

Fingerboards Mineral Sands Project EES Submissions
C/O Planning Panels Victoria
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19 March 2021

Dear Sir/Madam

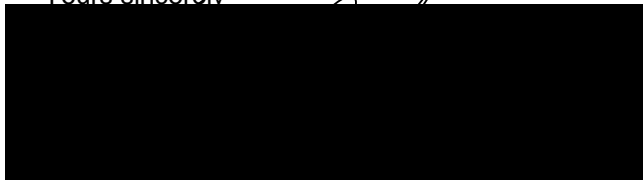
EPA Supplementary Submission Regarding Fingerboards Mineral Sands Project proposed centrifuges

Please find attached a submission made on behalf of the Environment Protection Authority Victoria (**EPA**) to the Fingerboards Mineral Sands Project joint Inquiry and Advisory Committee (**IAC**) under the *Environment Effects Act 1978*.

This supplementary submission is made in response to direction 32 of the IAC's directions dated 19 February 2021, regarding the proposed use of centrifuges for the Fingerboards Mineral Sands Project.

EPA looks forward to contributing further to the EES process through presenting its earlier submission (no 514), together with this supplementary submission, to the IAC.

Yours sincerely



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Fingerboards Mineral Sands Project



Environment
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**EPA Supplementary Submission:
Centrifuges**

March 2021

1. Executive Summary

This submission is made on behalf of the Environment Protection Authority Victoria (**EPA**) to the Fingerboards Mineral Sands Project joint Inquiry and Advisory Committee (**IAC**) under the *Environment Effects Act 1978*.

EPA provides this supplementary submission on the Fingerboards Mineral Sands Project (**Project**) proposed centrifuges in response to IAC direction 32. The Proponent proposes to introduce the centrifuge system to dewater the fine tailings and immediately backfill the fine tailings into the mine void. As a result, the Proponent proposes to remove the tailings storage facility (**TSF**).

The proposed inclusion of centrifuges is predicted to improve the recovery of water from fines tailings. This is unlikely to significantly change the impact to beneficial uses from the Project when compared against the impacts as assessed in the Environmental Effects Statement (**EES**) as exhibited because the water savings will largely counteract an error in the water balance recently identified by Kalbar and because the EES did not predict any seepage from the fine tailings to groundwater. It does, however, remove the risks to beneficial uses that was associated with a failure of the TSF.

The EPA relies upon the matters raised in its earlier submission (no 514) together with the additional submissions and recommendations set out in the body of this response. Key matters raised in the following submission include:

- Groundwater – the feasibility of applying centrifuges to coarse tailings should be explored;
- Surface water – the volume of water in the Freshwater Dam and impact on dilution should be clarified and approaches to reduce the chance of spillage from the water management dams should be implemented;
- Noise – an assessment of the potential for adverse impacts from tonal noise, low frequency noise, and vibration should be prepared (and mitigation measures implemented if necessary); and
- GHG – an amended GHG assessment should be prepared.

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2. Background

As outlined in the Project's exhibited Environment Effects Statement (**EES**), the mining process will extract ore, separate the minerals from the ore via a wet gravitational method and then return wet waste products (**tailings**) to the mine void as a part of rehabilitation. Coarse tailings and fine tailings would be separated, with coarse tailings being directed straight into the mine void (as a part of rehabilitation) and fine tailings to a temporary storage facility (**TSF**).

Since exhibition of the EES, the Proponent, Kalbar Operations Pty Ltd (**Kalbar**) have proposed adding a centrifuge system into the fine tailings process train with the purpose of further dewatering the fine tailings, followed by direct disposal of the fine tailings "cake" to the mine void. No change is proposed to the management of coarse tailings.

3. EPA's review of the Project's centrifuges

Potential effects from the addition of the centrifuges on groundwater, surface water, air quality, noise and GHG emissions is assessed in this advice. This submission also assesses whether EPA's previous submissions to the EES (submission number 514, filed on 28 October 2020 (**EPA Submission 514**)) have changed in response to the proposed addition of the centrifuges.

To inform this submission EPA has undertaken a review of the following expert witness statements and technical notes:

- TN01 - Implementation of centrifuges for water recovery and tailings management, (**TN-01**)
- TN 014 – Response to IAC Second Request for Information - Centrifuges, (**TN-014**)
- Supplementary Expert Witness Statement of Hugh Middlemis (Groundwater) for Kalbar
- Supplementary Expert Witness Statement of John Sweeney (Water Impacts) for Kalbar
- Supplementary Expert Witness Statement of Jarrah Muller (Water Balance) for Kalbar
- Supplementary Expert Witness Statement of Rob Loch (Rehabilitation) for Kalbar
- Expert Witness Statement of Ivan Saracik (Centrifuge) for Kalbar
- Supplementary Expert Witness Statement of Joel Georgiou (Groundwater) for Kalbar
- Supplementary Expert Witness Statement of Tony McAlister (Surface Water Quality) for Kalbar
- Supplementary Expert Witness Statement of Aaron Organ (Ecology) for Kalbar
- Supplementary Expert Witness Statement of Michael Cheetham (Erosion and Landscape) for Kalbar
- Supplementary Expert Witness Statement of James Weidmann (surface Water and Flooding) for Kalbar
- Supplementary Expert Witness Statement of Simon Welchman (Air) for Kalbar
- Supplementary Expert Witness Statement of Christophe Delaire (Noise) for Kalbar

- Supplementary Expert Witness Statement of Matthew Currell (Hydrogeology) for Mine Free Glenaladale
- Supplementary Expert Witness Statement of Conleth O'Loughlin (Centrifuges) for Mine Free Glenaladale
- Supplementary Expert Witness Statement of Brett Lane (Ecology) for East Gippsland Shire Council
- Supplementary Expert Witness Statement of John Webb (Groundwater) for East Gippsland Shire Council.

3.1. Groundwater

EPA considers that the proposed inclusion of centrifuges to the fine tailings circuit will likely increase reliability and certainty of recovering water from the fine tailings and therefore minimise the risk the *fine* tailings pose to beneficial uses (environmental values) of groundwater, compared with the TSF process.

However, EPA has, from the outset, been concerned about the risk the *coarse* tailings pose to beneficial uses of groundwater.

The exhibited EES modelling had assumed that there was no seepage from fine tailings to groundwater and that all the seepage was from the *coarse* tailings stream (*Appendix A006, page 153*). Therefore, EPA considers that changes to the fine tailings stream will not affect the volume of seepage to groundwater, with the possible exception of a slight decrease in volume due to a shift in the percent of tailings material able to be directed to the fine tailings stream. *Georgiou's supplementary statement* indicates that the adoption of the centrifuge will reduce the potential seepage to groundwater by 0.55 GL/year, a reduction of 32%. However, there is insufficient and unclear¹ data to confirm this reduction and to ascertain whether this reduction is actually due to a shift in the percent of tailings material able to be directed to the fine tailings stream induced by the centrifuges or, if it is due to other recalculations of the water volumes produced post processing.

Given that the exhibited EES modelling had that there was no seepage from fine tailings to groundwater and that all the seepage was from the *coarse* tailings stream, EPA considers that changes to the fine tailings stream will not affect the quality of seepage to groundwater. Whether the centrifuges may have a positive influence on the quality of water seeping from the fine tailings (and returned as process water) is irrelevant when assessing the discharge to groundwater.

As a result, EPA considers that the proposed inclusion of centrifuges will have minimal net effect on the quantity or quality of seepage from deposited tailings to groundwater.

It is not clear why the use of the centrifuges cannot be expanded to encompass all tailings. Given that all seepage to groundwater is assumed to come from the *coarse* tailings stream, EPA recommends that the Proponent consider and address the IAC on the feasibility of using centrifuges to increase the recovery of water from the *coarse* tailings as well.

¹ Table 2.1 of *Muller's supplementary statement* shows the total water in the combined *coarse* and *fine* tailings streams has decreased from 23,450 ML to 19,060 ML (a decrease of 4,390 ML). There is no explanation for this change. The change in proportions of *fine* and *coarse* tailings due to the centrifuges would change the volume of water in each of these streams, but in combination, the overall volume should not change. Furthermore, Table 2.1 indicates the data used in the EES incorporated a 60% recovery of water from the *coarse* tail underdrains, whereas the EES groundwater model adopted only 40% recovery.

It is also not clear how the fine tailings are proposed to be stored in the time between mining commencing and sufficient void being present for disposal. This may have groundwater implications due to rain infiltration. This should be confirmed.

Noting the above, EPA makes the following additional submissions:

1. **Further justification be provided to support the claimed potential reduction in seepage to groundwater.**
2. **The Proponent consider and address the IAC on the feasibility of using centrifuges to increase the recovery of water from the coarse tailings stream as well as the fine tailings stream.**
3. **Further information be provided on the storage of the fine tailings between mining commencing and sufficient void being present for disposal.**

The submissions outlined in EPA Submission 514 section 6.2 have not changed. In particular, EPA highlights its recommendations that further information be provided on the quantity and quality of the proposed discharge to groundwater from the tailings, that management techniques to recover water be applied to the tailings and that a new water quality monitoring program of water draining from the tailings be required prior to placement in the mind void.

3.2. Surface Water

EPA considers that the proposed inclusion of centrifuges to the fine tailings circuit is likely to reduce the overall risk the fine tailings pose to beneficial uses of surface waters, compared with the TSF process, but there is new uncertainty due to consequent changes to water management at the mine.

It is clear that the management of water within the mine site will change significantly with more water captured by the centrifuges and then reused in the mining process. Based on *Muller's supplementary statement*, EPA understands that water saved by the centrifuges should not have direct impacts on water which may be discharged off-site because water saved by the centrifuges will be sent to the Process Water Dam and reused in mining operations.

Muller's supplementary statement states that due to the centrifuges and more water being present on site, the risk of spillage of untreated water from the water management dams is increased to 3.4% in Year 8. Although there is a conflict between the revised Work Plan and the updated *Risk treatment plan: Water quality and hydrology* which should be clarified², the EPA recommends that approaches to reduce the chance of spillage should be implemented in order to meet a design criterion of spills being less than 1%.

Muller's supplementary statement also states that due to the centrifuges and more water being present on site, less water will be taken from the Freshwater Dam and therefore more water expected to be held within the Freshwater Dam at any one time. This is important as effluent from the Dissolved Air Floatation treatment plant (**DAF**) will be discharged to the Freshwater Dam before any water is discharged to the Mitchell River. In *Muller's original expert witness statement* (section 4.7), it is stated that due to limited water supply, the Freshwater Dam would "regularly be dry". As such, any DAF effluent would have little to no dilution before being discharged to the Mitchell River. The proposal to use centrifuges reduces this problem, and

² Compare page 8-3 of the revised Work plan with SW11 of the updated Risk treatment plan: Water quality and hydrology.

increases the likelihood of dilution occurring, but to an uncertain degree. More modelling, as suggested by *McAlister's supplementary statement*, is required to provide more certainty on this matter.

An obvious and important outcome from using centrifuges is that no TSF will be required. The removal of the TSF from the proposal reduces the risk to surface waters because it removes the risk from potential failure of the TSF. However, as noted in *O'Loughlin's supplementary statement*, the risk of a catastrophic failure of a centrifuge is possible and the design needs to include appropriate containment for this. *TN-014* discusses bunding associated with each of the centrifuge buildings with respect to ensuring that rainfall water on the buildings and equipment is captured and does not become runoff, and to capture spills in the event of accidental release of flocculant or slurry. There is however no discussion on the adequacy of the proposed bunding to contain effluent in the event of a catastrophic failure of the centrifuge plant.

Weidmann's supplementary statement assumes that the land allocated for the TSF will now be considered as "undisturbed" for the purposes of assessing flood potential. This needs to be confirmed.

Noting the above, EPA makes the following additional submissions:

- 1. Measures to reduce the potential of spillage from water management dams should be implemented in order to meet the design criterion of spills being less than 1.0%.**
- 2. Additional modelling be undertaken to provide further information to EPA and the IAC on the likely volume of water to be contained in the Freshwater Dam and the impact on dilution of the effluent from the DAF and proposed quality and quantity of water discharged to the Mitchell River.**
- 3. Confirmation that the land allocated for the TSF will now be considered as "undisturbed" for the purposes of assessing flood potential.**
- 4. Measures to avoid adverse impacts to the environment in the event of catastrophic failure of the centrifuges should be implemented.**

The submissions outlined in EPA Submission 514 section 6.1 have not changed. In particular EPA highlights that further information is required on the quantity and quality of water proposed to be discharged off-site.

3.3. Air Quality

EPA considers that the proposed inclusion of centrifuges to the fine tailings circuit and associated activities such as hauling of fine tailings to the mine and deposition of the tailings into the mine void is unlikely to change the risk to beneficial uses of air quality, compared to the TSF process.

EPA considers that the introduction of the proposed centrifuges to the fine tailings circuit may contribute to mitigating some dust generation activities on the site (such as reducing overburden haulage and accelerating rehabilitation). However, there is also a risk of increased dust generation due to the increased daytime mining and haulage activity as the centrifuge cake will be transported during the day – whereas the exhibited EES indicated there was no haulage associated with tailings management.

The result is that overall emissions from the exhibited EES and the centrifuge proposal are relatively similar.

The introduction of the centrifuges does not change EPA's recommendations outlined in EPA Submission 514 section 6.3. In particular, EPA highlights that further additional mitigation measures, such as those specified in paragraph 47 of *Welchman's supplementary statement*, should be included in the proposed Work Plan to ensure compliance with the SEPP AAQ.

3.4. Noise and Vibration

EPA considers that the proposed inclusion of centrifuges to the fine tailings circuit is unlikely to result in a substantial change in noise impacts compared with the TSF process, provided the risk of tonal noise, low frequency noise, and vibration is adequately managed.

Delaire's supplementary statement reports that:

- Changes in predicted noise levels for the mining operations would be generally between -1 dB and +1 dB during the day and evening periods and the night period for most receptors considered; with -4 dB at one location (R5, year 5) during the day and evening periods and +2 dB for the night period at another location (R45, year 8).
- No exceedances over the NIRV recommended maximum noise levels was predicted.

EPA notes that the location at which the centrifuge plant was modelled is not specified in *Delaire's supplementary statement*. (Figure 8 in *TN-01* provides a conceptual lay-out, however it is not clear whether this informed the noise assessment). This should be confirmed.

Delaire's supplementary statement assumes that the noise contribution of the haul routes would be the same as noise levels for the TSF process, on grounds that "*movements on the haul routes are not the primary contributors to the predicted noise levels at receptor locations near the proposed centrifuge plant locations*". While this statement is plausible, it would benefit from a detailed substantiation for each of the centrifuge plant locations proposed (for example, an indication of the relevant source contributions detailed in Appendix J of the exhibited EES).

EPA notes that the rotational speeds for the centrifuge bowls are reported to be typically in the range 1,000 to 1,800 rpm, which corresponds to frequencies of about 17 Hz to 30 Hz. EPA has concerns regarding the potential for adverse impacts from tonal noise, low frequency noise, and vibration related to the use of the centrifuges. The potential for these impacts is not discussed in either *TN-01* or *Delaire's supplementary statement*. This should be considered.

Noting the above, EPA makes the following additional submissions:

1. **The Proponent assess and, if necessary, implement measures to address the adverse impacts, from tonal noise, low frequency noise, and vibration from the centrifuge plant.**
2. **Further information be provided on:**
 - a. **The locations for which the centrifuge plant has been modelled**
 - b. **Justification that the haul routes would not be a significant contributor to the noise levels at noise sensitive areas.**

The submissions outlined in EPA Submission 514 section 6.1 have not changed.

3.5. Greenhouse Gas

Welchman's supplementary statement on air quality and GHG indicates that the use of the centrifuges would potentially result in an increase of 15% in average annual GHG emissions (Year 1 to Year 15) from the Project, but that the centrifuges would have other benefits for GHG reduction by eliminating the need for the use of amphirols and reduction in haulage distances which may result in a decrease of GHG emissions from diesel fuel. *Welchman's supplementary statement* however indicates that a complete GHG inventory has not been determined and therefore EPA is unable to provide advice on potential impacts of the centrifuges on GHG emissions.

Noting the above, EPA makes the following additional submission:

1. **The use of the centrifuges should be included in an amended GHG assessment and provided to the IAC.**