

## Memorandum

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Date:	15 April 2024
From:	Jamie Exeter
To:	Olivia Stirling
Application reference:	RC220325
Applicant:	Hawkeswood Mining Limited
Application details:	Establish and operate an alluvial gold mining operation – with updated plans and further written approvals obtained
Location:	1346-1536 Teviot Road, Millers Flat (the <b>Site</b> )
Zoning:	Rural Resource Area and Rural Residential
Activity status:	Discretionary

### 1.0 Introduction

This memo summarises our updated review of the application with respect to potential noise and vibration effects.

Our advice is based on the updated application and information recently provided to us by Town Planning Group and Hegley Acoustics Consultants (**HAC**), including:

- Updated site plans for the proposed Stages 1-4 (dated 20 February 2024).
- Confirmation of the approximate footprints of the proposed earth bunds (5.0 m) and the locations of the proposed mining activities on the site.
- A map identifying the sites where written approvals to the application have been obtained from the owners / occupiers (dated 7 March 2024).
- Ambient noise data measured at two locations on Teviot Road from 24 August to 31 August 2023.

We understand that the proposal is based on completing all mining and rehabilitation works within ten years, and compliance with the District Plan noise limits for permitted activities in the Rural Resource Area Zone.

The proposed hours of operation involving heavy plant and truck movements are 7 am to 7 pm Monday to Friday, and 7 am to 1 pm on Saturdays. We are unsure whether staff vehicle movements and dust control activities would take place outside of these times, but dewatering would take place overnight.

Written approvals to the application have been obtained from many of the owners / occupiers of the neighbouring sites. We have disregarded any potential noise and vibration effects on these sites.

The nearest notional boundaries, where written approvals have not been provided appear to be at 1334, 1377, 1580 and 1581 Teviot Road, and 61, 67 and 68 Clutha Road.

Styles Group has not undertaken a site visit or ambient and background noise measurements in the area at this time.

## 2.0 Predicted noise and vibration levels

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The noise level assessments provided in the HAC acoustic assessment dated 20 March 2023 (the **HAC assessment**) and the letter dated 17 November 2023 (the **HAC letter**) include the mitigation provided by the proposed earth bunds. We understand that the peak-activity noise level predictions are based on several items of plant being operated at once continuously in the area of the Site nearest to each receiver, and they assume the same ground height at the source and receiver locations.

We agree with the conclusion of HAC assessment that noise generated by the proposed activity will be able to comply with the permitted noise limit of 55 dBA L<sub>10</sub>. We base this on the following:

- The reference sound levels provided by HAC for the plant on the Site.
- The separation distances shown on the updated site plans, where the mining activity will be approximately 75 m from the nearest notional boundary at 1334 Teviot Road. The notional boundary will be screening from the activity by a 4 m high earth bund. The peak activity will likely occur below the existing ground level.
- The adjustment to the noise levels for averaging over the day under NZS 6802:1991 would be at least -1 dB. The adjustment would be greater on days when the peak noise levels are not generated consistently.

The minimum distance between the mining activity and the notional boundary at 1334 Teviot Road is much shorter than is stated in the HAC letter, but there are other factors that were not included in the noise modelling (as stated in the HAC letter) that would reduce the noise level predictions e.g., ground heights, and averaging noise levels over the day in accordance with NZS 6801:1991. Undertaking our own noise modelling is outside the scope of a peer review, so we are unsure what the predicted noise levels at 1334 Teviot Road would be when applying averaging in accordance with NZS 6802:1991 and factoring in the likely operational worst-case scenarios and respective ground heights. However, there is sufficient information provided to be able to agree that the noise emissions can comply with the noise limit for permitted activities in the zone based on worst-case assumptions.

We agree that noise generated while forming the earth bunds can readily comply with the permitted construction noise limits. A typical activity-based free-field reference level for the use of an excavator, a dozer, and a truck being used in the same area to construct an earth bund would be approximately 78-83 dBA L<sub>10</sub> at 10 m. The southern façade of the nearest dwelling at 1334 Teviot Road is approximately 80 m from the nearest point on the Site where this construction activity would take

place. At this distance over grassland, the construction noise level would be no greater than approximately 65 dBA  $L_{10}$  when assessed in accordance with NZS 6803P:1984. This is compliant with the permitted construction noise limits.

The potential vibration levels have been assessed based on a separation distance of 35 m from the dwelling at 1334 Teviot Road during construction of the bund, and approximately 50 m during mining activities. These distances are not consistent with the updated site plans, but we agree with the conclusion that the guideline values of the referenced Standard DIN 4150–3 to avoid cosmetic building damage can be readily complied with during the proposed construction and operational activities.

The DIN 4150–3 guideline limits are only concerned with avoiding building damage. They are not an appropriate control for potential vibration effects on the building occupants. However, we expect that any perceptible vibration at 1344 Teviot Road would be just noticeable and would only occur when heavy plant is operated in the nearest area of the Site. This is based on the assumptions provided in the HAC assessment that the construction plant will include a dozer, an excavator, and trucks (and not vibratory compaction).

### 3.0 Ambient and background noise levels

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HAC have provided us with the results of noise monitoring undertaken at 1313 Teviot Road (**site 1**) and 1535 Teviot Road (**site 2**) from Thursday 24 August to Thursday 31 August 2023. We understand that meteorological conditions throughout the monitoring were fine with calm to light wind. We have not been able to confirm whether there was any activity on the Site during the measurements.

HAC describe the noise as general environmental noise with no significant contribution from road traffic, farming activities, insects, or birds. HAC note that there may have been the occasional noise event occurring, but the noise environment was relatively steady and typical of the rural environment.

At sites 1 and 2 the measured  $L_{10}$  noise levels during the proposed operating hours generally range between 40 and 55 dBA  $L_{10}$ , with occasional periods as high as approximately 55-65 dB  $L_{10}$  and others as low as approximately 35-40 dBA  $L_{10}$ . The  $L_{95}$  noise levels (the background sound level that is subjectively perceived as continuously present) range from approximately 30-45 dBA  $L_{95}$ . The background sound levels at night, when the dewatering pumps would run, are less than 30 dBA  $L_{95}$ .

The measured  $L_{eq}$  noise levels (the average noise levels) during the day at site 2 are generally higher than the  $L_{10}$  levels, by up to approximately 20 dBA at times. This also occurs at site 1 but only for brief periods and by a smaller margin. When the  $L_{eq}$  level is higher than the  $L_{10}$  level, it means that a sound source is loud enough, or close enough to the microphone, to increase the averaged noise level over the sample period, but it is present for less than 10% of the time (e.g., less than 90 seconds in a 15-minute sample). This is typical when a loud but short noise event takes place nearby, such as farm vehicles or trucks passing, or bird scarers operating. The source of the noise that has caused the  $L_{eq}$  levels to be higher than the  $L_{10}$  levels has not yet been identified.

The measured  $L_{10}$ ,  $L_{eq}$ , and  $L_{95}$  levels are typical of an active rural environment. We would expect to measure such levels in a rural environment where there are variable or transient sound events throughout the day, such as road traffic and truck movements.

We don't dispute the measured levels, but we cannot be confident that they represent the existing ambient sound environment at the nearest notional boundaries without understanding the controlling noise sources. Our understanding may become clearer once we have undertaken our site visit.

In advance of our site visit, we expect there will be long periods (hours at a time) of relative quiet during the day at the nearest notional boundaries that may be punctuated by the noise of intermittent and seasonal rural activities. This would mean that the noise from the proposal will increase the ambient noise levels and will become the dominant noise source.

## 4.0 Potential noise and vibration effects

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The noise from the site will be similar in level and character to the noise from activities that are anticipated by the permitted standards. However, the scale and duration of the proposed earthworks are significantly greater than for a permitted activity.

The proposed hours for mining and processing are for shorter periods of the day when compared with the daytime hours of the permitted noise limits for the zone. There may be activity on the site outside of these hours for dust control and staff vehicle movements, and the proposal includes noise from dewatering pumps throughout the night.

We expect that noise from the Site during the day will be clearly audible at the neighbouring notional boundaries. It may be the dominant noise source at times and mask natural sounds in the environment, such as birdsong and insects. Without appropriate controls, noise from the dewatering pumps at night could be consistently audible and dominant at the neighbouring notional boundaries and it could cause considerable annoyance.

The potential noise effects of the proposed activity would be experienced over a considerably longer duration than would be expected for a permitted activity. Although the proposal is to comply with the permitted noise limits, the significantly longer duration of the activity would result in a much longer duration of the noise effects, and therefore a much higher potential for annoyance.

We have not considered the potential noise effects at any future notional boundaries in the area, but we have recommended that an advice note is included in any noise limit condition to make it clear that compliance with the permitted noise limits would be required at any future notional boundary.

Vibration generated on the site would not cause cosmetic damage (e.g., cracks forming or enlarging in plaster) to any neighbouring dwelling based on the guidance of DIN 4150-3:2016. We do not expect vibration within the nearest dwellings to reach levels that would cause serious annoyance or disrupt residential and office activities. We note however that any perceptible vibration would be experienced at the same time as the highest noise effects, which could be more likely to generate adverse response.

## 5.0 Submissions

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Several submitters have raised concerns about potential noise and vibration effects. Our comments below address any specific noise and vibration issues that are not already covered in this advice.

Concerns are raised by the submitter at 1266 Teviot Rd about noisy activities taking place at heights above the earth bunds. If this is proposed or possible, it would need to be managed in terms of the plant used and the distance from the nearest notional boundary to ensure consented noise limits are not exceeded.

The Ministry of Education (**MOE**) has raised concerns about road traffic noise at Millers Flat School from heavy vehicles associated with the proposed activity. We note for reference that World Health Organisation guidelines recommend values for schools of 55 dB  $L_{Aeq}$  within outdoor playgrounds while children occupied them, and 35 dB  $L_{Aeq}$  inside school classrooms during class. Assessment against these guidelines would involve identifying the playground areas at the school and calculating the road traffic noise based on the expected number of heavy vehicle movements past the school in any 15-minute period.

The submitters from Quince B&B have requested continuous monitoring from their property. We support the requirement for noise monitoring, but this would not typically be undertaken from all neighbouring sites. We have recommended monitoring from the nearest and most exposed notional boundary during the peak noise activities. We note that any monitoring device would need to meet the requirements of New Zealand noise Standards and have a traceable calibration history to provide reliable results. This does not include smart phones or store-bought devices. We share the submitter's concerns about noise levels at night and have recommended a condition to this effect.

The submitters from 1334 Teviot Road have raised questions about the noise level predictions and inconsistencies in the distances assumed in the noise and vibration assessments. We have addressed some of these concerns already, but provide the following additional comments:

- i. Our desktop calculations show that the noise contours are generally consistent with the reference data and modelling assumptions. The equipment used in the modelling appears to represent a worst-case for activities occurring simultaneously in one area.
- ii. Adding a reflective region in the model over the river is unlikely to make any appreciable difference to the predicted noise levels i.e., less than 1 dB and only at the receivers to the west who are near to the river.
- iii. The submitters note that only noise levels during the noisiest mining activities have been provided, but noise will be generated by other sources. We agree that an assessment of the potential effects should consider the duration of the noisiest activities in the nearest part of the Site to their property and what the expected lower noise levels will be for the remainder of the proposed 10-year period.
- iv. As discussed in previous sections, we expect vibration may be just-perceptible inside their dwelling when construction and operational works are in the nearest part of the Site. This assumes that no vibratory compaction will be required.

We have included a recommendation for an Operational Noise Management Plan to address some of the submitters' concerns about the management of construction and operational noise and vibration from the Site.

## 6.0 Recommendations

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We recommend the following conditions if consent is granted to the application as proposed.

The noise limit condition is based on compliance with the permitted noise limits, as proposed. In Section 4.0. of this memo we have described the potential noise effects of the proposal. These effects would be experienced over a significantly longer duration than would be expected for a permitted activity, and therefore have a much higher potential for annoyance.

1. All mining and processing activity on the site, including heavy plant and truck movements, must only take place between 07:00 and 19:00, Monday to Friday, and 07:00 to 13:00, on Saturdays. The above times do not apply to the use of a water cart on site for dust control, which may take place between 07:00 and 22:00 on any day, or the operation of dewatering pumps.
2. The earth bunds illustrated in the final application site plans must be constructed before any mining and processing activity authorised by this consent takes place. The height of the bunds must be no less than 4.0 m except for the bund along the south-eastern boundary of the site which must be no less than 3.0 m high.
3. All activities except the operation of dewatering pumps must be conducted so as to ensure the following noise limits are not exceeded at any point within the notional boundary of any dwelling, rest home, or hospital, or at any point within any Residential Resource Area or any Rural Settlements Resource Area:

On any day 07:00 to 22:00:                    55 dBA L<sub>10</sub>

22:00 to 07:00 the following day:        40 dBA L<sub>10</sub> and 70 dBA L<sub>max</sub>.

*Advice note: These noise limits will also apply at any notional boundary that is established after the date of this consent.*

4. Dewatering pumps on site must be designed and operated to generate noise levels no greater than 25 dBA L<sub>10</sub> at any notional boundary not on the subject site.
5. Site-based trucks, plant, and machinery must not be fitted with tonal reversing alarms. Broadband reversing alarms are permitted.
6. All vibration generated on the site must comply with the guideline vibration values of DIN 4150-3:1999 *Vibrations in buildings – Part 3: Effects on structures*.
7. Noise monitoring must be undertaken by a suitably qualified person on behalf of the consent holder when excavation initially advances to within 300 m of the notional boundary at 1334 Teviot Road. The monitoring must include daytime noise measurements representative of the worst-case noise emissions during mining. A monitoring report must be provided to Central Otago District Council within two weeks of the monitoring being completed. The report must include a comparison between the results and the consented noise levels, and any further mitigation that will be required for compliance when the works are in the area of the site nearest to 1334 Teviot Road.

8. The consent holder must submit an Operational Noise Management Plan (ONMP) to Central Otago District Council for certification before any construction, mining, or processing activity authorised by this consent takes place. The objectives of the ONMP are to set out the methods and procedures required to adopt the best practicable option for minimising noise and vibration emissions from all aspects of the consented activities, and to ensure that noise and vibration consistently complies with the consented limits. The ONMP must include:
- i. The consented noise and vibration limits.
  - ii. Requirements and procedures for noise monitoring to ensure consistent compliance with the noise limits in this consent.
  - iii. Procedures for communicating effectively with neighbours.
  - iv. Procedures for receiving and responding to complaints about noise and vibration.
  - v. Procedures for staff and contractors to follow to minimise noise and vibration emissions.
  - vi. Practicable management and mitigation measures for complying with the consented limits and reducing noise and vibration effects at the neighbouring notional boundaries.