

8 February 2021

Kalbar Operations Pty Ltd
48 Bailey Street
Bairnsdale VIC 3875

Attention: Chris Cook

Dear Chris

**FINGERBOARDS MINERAL SANDS PROJECT - CENTRIFUGE DESIGN PROPOSAL
ENVIRONMENTAL NOISE EVIDENCE ADDENDUM**

INSTRUCTIONS

As instructed by White & Case by email on 29 January 2021, this letter is provided as an addendum to my evidence statement¹, and presents an assessment of the environmental noise implications of a design proposal for the Fingerboards Mineral Sands Project (the Project) which incorporates centrifuges in lieu of tailings storage facilities.

DESCRIPTION

In the time since the MDA report² was prepared, Kalbar Operations Pty Ltd (Kalbar) has been investigating design options to address water balance matters for the Project.

This has led to a proposed design change which would involve the development of two centrifuge plants, as detailed in Technical Note TN 01 *Implementation of centrifuges for water recovery and tailings management* dated 18 January 2021.

The centrifuge plant eliminates the need to construct the temporary tailings storage facility (TSF) and the in-pit fines TSF and, in turn, eliminate the need for the Amphirol plant which are the primary noise sources associated with the TSF.

Each centrifuge plant would consist of four centrifuges (three operational and one standby) enclosed within a clad building to provide noise mitigation. The centrifuge plant would operate 24 hours a day, seven days a week (in contrast the Amphirol plant which were proposed to operate during the day only). The centrifuge plant is to comprise a demountable configuration which enables each plant to be periodically relocated as the Project progresses.

The following additional noise sources are associated with the centrifuge plant:

- Front end loader operations for handling dried cake stockpiles at each centrifuge plant
- Ancillary transformers at the exterior of each centrifuge plant.

The above sources would also operate 24 hours a day, seven days a week.

It is understood that development of the centrifuge plant would also result in changes to haul route movements for handling fine tailings.

¹ Ev 001 R01 20200942 *Fingerboards Mineral Sands - Acoustic evidence* dated 30 January 2021

² MDA Report Rp 001 R12 20170182 *Fingerboards Mineral Sands – EES Noise and Vibration Assessment* dated 25 August 2020

ASSESSMENT BASIS

A simplified and conservative assessment has been carried out by conducting revised operational noise modelling for the primary noise source changes. Specifically, the modelling accounts for the removal of the Amphirol plant, and the addition of the noise sources associated with operation of the centrifuge plant.

The modelling approach is conservative on account of the following:

- The centrifuge plant has been modelled without the benefit of the noise reduction associated with the proposed enclosure for the plant

The design would need to be developed in further detail to provide a reliable basis for modelling the effect of the enclosure (to account for building configuration, material selections, and envelope penetrations). However, a basic lightweight enclosure with acoustically designed penetrations would reduce the noise of the centrifuge plant by at least 5 dB, and alternative material selections including demountable insulation panels would readily enable enclosure reductions of at least 15 dB.

- The noise contribution of the haul routes is assumed to result in the same noise levels

The centrifuge plant would result in changes to haul routes and their usage relative to the Project design involving TSFs. However, advice from Kalbar suggests that there would be a net reduction in haul route distance travelled, resulting in comparable and potentially reduced noise generation from haul route traffic. Movements on the haul routes are not the primary contributors to the predicted noise levels at receptor locations near to the proposed centrifuge plant locations; minor changes in their noise contribution would therefore not translate to material changes in total predicted noise levels at receptor locations.

The noise modelling for the centrifuge plant is based on centrifuge noise emission data (sound power levels) provided by Kalbar in Section 8 of Technical Note TN 01. As part of this assessment, the data were reviewed by comparing the levels with manufacturer data from a candidate plant supplier. The review confirmed the data was suitable for noise modelling and assessment purpose.

The sound power level data of the centrifuges and other plant relevant to this noise assessment are detailed in Appendix A. For reference purposes, this includes the sound power data of the Amphirol plant associated with the TSFs.

PREDICTED NOISE LEVELS

The predicted noise levels for the Centrifuge option for each of the four (4) scenario years assessed in the MDA report are tabulated in Appendix B, together with applicable NIRV criteria. For comparison, the tabulated data includes the predicted noise levels for the TSF-based configuration of the Project, and the change in predicted noise levels associated with the centrifuge-based configuration.

The predictions are provided for the preferred material transport option for the Project, which involves the development of a dedicated rail siding, at Fernbank to the south of the mine.

The results demonstrate:

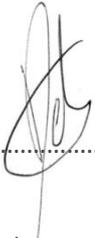
- The predicted noise levels are below the recommended maximum noise levels (recommended levels) of EPA Publication 1411 *Noise from Industry in Regional Victoria* (NIRV) for the day, evening, and night; and
- The predicted noise levels are generally comparable for the TSF and centrifuge based configurations of the Project, with increases of up to 2 dB (typically 1 dB) and reductions of up to 4 dB (typically 1 dB).

The results therefore demonstrate the viability of the centrifuge-based configuration of the Project with respect to environmental noise levels.

Given the conservative modelling approach, actual noise levels in practice would be lower as a result of the effect of the enclosure, further supporting the viability of this design option. Irrespective, if the centrifuge-based option is developed, all aspects of the centrifuge plant, including the building design, associated ancillary equipment and associated haul route changes, would need to be represented in the design stage noise modelling. Consistent with the wider approach to addressing noise from the site, this design stage modelling would inform:

- the specification and tendering of equipment to meet the noise requirements
- the development of the noise mitigation and management measures to be documented in the Environmental Noise Management Plan.

I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Inquiry and Advisory Committee. Yours sincerely

Signed 

Dated 8 February 2021

APPENDIX A NOISE EMISSION DATA

Table 1: Octave band sound power level data

Source	Model/ duty	Notes	Octave Band Centre Frequency (Hz)							Total A-weighted
			63	125	250	500	1k	2k	4k	
Amphirol	Mudmaster	Data as referenced in the MDA report to assess the design incorporating a Tailings Storage Facility (TSF). Based on manufacturer data for similar-sized equipment, with spectrum based on data contained in BS 5228-1 ³ .	115	115	109	107	106	104	98	111
Front end loader	9T	Data as referenced in the MDA report, and adopted for modelling activity adjacent the centrifuge plant. Based the on upper range of AS 2436 ⁴ values, with spectrum based on data contained in BS 5228-1. Modelled as a point source at a height of 2 m above ground level. The modelling accounts for the front end loader operating for 50 % of the time during a 30 minute assessment period, consistent with modelled duration corrections for other front end loader.	115	109	108	108	106	104	100	111
Centrifuge	Alfa Laval P3-10070	Candidate centrifuge for assessment purposes. Data derived from manufacturer test data ⁵ , and corresponds to the combined total noise emissions of three (3) centrifuges operating simultaneously. Modelled as a point source at a height of 10 m above ground level, and without the noise reduction afforded by the proposed enclosure of the plant.	107	106	105	107	101	101	101	109
Transformer	2 MVA	Empirical data from AS 60076-10:2009 ⁶ , with spectrum based on measurements by MDA. The sound power levels include the noise from ancillary plant such as cooling plant. Modelled as a point source at a height of 2 m above ground level	68	79	76	67	58	49	42	70

³ BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*

⁴ AS 2436-2010 *Guide to noise and vibration control on construction, demolition and maintenance sites*

⁵ Centrifuge derived sound power level data documented in Technical Note TN 01

⁶ AS 60076-10:2009 *Power transformers – Part 10: Determination of sound levels*

APPENDIX B PREDICTED NOISE LEVELS

Table 2: Predicted noise levels, dB LAeq – Project with Tailings Storage Facility (TSF) option and Project with centrifuge option – Day/evening periods

Receptor	TSF option				Centrifuge option				Change in predicted level			
	Year 1	Year 5	Year 8	Year 12	Year 1	Year 5	Year 8	Year 12	Year 1	Year 5	Year 8	Year 12
R1	38	38	39	39	38	39	39	40	-	+1	-	+1
R5	37	36	36	30	37	32	35	30	-	-4	-1	-
R6	33	33	33	29	34	32	32	29	+1	-1	-1	-
R7	31	34	36	31	31	34	36	30	-	-	-	-1
R15	28	33	35	31	28	33	35	30	-	-	-	-1
R16	25	30	33	29	25	30	33	29	-	-	-	-
R21	36	34	28	29	36	33	27	29	-	-1	-1	-
R23	34	34	34	34	34	34	34	34	-	-	-	-
R29	22	26	29	26	22	26	29	26	-	-	-	-
R30	24	27	31	30	24	27	31	30	-	-	-	-
R31	29	30	32	32	28	30	33	32	-1	-	+1	-
R43	33	34	26	31	32	34	26	31	-1	-	-	-
R44	29	30	29	33	28	30	30	33	-1	-	+1	-
R45	30	32	33	33	29	32	33	33	-1	-	-	-
R47	26	29	32	32	26	29	32	32	-	-	-	-
R52	37	37	37	37	37	37	37	37	-	-	-	-
R53	36	36	36	36	36	36	36	36	-	-	-	-
R58	29	30	30	30	29	30	30	30	-	-	-	-
R60	37	37	37	37	37	37	37	37	-	-	-	-
NIRV day/evening criteria	46/41	46/41	46/41	46/41	46/41	46/41	46/41	46/41				

Table 3: Predicted noise levels, dB LAeq – Project with Tailings Storage Facility (TSF) option and Project with centrifuge option – Night period

Receptor	TSF option				Centrifuge option				Change in predicted level			
	Year 1	Year 5	Year 8	Year 12	Year 1	Year 5	Year 8	Year 12	Year 1	Year 5	Year 8	Year 12
R1	33	35	32	35	34	36	32	36	+1	+1	-	+1
R5	31	29	30	28	32	30	30	29	+1	+1	-	+1
R6	29	30	29	28	30	31	29	29	+1	+1	-	+1
R7	25	30	31	27	26	31	32	28	+1	+1	+1	+1
R15	23	31	33	26	24	31	33	27	+1	-	-	+1
R16	22	28	33	27	23	28	33	27	+1	-	-	-
R21	33	31	24	27	33	31	25	28	-	-	+1	+1
R23	31	31	31	31	31	31	31	31	-	-	-	-
R29	19	24	28	24	19	24	28	24	-	-	-	-
R30	20	24	30	27	20	24	31	27	-	-	+1	-
R31	24	27	30	29	24	27	30	29	-	-	-	-
R43	29	33	23	30	29	33	24	30	-	-	+1	-
R44	27	30	25	32	27	30	26	32	-	-	+1	-
R45	25	29	29	31	26	30	31	32	+1	+1	+2	+1
R47	22	26	31	28	22	26	31	29	-	-	-	+1
R52	35	35	35	35	35	35	35	35	-	-	-	-
R53	34	34	35	35	34	34	35	35	-	-	-	-
R58	26	26	26	27	26	26	26	27	-	-	-	-
R60	34	34	34	34	34	34	34	34	-	-	-	-
NIRV night criteria	36	36	36	36	36	36	36	36				