - aquifer draw down	Bore field into deep Latrobe Aquifer (to be utilised for initially the first 3 years- make up water) 4 GL Winter-fill water allocation from Mitchell River yet to be made available	Latrobe Aquifer – drawdown including the overlaid Seaspray Group aquifer. Mounding will impact groundwater dependant ecosystems	Mounding and slumping within the water table will render some land unsuitable for existing practises. In dry climatic times groundwater is used by the horticultural industry to supplement their water requirements. Dryland farmers and households use shallow aquifers for stock and domestic purposes – with usually no other alternative.
-water balance (increased inflow and outflow to River)		Flow rates to River will lessened with dams constructed on all catchments	In times of significant rainfall events it is hoped the infrastructure involved with the mine will withstand the impact and not create or exacerbate the event

Does the project significantly impact? -environment -amenity -human health	Environment	Yes, it will significantly impact the environment because of rediverted roads, changed topography, altered water flow regimes, removal of vegetation, massive use of carbon fuels producing greenhouse gases	Dust from large open areas of exposed soil, unknown timeframes for completion of rehabilitation, removing large volumes of water that normally would flow into the Heritage River, RAMSAR wetlands, Silt Jetties and on into the Gippsland Lakes from both the Perry and Mitchell River systems.
	Amenity	Changed landscape, dirt bunds constructed within panoramic scenery	Primary production, residential and lifestyle properties unable to co-exist with operating mine because of dust, noise, illuminated lighting, vibration, increased traffic and changed road corridors.
	Human Health	Increased workers will put more pressure on already over stretched health providers. Planning permit should dictate larger distances of buffer zones protecting sensitve receptors and other zoned users	Some health problems have long latency periods, compromised health of residents (asthma, stress, depression). Community wellbeing and welfare should be enhanced by following a path of economic development that safeguards the welfare of future generations

The Proponent concludes…. “There is a procedure set out in Victorian planning and mining legislation that exempts mining within the proposed mining licence area from the need for planning approvals under planning schemes in lieu of other approval processes set out under the mining legislation.”

But the East Gippsland Planning Scheme also encourages Agriculture within the municipality, acknowledging the economic benefits it has historically and will in the future bring to the region.

The Proponent’s statement …”There will be a temporary loss of agriculture production averaging 443ha for the project life of 20 years, but little or no risk of permanent loss. The total acreage of agricultural land will generally be maintained post mining other than areas set up as native conservation areas. The economic benefit derived from the proposed mineral sands project will offset the temporary loss of productive land withdrawn from agricultural production.”

The resources they are mining are not in short supply and will only be mined while it is economically viable to do so. Other minerals sands mines in Australia have been placed in care and maintenance mode, or ceased production – this mine should not be contemplated because of the negative impact actual and perceived on existing successful horticultural and dryland faming in the vicinity of the mine – these existing enterprises have brought resilience into their operations and have weathered the highs and lows of the economy, rise and fall of commodity prices, overcome the impacts from natural disasters and still exist.

Figure 3 Photo of Lucas Creek

Lucas Creek will be crossed twice with the diverted roads, also vegetation containing EVC and significant old mature trees to be removed so they can mine through the existing "C" Class road (Bairnsdale-Dargo Road), to the right of the photo is where the haul road 100m wide, containing water pipeline, electricity is to be constructed out to the proposed rail siding - all included in the C156egip amendment

Photo source: Johnston collection

East Gippsland Planning Scheme - a legal document put in place to ensure fair and equitable use of all land, assisting in making region resilient, sustainable, and providing for our future generations.

Planning policy framework- supporting Agriculture within the Municipality - East Gippsland Planning Scheme:

Clause	Directions	Proposed mine's impact
12.01-1 Protection of biodiversity	-Identifying and protecting areas of biodiversity including important areas of biodiversity - Providing links between areas of biodiversity - Planting and tree cover to increase habitat	The proposal will remove over 700 large established trees which provide shade, shelter, breeding habitat, refuge, food sources for birds, insects, native animals, livestock, and humans. Offsets provided will not replace the current biodiversity that will be removed. Biological diversity should be protected, and ecological integrity maintained.
12.01-2 Native vegetation management	- Removal of native vegetation resulting in no net loss to biodiversity.	Native vegetation is essential to provide the mixed species that support the local fauna. Significant rare and endangered flora species exist within the project and surrounding area and should be augmented not diminished.
13.04-2 Erosion and landslip	-Land degradation processes – management of use and development in areas prone to landslip, erosion etc. -Dams – as relevant to erosion or landslip	Soils of the area are problematic – sodic, acid sulphate, erosive, unstable, tunnel erosion - requiring experienced management. Dam construction is not always successful with soil failing to consolidate due to dispersive nature

13.06-1 Air quality management	- Integration of land use and transport to improve air quality through reduced emissions -Separating uses that generate emissions and more sensitive uses	Large greenhouse gas emissions from mining, processing, vehicle and machinery movements, noise, dust impacting sensitive receptors residences as well as animals' pastures and habitat
13.07-1 Land use compatibility	- Amenity impact management -Conflict between uses within a zone	Dust, noise, light, vibration and visual impacts on animals, vegetation and humans living within and travelling through the area
13.07-2 Major hazard facilities	- Minimising the potential risk to humans and property from major hazard facilities - Providing for the ongoing viability of major hazard	Potential environmental and health risks including fires, floods, water shortages impose on other beneficial users, air quality, increased traffic movements including B-double trucks on country roads and popular tourist routes.
14 Natural Resource Management	- Planning is to assist in the conservation and wise use of natural resources including energy, water, land, stone, and minerals to support both environmental quality and sustainable development. -Planning should ensure agricultural land is managed sustainably, while acknowledging the economic importance of agricultural production.	Project is not a "wise" use of the finite water resources. The volume of water required could be better utilised in renewable, sustainable, viable, productive food production. Quick profits versus land stewardship. With the projected population in East Gippsland Shire Council to increase 28% by 2030 and Wellington Shire Council by 16% we should be producing more food and encouraging renewable industries

14.01-1S Protection of agricultural land objective	-To protect the state's agricultural base by preserving productive farmland. - Strategies Identify areas of productive agricultural land, including land for primary production and intensive agriculture. - Consider state, regional and local, issues and characteristics when assessing agricultural quality and productivity. Avoid permanent removal of productive agricultural land from the state's agricultural base without consideration of the economic importance of the land for the agricultural production and processing sectors. - Protect productive farmland that is of strategic significance in the local or regional context. - Protect productive agricultural land from unplanned loss due to permanent changes in land use. - Prevent inappropriately dispersed urban activities in rural areas. Protect strategically important agricultural and primary production land from incompatible uses. - Desirability and impacts of removing the land from primary production, given its agricultural productivity. - Impacts on the continuation of primary production on adjacent land, regarding land values and the viability of infrastructure for such production. - Compatibility between the proposed or likely development and the existing use of the surrounding land. - The potential impacts of land use and development on the spread of plant and animal pests from areas of known infestation into agricultural areas. -Avoid the subdivision of productive agricultural land from diminishing the long-term productive capacity of the land. - Give priority to the re-structure of inappropriate subdivisions where they exist on productive agricultural land. - Balance the potential off-site effects of a use or development proposal (such as degradation of soil or water quality and land salinisation) against the benefits of the proposal.	The proponent has owned land within the project area for over 6 years – during that time, no improvements nor maintenance have been done to their land – vermin, weeds remain uncontrolled. Land stewardship is not a principle they engage in. Adjoining properties have been nurtured and improved working with the environment to achieve economically viable, sustainable, productive properties. These properties produce products that are sold locally, nationally, and internationally. -Agriculture creates 4.2 additional flow on jobs for every direct employee this means there are around 10,500 jobs connected with agriculture in the area. Mining creates 1 additional flow on jobs for every direct employee meaning the mine will only create 400 jobs. -The proposed mine will remove soil profiles and reconstitute the layers if and when rehabilitation occurs. Whether these soils will be viable and able to sustain vegetation in an economic capacity is questionable. The soils in the area are dispersive by nature and require selective management and appropriate pastures species selected. -Appropriate design criteria required to avoid long term landform degradation. Consideration to be given to slope geometry, upper soil profile characteristics (physical/chemical) and surface drainage and erosion mitigation. The project is not in the public interest because it is contrary to the principles of ESD [ecologically sustainable development] - namely intergenerational equity because the predicted economic benefits

		would accrue to the present generation but the long-term environmental, heritage and agricultural costs will be borne by the future generations
14.01-1R Protection of agricultural land	-Gippsland Strategy Protect productive land and irrigation assets, including the Macalister Irrigation District, that help grow the state as an important food bowl for Australia and Asia.	Lindenow Valley also has a significant established “food bowl” producing vegetables for the local, national, and international market. The area of horticulture is increasing and if the same amount of water (as is required for the mine) was available to the vegetable growers they could increase their production three-fold.
14.01-2S Sustainable agricultural land use	-To encourage sustainable agricultural land use. - Strategies ensure agricultural and productive rural land use activities are managed to maintain the long-term sustainable use and management of existing natural resources. - Support the development of innovative and sustainable approaches to agricultural and associated rural land use practices. - Support adaptation of the agricultural sector to respond to the potential risks arising from climate change. - Encourage diversification and value-adding of agriculture through effective agricultural production and processing, rural industry, and farm-related retailing. - Assist genuine farming enterprises to embrace opportunities and adjust flexibly to market changes. - Support agricultural investment through the protection and enhancement of appropriate infrastructure. Facilitate ongoing productivity and investment in high value agriculture.	Agriculture is a long term, sustainable industry – mining is not – you can only mine once. Mining and processing use large amounts of fossil fuels, increasing the greenhouse gases, exacerbating climate change. The area of the mine has experienced major floods, fires, and severe droughts the mine will not lessen the likelihood of these climate induced disasters. Proposal will result in a range of negative impacts to the adjoining landholders and that the application has the potential to impact negatively on the long-term sustainability and viability of the community.
14.02-1 Catchment planning and management	-Protecting and restoring the natural function of catchments - Managing impacts on downstream water quality including from development	-Mine operation will change topography, soil profiles, surface water flow, hydrology, and drainage, as well as changed vegetation cover.

14.02-1S Catchment planning and management	- To assist the protection and restoration of catchments, water bodies, groundwater, and the marine environment. - Strategies ensure the continued availability of clean, high-quality drinking water by protecting water catchments and water supply facilities. - Consider the impacts of catchment management on downstream water quality and freshwater, coastal and marine environments. - Retain natural drainage corridors with vegetated buffer zones at least 30 metres wide along each side of a waterway to: Maintain the natural drainage function, stream habitat and wildlife corridors and landscape values, minimise erosion of stream banks and verges, and reduce polluted surface runoff from adjacent land uses. - Undertake measures to minimise the quantity and retard the flow of stormwater from developed areas. - Require appropriate measures to filter sediment and wastes from stormwater prior to its discharge into waterways, including the preservation of floodplain or other land for wetlands and retention basins. - Ensure that development at or near waterways provide for the protection and enhancement of the environmental qualities of waterways and their instream uses. - Ensure land use and development minimises nutrient contributions to water bodies and the potential for the development of algal blooms. - Require appropriate measures to restrict sediment discharges from construction sites. Ensure planning is coordinated with the activities of catchment management authorities.	With the proposed 20 contingency dams to be constructed in the project area and adjoining Planning Scheme Amendment area – the volume of water flowing to downstream beneficial users including, groundwater dependent ecosystems and the environment will be severely reduced. The quality and quantity of discharged water beyond the catchment dams will need to be monitored ensuring it does not contain flocculants which are detrimental to aquatic habitat, contain toxins and sediments. The artificial water diversions and releases upset natural flow patterns in surrounding streams and modify water temperature and intensify concentrations of metals. With the planned re-contouring of the topography of the finished landform – reconstructed gradients of 30% are questionable if they can handle the surface water flows experienced in east coast lows which can dump up to 10 inches of rain in 24 hours. The impact of nutrients and sediments discharging from the sites will have a significant impact on the Mitchell River and its ecology – the River is a major drawcard for tourists, recreational fisherman, canoeists, and naturalists.

14.02-2S Water quality	-Ensure that land use activities potentially discharging contaminated runoff or wastes to waterways are sited and managed to minimise such discharges and to protect the quality of surface water and groundwater resources, rivers, streams, wetlands, estuaries, and marine environments. - Discourage incompatible land use activities in areas subject to flooding, severe soil degradation, groundwater salinity or geotechnical hazards where the land cannot be sustainably managed to ensure minimum impact on downstream water quality or flow volumes. - Prevent the establishment of incompatible land uses in aquifer recharge or saline discharge areas and in potable water catchments. - Encourage the siting, design, operation, and rehabilitation of landfills to reduce impact on groundwater and surface water. - Use the mapped information available from the Department of Environment, Land, Water and Planning to identify the beneficial uses of groundwater resources and have regard to potential impacts on these resources from proposed land use or development.	Long term presence of thorium residue in tailings can take thousands of years to disperse – 90 ha of tailings dams will be constructed at the head waters of the Perry River System. After 5 years they will be relocated, and additional tailings dams will be constructed within the mined void, but this area is in close proximity to the Mitchell River - All residents within the 2km radius rely on rainwater tanks. Towns including Lindenow, Walpa and Lindenow South have town water. Towns are on permanent water restrictions.
In consideration of relevant Policy documents relating to	Any special area or management plan under the Heritage Rivers Act 1992	The Mitchell River is a proclaimed Heritage River, undammed, free flowing through a Ramsar wetland, world renowned Silt Jetties onto the Gippsland Lakes System. Environmental flows are maintained but quantity and quality of water should not be compromised because of the proposed mine.

In consideration of relevant	Any action statement or management plan prepared under the Flora and Fauna Guarantee Act 1988	This project is under joint consideration with the Victorian and Federal bilateral EBPC agreement because of Ramsar wetlands, listed threatened species and communities, Listed migratory species and Nuclear Actions. The map shows below the Endangered, Vulnerable and Depleted EVC communities in the area

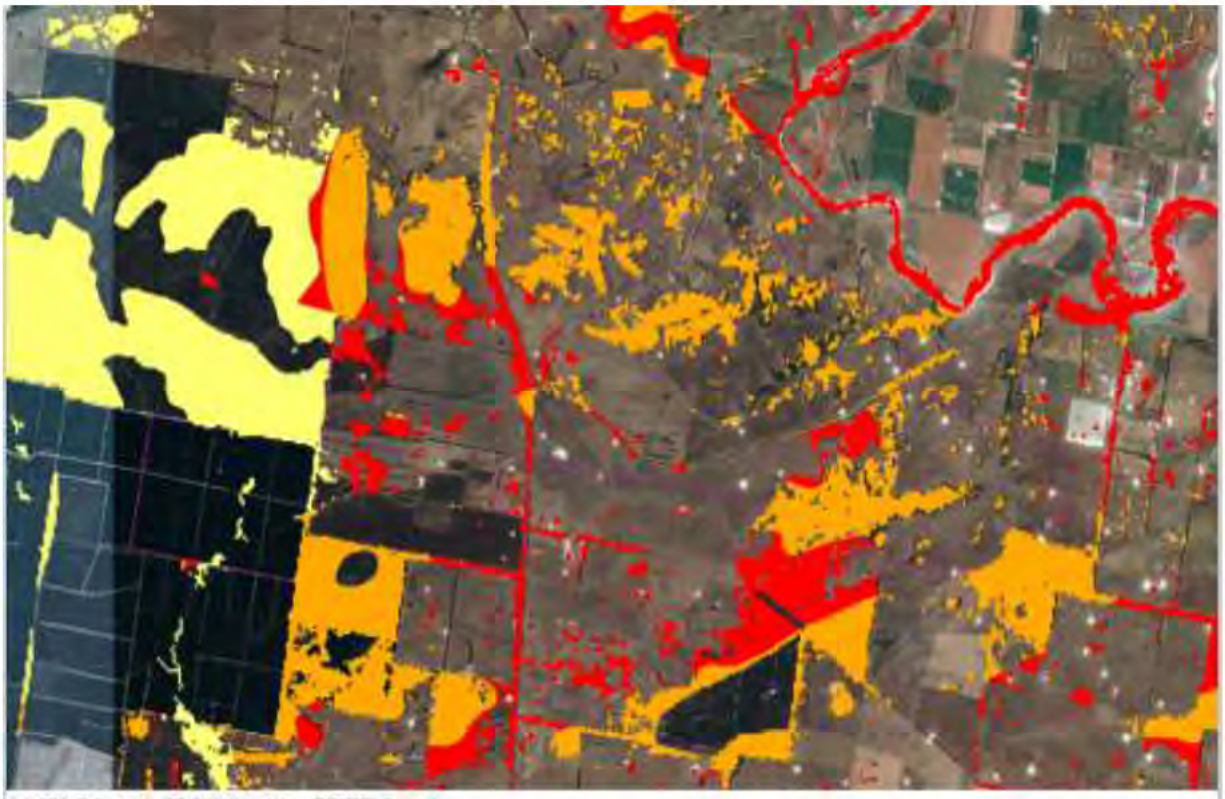


Figure 4 Land within the C156egip amendment including large established trees that will be removed, haul road to be constructed along the treed area at the rear of the animals. *Photo source: Johnston collection*

The Proponent states…" The project is not likely to lead to inappropriate land use conflicts provided that appropriate avoidance or mitigation of potential impacts is implemented."

This **avoidance** and **mitigation** will only be as good as it is regulated and monitored by the relevant authorities. Past examples of failed rehabilitation or the lack of it, tailings dam seepages and collapse, unregulated contaminated water leaving the site entering waterways question whether this proposal can be adequately mitigated. The area contains a vast watershed which feeds into gullies recharging groundwater supplies and delivering surface water flows to streams, rivers, and the Gippsland Lakes system.

The areas current use for horticulture, agriculture including wool production, fat lambs, dairying, beef cattle and lifestyle properties will be severely affected through impacts of dust, noise, light, vibration, increased traffic, and changes to the amenity of the area. It is the opinion of most of the local residents that they do not wish to remain living in this significantly changed environment and suffer the consequences.

Figure 5 Dry land farming *Photo source: Johnston collection*

A Planning Scheme Amendment is requested by the Proponent so they can have ultimate control over the required area for water sources, access, and land with disregard for the residents, community and landowners impacted. This Planning Scheme Amendment was not discussed with the community, Local Government nor the impacted landowners. There was no “consultation”.

Why can’t the diverted roads be built over the already mined area to the south of the Bairnsdale-Dargo Road, closer to the scenic panoramic views of the valley and mountains, this would eliminate the removal of listed EVC’s, significant roadside vegetation and large habitat trees. The roads in their current positions have been constructed and maintained on land that is slightly elevated to the adjoining land, the roots of the large trees serve as reinforcement of the structure and profile of the roads creating stability.

Why remove existing, viable agricultural land to construct new roads when suitable adequate roads currently exist. Modifications could and should have been made to the Fingerboards intersection such as an enlarged roundabout.

The proponent acknowledges the road diversions and construction of haul roads are regarded as high impact risks to the community. Review of crash data used as part of the proponent's assessment showed at four locations reported casualty crashes occurring in the last five years was more than three. This is casualties only, not incidents - which as a local resident, I am aware are far more frequent. As a major tourist road leading to the high country and National Parks, popular cyclists' routes, school bus routes, roads utilised in the movement of agricultural machinery and regular travellers these road diversions will impact on many users. The inconvenience and increased travel times while roads are relocated and constructed will be a major disruption and concern to the public.

The creation of a four-legged roundabout is a major risk as drivers will not be expecting B-Double trucks to cross the road in front of them in a rural setting.

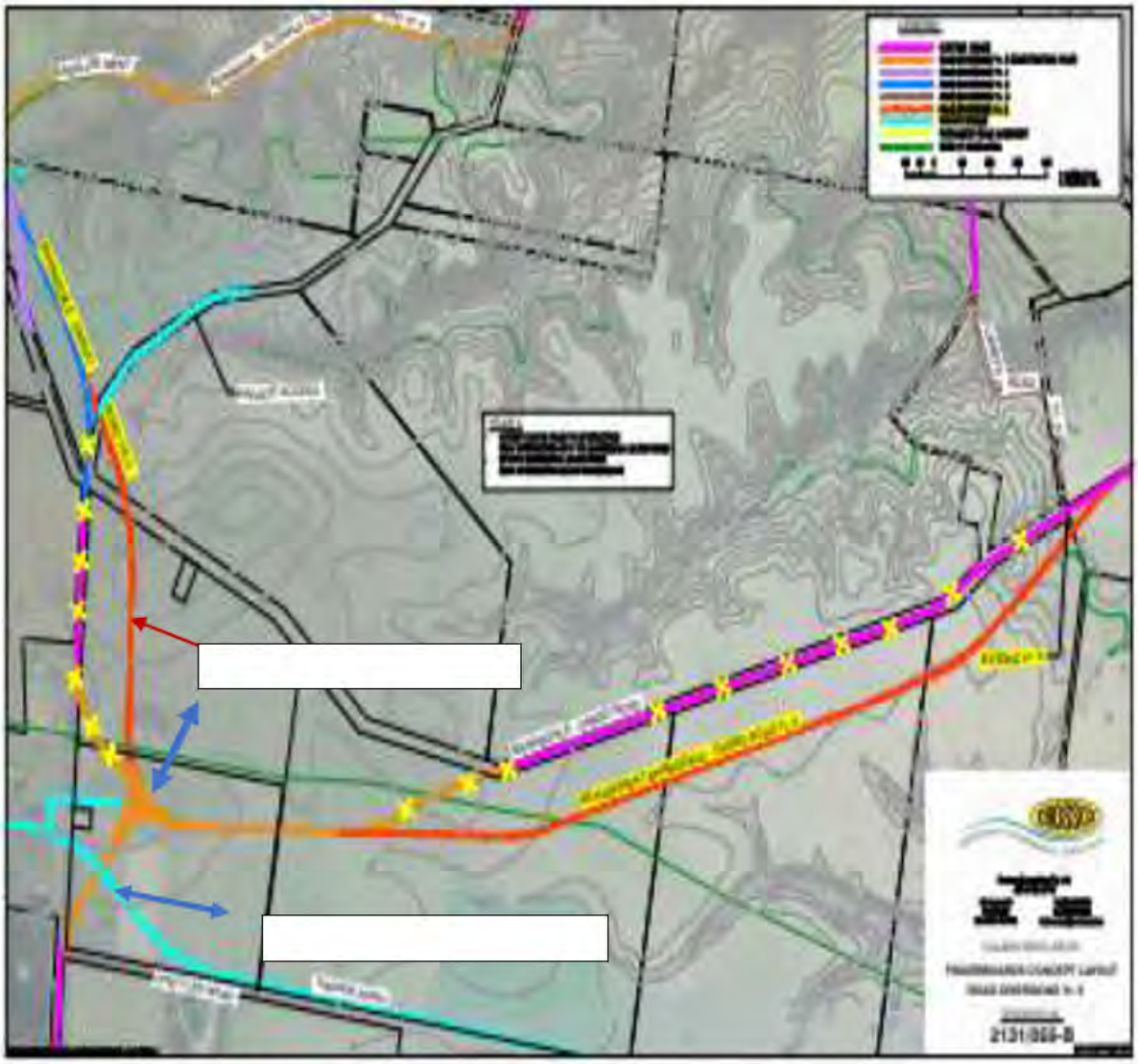


Figure 6 Impacts on traffic flow with changed intersections.

Figure 7 Area to be mined *Photo source: Johnston collection*

Would the Planning Scheme Amendment and Public Acquisition Overlay even been considered if the land to be impacted was covered with treed vegetation; most likely not, because it is a cleared landscape and appears as a convenient option to the proponent on a clean pallet.

Twenty indicative water managements dams are to be constructed within the project area for water to be captured and utilised in the processing of the resource and for dust suppression. Dams 11,12,13,16,15,14 and 17 are within the Lucas Creek catchment (watershed catchment is within the project area and within the Planning Scheme Amendment area).

At times this catchment yields significant volumes of water which is used by downstream beneficial users including groundwater dependent ecosystems and the environment. Lucas Creek also discharges a significant flow into the Mitchell River as shown in the flood photo below taken in 1990. These indicative water management dams will significantly diminish the flow regime to these downstream users.

Figure 8 Lucas Creek Flooding in 1990 - Diverted roads within the C156egip amendment will cross Lucas Creek twice, continency dams for mine use will be constructed to capture surface water from the watershed of this catchment restricting flow to other downstream beneficial users. *Photo source: Johnston collection*

This PSA and PAO proposition is yet another example of Kalbar's lack of social licence – their inability to discuss and answer questions asked of them at public meetings preferring to default to their standardised statement of …" *it will all be in the EES",* shows they have failed their community consultation requirements.

This Amendment and overlay have not been shown in the public domain.

The first time the public got to see it was if they had the good fortune to find it buried amongst more than 11,000 pages of intense technical information in the EES documents.is that how it was intended nor were the 20 dams proposed on creeks and gullies discussed with the community?

The proponent states that the Amendment is required because in the current East Gippsland Planning Scheme this type of development would require planning permission or are prohibited under the current scheme.

The proponent requested changes to the planning scheme to include:

- Specific Control overlay included in extra project land outside the Mining Licence area.
- A Specific Control overlay into local planning scheme (inserting new Schedule 1 to Clause 45.12) which allows the requested amendments to the planning scheme to be achieved through a single approval.

- A new incorporated document "Fingerboards Mineral Sands Project Incorporated Documents October 2018" to Schedule Clause 72.04 allowing all project components outside the mining licence area to be regulated and "streamline" planning approvals under the one planning mechanism.

Why the Planning Scheme Amendment should not be approved

- **In light of the expected impacts of the mine project as outlined in the tables above and in other chapters of this community submission, this is a highly inappropriate location for a mineral sands and rare-earths mine. If approved it is expected to have long-term negative consequences for landholders who occupy land on and surrounding the mine footprint.**

- **Given the mining project is 1,675 hectares, the mining proponent should be required to locate its needed infrastructure within the confines of the project boundary.**

- **This is not a project of National or even State importance or essential service - it is for private profit and therefore the mining proponent should not be allowed to assume control over private land.**

- **This Amendment will cause untold disruption to the impacted landholders having a significant impact on the viability and pre-existing use of their land.**

- **This is a mechanism for giving the Mining Company access to private land to the detriment of the existing landowners, current businesses, local residents, community and the people of East Gippsland.**

- **Compulsory acquisition is strongly contested there is no justification for allowing this to proceed.**

- **If it is determined that all of this infrastructure must be located on private land outside the boundary of the mine project, it must be a matter for the East Gippsland Shire Council to determine under its planning permits approval process. Due to the EES being released during a Council election caretaker period, the Council has not been able to consider this matter or indeed the full EES document and has been given an extension until 10am on 11 December 2020 to lodge its submission.**

The intent of removing mining from the state planning provisions was not to be fair or just or allow equal legal status under statutory law rather it was to promote mining exploration as a business investment without due consideration or understanding of other pre-existing enterprises.

Therefore, a government granted exploration licence accords a legal economic privilege to a speculative industry that subordinates existing economic enterprises, through occupation of private property, rendering landholders and communities subservient to the proponent in the absence of the right of veto. It is contended that this is not acceptable particularly in light of the impact on landholders and the community.

Chapter 18: DRAFT WORK PLAN

Contents

Executive summary

The EES does not meet the Minister's requirements. It fails to address a number of key areas and much critical information is missing or misleading.

The risk assessment process has led to the trivialisation of significant risks in an apparent attempt to avoid the need for further mitigations.

The risk assessment process and risk management plan has failed to look at the consequential and cumulative risks associated with the project.

The ALARP approach to risk mitigation emphasises the proponent's willingness or capacity to finance mitigations rather than what is required to reduce risk.

The assumptions on which the Work Plan is based – including water needs and air quality impacts – are based on dated or misleading data.

As a consequence, the Work Plan as presented will result the local community and East Gippsland region being exposed to unreasonable risks.

The TSF model put forward in the Work Plan is unsuitable for locations prone so seismic activity and inundation

There is insufficient information about rehabilitation so an adequate bond cannot be determined

The Work Plan as described could result in a significant potential liability to the State

The Work Plan has not considered the substantial off-site infrastructure requirements

MINERAL RESOURCES (SUSTAINABLE DEVELOPMENT) ACT 1990 - SECT 117

Offence to obtain licence or other authority dishonestly

S117 of the MRSD Act states that

"A person must not, by any false statement, misrepresentation or other dishonest means, obtain or attempt to obtain a *licence* or other *authority*, or the renewal of a *licence* or other *authority*." (Government of Victoria, 1990)

This Draft Work Plan (WP) proposal has raised concerns in the local community with the WP drawing from the EES findings that are supposed to be based on extensive scoping requirements.

The WP is to be assessed against the legislative and policy requirements set by the Victorian and Commonwealth governments.

Kalbar's EES has been found to be lacking in crucial and essential detail, has misleading information for assessments, evaluation and modelling, provides no economic business case and can be challenged for its accuracy and ability to actually eliminate or minimise risks.

If the appropriate detail does not exist or is found to be disingenuous based on the scoping requirements of the EES or outdated guiding documents then the mitigation measures proposed in the draft Risk Management Plan and associated Risk Treatment Plans will also be erroneous.

Worst, if the work plan is approved based on 'misguided' information contained within, then the associated undermining of the risks will also inform the calculation of the rehabilitation bond to be applied through the project's mining licence. Given the Victorian Auditor General's Report, (VAGO, 2020), there is a real risk that this project could expose the state to significant monetary and environmental liabilities.

The work plan has a clear, defined purpose and objectives with all identified risks declared to the regulator ensuring the proponent remains compliant with the act. So, it is incumbent on ERR to have the capability to review the draft workplan for its robustness, accuracy and integrity as the risks from Kalbar's mining operations on a plateau beside a heritage river upstream of significant economic, recreational, cultural assets are substantial. The likely extensive human health and environmental impacts of this project are significant as are the geotechnical implications yet the EES reads as a low risk mine.

Flawed risk management approach

Risk based approaches are flawed. Kalbar's EES is full of risk matrices completed by numerous consultants engaged by Kalbar to conduct the relevant risk reports. Without the community being privy to the Terms of Reference to that agreement, we are not to know what bias, if any, has been attached to these risk conclusions. It is in the proponent's interest to trivialise risks which has been detected throughout the findings of the EES outcomes in order to minimise future costs and avoid stricter compliance conditions.

A risk management plan can tick all the boxes but if a risk/hazard has been understated or undermined, as found in this EES, then the corresponding mitigation and assessment are just words on paper.

The nominal risks identified throughout this work plan, if approved, detail the precise works the proponent will undertake and how those risks will be eliminated or minimised as far as reasonably practicable. Who determines what 'reasonably practicable' means as this is open to interpretation and hard to prove non-compliance?

To test this process where identified risk(s) must be eliminated or minimised as far as reasonably practicable – the project's upstream tailings dam is the example used to measure against the following risk assessment process due to their significant geotechnical risks. To be noted, tailings dam positioning was discussed in Chapter 4, Alternatives, but all options remained near to mining operations on top of the plateau. Further the 'no project' option, though required under the EES, was not given adequate consideration.

If the consultant has assessed and applied a risk matrix for the assumed hazards, identified controls to eliminate or mitigate the risk, then rated the risk down the scale would the regulator assess that the consultant (engaged by the proponent with their own scoping agreement) has given enough information to justify the location with no need to provide an alternate option downstream for tailings dam placement.

Without set guidelines and adequate checks and balances, the 'as low as reasonably practicable' (ALARP) approach to risk mitigation is open to misapplication. ALARP puts the cost factor on an equal or higher footing than the consequences a hazard might cause. In effect it reduces the protections afforded to identified sensitive receptors – be they environmental, human, social or economic. As the Work Plan stands there will be no opportunity to challenge the proponent's subjective determination of what is practicable. Subsequent variations to the Work Plan, which invariably are done without providing the opportunity for public comment, exacerbate these risks.

The ability of the proponent to minimise risk 'As far as reasonably practicable' under section 40(3)(c) of the MRSDA of the Regulations based on risk analysis under the Occupational Health and Safety Act 2004.

Under section 20(2) of the Occupational Health and Safety Act 2004, reasonably

practicable means: (Government of Victoria, 2004)

that which is, or was at a particular time, reasonably able to be done to ensure health and safety, taking into account and weighing up all relevant matters including:

a. the likelihood of the hazard or the risk concerned eventuating

b. the degree of harm that would result if the hazard or risk eventuated

c. what the person concerned knows, or ought reasonably to know, about the

hazard or risk, and any ways of eliminating or reducing the hazard or risk

d. the availability and suitability of ways to eliminate or reduce the hazard or risk

e. the cost of eliminating or reducing the hazard or risk.

In regard to 20 (2e), if the cost is considered unreasonable (could be subjective), as opposed to reasonable, would the proponent be compliant or non-compliant if the risk progressed to an event. Would the proponent be absolved from any wrongdoing under section 51, Reportable events, MRSD Regulations (2019)? (Victorian Government, 2019)

The ALARP approach appears to conflict with the 'precautionary principle' required by the MRSD Act.

MINERAL RESOURCES (SUSTAINABLE DEVELOPMENT) (MINERAL INDUSTRIES) REGULATIONS 2019 - REG 15

Additional information requirements

(1) An application for a mining licence under section 15(1) of the Act must contain the following additional information—

(e) the estimated annual expenditure, for the first 5 years of the licence, to undertake the proposed program of work and rehabilitation;

(f) evidence of the applicant's financial capability to fund the estimated expenditure.

Under the scoping requirements the proponent is expected to meet the

4.1 Resource development: Assessment of likely effects,

Assess the project feasibility including the predicted economic costs and benefits from construction and operation of the project, including capital investment, operating expenditure, employment and business opportunities, taxes and royalties to the regional, state and national economies, and the temporary and permanent impacts on agriculture, forest resources, tourism and businesses.

Where is the cost estimate for the WP? For a project this size with the 'assumed risks' the state should expect a cost estimates breakdown to be a fair bit more detailed that what Kalbar provided in their Introduction, p 1-4, based on 2018 figures.

1.2.5 Economic benefits - *The project is predicted to generate considerable economic benefits over its life, including:*

Capital expenditure of approximately A$190 million.

Revenue of approximately A$4.9 billion, based on current price forecasts and an exchange rate of 0.75 A$:US$.

Royalties of approximately A$115 million and total taxes of over A$650 million.

Operating cost of approximately A$2.4 billion.

The level of these benefits are current estimates and reflect assumptions, calculations and model predictions made as part of a bankable feasibility study for the project completed in August 2018. The underlying assumptions and other factors will be subject to change over the period of operations for the project, with subsequent changes to these estimates likely.

This has significant consequences in relation to the ability of the proponent to access appropriate insurance and security for land entry under MRSDA (1990) 26AU and 25AV, determined or specified by the Department Head correctly applying an appropriate monetary estimate in recognition of the risks identified, not in the proponents prejudiced rating scale given to its importance.

Having assessed the financial documentations of the company and other research, the nature of Kalbar's company structures (i.e. a shell company) indicates that its main objective may well be to secure the licences, permits and planning scheme amendment with a view to on-selling them to another company, as is the common practice of many small exploration (and property development) companies. In fact, Kalbar, by its own admission, has a proven record of doing exactly this. ASIC (2019)

There is no indication in the Work Plan or the BAEconomics Report that the proponent has identified and assessed business risks that could impact on the project's revenue, such as competition from other mines or strategic directions of either the Australian Government or its trading partners.

Would the regulator be assured that the proposed draft work plan presented by the proponent has applied the risk matrix with integrity and in line with ERR guidelines as reflected in MRSD regulations and the principal act.

Tailings dams

Tailings dam construction and design can be considered under the following *Scoping Requirements* -

3.3 Project description

The EES is to describe the project in sufficient detail both to allow an understanding of all components, processes and development stages, and to enable assessment of their likely potential environmental effects.

The project description should canvass the following:

- *Details of all the project components, to the extent practicable, including:*

*Function and **design principles** and capacity of main components of works, including overburden handling, ore extraction (including reagents to be used), mineral separation, tailings management and electricity supply and use.*

3.5 Applicable legislation, policies and strategies

The EES will need to identify relevant legislation, policies, guidelines and standards, and assess their specific requirements or implications for the project, particularly in relation to required approvals, including (but not limited to):

- *Management of Tailings Storage Facilities*

4 Assessment of specific environmental effects

Design and mitigation measures that could substantially reduce and/or mitigate the risk of significant effects.

The Tailings Storage Facility

Kalbar states the design, construction, monitoring and rehabilitation of the temporary TSF will be compliant with the Technical Guideline, Design and Management of Tailings Storage Facilities, April 2017 (DEDJTR, 2017). In that ERR reference document it states, *the design of a TSF should be based on* ***appropriate standards and principles (but not necessarily be limited to these)*** *such as those outlined in:*

- *Guidelines on the Consequence Categories for Dams (ANCOLD 2012b)*
- *Guidelines on Tailings Dam Design, Construction and Operation (ANCOLD 2012a)*

But ANCOLD (2019) have published new guidelines that users also need to take account of in relation to static liquefaction due to a number of tragic tailings dam failures around the world. (ANCOLD, 2019) It appears that new ANCOLD publication was ignored or is this an example of justifiable location and design based on *as far as reasonably practicable?* ERR should now update their own documents to include ANCOLD guidelines.

Mine site conditions ***must*** *include the climate and topography, the physical and geochemical properties of the ore and tailings, the amount of water, the impact on water quality, the planned height of the dam and the available construction materials* (McLeod 2016). Additionally, tailings dam designs must also include long-term closure plans and minimise risks to the physical, geochemical and ecological stability of the tailing's facility.

Best Practices for Tailings Dam Design

Tailings dams differ from water dams because they impound a mix of saturated tailings solids and water, rather than only water and are continuously constructed (raised and expanded) during the life of a mine. The location of the TSF for this project is located on a plateau, upstream of sensitive receptors and will be moved to mined out areas as the mine operations progress.

App003, Figures 7.2 - 7.7, relates to design, construction and limitations knowing the project's TSF will be constructed upstream, then section 8 of the same report puts forwards a risk assessment for the purpose of the WP report "focusing on risks impacting on assets and people within the Geotechnical Risk Zone." This assessment is dangerously deficient for a workplan report as a probabilistic risk rating in the absence of crucial and inadequate modelling for dam failure consequences renders the WP erroneous.

Any google search on building tailings dam upstream will point to some basic design principles**. Appropriate design** of tailings dam is the first stage to eliminate a hazard rating in consideration of earthquake and flood events for the TSF. When these basic principles are not met the risk factor greatly increases therefore, it is incomprehensible that Kalbar and their consultants are ignoring some basic principles.

BHP (2019) note 3 design types for tailings dams: upstream, downstream and centreline,

- ***Environmental conditions and the nature of tailings need to be considered when designing mine tailing storage.***
- ***Dam consequence or classification ratings are based on the modelled, hypothetical most significant failure mode without controls – not on the current physical stability of the dam. They inform dam design, surveillance and reviews.*** (BHP, 2019)

The upstream method for tailings dam is the lowest initial cost as construction allows for the minimal amount of onsite fill materials allowing subsequent raising as needed. However, this fill material may be less stable than other designs under static loading as mining operations, environment changes and climate are dynamic processes.

There is an assumption that onsite materials will be used for dam wall structures, but no assessment calculation exists in the report for bulk tonnage material required to support the engineered landforms that Kalbar propose to do. This is important to ensure the reviewers have the confidence that superior materials are used and can be funded, in the absence of an economic business case which has not been provided.

First basic design principle - upstream tailings dams should not be constructed in areas higher than low seismic risks

In the Geotechnical Report, section 3.3.1 App003, p38, Kalbar have rightly classified the area of East Gippsland as moderate seismicity. This is not reflected in the risk management report for the release of toxic tailings to the environment or public, rather the design is deemed appropriate if ground shaking occurred. A map from (GeoScience Australia) shows the related onshore fault lines to highlight this rating. (University of Melbourne, 2020)

Second basic design principle – Construction of upstream tailings dams should only occur in arid regions, with minimal amount of water requiring storage or **where rapid water accumulation is improbable** to reduce the potential for large rain events to compromise dam wall integrity. East Gippsland is an extreme event area for high rainfall.

Again, saturation/liquefaction are dismissed, p114, because **it is assumed -**

1. The tailings are unlikely to be saturated (ignoring the potential for heavy rainfalls)
2. Overall landform stability does not depend on the strength of the tailings rather the stability of the outer slopes formed of HHF gravels would not be compromised by the liquefied tailings.

Yet, static liquefaction and strength loss of tailings dams occur due to undrained failure leading to saturation and why there is now a worldwide focus on preventing tailings dam failures due to poor design.

Consequently, *"a tailings pond that is expected to receive high rates of water accumulation (due to climatic and topographic conditions) should be constructed using a method other than upstream construction."* (U.S. Environment Protection Agency, 1995)

Can it happen at this mine – most certainly as there are numerous comments throughout the EES, compiled by different consultants, that note concerns with the existing soil profiles. Likewise, there is an assumption in the Geotechnical Assessment, App003, p112 that the tailings will be adequately dried, and rainfall can be adequately diverted to "ensure that excessive infiltration of water into the landform does not occur." There is also a great emphasis which means **a dependence** that *"surface water in natural drainage paths, rainfall, and run-off **must** be managed during construction to ensure that excessive infiltration of water into the landform does not occur."* Otherwise, pore pressure can reduce stability of constructed landforms relative to clay construction and slopes.

What is perplexing though is the actual placement of the sand tailings into the TSF. According to section 7.5 of the WP "*the sand tailings will be drained and deposited by a stacker onto a floor drainage layer to ensure that the landform is well drained. Fine and sand tailings can be deposited in this way, provided they are drained.*' A stacker would need to handle 44,000 tonnes a day from a spigot. However, it would be very energy intensive to get tailings dry enough (conditioned) so they could be stacked.

Yet, Chapter 4, section 7.2.2, co-disposal includes what the preferred option is considering alternatives, *"pumping of coarse sand tailings back to tailings disposal areas within the mine voids followed by dewatering. Additional water will be recovered from the coarse sand tailings using under-tailings dump drains. The dewatered sands tailings will be spread within the tailings disposal areas in the mine void using conventional earthmoving equipment."*

7.1 of the WP - SW22, states *"the temporary TSF will be constructed using engineered cells with lined walls. Water will be managed using a decant system, sumps and drains to capture and reuse seepage."*

But App A023, *Proposed Tailings Management Strategy Notes on Post Closure Settlement,* section 3.2 note both methods which makes a closure plan indeterminable.

The sand will be placed into the floor of the mining void either by sand stackers or deposited as a slurry into enclosing cells and allowed to drain to a decant recovery system.

Section 7.5.1 of the WP, Water Control. P113 then states, *"It is expected that the sand tailings will drain freely due to the minimal clay content. HHF clay overburden may trap water and form localised perched water, although this is expected to be minor for clay placed in horizontal layers, and tailings retainment structures within the landform will provide drainage paths. Perched water may lead to tunnel erosion if seepage reaches the outer slopes of landform profiles. The covering layer of HHF Gravel is a coarse, more freely draining layer that is not readily erodible, and is intended to prevent perched water from causing such erosion.*

Measures should be taken to ensure that excessive water does not enter the interior of the landform, by:

- *Ensuring that natural surface water drainage paths are re-routed away from the landform; and*
- *Ensuring that rainfall does not cause ponding and excessive infiltration. It is expected that this will be achieved with the supplied slope profile designs and proposed topsoil and rehabilitation treatments that have been proposed by Landloch (Ref. 17).*

Nineteen water management dams are proposed to be located across the project area over the life of the project. The number of operational water management dams is dependent on the configuration of mine contact areas at any one time.

This WP does highlight risks related to the many 'dams' across the project site dependent of the adequacy of lower sands drying so the control of inflows across, around, or under the impoundment via drainage is important to retain structural stability and to control environmental impacts. Due to existing climate variables over the recent decades it has been predicted that extreme events will increase and why there are a number of ANCOLD declared dams on site primarily to prevent the unplanned and uncontrolled discharge of water from the project site.

Section 8 of the WP, Table 8-1: Residual risk ratings – water quality and hydrology has the likelihood as rare or unlikely which contrasts with much media and mine engineer reports. (Cornwall, 2020)

"More than 40% of major tailings dams are the upstream design, according to a global inventory of more than 1700 dams recently launched by pension funds of Sweden and the Church of England, which have pressed the mining industry to strengthen environmental and safety measures. A study of 8000 tailings dams in China found that 95% were upstream dams. And such dams are involved in three-quarters of tailings dam failures, according to one estimate.

The problem is that tailings aren't a predictable building material, and they are often waterlogged. The water can act like a lubricant, reducing the friction that binds an earthen dam together. Engineering flaws such as poor drainage can exacerbate the problem. In extreme cases—such as the 2019 disaster at the Brazilian iron mine—dam sections simply liquefy."

Accordingly, this WP risk assessment fails and incorrectly identifies the hazard, mitigation, likelihood and residue consequence related to dam failure as low as reasonably practicable.

Prevention

Scoping requirements -

4.1 Resource development: Design and mitigation measures

- *Describe methods and strategies to demonstrate* ***the radioactivity of tailings and waste materials stays within environmentally acceptable exposure levels****; and*

4.3 Catchment values: Assessment of likely effects

- *Develop a* ***water balance model to quantify the project's demand*** *(both quantity and quality) on groundwater and/or surface water resources, including volume to be extracted, stored and released during the construction, operations, rehabilitation, decommissioning and post-closure phases of the project.*

Chapter 4 Alternative, section 4-17, notes, *"fines tailings will initially be disposed into an on-mine path temporary tailings storage facility (TSF)…When the mine void is of sufficient size, the fines tailings will be disposed of to the void. The on-mine path temporary TSF will be retained until the area is mined in year five, providing contingency for tailings disposal up to this time."*

Section 8, Table 8-1: Summary of residual risk ratings – airborne and deposited dust has consequences as low or insignificant with likelihood as rare or unlikely. There are two 'possible' ratings related to wind dispersion which has been rated a bit higher yet, still wrongly rated.

Misleading data used in modelling

Misleading data for Kalbar's water balance modelling predicts greater rainfall runoff to increase surface water availability to reduce dust than a more accurate climate projection which was ignored by Kalbar consultants. Consequently, the capacity to source sufficient top-up water - predominantly for external water sources (Mitchell River or groundwater from the Latrobe Group Aquifer) - will need to be reassessed and evaluated.

The risk management report does not quantify the risks and consequential hazardous dust implications due to lack of water availability as it is assumed the water balance modelling is accurate therefore, ignored.

> *Table B1 4.5 -- HMC stockpile areas will be protected from windblown erosion by the use of water sprays and perimeter shade cloth fences (or a more substantial structure).*
>
> *15.4, ref AQ02, Water or appropriate suppressants will be applied to working surfaces, stockpiles, haul roads and other areas where rehabilitation is not yet practical, to minimise dust generation, and in particular, during drier months.*
>
> *15.5 ref AQ03 Drop heights for topsoil and overburden during creation of stockpiles will be minimised* ***as far as practicable*** *to reduce dust generation.*

> *15.7 ref AQ16 Dust generation from haul roads will be controlled by applying water or **chemical suppressants**, cessation of haulage during adverse weather conditions, and as required in response to real-time air quality monitoring.*

The flaw in the low risk ratings goes to the contradiction in how the TSF can be managed to promote the essential drying process by dewatering/decanting the tailings yet, also needing to maintain a dampened surface to prevent potentially serious wind dispersion of the drying fine materials. This can only be achieved if the surface is stabilised by revegetation, chemical binders, or rock cover. So, how will the current misleading water balance maintain dust suppression to prevent the fine tailings being dispersed in the retained temporary TSF for the 5 years as well as the main TSF in the mine void if the objective is to dry out the materials, all the while using earth working equipment? What are the chemical suppressants and a risk rating for that?

Table B1: Risk controls and performance measures

> *3.18 ref, GEO18 Overburden and sand tailings will be placed on a sound, free-draining mine floor.*

With a simple visual inspection, it is not hard to see the ripped landscape from extensive rainfall events and the subsequent erosion with the more significant, forming the gullies. That does not happen because the geology is stable. In the absence of full hydrogeological assessment risk ratings should be deemed unrateable at his stage.

Risk treatment plan: Biodiversity

A work plan is the Department's approval and authorisation of a project to impact & condone destroying elements of the environment and valued assets, legislated by way of various statues, policies and regulatory guidelines.

Once the permits are in place the vast vegetation clearing, removal, habitat destruction and ground disturbing works will commence with the offset policy deemed appropriate.

The risks identified with biodiversity losses – and the consequent offsets required – have been significantly underestimated.

Rehabilitation

Definition: *The return of disturbed land in a safe, stable and non-polluting condition to an agreed and sustainable end land use. It broadly involves stable landform design including voids and mining wastes, construction and shaping, materials characterisation, materials handling and placement, surface water management and revegetation.* (Earth Resources, 2019)

The decommissioning and closure of *"tailings material should be securely stored for an indefinite period and present no hazard to public health and safety or the environment. Therefore, the closure of a TSF and rehabilitation works should be as inherently stable, **resistant to degradation** and as consistent with the surrounding landscape as possible.*

ANCOLD sets sustainable closure as a target at the commencement of planning for a tailings dam. (ANCOLD, 2017) *ANCOLD has adopted* ***1000 years as a notional post-closure life for the purpose of design and operational considerations, although longer periods are specified for specific design items including flood management and stability.***

The closure of a TSF should be appropriate to the nature of the contents, relevant environmental considerations (land, water, air), the desired final landform and accord with community and landowner expectations. That is, the final landform design should be compatible with the form of containment or encapsulation of the tailings, the nature of the embankment materials, the needs of the community and the landowner, any legal requirements, climate, local topography and the level of management available after reclamation." (Earth Resources, 2017)

Noteworthy,

- Kalbar owns only one fifth of the land in question for the mine project, so landowner agreements are very important.
- In areas where mining companies have purchased land there is no compulsion for miners to honour the EES commitments regarding rehabilitation
- Progressive rehabilitation has never occurred in Victoria
- The metal toxicity for sand tailings and materials used onsite for dam construction are understated and could leads to significant seepage
- Suitability of dispersive soils for compaction to maintain stability cannot possibly be proven
- The site is subject to extreme rainfall events so the foundation materials could be compromised before final capping.
- The acidity of remaining ore has been understated or ignored leading to leaching and undermining of a safe, stable and sustainable landform.

Again, the assessments in App A023, *Proposed Tailings Management Strategy Notes on Post Closure Settlement,* notes the complexity to establish final land profile is also indeterminable.

The final land profile which is achieved by the placement of various layers of potentially consolidating materials is very complex. Factors which impact on the outcome include:

- *Variable material properties;*
- *Rate of placement of each layer;*
- *Time delay between placement of each layer;*
- *The proportion of overburden, sand and fines in the profile; and*
- *Spatial variations in conditions (such as the presence of containment embankments and road pillars).*

The specific profile of ore and overburden also varies throughout the mine. Each of the materials (sand, fines and overburden) have different consolidation/swell properties and mine management will be maintained to allow for placement of varying thickness of each to result in a design surface profile.

For these reasons, it is important to ensure that specific cases are analysed on a case by case basis and that appropriate action is taken to ensure the designed landform is achieved.

Further comment by App 023, section 9.3, highlighted no consolidation modelling of the fines tailings has been completed. Nor was there any determination on the effect of extreme rainfall events and to its impact on settlement/consolidation of tailings as various layers are placed for the final land profile other than rate and/or time delay in placement of each layer.

Scoping Requirements –

4.1 Resource development: Assessment of likely effects

- *Assess the project feasibility including the predicted economic costs and benefits from construction and operation of the project, including capital investment, operating expenditure, employment and business opportunities, taxes and royalties to the regional, state and national economies, and the temporary and permanent impacts on agriculture, forest resources, tourism and businesses.*

4.8 Rehabilitation: Key issues

- *Adequate overburden and soil availability for the rehabilitation of the project area to ensure the post-mining topography can be reconfigured to pre-mining topography, or as close as practical to enable productive land-uses to be re-instated.*

Given the lack of financial details as to capital required for operations, etc., has Kalbar the ability to provide an upfront rehabilitation bond for the significant intended ground works prior to mining operations. This is particularly relevant if the financial history of Kalbar leads to the site eventually being on-sold with all appropriate approvals in place. Currently, Kalbar are counting on the Minister to determine a rehabilitation bond using the obsolete bond calculator before the new more accurate calculator is implemented noting on P11-1 of this draft work plan, *"FINANCIAL*

PROVISIONING FOR CLOSURE - Kalbar has used the Department of Economic Development, Jobs, Transport and Resources' bond calculator as the basis for preparing a preliminary rehabilitation and closure cost estimate. The closure cost estimate will be provided to Earth Resources Regulation to inform its estimation of the bond required for project approvals. The manner and form used to determine the rehabilitation bond will be determined by the Minister for Resources."

The VAGO (2020) concluded ERR did not have the ability to adequately manage rehabilitation nor an appropriate bond calculator in place to accurately assess the significant costs involved in rehabilitation. This includes compliance and enforcement with EPA, DELWP also complicit. To ensure that the bond calculation for this project is robust and presents a more accurate representation of the potential risks posed, a new bond system is yet to be implemented by ERR, therefore, no work plans should be approved until the recommendations of the VAGO report can be effectively implemented. (VAGO, 2020)

The current legislation is clearly not fit for purpose, as evidenced by the mining sector's consistently poor record. Yet, the WP needs to be approved with the MRSDA, the primary instrument by which the project would be regulated. In order to approve the WP the Minister needs to assess the environmental & community risks/damage against the legal requirements of the MRSDA and with consultation of the EPA, DELWP and WorkSafe Victoria under their respective Memorandums of Understandings.

ERR need to outline a criteria used to critique whether the information in the WP can achieve a self-sustaining final landform rather than rely on a consultant engaged by the proponent to interpret a representation of what could happen. A proponent only has to achieve their statutory obligations. Will that be enough *under as far as reasonably practicable?*

So, it is important that the Minister and appropriate department heads fully understand the implications if the presented facts, identified as misleading and/or inaccurate, are legitimately considered. In this case, can a balance be achieved between mining operations while ensuring risks to the environment and community have been accurately quantified to make that decision.

Has the proponent satisfied the social, economic and environmental objectives of the state to prevent exposure to the state of significant financial risks?

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Chapter 19: EPA WORKS APPROVAL

EPA VICTORIA WORKS APPROVAL APPLICATION

Contents

Executive Summary

The proponent has applied for approval of a Dissolved Air Flotation system to treat mine contact water that will eventually be discharged back into the Mitchell River.

Baseline analyses of water quality presented must be questioned due to the limited sampling and the questionable locations selected – in particular gullies during an extended period of drought. Such analysis has enabled the applicant to present an impression of existing 'contamination' levels that may be unrepresentative of the actual heavy metals and other levels in the Mitchell River. In doing so it avoids the rigorous standards expected of anyone who seeks to use rivers to remove wastes.

The proponent has also used incorrect and dated information that gives the impression the flows of the Mitchell are much higher than they are and thus the river is more 'able' to provide the function of diluting toxic materials than it really is. Up to date data is available and should be used in any modelling.

Doubts exist as to the capacity of the DAF to perform the intended function, and as to the wisdom of disposing of highly toxic solid materials from the process in productive agricultural land. Premature approval of the decision could unwittingly lock the authorities into untoward and unwanted situations of providing for additional water needs at the expense of other users and the environment.

The application should not be considered unless sufficient, independently obtained, defendable baseline data is presented and the proponent is able to provide solid evidence that their proposal will not be locking the authorities into a situation that could have very significant and negative long term impacts.

Purpose of the application

Attachment D - EPA Victoria Works Approval Application for controlled discharge of treated surplus mine contact water. The application proposed the use of a Dissolved Air Filtration system to remove toxic materials from mine contact water prior to release.

Problems with the proposal

Attempts to make receiving environment appear compromised

'Given the importance placed on treating wastewater and discharging to the receiving environment, it appears the intention in this Work Approval Application to EPA was to create a perception that the receiving environment was already compromised. Therefore, prescriptive licencing limits that will be proposed by Kalbar is that EPA apply reduced water quality standards to reflect Kalbar's baseline studies. P61, section 14.2.

14.2. New licence

Should EPA Victoria determine that an EPA Licence is required for the proposed water treatment system and discharge off-site, Kalbar requests that the enclosed Works Approval application includes a new licence application.

As the enclosed Works Approval application involves water discharge to surface waters, licence limits will be proposed by Kalbar after completing construction and installation and prior to the commencement of operations. These limits will be based on the SEPP (Waters) and where relevant the ANZECC (2000) guidelines for 95% species protection. Where background concentrations in receiving waters exceed the SEPP (Waters) environmental water quality objectives, new site-specific limits may be proposed.

Adequacy of Wastewater Treatment Plant

The first concern for the EPA Works Approval Application is with the proposed wastewater treatment plant Kalbar intend to use - dissolved air flotation (DAF).

Kalbar recognises the removal of heavy metals may potentially be problematic due to particle size and/or concentrations.

Kalbar notes the varied use of different chemical flocculating aids or coagulants could be used but these alone will not be sufficient.

The DAF aims to separate and float the range of analytes to be captured in the flotation process, however, DAF is known to be more suited to 'delicate particulate matter.' The separation of different analytes cannot be recovered effectively by just one/two processes as each respond better or worst depending on the methods. (Kyzas & Matis, 2018)

One such example is copper which cannot be removed via the DAF process, p49. As such, the risk for discharging poorly treated and toxic wastewater to the environment is real.

Furthermore, the economic costing to improve the separation and recovery of toxic analytes need to be reassessed as any potential shortfall by the company to cut costs at the expense of appropriate treatment is not acceptable.

Discharging toxics to Mitchell River

Secondly, adding to the complication of a greater concentration of toxic contaminants to the receiving water is the surface water availability and flow regimes adopted by Kalbar being incorrectly based on a 117-year modelling framework (1900-2017). This has been clearly demonstrated as unreliable data given Kalbar's consultant, EMM (2020a), failed to follow the first recommendation noted in their reference document, DELWP (2016), where rainfall collation from 1975 to the present is more representative of variable climate data and noting that if alternate baseline data is to be used then a comparison is to be made which was not. (DELWP, 2016; EMM, 2020)

Also, drought information from the previous 3 years is absent. Therefore, the opportunity to process the recent data for reduced flows on the Mitchell River has been missed. This reduces understanding of the ability of the river to dilute concentration of toxic contaminants with reduced surface flows.

This has been acknowledged on p17 with EPA recommending treated water discharges should not occur when daily Mitchell River water flows are less than 50 ML/day, so as to limit the risk of impacts arising due to nitrogen or phosphorus in the discharged water.

But the existing discharge point to the Mitchell won't be enough with Kalbar wanting to secure a licence amendment for a second licensed discharge point to the Perry River system, P39. It all becomes too easy once mining is approved for a proponent to request an amendment, variation and the whole mine footprints expands. Kalbar have been doing this over the last 4 years.

Managing Solid Waste

The third problem is the recovered solid waste sludge (p34 & p50) with approximately 5 tonnes per day created when the DAF plant is operating at full capacity.

It would take only 20 days to produce 100 tonnes of DAF solids (toxic metals including vanadium and chromium). This waste material would be combined with approximately 7,500 tonnes per day of fines tailings prior to disposal in the temporary TSF or the fines tailings cells in the mine void.

COMBINING WITH fines tailing is important here. How will it be combined? Fine tailings from the ore are particles smaller than 38µm. Daily, a toxic sludge will be 'combined' with a massive tonnage of small particles which can become an aerial dispersant. If the sludge contains both **CR(III)** & **CR(VI)** compounds, chronic inhalation can increase the risk of lung, nasal and sinus cancer. Also, severe dermatitis can result from contact with these compounds. Other toxic substances abound including Tungsten and Vanadium.

5.4.5. Solid waste or prescribed industrial waste generation

The only waste stream arising from the activity is solids removed during the DAF process. During years of highest DAF throughput, approximately 125 tonnes of solid residue would be generated by the treatment system. A description of the chemical characteristics of solid wastes to be generated in the course of the process water treatment is provided in Section 12 of this Works Approval application.

Solids generated from the DAF treatment system flotation process will be collected and combined with fines tailings prior to disposal in the temporary TSF or in the fines tailings cells in the mine void.

In all, 100 -125 tonnes x 15 years mine life equating up to 1,875 tonnes to be buried on site & remain insitu forever that supposedly will not leach/seep/contaminate the surrounding environment.

Can the EPA and the Planning Panel be assured that disposal of toxic solid waste into the temporary TSF in the future mine path will remain secure and be suitable to return to its pre-mining land use and capability, native vegetation, or other agreed post-mining land use.

On p51, section 12, Kalbar state the metal concentrations in the DAF solid residues are predicted to meet EPA Victoria clean fill guidelines. However, Kalbar has *provisionally classified the DAF residues as a 'Category C' waste, pending confirmation of materials properties when actual residue samples are available*

(Table 12-1). 'Category C' waste is suitable for best practice landfills, but Kalbar are intending to dispose of this waste on agricultural land – to effectively treat productive farmland as a toxic dump similar to the likes of those used for asbestos and contaminated soils.

Insufficient information about contaminants

The information provided by Kalbar is insufficient for making a decision with some long range and potentially very negative consequences,

The concern is that the table present is not representative of all elements including

Tungsten (W), Vanadium (V) and Cerium (Ce) to name a few which have been previously noted in Kalbar's Geochemistry and Mineralogy Report, section 4.

The trace element assays have been determined using the same XRF bead with Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS). The elements analysed included: Bi, Ce, Cr (total), Co, Cu, Hf, La, Nb, Ni, Sn, Th, U, V, W, Y, Zn and Zr. In some samples, the additional rare-earth elements were analysed using LA-ICP-MS. These elements included: Ce, Dy, Er, Eu, Gd, Ho, La, Lu, Nd, Pr, Sc, Sm, Tb, Tm, Y and Yb.

Table 12-1: DAF solids - estimated chemistry

Analyte	Total metals, mg/kg	
	DAF solids	EPAV Fill (TC0)
Arsenic (As)	14	20
Cadmium (Cd)	<0.1	3
Chromium (Cr total)	112	1 (CrVI)
Cobalt (Co)	18	--
Copper (Cu)	18	100
Lead (Pb)	15	300
Mercury (Hg)	0.02	1
Molybdenum (Mo)	3	40
Nickel (Ni)	36	60
Selenium (Se)	0.6	10
Thorium (Th)	19	--
Tin (Sn)	5	50
Uranium (U)	4	--
Zinc (Zn)	57	200

Note: A dash (--) means no EPA guideline value is available. EPA guideline values are taken from EPA Victoria publication IWRG621, Industrial Waste Resource Guidelines - Soil Hazard Categorisation and Management.

Average assay data is taken from Kalbar (2020) and is based on the analysis of the -20um fraction of topsoil and overburden samples analysed within the project area.

Maintaining Dust

This leads to the fourth issue and is connected to the water balance modelling. (EMM, 2020) The average mean for captured runoff is greatly reduced severely impairing the projects ability to maintain dust levels.

The conceptual surface water model for climate change allowed **a 50% percentile change in runoff** with the following figure from East Gippsland Urban Water Strategy showing what that would look like. (East Gippsland Water, 2017)

Problems with proponent's water modelling

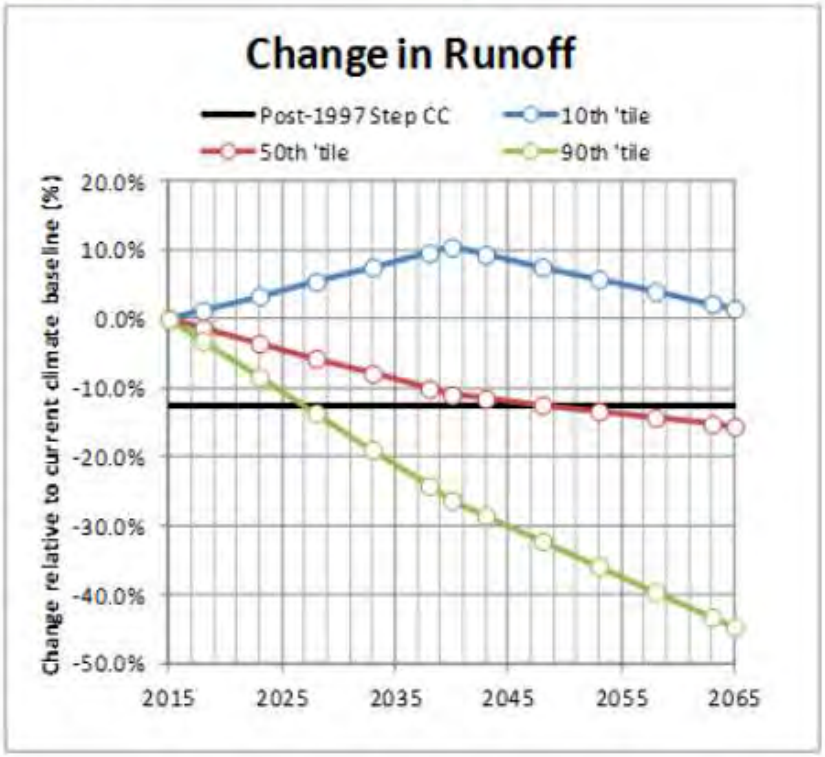
Effects of misrepresentation of rainfall runoff

Rainfall runoff has been misrepresented so the proponent would need to access a greater external water source which appears to be via groundwater from the Latrobe Group Aquifer. This aquifer has been in a depleted state for decades with overextraction more than can be recharged. The ability to access more groundwater from Southern Rural Water over the lifetime of the mine including decommissioning cannot be relied upon.

Will dust control measures be sacrificed?

The capacity to 'reprocess mine water' has been overestimated. More water is needed for operations. The EPA and the Planning Panel need to be ensured that damping down dangerous dust dispersants will not be the casualty in favour of continuing mining operations over the health and amenity of sensitive receptors

FIGURE 10-7: Percentage change in runoff used to create time slices between 2015, 2040 and 2065.



Can disposal of solid waste and fine tailings be safely achieved?

The disposal/combining of solid waste with fine tailings now needs some serious consideration to determine if it can be safely achieved.

The GHD starter pit report tells us dams are likely to need lining with 1.5 metres of quality clay. This is most important for the tailings dam as it holds, in addition to fine sand, heavy metals and flocculants (solid waste). HDPE alone is inadequate as a liner as sections of the liner will be under a hydraulic head of more than 20 metres. The base of the dam will distort under pressure beyond the ability of HDPE to seal at this depth. We can only hope that the clay might, hopefully, reseal as it distorts.

It is not clear the condition of the fine sands as they are placed in the dam or how the solid waste is combined with the fine sand tailings but the fine sands will be pumped to the dam in a liquid condition. If they are to be conditioned (water removed) at the dam site, they would then need to be mechanically placed.

Kalbar say they will continue to decant water at the dam to where? Does this mean the water is recycled back in a continuing revolving system via the DAF treatment process with an ever-increasing concentration of the metals in a liquid state escaping to the receiving environment? As the contents dry as desired via evaporation (part of the water balance system), more surface areas are exposed to aerial dust dispersal.

As the TSF's are temporary being in the path of future mine operations, any potential drying would require dam contents to be re-liquified so that they could be pumped to another mine void(s) which would, not only, be expensive but also a problem if the expected amount of water the project has modelled to be available doesn't exist.

Understandably, there is great concern because these 'moveable' dams could hold a couple thousand tonnes of residual toxic metals needing to be kept in a dampened state to prevent dust if not already in a liquid state. At what point, can these dams then be prepped for decommissioning if the lower sands can never dry out? - The ultimate conundrum!

Misleading data/reports

Kalbar's EES report is littered with inaccurate and misleading data and it continues with stream flow data for the Mitchell. Why would Kalbar use an amount from a 2011 doco by DSE when there are more recent & valid representations of stream flows.

Mitchell River

Mitchell River is the largest unregulated river system in Victoria and has an estimated average annual stream flow of 884,500 ML/year (DSE, 2011). This represents a significant portion of the total inflow into the Gippsland Lakes. The Mitchell River and its tributaries provide irrigation water for farmers living within the catchments. It also supplies potable water to approximately 18,300 customers living in townships including Bairnsdale and Paynesville (EGW 2017).

Why is Kalbar constantly misrepresenting the data to a higher average than what it actually is? There was an historical average around the amount noted in 2011 but the annual average mean since 1975 is now approximately 777.7 GL/year – a decline of 12per cent compared with historical water availability according to DELWP. (DELWP, 2020) Even the following graphic from East Gippsland Water gives a better reflection of average daily river flows of 1,720 ML/d from 1997-2015 while excluding the most recent drought. (East Gippsland Water, 2017) The Mitchell River services a few thousand more customers than Kalbar declared. Why does Kalbar have so much difficulty coming up with the right data when it is readily and publicly available?

Important to note that **the solution to pollution is dilution**. Monitoring in poor flowing rivers would expose poorly dispersed contaminant concentrations as noted by EPA.

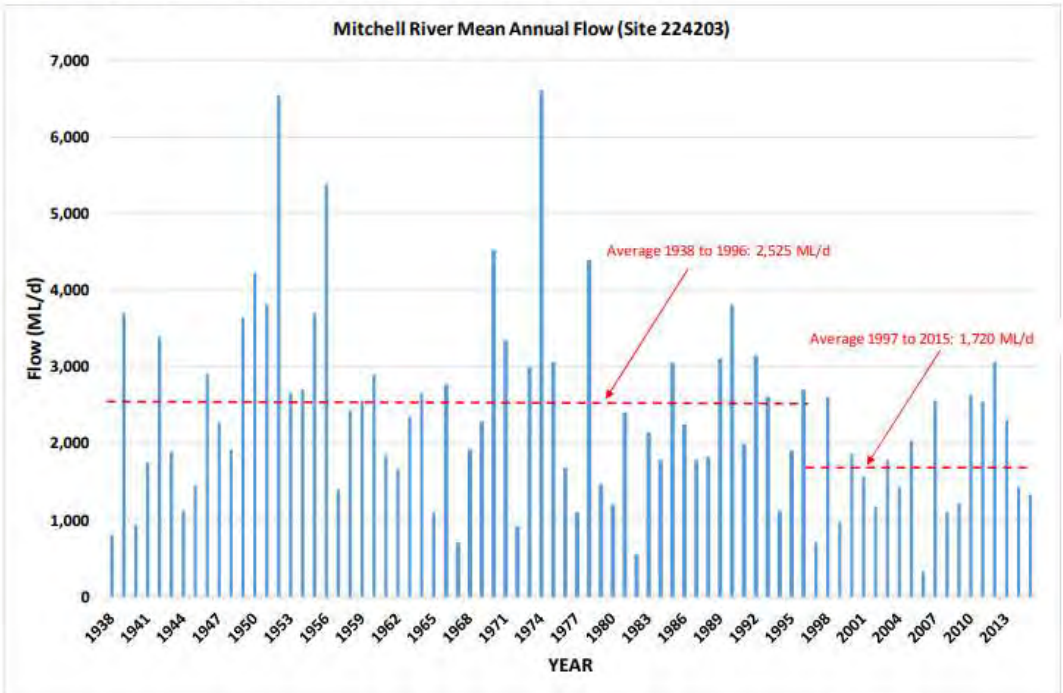
The planning Panel is to take note of the supplied chemical data from Envirolab analysis #22941.

Water quality under State Environment Protection Policy (Waters) aims to ensure Victoria has clear and relevant standards, legal rules, and statutory obligations regarding our state's water environments.

It is then incumbent on mining proponents to support the existence of appropriate standards, which should, but are not, independently monitored and enforced by the regulatory authorities. (EPA)

EAST GIPPSLAND WATER URBAN WATER STRATEGY

FIGURE 10-2: Historical annual Mitchell River flows



Importance of defendable baseline data

Compliance with the environmental requirements associated with any mining licence conditions cover the existing environment's classification. If surface water is classified as moderately modified, then the allowable amount of contaminants from waste discharge is greatly tolerated if existing background levels of contaminants exist. Hence the justification for Kalbar to prove that the river system does experience some modification, so it is not surprising that undermining existing water quality is high on Kalbar's list.

The Fingerboards project site has been subject to multiple exploration ground disturbances over the years and most recently from Kalbar's own exploration so any chemical analysis would expect to see changes. But it is these changes that prove the receiving environment is susceptible to the smallest of disturbance. However, EPA, the Planning Panel, community and other affected stakeholders should expect that regardless of background screening, Kalbar should and must ensure that no increase in contaminants enter the waterways upstream of extensive and intensive agricultural operations and Gippsland Lakes.

Limitations of risk matrices

The **Risk Matrix reports cleverly distort** the actualities of any resource project proposal. They are subjective, simplistic, have elements that are not measurable all the while providing a mechanism for others to conveniently box a known risk or a potential risk with a couple of disclaimers in that '---' was not considered.

Numerous research papers can be found on google challenging the effectiveness of risk matrices. *What's wrong with Risk Matrices?* Louis Anthony Cox is one example.

Risk matrices—tables mapping "frequency" and "severity" ratings to corresponding risk priority levels—are popular in applications as diverse as terrorism risk analysis, highway construction project management, office building risk analysis, climate change risk management, and enterprise risk management (ERM). National and international standards (e.g., Military Standard 882C and AS/NZS 4360:1999) have stimulated adoption of risk matrices by many organizations and risk consultants. However, little research rigorously validates their performance in actually improving risk management decisions. This article examines some mathematical properties of risk matrices and shows that they have the following limitations. (a) *Poor Resolution*. Typical risk matrices can correctly and unambiguously compare only a small fraction (e.g., less than 10%) of randomly selected pairs of hazards. They can assign identical ratings to quantitatively very different risks ("range compression"). (b) *Errors*. Risk matrices can mistakenly assign higher qualitative ratings to quantitatively smaller risks. For risks with negatively correlated frequencies and severities, they can be "worse than useless," leading to worse-than-random decisions. (c) *Suboptimal Resource Allocation*. Effective allocation of resources to risk-reducing countermeasures cannot be based on the categories provided by risk matrices. (d) *Ambiguous Inputs and Outputs*. Categorizations of severity cannot be made objectively for uncertain consequences. Inputs to risk matrices (e.g., frequency and severity categorizations) and resulting outputs (i.e., risk ratings) require subjective interpretation, and different users may obtain opposite ratings of the same quantitative risks. These limitations suggest that risk matrices should be used with caution, and only with careful explanations of embedded judgments.

Under the EPA guidelines 1695.1, as referenced by Kalbar, “the information in this publication is for general guidance only. It does not constitute legal or other professional advice and should not be relied on as a statement of the law. Because it is intended only as a general guide, it may contain generalisations. You should obtain professional advice for your specific circumstances. EPA has made every reasonable effort to provide current and accurate information, but it does not make any guarantees regarding the accuracy, currency or completeness of that information.”

What the risk matrix does not reflect is the crucial input data for end parameters and modelling as an example.

So, how does a risk matrix ensure the professional advice/consultant reports/terms of reference will all lead to credible and accurate data collation?

It cannot.

This comment below is now relevant, and EPA and the Planning Panel should take notice.

Limitations of risk matrices

Risk matrices have many limitations and are not a panacea for all ills. In the hands of the inexperienced, the biased, or individuals with an agenda, they can, of course, generate misleading ratings.

They are also unable to reflect the effects of consequential and cumulative effects and force the consideration of risks in isolation that does not reflect practical realities.

Insufficient information on which to grant approval

Therefore, in the absence of credible data to inform crucial modelling the risk assessments in Kalbar’s EPA Work Approval Application cannot be relied upon to seek the appropriate licence for “the occasional controlled discharge of treated surplus mine contact water stored in the Fingerboards freshwater storage dam to the Mitchell River via a transfer pipeline.”

Rhetorical Question: Can the Gippsland economy thrive on mining alone?

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Chapter 20: RISK

Contents

Executive Summary

The challenges associate with the location makes this mine is one of the most complex in the world.

The proponent has failed to discuss all relevant risks, including the business risks associated with the project. The proponent has failed to consider the consequential and cumulative impact of identified risks.

The proponent uses a variety of approaches to risk assessment that provide unrealistic ratings that trivialise the risks and do not hold up to scrutiny. Furthermore the proponent has used different bases for comparison of effects to provide the risk assessment outcome that suits their purpose best, e.g. considering the global impact of emissions, but the regional impact on gross product.

The modelling used to inform many of the assessments is faulty, e.g. impacts on air quality and water. It is also based on a deficiency of analytical data and relies heavily on unverified proponent provided information rather than independently acquired and tested inputs.

Mitigations proposed do little, if anything, to address the risks. Self-monitoring is not a mitigation.

The complexity of the proposed mine

The proposed Fingerboards Mineral Sands Mine is in our view *the* most complex of any such mine in Australia, and possibly the World.

The location, geology, soils, ground and surface water, proximity to established, sensitive industries, potential impacts on two Ramsar sites and many other factors combine to make it a very complicated proposition.

Inexplicably low risk ratings

Given the complexities and the underlying risks to existing environmental and social values, it is difficult to fathom how the proponent could consider the majority of risks to be ‘very low’ or ‘low’, a few ‘medium’, and only a couple requiring further attention. Or being considered to be worth the sacrifice (e.g. Aboriginal Cultural Heritage).

Figure 1 below shows the proponent’s claims of inherent risk levels in the project. It is highly unlikely that the number of ‘risk events’ identified for each hazard reflects the reality of the mine. Whether that be during construction, operations or decommissioning, and it is even less likely that the assessment of risk inherent in those hazards actually reflects what is likely to eventuate with the mine.

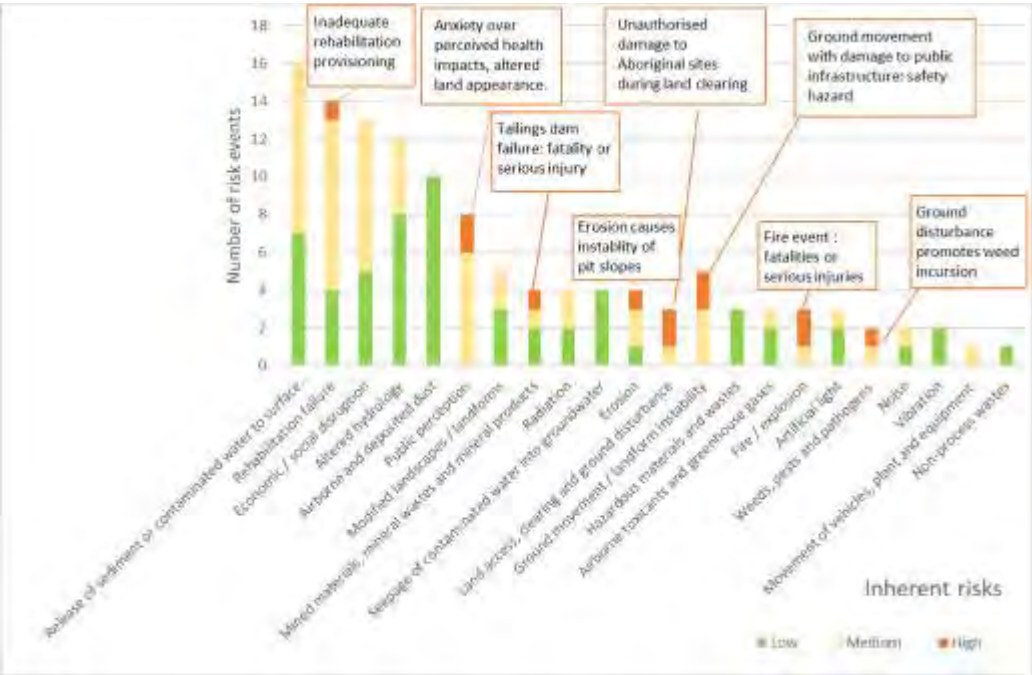

Figure 40: Claimed inherent risk summary

For example, to only identify two possible instances where noise would present risk appears to ignore the considerable number of instances where noise from mining has clearly been a problem. Past experience with similar mines has not only profoundly disrupted lives and affected the health of nearby receptors, but also required intervention by the authorities, and even litigation, in an attempt to impose better standards on mines' operations.

This was the case at the Keysbrook mine in WA, which has been held up in the EES as a model example for air quality mitigations. Furthermore, the assignment of a low risk rating to airborne contamination and dust is in direct contradiction to the experiences of communities that have active or abandoned mines in the vicinity.

The recent experience of contamination with toxic dust from the Stawell tailings dam is one such example. (Australian Mining, 2016)

Airborne contamination associated with the Fingerboards mine is expected to create significant problems well beyond the boundaries of the mine.

Hazards do not exist in isolation

It is equally puzzling, disconcerting and alarming that the proponent has presented all risks in isolation and has given no identifiable evidence of consideration to the combined or cumulative impacts of any hazards eventuating.

To illustrate this, an example is the highly dispersive soils and concurrent potential seismic activity increasing the likelihood of tailings dam failures. If this occurs on the western side it will in turn result in the release of many tonnes of contaminated sludge into the surrounding environment, which would result in irreversible damage to the rare and unique chain of ponds formation, and the Perry River and beyond that the entire Lakes ecosystem.

Perhaps even more concerning is that by assigning the very optimistic values to the likelihood and/or consequence of events, the proponent, a relatively new company for whom this is their first mining project, has been able to avoid the level of scrutiny the public should be able to expect for such a complex proposal.

In doing so, it has enabled the proponent to nimbly avoid the modelling that could reasonably be expected for very serious events such as tailings dam failures. (Kalbar Operations Pty Ltd, 2020)

It could be argued that the guidelines provided for the preparation of the EES actually encourage this inadequate approach to risk assessment by indicating that hazards with ratings determined to be medium or below require no further attention. (DSE, 2006)

It is not surprising then, that with some deft ‘mitigations’, the proponent’s assessments of residual risks leave very few areas requiring further attention. This permits attention to then be diverted from areas that the community identifies, based on a range of parameters, as having high intrinsic or residual risk.

A case in point is the high number of rehabilitation failures across the state, as recently reported on by the Auditor General. (VAGO, 2020).

If a company such as Iluka, Australia’s most experienced mineral sands miner, was unable to meet its commitments to progressive rehabilitation at the Douglas mine why would it be considered plausible that an inexperienced company be able to achieve any more? And in a considerably more complex environment, with planned mining sequences that do not allow a staged and consecutive mining footprint.

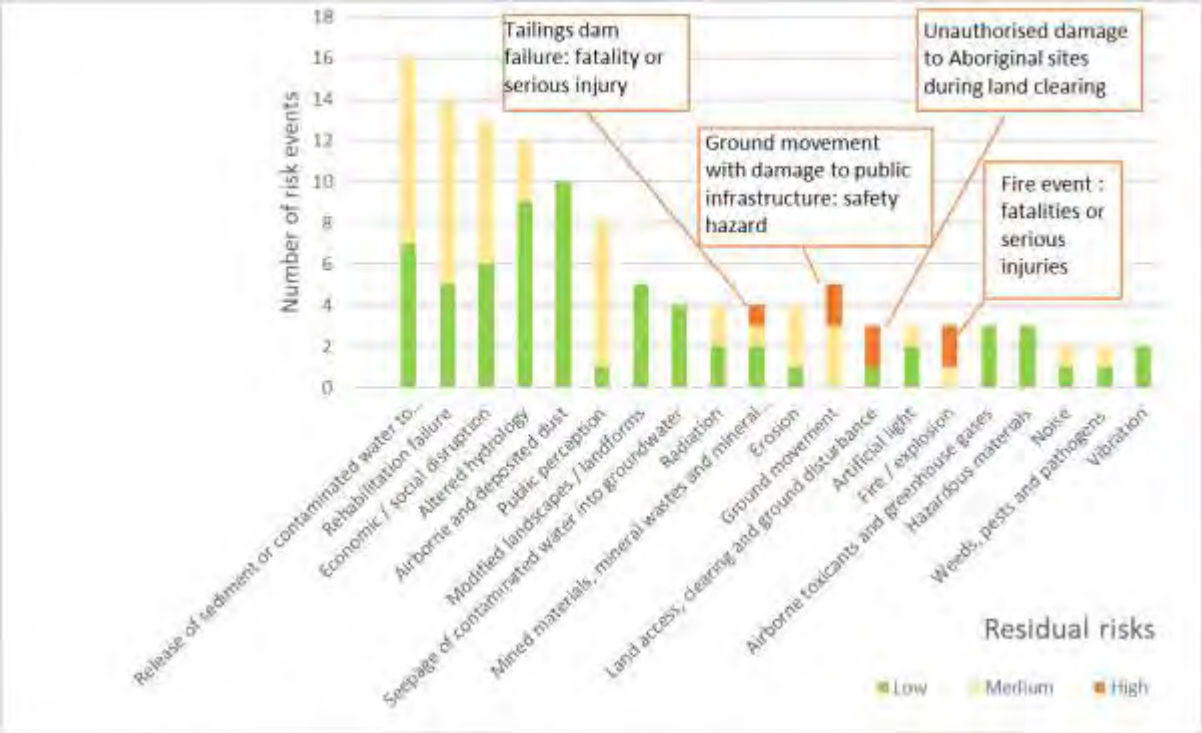

Figure 41: Claimed residual risk summary

What are 'binding public undertakings'

The proponent claims they have 'given binding public undertakings to implement a range of mitigation measures to limit the risk of environmental harm'. (Kalbar Operations Pty Ltd, 2020)

However, to our understanding, there is no such thing as a 'binding public undertaking'. Given the ease with which changes to the 'ownership' of the project have been made, and the apparent lack of regulator concern about the inexperience or financial viability of the proponent company, these claims hold zero credibility with the community.

In addition, the proponent has responded to the community at a number of meetings where concerns were rightly expressed around off-site impacts such as sedimentation of the Mitchell River, or contamination of vegetable crops, that the only means of redress would be to take them to court.

Even if an individual or business was to take the legal pathway, the company has no assets that can be called on to make good damages.

The modest local properties that have been purchased to enable the mineral sands mine to proceed have been transferred to another company called Kalbar Property Pty Ltd which is a different commercial entity to the proponent.

Failure to assess business risks

There is no evidence provided within the EES documentation that any serious consideration has been given to the many, considerable and grave business risks associated with the project. These could make it neither feasible, nor financially viable.

It is these factors that are critical to the proponent being able to afford to make good on rectification if any of the inherent or residual risks are ever realised.

The industry's interpretation of the 'as low as reasonably practical' framework appears to translate to 'what is the cheapest to get a passable outcome'. The most pressing condition then becomes financial capacity rather than capacity of mitigation. This then makes the extensive and thorough assessment of business risks even more critical in determining whether the company should be granted a mining licence.

Although MRSD Regulations require projects be shown to be economically viable, there is little evidence to indicate that that requirement is adhered to in reality. (Parliament of Victoria, 2019) [8]

Inconsistent application of likelihood and consequence

The company has been inconsistent with its selection of scale for consequence parameters, moving between local, regional, state and international guidelines to produce the most favourable assessment for the project.

These inconsistencies have resulted in the likes of comparing the Net Present Value to that of the East Gippsland Region while comparing the extent of greenhouse gas emissions to those of the entire globe.[9]

Indeed, the company admits that the technical specialists revised the criteria for risk assessment/modelling 'where appropriate'.

Who determines what is appropriate?

Consequence ratings should be selected to reflect where the action is going to occur and who or what is going to be impacted. Even the use of the ratings used by local shires would have provided far different indicators of extent of consequence, than the nationally based indicators chosen by the proponent.

Any business would be basing their consequence levels on the basis of specific or local impacts, not state, national or global ones. (Wellington Shire, 2020)

The community has many and valid concerns about the deceptive picture these inconsistencies illustrate around/pertaining to the mine's benign effects on the social, economic, cultural and environmental values identified.

[8] Nor do we see any consideration of the requirement that projects be environmentally sustainable or that allow for intergenerational equity.

[9] Even with the global, they have avoided including Scope 3 emissions and a number of other sources that would not occur if the project was not to proceed

Examples of inconsistencies

Some examples are evident from the Works Approval Application.

Discharge of contaminated water

One such is the number of hazards associated with the Dissolved Air Filtration system to treat mine water that have been identified, any of which could lead to contaminated water entering the freshwater dam and being released to the Mitchell River.

These hazards include malfunction of equipment, differences in quality of inflow water to the DAF, or the effects of extreme weather events. The proponent assesses the consequences of contaminated water being discharged to the Mitchell as minor, without providing evidence of how this conclusion was reached.

Who have they consulted with? What consideration has been given for the people who rely on the Mitchell downstream for irrigation, stock or domestic purposes? What consideration has been given to the aquatic ecosystem?

In addition, the claim that the consequences are 'minor' completely ignores the effects such increased discharges will have in an extreme event – in particular to those living and working on the Lindenow Flats. There has been no modelling of the effects of such discharge to justify a 'minor' consequence rating.

Even without the ever-increasing likelihood of extreme weather events due to climate change, the assessment of the chance of 'increased rate of release' as rare (i.e. 'could happen but probably never will) is optimistic and certainly not reality based.

And because of the selection of likelihood and consequence criteria, the final risk rating as 'low' translates to no intervention being required to avoid the event or ameliorate the outcomes.

It is very doubtful the people on the Lindenow Flats would be able to get any or adequate insurance against such an event given it is not only foreseeable, but likely to occur.

Reputational risk

It appears that the only concern the proponent has in relation to discharge of contaminated water is the reputational damage brought about by the public "perception that Kalbar is harming the Mitchell River or Gippsland Lakes" – a risk they rate as high.

This seems at odds with their dismissal of any potential reputational damage to the Horticultural growers from being associated with, or affected by, contaminating events from the mine.

Why does the proponent believe their reputation is of more value than that of the vegetable growers? The Horticulture industry, whose very business depends on their 'clean green' image, is a sustainable industry worth in excess of $150million per annum and has developed a reputation on the back of consistently providing a quality product.

Airborne contamination and dust

Dust contamination is inevitable with the mine and the proponent has openly stated that it will not be able to control all its emissions.

Water modelling indicates that it has not allowed for adequate amounts of water to keep dust-generating and exposed surfaces damp. Airborne contamination and dust will undoubtedly negatively impact on people, pastures, stock, wildlife, rivers and the local horticultural industry – including the many hundreds of workers who work outdoors.

The extent of those impacts will vary, but to the affected parties they are certainly not insignificant.

In addition, meteorological data indicates the likelihood ratings provided in the EES are far too low as a result of significant underestimations. This data flaw pertains to not only the possible windspeeds in the area, but also as a consequence of their year-round occurrences.

The outcomes of those underestimations include a lack of adequate consideration for the of a number of harmful factors associated with airborne contamination – including respirable crystalline silica, radionuclides and heavy metals.

Unfortunately to date, it takes many years and instances of negative effects from mine dust contamination before community's concerns are actually acknowledged. Such was the situation with community concerns about dust blowing off the tailings dam of the Stawell gold mine. (Australian Mining, 2016)

Dust contamination from mines and tailings dams is not an uncommon event – the likelihood of a regulator promptly and effectively intervening is unfortunately, based on past community experience elsewhere in Victoria, less.

Tailings dam

Kalbar's 'assessment' of the risks associated with tailings dams' failures have resulted in the final risk rating being beneath the level required for more investigation as per the parameters in the EES. This underestimation is a result of extremely optimistic consequence ratings. Without accurate and relevant modelling for failure, how can the proponent determine what the consequence level is?

There are many other inconsistencies that the community will seek to address in the Panel Hearing.

Mitigations?

The community is particularly concerned at the type of 'actions' proposed in the EES that are claimed to be mitigate risks.

Many of those mitigations listed have already been demonstrated to be ineffective in other mining operations.

As an illustration, there is possibly only one Environment Review Committee still operating in Victoria, and even that is plagued by issues arising from lack of independence and lack on ongoing regulator attendance at meetings. The community feels in a 'no win' situation in the face of what appears to be ongoing devaluation and deflection of community concerns. (Ross, Various)

Many of the professed mitigations proposed are no more than existing practices that have no relevance to operations of the proponent. e.g. encouraging farmers to get 'environmental certification' when all farmers already meet very strict quality assurance protocols and already have membership of the relevant agencies. And this very principle proposed by the mine proponents puts the responsibility to mitigate impacts of the mine on surrounding businesses rather than on the mine itself, an extraordinary expectation.

The claim that they will hold an annual local community event when there is already the East Gippsland Field Days and other annual events to showcase the produce and associated suppliers is similarly insulting.

Many supposed mitigations are no more than standard business practice to avoid unnecessary costs, and some ascribe to the proponent powers they do not have, e.g. ensuring visitor traffic to national parks won't decrease.

Others are outright offensive, such as providing employees with 'incentives' to attend community events and paying them to participate in voluntary emergency management organisations such as the CFA or SES. That is not how communities develop and work together, it corrupts the spirit of local communities.

And how on earth is a 'community fund' to 'support community events and initiatives to encourage social interaction' going to help anyone adjacent to the project area whose community is going to be torn apart by the mine?

This appears to be nothing more than an attempt to invalidate the very real stresses that people experience as a result on the mine

Mitigations should be grounded in focused, achievable and measurable strategies, rather than just words thrown at paper to give the appearance of attempting to address risks.

In summary, mitigations should be reflective of good governance and a respectful and thorough understanding of a company's responsibilities and Duty of Care.

To accept mitigations put forward to obtain a mining license, and without critiquing the evidence behind the risk ratings submitted, and without critiquing the capacity for measures to translate to reality, is irresponsible in the extreme.

It fails to align with best practise and legislation.

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