

## Fingerboards Mineral Sands Project — Inquiry and Advisory Committee (IAC)

### Expert meeting statement — Update by Rob Loch and findings in Gavin Mudd’s report, from F.2 and F.5

Meeting held: **12 April 2021, remotely via Microsoft Teams**

Experts: **Darren Billingsley (DB), Michael Cheetham (MC), Jess Drake (JD), Rob Loch (RL) and Gavin Mudd (GM)**

Observers: *none*

Note taker: **Cathie Shorthouse**

Date, time and location of meeting(s): **12 April 2021, 9:00am - 10:30am (AEST), remotely via Microsoft Teams**

**The meeting content was sequenced to allow attendees to leave after their area of expertise was discussed (DB left at 9.57am; GM left at 10.03am).**

The following key issues and areas of agreement and disagreement were identified by the participating experts at the meeting:

Item No.	Issue	
1.	Discussion of centrifuge proposal	
	<b>Matters of agreement</b>	
	<b>No.</b>	<b>Agreed fact/opinion</b>
	1.1.	GM and RL can see some of the reasons for the centrifuge but we are not experts in this area. It GM raises the question of how well it will work.
		<b>Assumptions relied upon in reaching agreement</b>
		GM: The centrifuge issue came in after the reports were done. Concerns raised include – <ul style="list-style-type: none"> <li>• It hasn't been used in mineral sands before</li> <li>• It is an expensive option</li> <li>• There's still uncertainty as to how effective it will be in achieving required goals.</li> </ul>

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		Being cautious, more work is to be done to assess the technical work underpinning it all. From a water budget perspective, if it fails then it has a significant impact on mine's overall operation.
		<b>Individual comments in respect of agreed fact/opinion</b>
	RL	<p>Unsure how much impact it will have on rehabilitation performance in some respects. The bulk of tailings, both fine tailings (the fines) and the sand tailings will be dried using centrifuges and can be trucked out and placed.</p> <p>Placement of Haunted Hills impermeable overburden within the pit remains and not sure there's a drastic difference there, given that the same impermeable layers are also present prior to mining.</p> <p>With respect to the proposal to use a mixture of fine and sand tailings to form a subsoil, that layer is planned to be placed as co-disposal. Depending on the ratio of the mix it could be dried and bear traffic in a reasonably short period and highly uneven mix of blocks of dried out fine tailings with the sands should not be an issue. Currently planned rehab trials will look at very thoroughly mixed fine and coarse tailings of different ratios.</p> <p>The centrifuge should save the mine an enormous amount of water and unlikely to be committed to if cost was an issue.</p>
	MC	Not involved in the mine's discussion for this.

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2.	F.5 Rehabilitation criteria and soils, GM point 37, baseline chemistry data needed	
	<b>Matters of agreement</b>	

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	<b>No.</b>	<b>Agreed fact/opinion</b>
	2.1.	<p>GM: Considers more work needs to be done, including on groundwater and surface water data, that underpin criteria for rehabilitation.</p> <p>RL summary: There is an agreed need between GM and DB for more data as per regulatory requirements.</p>
		<b>Assumptions relied upon in reaching agreement</b>
		<p>RL: Remediation and rehabilitation comments from GM raise lack of data relating to radionuclides.</p> <p>DB: Agrees there is insufficient radionuclides to date, especially for Mitchell River. This has been flagged with Kalbar last November that they need to get more data and analysis, specifically for radium 226 and radium 228. A 12 month data set, at least, is required for baseline material.</p>
		<b>Individual comments in respect of agreed fact/opinion</b>
	DB	In terms of surface dose rates and radon levels. Three years of continuous data is now available (only 18 months of values were available for the initial report) and this is outlined in the witness statement. Re dose rates, a finer grid survey was always proposed to be done and needs to be undertaken prior to Kalbar receiving approval for a management licence, as dose rates are critical for rehabilitation. However, it was never considered to be done as part of the EES process by Kalbar.
	GM	Regulatory concerns acknowledged, along with differences between Kalbar and Douglas or projects in western Victoria. Baseline data being known and characterised before mining will determine how operations will achieve rehabilitation.
	DB	No mineral separation will be undertaken on site and what is replaced in the mine void has less radioactivity than what is taken out, and it will be capped.
	GM	The heavy mineral concentrate will be a more radioactive product than that leaving Hamilton, which puts emphasis on how it will be managed and transported.
	DB	Agrees with GM comments. This is integral to the waste management plan and there is expected to be criteria for surface dose rates over the top of the cap to be less than original measures.

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	GM	Advocates for good characterisation of different soils, with use of average background dose rates, with elevated levels only at mineralised zones. Ability to be comfortable in qualifying this range.  Current elevated levels are a concern. Performance of rehabilitation in 10 - 20 years needs to be able to be assessed as causal or natural variability. If high levels are present now then it is important to be able to make that interpretation from having underlying baseline or pre-mining data.
	DB	Agrees.
	GM	Having the data would also be a community expectation, as promised by industry and government, and to be available to them.

Item No.	Issue	
3.	F.5 Rehabilitation criteria and soils, GM point 38, recognition of length of time to achieve rehabilitation goals	
	<b>Matters of agreement</b>	
	<b>No.</b>	<b>Agreed fact/opinion</b>
	3.1.	RL summary: Monitoring should be adequate to be pick up the changes. Concern is expressed that the information is not going to be sufficiently shared. Transparency on how judgements are made is important.  Sharing of data is important.
		<b>Assumptions relied upon in reaching agreement</b>

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	<p>RL: What is to be achieved by rehabilitation works needs to be clearly set out, but strict time frames can be dangerous. A nominated time does not consider the impacts of one-off events such as a bush fire or a drought, or brilliant years of growth rate of grass only. The aim for rehabilitation is to basically have soils supporting vegetation, with carbon and nutrient stores, as well as water storage capacity equal to or better than analogue sites. There needs to be a quantitative measure of parameters that ensure the land and soil would be sustainable. Potentially if a nominated time period is set as the goal, it could be met by a mine and the rehab still not be right and the mine is clear of responsibility. Preference is to focus on achieving rehabilitation targets.</p> <p>GM: Agrees to a point. His experience indicates that a lack of a time frame allows things to drag out. At some point an assessment is needed to show they are on target (or on the forecast trajectory to it). Time frame could be linked to 'a return to farming' or other potential land use, but it is also a regulatory issue, to consider release of bond or recognise there is more work to do by mine. An explicit process is needed to be able to make the judgements that rehab has worked or not.</p>	
	<p><b>Individual comments in respect of agreed fact/opinion</b></p>	
	<p>RL</p>	<p>Competent monitoring these days, from six months, will have baseline measurements on soils and analogue soils. On an annual basis it should track biomass production, soil carbon, nitrogen, phosphorous, and potassium profiles and every competent rehabilitation report that is done compares the rehabilitation area against its analogue areas and its targets. Virtually from year one or two, competent monitoring is tracking and reporting 'how it is going'. One aim of monitoring is to recognise very quickly if it is not going well.</p>
	<p>GM</p>	<p>A problem with that is it is done internally between consultant and regulator, and not done publicly. NSW is a good example of presenting it in statutory annual environmental management (or monitoring) reports but Victoria does not make their reports public.</p> <p>NSW and SA are the only states to share [reports] publicly. They may be shared locally, where communities can access them but others are kept and considered commercial in confidence or part of non-disclosure agreements.</p> <p>Concern is to get evidence to show it is done publicly and transparently, so there is an ability to see what's going on and are on track to achieve rehabilitation objectives.</p>
	<p>RL</p>	<p>Would have expected the recommended rehabilitation to track the success or otherwise. The issue as GM sees it, is the information is not publicly available. Any mine that is doing good rehab and not bragging about it is seriously silly.</p>

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	GM	Agrees, and cites mines that don't brag enough, along with others that run from shame.
	DB	10.03am – leaves to meeting

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4.	F.5 Rehabilitation criteria and soils, GM points 39 & 40, bond calculator	
	<b>Matters of agreement</b>	
	<b>No.</b>	<b>Agreed fact/opinion</b>
	4.1.	RL summary: Data is missing. GM: Requests transparency in this matter also, to show how numbers are justified.
	<b>Assumptions relied upon in reaching agreement</b>	
	MC and RL are not offering [an] opinion as to whether it is required as part of the EES or not. GM has concerns as discussed [noted below].	
	<b>Individual comments in respect of agreed fact/opinion</b>	
	RL	Recognises the information is not there. Enquires if Victorian bond calculator has been updated.

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	JD	[Checks and] confirms the updated version was released on 16 March 2021.
	GM	Is aware bond quantities are not routinely released. Understanding the values is important and as well as how they were arrived at.
	GM	10.03am – leaves the meeting

Item No.	Issue	
5.	F.2 Soil erosion in project area, JD findings - comments 43 & 55	
	<b>Matters of agreement</b>	
	<b>No.</b>	<b>Agreed fact/opinion</b>
	5.1.	<p>RL summary: We totally agree with JD's view that it is essential to understand erosion. RL and MC's view is that [the] erosion on site, while it is present, is certainly small and that further mapping is not of value.</p> <p>JD: Agreed that undertaking erosion mapping on the area that is to be actively mined is not necessary, and that erosion mapping/assessment of offsite areas, interface of mine and natural soils, or areas not being mined is essential. Happy to hear there is an assessment somewhere.</p>
		<b>Assumptions relied upon in reaching agreement</b>
		JD: Requests to know which report MC wrote. It may not have been included in the limited reports she reviewed.

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		<p>MC: The Fingerboards Mineral Sands Landscape Stability and Sediment Transport Regime Assessment version 10.</p> <p>RL: Personal view is that a detailed survey of the site it would not be helpful as –</p> <ul style="list-style-type: none"> <li>• The areas of existing erosion may be dug up</li> <li>• From a perspective of longer term erosion, in setting rehab goals, it is advisable not to nominate acceptable quantities of erosion from a currently (slightly) unstable landform, as it lowers the bar.</li> </ul> <p>JD: This part of the EES was not provided to be reviewed and needs to be looked at before commenting further.</p> <p>Keen to know what erosion is already happening on site and how is the mine going to affect that erosion, off site and also outside of tailings area. (In agreement with RL and MC, in that there is no point in doing an erosion assessment of the area to be rehabilitated).</p> <p><b>Individual comments in respect of agreed fact/opinion</b></p> <table border="1" data-bbox="286 778 2089 1046"> <tr> <td data-bbox="286 778 642 858">JD</td> <td data-bbox="642 778 2089 858">To seek a copy [and] JD will read MC’s report and return opinions to RL.</td> </tr> <tr> <td data-bbox="286 858 642 1046">RL</td> <td data-bbox="642 858 2089 1046">Considering how poorly managed some of the more “at risk” components of the area are at present, in RL’s view the area is remarkably stable. In, Victoria widespread rilling of hillslopes is seldom seen (unlike more northerly states), the dominant erosion processes are more associated with concentrated flows forming gullies. Much of the site is low gradient. Main focus for the broader landscape was on getting vegetation cover back. Aimed to minimise tunnel erosion, and avoid layers of sodic material within 1m of the surface.</td> </tr> </table> <table border="1" data-bbox="286 1046 2089 1308"> <tr> <td data-bbox="286 1046 642 1308">MC</td> <td data-bbox="642 1046 2089 1308"> <p>With respect to request for mapping of erosion. Within mine boundary, where earth is to be turned, there is no point in doing any mapping in terms of erosion (in agreement with RL’s comments).</p> <p>Downstream, for example the sediment capture dams and the lease areas, it is recommended these areas be monitored annually and event-based monitoring (i.e. after large events) due to some of the processes potentially being detrimental during the operation prior to full rehab. It is recommended also to revegetate these areas now and maintain them throughout the mine life. (This also gives the benefit of 20+ year vegetation maturity at relinquishment).</p> </td> </tr> </table>	JD	To seek a copy [and] JD will read MC’s report and return opinions to RL.	RL	Considering how poorly managed some of the more “at risk” components of the area are at present, in RL’s view the area is remarkably stable. In, Victoria widespread rilling of hillslopes is seldom seen (unlike more northerly states), the dominant erosion processes are more associated with concentrated flows forming gullies. Much of the site is low gradient. Main focus for the broader landscape was on getting vegetation cover back. Aimed to minimise tunnel erosion, and avoid layers of sodic material within 1m of the surface.	MC	<p>With respect to request for mapping of erosion. Within mine boundary, where earth is to be turned, there is no point in doing any mapping in terms of erosion (in agreement with RL’s comments).</p> <p>Downstream, for example the sediment capture dams and the lease areas, it is recommended these areas be monitored annually and event-based monitoring (i.e. after large events) due to some of the processes potentially being detrimental during the operation prior to full rehab. It is recommended also to revegetate these areas now and maintain them throughout the mine life. (This also gives the benefit of 20+ year vegetation maturity at relinquishment).</p>
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		<p>Some head cuts and gullying and occasional tunnel erosion were observed and can be monitored over the mine life. A lot of it will be vegetated and condition of vegetation will be monitored. A concern would be a head cut rapidly progressing towards as sediment capture dam, leading to that dam's failure.</p> <p>However, measured rates of recession of those nick points (head cuts) are incredibly slow and none are particularly close to where dams are proposed to be. So nothing will happen overnight to lead to a dam's destruction.</p> <p>Processes like a head cut will change over time, so monitoring is advised to check if it is moving or if new ones form or gullies or tunnel erosion forms, then address them as needed. With vegetation in there, within 5 – 10 years they will become robust sediment traps and healthy little gullies.</p>
	JD	An action: to read MC's report to find this information.
	MC	<p>Offered to meet again and discuss with JD if clarification is required.</p> <p>Explained the report covers the active erosion processes, and site walkover that was done (excluding one part near the interface of pine plantation, which was seen this year). Recommendations were based on nick point recession rates as included in the report. Revegetation in strategic parts would create a buffer region and dams are present to capture sediment, if needed.</p>
	RL	The gully lines are quite cobbly. The sandy soils have a bit of gravel at depth and winnowing has contributed to gravel accumulating in gullies. Comments with respect to observations of accelerated erosion were generally aimed to identify issues associated with management, e.g., a tractor driver undercutting toe of slope.
	MC	All flow lines have cattle wondering through them with little vegetation and is quite remarkable they are not worse than they are.
	JD	Request comment on interface between mine and natural soils in terms of erosion.
	RL	If the soils are rehabilitated as RL would like to achieve, less drainage and less runoff will occur i.e. more water will be going through the trees and grass. With an interface between rehab and natural soil, natural soil will invariably be downslope. Rehabilitated soil will not be getting seepage or very little and the natural soil may have more seepage or runoff. Interface will need to be very carefully compacted and managed to avoid a

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		<p>large overland flow entering to depth and causing a tunnel at that point. It hasn't been strongly discussed at this stage but is not difficult to do. It is important that this is addressed.</p> <p>MC To address gullyng within the rehab area, for example, the proposal is to treat the soils and plant vegetation. Downstream of that section, below that interface, ideally have it as established vegetation from these pre-emptive re-veg works and it will address tunnelling. A blending of the two approaches should be enough to have a pretty robust landscape. If meeting over a particularly sloping surface some care may need to be taken at those areas. Acknowledges this point was not addressed exclusively but is not a major issue.</p> <p>RL In terms of controlling lateral seepage that might cause tunnel erosion, the aim is to have more trees nearer the edge of the plateau to dry it out. The top of plateau has such low gradients that the rates of seepage are so slow they can't get a tunnel going. When they get to the edge of the plateau and gradients increase, the mantle of sandy soil protects it, and it seems to be a stable situation. It is recognised that lateral seepage is an enemy. Planning was aimed to not have seepage coming out part way up a hill slope.</p> <p>MC MC: To check with Kalbar and obtain a copy of his report to pass onto JD.</p>
	JD (outside of meeting – brief reading and comments only)	<p>JD undertook a very brief and high-level read of Appendix A006 (Appendix C): Landscape Stability and Sediment Transport Regime Assessment dated April 2020, Version 10, issued 30th April 2020. This very brief read of this Appendix came out of the expert conclave meeting. <u>The brief reading of the Appendix does not constitute a review</u>, as there is insufficient time available to undertake a full review of this document. My comments are therefore limited by the brief reading of this Appendix, and a more thorough review may enable further consideration of the information provided.</p> <p>In reading of the Appendix, JD notes that some of the discussion (as above) for the rationale for the type of assessment undertaken and the locations of the assessment does not appear to be included. This information, and thus how the decisions for scope of assessment were made, is important for the reader (as a stakeholder or decision maker) to:</p> <p>a) understand the full extent of the effects the mine may have on soil erosion and sediment transport, and b) any limitations to that information that may inform further information needs, risks or mitigation strategies.</p>

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		<p>As an example, if only waterways were assessed as part of the work in this Appendix, then a limitation would be that mine interface and/or other erosion identified on the site was not assessed (see Jess Drake Expert Witness Statement for a list of erosion noted to be present on the mine project area). However, background information, if provided, may explain why other erosion or areas of the mine was not considered in this assessment and why. Thus, for the purpose of a statement of effects, it is essential to capture:</p> <ul style="list-style-type: none"> <li>a) what are the knowns and unknowns associated with erosion at the site as an effect from the mine (i.e. evidence and limitations),</li> <li>b) any information used to make assessments and decisions, and</li> <li>c) risks and mitigation strategies, and/or information needs, associated with aspects of erosion covered or not covered in the technical reports.</li> </ul> <p>JD agrees that the Appendix includes a detailed assessment of waterway erosion at the site, it includes clear aims, methods, results and maps of the waterways assessed (for example, Figure 4-1 and Figure 4-2), and considers the effects of the mine on the erosion assessed, recommendations to manage erosion and mitigate effects, and monitoring options. The Appendix does not appear to consider the interface between the natural soil and the mine, or any other identified erosion within or immediately offsite of the mine project area that was not contained within the waterways assessed.</p>

Prepared jointly by:



**DARREN BILLINGSLEY**

19/4/2021

**MICHAEL CHEETHAM**

[insert date]

**JESS DRAKE**

[insert date]

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Prepared jointly by:

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**DARREN BILLINGSLEY**

**[insert date]**



**MICHAEL CHEETHAM**

**[insert date]**

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**[insert date]**

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**MICHAEL CHEETHAM**

**[insert date]**

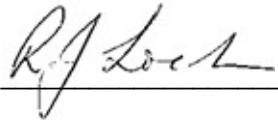
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**JESS DRAKE**

**[19th April 2021]**



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**ROB LOCH**

**[19 April 2021]**

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**GAVIN MUDD**

**[19 April 2021]**

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**ROB LOCH**

**[insert date]**



**GAVIN MUDD**

**19 April 2021**