NVC
NOISE VIBRATION CONSULTING

Bluestone Mines Tasmania Joint Venture
Murchison Highway
Renison Bell TAS 7469

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Doc 6280

Attention: Amanda Halley

RENISON PASTE BACKFILL PLANT — NOISE ASSESSMENT

Bluestone Mines Tasmania Joint Venture (BMTJV) operates the Renison Bell tin mine, and is seeking to add an additional processing facility, referred to as the Paste Backfill Plant (PBP). Both the construction and operational stages of this plant have the potential to cause noise emissions, which may be intrusive to sensitive receivers in the area. As such, NVC has been engaged to conduct a noise assessment of the operational process and the construction phase. This letter details the results of this assessment, conducted in December 2020.

1. BACKGROUND

1.1. Siting and Existing Infrastructure

Figure 1, below shows an overview of the surrounding area. The proposed site for the paste plant is located approximately 100m north of the existing Renison processing plant, which itself is located on the Murchison Highway, approximately 10km west of Rosebery. To the south of the existing plant are the majority of the mine tunnels, with associated air supply and exhaust fans located around the hilltop. To the north of site are the tailings ponds, adjacent to which additional mechanical plant is proposed, to facilitate the re-processing of historical tailings. A noise assessment for that project was previously conducted by NVC[1]. Measurements and predictions from that assessment have been used to define the existing ambient noise environment in the area for the PBP assessment.

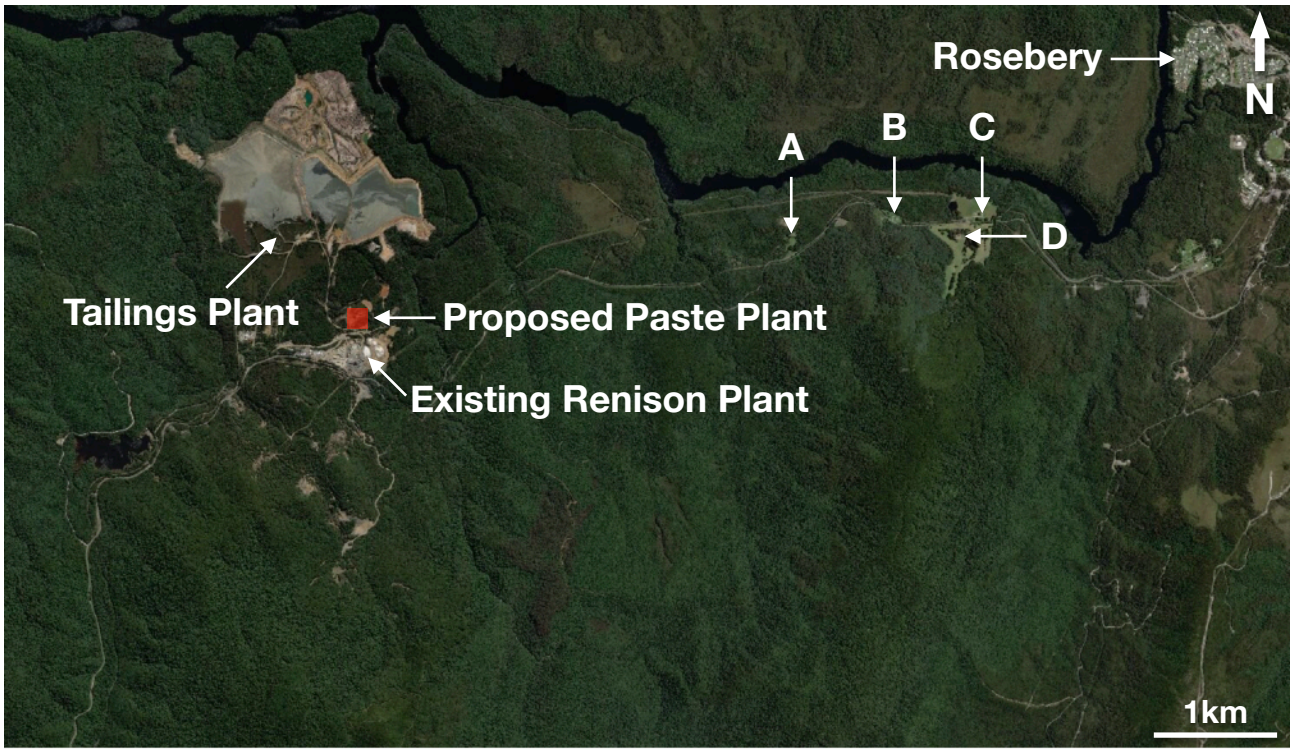

FIGURE 1: SITE AND SURROUNDING AREA

[1] *Rentails DPEMP Noise Assessment*, Doc 5883_01, NVC, 20 August 2019.

1.2. Proposed Plant

The proposed paste backfill plant is to be constructed adjacent to the existing processing plant, as indicated in Figure 1. The raw product for the plant is tailings sourced directly from the existing processing plant. The product is then processed into filter cake, which can either be stockpiled within the facility or further processed. The facility is to have covered stockpiling for up to 2,500m^3 of filter cake material. The filter cake is then further processed to create cement paste, which is able to be directly distributed to mined underground areas for backfilling and ground support. The plant is to be capable of processing 50 to 80m^3 of filter cake per hour. It will operate on a campaign basis, (i.e. will be entirely turned off when not required), operating 24/7 when in use. It is expected that the plant will initially run at 16% (1264 hours per annum), with an increase in production expected as product demand increases.

The facility comprises a large, undercover area for filter cake storage, an enclosed 'filter building', several external storage tanks, and conveyor and pipework systems for product transportation. The associated mechanical equipment comprises, in general; pumps for water and product movement, tank agitators, screw conveyors, belt conveyors, air compressors, and drying fans. A wheeled loader and large trucks are also expected to be used for the movement of product.

1.3. Construction

The proposed plant is to either be constructed of new equipment, or relocated equipment from Henty Gold Mine. The construction process for the plant comprises the following:

- Demolish the existing 'core shed' structure on the proposed site, and remove concrete pad.
- Earthworks to cut and fill the target area. A cut approximately 2m deep is proposed.
- Upgrade access road to the target area, and construct concrete pad for the structures.
- Construction/installation of building structures and mechanical plant and equipment.

Due to the relatively small size of the site, it is expected the equipment required will include a dozer, 30T excavator, two haul trucks, a grader, a roller, a loader, mobile cranes up to 100T, and large trucks for the delivery of materials and equipment.

1.4. Surrounding Area & Residential Dwellings

Along the Murchison Highway to the east are the nearest residences, marked A, B and C. Location D is the Rosebery golf course. The nearest residence (A) is approximately 3.5km from the existing Renison plant and proposed PBP site. The terrain is very hilly, with a series of gullies and ridges between the site and the residences. All residences are well screened from view of the site by topography and heavy foliage, which covers the vast majority of the region. Past these residences to the east is the town of Rosebery, which is comprised of a larger residential area and the Rosebery Mine. The details of the labelled locations are shown in Table 1.

TABLE 1: LOCATION OF NEAREST SENSITIVE RECEIVERS

Location	Distance from PBP [m]	Coordinates
A	3630	374141E, 5372848N
B	4500	374992E, 5372992N
C	5230	375691E, 5373047N
D	5020	375536E, 5372864N

2. EXISTING NOISE ENVIRONMENT

Unattended baseline noise measurements were made for the Rentails project in 2019 at locations A and C. Noise logging was completed for nominally 11 days between the 10th and 21st January 2019 at location A, and 8 hours during the day at location C.

The measured data is summarised in Table 2, while the following comments summarise subjective perception of the noise heard at the measurement locations whilst deploying the loggers (at approximately 10:00AM, 10th January 2019):

Location A:

- Traffic on the Murchison Highway loud and completely dominant when nearby.
- Rural noise (insects, animals, tree rustling) consistent and dominated the background.
- Low level tonal whine just audible at very low level when background very quiet – perceived as from south. Source unknown.

Location C:

- Traffic on the Murchison Highway loud and completely dominant when nearby.
- Rural noise (insects, dog barking, tree rustling) consistent and dominated the background.
- No industrial noise audible during attendance.

TABLE 2: MEASURED COMMUNITY NOISE LEVELS

Location	Period	Sound Pressure Level [dBA]		
		L10	L90	Leq
A	Day (0600 - 2200 hours)	47	32	43
	Night (2200 - 0600 hours)	43	26	40
C	Day (0600 - 2200 hours)	49	36	46

From Table 2, it may be seen that the overall ambient noise level during the night is substantially similar to the day time level. Observing the spectrogram shows that this is due to a very consistent narrow band of noise centred at approximately 2500 Hz, which occurs during the night time only. From previous attended night time measurements in similar areas, it is assumed that insects are the source of this noise. The remainder of the frequency spectrum shows very little other noise during the night time, aside from occasional vehicles passing by.

Since both residences are very well screened from both Renison Bell and Rosebery, no notable industrial noise emissions were expected to be seen in the measured data. Background noise levels are relatively low, and traffic noise is the dominant noise source during the day.

Additionally, predicted noise emissions for the Rentails plant are relevant. The Rentails DPEMP noise assessment[1] showed noise emissions from the new plant were predicted to result in a noise level of 21 dBA at location A, and below 20 dBA at locations B, C and D. They are thus substantially below the background noise level at all residential receivers, and thus will not effect the ambient noise levels.

3. NOISE PREDICTIONS

Predicted noise emissions for the operation of the new plant have been made using iNoise software, which implements the ISO9613 algorithms. The predictions account for geometric spreading, air absorption, ground absorption and topography. Predictions are made separately for the construction and operational phases of the site.

3.1. Operational Plant Equipment

Specific details of the mechanical plant equipment are currently unknown, and hence assumptions have been made on the expected plant, based on the published NOI[2]. The number of items is estimated from the product flow diagrams, and the electric power is based upon approximate sizes of similar equipment in the existing plant. The electric power levels chosen, and thus sound power levels (SWL), are generally on the higher side of what is expected to be used. SWLs for the equipment are

[2] *Paste Backfill Plant - Renison Operations - Notice Of Intent*, Bluestone Mines Tasmania Joint Venture Pty Ltd, Final Revision 2, 9th Nov. 2020

either taken from previous noise measurements by NVC for similar equipment, or calculated using generic equations based on the electrical power of the item as per CadnaA[3]. The expected plant equipment and associated sound power levels are shown in Table 3.

TABLE 3: MAJOR EQUIPMENT - SOUND POWER LEVELS

Equipment Type	Number	Electric/Engine Power [kW]	Sound Power Level [dBA]
Wheeled Loader	1	209	107[1]
Water Pumps	6	130	93[2]
Product Pumps	12	200	95[2]
Agitators	6	200	95[2]
Air Compressors	3	200	104[1]
Conveyors	6	100	92[2]
Fans	3	600	104[3]
Trucks	2	400	104[1]

[1] Based on noise measurements by NVC.
[2] Based on noise measurements by NVC, adjusted for electrical power as per CADNA-A.
[3] Based on generic calculations for power, pressure and flow rate - assumed ~~generic data~~ - 600 kW, 1500 Pa differential pressure, 60 m^3/s flow rate.

3.2. Construction Equipment

Sound power levels for the anticipated construction equipment have been taken from previous noise measurements by NVC of equivalent equipment. The sound power levels are summarised in Table 4.

TABLE 4: MAJOR EQUIPMENT - SOUND POWER LEVELS

Equipment Type	Number	Sound Power Level [dBA]
Dozer	1	108
30T Excavator	1	104
Haul Trucks	2	107
Grader	1	114
Roller	1	107
Wheeled Loader	1	107
Mobile Crane (~25T)	1	98
Mobile Crane (100T)	1	99
Trucks	3	104

3.3. Noise Predictions

In creating the noise model, the following has been assumed:

- All equipment is operating continuously, 24 hours per day. This applies to both operational and construction noise predictions.

[3] CadnaA = Computer Aided Noise Abatement software

- Where electrical power is unknown, the power is taken to be equivalent to the largest equivalent item currently installed on site.
- It is unknown exactly which equipment will be located inside and outside, and thus it is assumed that all equipment is located outside, and is unenclosed - i.e. has no localised screening. This is very conservative.
- The ground around the site (including the tailings dams) is 'hard' with a ground factor of 0 (totally reflective). The ground at the receivers and the intermediate area used a ground factor of 0.5 (50% absorptive). This is conservative.
- It is assumed that there is no screening due to vegetation – this is conservative as all residences have significant vegetation between them and any part of the Renison site, which will provide some acoustic screening.

The model also includes operation of the existing processing plant equipment, and the Rentails plant, as detailed in the Rentails noise assessment. The predicted noise levels at the receivers are shown in Table 5, for three separate scenarios: existing plant alone, existing plant and PBP operational noise, existing plant and PBP construction noise. Note that 'existing plant' comprises both the Renison processing plant and the yet to be installed Rentails plant.

TABLE 5: PREDICTED NOISE LEVELS

Location	Predicted Noise Level, SPL [dBA]		
	Existing Plant	Existing Plant + PBP Operation	Existing Plant + PBP Construction
A	24	26	26
B	22	23	24
C	20	22	22
D	20	22	22

4. CRITERIA

The existing EPN for Renison Tin Mine, No. 7092/2, does not contain any noise criteria. Additionally, the West Coast Interim Planning Scheme 2013 does not contain noise criteria for Environmental Management nor Rural Living zones.

The EPA Environmental Protection Policy (Noise) 2009 is therefore referred to for criteria. It states an outdoor criterion of 50 dBA, Leq 16 hr, from 0600 to 2200 hours for 'moderate annoyance, daytime and evening'. There is also a night time criterion for 'sleep disturbance, window open', of 45 dBA, Leq 8 hr from 2200 to 0600 hours.

The EPA does not publish noise criteria which address mining operations directly. It does, however, maintain a Quarry Code of Practise (QCoP), which defines noise criteria for quarrying and associated activities, which may be deemed relevant in this case. The QCoP states the following pertaining to noise emissions from quarrying activities:

> *"Noise from quarrying and associated activities, including equipment maintenance, when measured at any neighbouring sensitive use must not exceed the greater of;*
>
> - *the A-weighted 10 minute L90, excluding noise from the quarry, plus 5 dBA, or,*
> - *the following levels;*
>   - *45 dBA from 0700 to 1900 hours (day time),*
>   - *40 dBA from 1900 to 2200 hours (evening),*
>   - *35 dBA from 2200 to 0700 hours (night time).* "

The tightest criterion identified is then the QCoP night time criterion, which specifies a limit of 35 dBA between 2200 and 0700 hours. As the plant operates 24/7, this level is adopted for the assessment.

5. ASSESSMENT

In assessing the predicted noise emissions from the proposal, is it noted that the exact location and orientation of equipment within the plant is not known, and thus not able to be factored into the predictions. Additionally, much of the mechanical plant equipment will be either located inside the filter building or screened by it, however the details of the construction and the number and position of openings is unknown. In general, screening within the plant and enclosing the equipment within the building will result in actual noise emissions being further reduced from the predicted levels.

Assuming all equipment operates continuously, the QCoP night time criteria is the tightest, and as such is the focus of the assessment.

Predicted noise emissions from the operation of the existing Renison plant and the Rentails plant are are well below the existing background noise levels. These operations may then be expected to be inaudible - this was verified by site measurement and perception.

The expected noise emissions from the operation and construction of the proposed plant are lower than the measured emissions from the existing fixed plant, however, when combined with the existing plant, do raise the overall predicted noise emissions by approximately 2 dB. Due to the existing background noise level, these emissions are still unlikely to be audible from the residential receivers.

With conservative predictions for noise emissions from PBP construction and operations well below the identified criteria at the nearest sensitive receivers, and expected to be inaudible at these locations, it is determined that noise emissions from the construction and operation of the PBP will be acceptable.

Should you have any queries, please do not hesitate to contact me directly.

Kind regards,

Jack Pitt

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