Notice of Request for More Information Response Document

Site name:	**Hemerdon Mine Mineral Processing Facility**
Site address:	**Hemerdon Mine, Plympton, Devon PL7 5BS**
Operator name:	**Drakelands Restoration Limited**
Application reference:	**EPR/AP3203ML/A001**

Contributors:

Emily Shann Pitts, Shann Pitts Consulting Limited

Andrew Nisbet, Tungsten West Plc

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Shann Pitts Consulting Limited

Westbrook Farm, Westbrook, Gillingham, Dorset, SP8 5DT

Mob: 07866 024096

emily@shannpittsconsulting.co.uk

www.shannpittsconsulting.co.uk

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Introduction

Overview

This document has been written by Shann Pitts Consulting Limited on behalf of and in conjunction with Drakelands Restoration Limited, drawing on additional technical knowledge from several sources:

- WSP Acoustics Teams (UK and Australia)
- Brian Jarvis (Eatec Dynamics)
- Colin Cobbing (Pinnacle Acoustics)

This document serves as a formal response document to the Environment Agency (EA) with respect to two outstanding 'Notices of request for more information' or 'Schedule 5 notices' relating to a new permit application for the operation of the minerals processing facility at Hemerdon mine (permit application reference: EPR/AP3203ML/A001).

Permitting Background

On 26 August 2021 Tungsten West Plc (Tungsten West) submitted a new bespoke environmental permit application to the EA for the operation of the Mineral Processing Facility at Hemerdon Mine.

On 17 September 2021 the EA permitting department deemed the permit application permit to be 'duly made'. Subsequently, the EA carried out a public consultation on the permit application which closed on 29 October 2021.

On 8 February 2022 the EA served Tungsten West with a Schedule 5 notice with respect to the permit application requiring updated supporting documents namely non-technical summary, BAT assessment, environmental risk assessment, BS4142 noise impact assessment, air quality impact assessment and site plan. This Schedule 5 notice is herein termed 'Notice 1a'.

On 16 February 2022 the EA issued Tungsten West with a second Schedule 5 notice requiring a revised Noise and Vibration Impact Assessment (NVIA) to address twelve individual queries relating to the assessment of low frequency noise (LFN). This Schedule 5 is herein termed 'Notice 1b'.

On 17 June 2022 the legal entity making the permit application was transferred from Tungsten West to Drakelands Restoration Limited (Drakelands Restoration).

In July 2022, due to the impact of the war in Ukraine, Drakelands Restoration revised some of the detail within the permit application to reflect proposed operational changes designed to reduce the CAPEX and OPEX of the project, termed internally as 'Project Trident'.

On 1 December 2022 Drakelands Restoration submitted to the EA individual responses and supporting documents with respect to Notices 1a and 1b including a substantially new Noise and Vibration Impact Assessment.[1]

On 12 December 2022 the EA opened a new public consultation of the revised permit application documents, as a result of Project Trident. This consultation ended 31 January 2023.

[1] Noise and Vibration Impact Assessment, WSP Australia, PS134446, 29 November 2022

On 3 February 2023 the EA issued Drakelands Restoration with a third Schedule 5 notice 'Notice 2a' requiring the production of a Noise Management Plan (NMP) incorporating audible noise and LFN. Anecdotally, the EA had accepted the response to Notice 1a with respect to audible noise but require the NMP to also incorporate LFN. There was verbal confirmation that the development of an overarching NMP incorporating audible noise and LFN control would satisfy the remainder of the questions.

On 1 March 2023 the EA issued a fourth Schedule 5 notice 'Notice 2b' which follows on from the response to Notice 1b which did not satisfactorily address all of the points raised in Notice 1b. Notice 2b requires the development of a revised noise impact assessment (NIA) with respect to LFN. The notes in Notice 2b confirm the closure of Notice 1b.

Structure of Document

The document has been written to summarise the responses of Drakelands Restoration to the single outstanding issue in Notice 2a (the NMP) and the whole of Notice 2b.

With respect to Notice 2a, an updated NMP has been prepared by WSP which incorporates the management of audible noise and LFN.[2] The NMP is provided as a supporting document to this response.

With respect to Notice 2b, a revised NIA has been developed by WSP which is comprehensive and supersedes all previous reports with respect to LFN assessment from the mineral processing facility.[3] Notice 2b requires the updated NIA to address eight specific issues. This response document is separated into sections which are numbered as per the questions in Notice 2b. The relevant sections of the NIA are referenced in the response to each issue raised within the notice.

The following separate supporting documents accompany this response:

- Hemerdon Mine Noise Management Plan for Minerals Processing Facility, WSP, August 2023
- Hemerdon Mine Low Frequency Noise Impact Assessment, WSP, August 2023
- Low Frequency Nosie Mitigation Options Appraisal, WSP, August 2023

[2] WSP report Hemerdon Mine Noise Management Plan for Minerals Processing Facility, August 2023
[3] WSP report Hemerdon Mine Low Frequency Noise Impact Assessment, August 2023

Question 1a

Within the NVIA report, provide a non-technical summary and conceptual plan of the proposal with regards to low frequency noise impact, covering the following areas:

- The potential sources of low frequency noise, and location;
- New equipment at the site, the location and mitigation;
- Disused equipment at the site, and location; and,
- Main mitigation measures.

This summary is needed to provide additional clarity to identify historic changes to the site and proposals. We acknowledge that some of this information is currently provided within the NVIA report, and will also likely be in the Noise Management Plan, but a summary at the front of the NVIA report would be useful for both members of the Environment Agency, and also members of the public that may read the NVIA.

Question 1a Response

The Introduction (Section 1) of the accompanying NIA provides:

- A scope for the report;
- Details about the site location;
- A description of processes on site;
- Plant Schedule (Table 1-2) which identifies the location of plant and any plant from Wolf Minerals operations and which items will continue to operate and which will not operate; and
- Site history including a summary of previous documentation relating to noise control.

Mitigation and Noise Control is summarised in the Executive Summary of the NIA and further detailed in Section 8 and includes:

- Inherent Mitigation and Secondary Mitigation which will be employed from the outset; and
- Further Secondary and Tertiary Mitigation options for implementation if required.

Question 1b

Amend the NVIA to include all potential sources of low frequency noise, or provide a justification for the exclusion of potential sources of noise from the assessment.

You have stated that Tungsten West has updated the BS4142 background noise assessment to consider the impact of noise from a proposed Primary Jaw and Secondary Cone crushing arrangement. This does not justify its exclusion from the NVIA.

All potential sources need to be included in the NVIA, or provide a written justification as to why it is not. The new proposed jaw crushers are expected to be significant sources of LFN/infrasound. It is not known at what mechanical frequency those items of plant operate, nor the sound power at those frequencies. Any effects from these additional sources are therefore not currently quantified or understood.

Question 1b Response

See Section 6.4 of the NIA within which includes:

- Table 6-1 which lists all LFN generating plant items. There is no other plant or equipment on site which are known sources of LFN.
- An assessment of LFN levels from the new proposed semi- mobile primary jaw crusher. The secondary bell and cone crusher and the tertiary crusher are not sources of LFN and have been excluded from the assessment altogether.

Question 1c.

Amend the NVIA to include the impact at 20Hz 1/3 octave band for completeness.

Question 1c Response

As agreed with the EA during a meeting on 02/08/2023, the NIA focuses on noise levels at the fundamental frequency of the screens and their harmonics. In this context, specifically focusing on 20Hz is no longer required and this is not referenced further in the NIA.

Question 1d

Provide further information to justify the chosen acoustic radiation efficiency of 0.1 for all screens, or justify and use a more conservative assumption for the assessment.

Table 17 of in the previous NVIA report (Ref TWL-CP-PA-EN-006.2.23 dated 18/08/2021) identified an Acoustic Efficiency (AE) range of 0.005 to 0.819. Whilst it is understood that J5510B and J5645B screens are excluded, it is not clear why the higher AE figures from Table 17 have not been considered.

Question 1d Response

An acoustic efficiency (AE) value of 0.3 is used in the NIA.

Section 6.3 of the NIA details the rationale for discounting the higher AE values that were previously stated in the 2021 NVIA report.

Section 6.3 shows the rationale for using an AE value of 0.3 and why this is a conservative value. Deck venting trial data from August 2020 demonstrated that as long as the screen has at least a 10% open area, a low acoustic efficiency value can be assumed. The design flow rate of the screens is a key LFN control measure which is detailed in Section 4 of the NMP. SCADA controls will ensure that the screen covering is maintained below 90% under all conditions.

Question 1e

Include additional mitigation options within the NVIA.

A previous Schedule 5 notification (dated 16/02/2022) requested a more comprehensive appraisal (including consideration of costs and benefits) of all available control options.

You have stated that this written appraisal shall be included as part of the Noise Management Plan. We also require these options to be assessed within the NVIA to justify your selection of appropriate measures to prevent or where that is not practicable minimise emissions of infrasound/low frequency noise.

It is noted that previously discussed mitigation measures such as antiphase speakers, enclosure of sources, and Innova J57 building cladding proposed under previous operation, have not yet been considered for the assessment, and the currently modelled insertion loss of the proposed double-layer concrete building cladding system is zero for sound frequencies in the 12.5 Hz, 16 Hz, and 25 Hz third octave bands.

Question 1e Response

An Options Appraisal exercise has been carried out and the methodology and results of this exercise can be found in the supporting document to this response, namely the Low Frequency Noise Mitigation Options Appraisal Report. This report is a standalone document, the findings of which feed into the proposed mitigation assessed in the Noise Impact Assessment which will be enacted through the Noise Management Plan.

The Options Appraisal report supersedes the Wolf Minerals (UK) Ltd report Low Frequency Noise options Evaluation Process, January 2018 which includes mitigation options as detailed within the question. Appendix A of the Options Appraisal report revisits all of the options presented in this report (which was written when the site was previously operational). Any viable options were carried forward into the updated Options Appraisal exercise.

In determining the required level of mitigation to minimise the emissions of LFN from the operational site, it was deemed that the inherent mitigation and one secondary mitigation option should be employed from the outset namely, the acoustic enclosures for all of the screens in addition to the use of deck venting. In addition, a further two viable LFN mitigation options are available to be employed if required; acoustic enclosures with cladding and active noise control. For full details please see the supporting report.

The NIA has included the inherent mitigation option and one secondary mitigation option to conservatively predict impacts of LFN at noise sensitive receptors. Due to the conservative nature of the NIA, it is deemed unlikely that it will be necessary to employ additional mitigation options however, if monitoring during site operations determines the need, then further appropriate mitigation measures will be employed as soon as practicably possible.

Question 1f

Provide additional information on the proposed cladding, and ensure that this is consistent with the BS4142 assessment and any Noise Management Plan.

It is currently unclear what cladding is proposed for the different Mineral Processing Facility buildings, equipment housing or extensions. Whilst we expect that further detail shall be provided in the Noise Management Plan, it must be ensured that this information is also clear in the NVIA. The BS4142 assessment and NVIA currently contain insufficient and conflicting detail on the proposed cladding. You must identify clearly in the Application what control measures are proposed in order to enable us to make a determination.

Question 1f Response

Replacement cladding is not proposed for the Mineral Processing Facility main building. This option was excluded through the Options Appraisal exercise.

Cladding is not currently proposed for the screen enclosures within the Mineral Processing Facility. The LFN trial carried out in June / July 2023 trialled the use of Kingspan cladding in addition to the acoustic enclosure and was shown to provide a reduction in near field measurements at the 2nd harmonic of 4.2 dB but no reduction in noise level at the fundamental frequency.

However, cladding is proposed on several buildings as detailed in Section 4.1, Table 4-1 of the NMP and replicated in Table 1 below:

Table 1 – Proposed cladding on buildings

Building	Area	Type of cladding	Extent of cladding
New Ore Sorting Sizing Screen Building	125A	8W KS1000 RW/40+I+L (Kingspan)	Down to floor. Pedestrian / forklift access at base. Reduced conveyor openings
New Ore Sorting building	125B	8W KS1000 RW/40+I+L (Kingspan)	Suspended flooring and cladding down to this flooring. Building open underneath. Pedestrian doors. Reduced conveyor openings
Tertiary Crushing Building	130	Existing process plant cladding. 24g 0.63-gauge steel	Down to floor. Roller shutter door and pedestrian doors. Reduced conveyor openings
Main Process Plant Building	Various	Existing process plant cladding. 24g 0.63-gauge steel	Down to floor. Roller shutter door and pedestrian doors. Reduced conveyor openings
Tertiary dewatering screen building	130A	8W KS1000 RW/40+I+L (Kingspan)	Suspended flooring and cladding down to this flooring. Building open underneath for vehicle access. Pedestrian doors. Reduced conveyor openings
New Tertiary sizing Screen Building	130B	8W KS1000 RW/40+I+L (Kingspan)	Suspended flooring and cladding down to this flooring. Building open underneath for conveyors. Pedestrian doors. Reduced conveyor openings

Question 1g

Provide an assessment of amplification within the receptors, or provide a justification for why this has not been provided.

Amplification has not been considered within the NVIA, although you have acknowledged in your previous submissions that this can occur. The potential for this will be considered by the Environment Agency when we determine the potential impact. Therefore, should you want to provide further information with regards to amplification that shall support your application, please do so.

The absence of any further recognition or assessment within the NVIA of the risks presented by this manifestation of increased sound pressure levels at certain low frequencies within residential properties is a serious omission in the NVIA.

Question 1g Response

In accordance with Section 7.4 of the NIA:

7.4.2 *Appendix N provides a full justification for not including an assessment of amplification of LFN in dwellings. This is based on a review of published research on outside to inside low frequency sound transmission into buildings, a consideration of available research on vibration transmission into and through buildings, a review of the potential for resonance effects and room modes, and a review of the available measurement data obtained during previous operations by Wolf Minerals.*

7.4.3 In summary, this review has found:

- *Published research on outside to inside low frequency sound transmission into buildings shows that the sound reduction afforded by the building envelope at the low frequencies under consideration (12.5 Hz and 16 Hz) is small or even negligible. However, no instances of amplification within the building have been shown.*
- *Consideration of available research on vibration transmission into and through buildings also indicates that effects will be small or negligible. The laws of physics (conservation of energy) determine that no amplification in sound energy can occur.*
- *Measurement surveys undertaken at receptor locations at and around Hemerdon mine have shown a variation in sound pressure levels measured at various locations within individual receptor buildings. However, these results do not demonstrate any amplification effects within the building, and the research suggests that amplification effects will not occur. Resonance effects (e.g. from windows) can occur, but will only serve to negate any sound attenuation that might otherwise have been provided by the building façade / envelope.*
- *For the purposes of the low frequency sound prediction model, a worst case assumption would be that there are no amplification effects but there will also be no sound reduction provided by the building envelope, i.e. that the building structure is effectively 'invisible' to low frequency sound.*

If once the site is operational, off-site monitoring shows that amplification does occur then additional mitigation will be employed as required in consultation with the Environment Agency and the Noise Management Plan will be reviewed accordingly.

Question 1h

Provide consideration and quantification of the uncertainty of the propagation model, including the source sound power uncertainties and directivities. Consider the quantitative effect of constructive and destructive interference at different locations at distance arising from operation of coherent, or nearly coherent (as opposed to non-coherent) sound sources operating at low frequencies. Consider the worst-case scenarios, and what impact these would have on the identified receptors.

Uncertainty has not been considered within the NVIA. We are concerned that the known uncertainty of the measured acoustic efficiencies, together with the unknown uncertainty of the propagation model, could fail to correctly identify the impact on receptors. Operation of coherent sound sources (e.g. large mechanical screens running at the same low frequencies) will generate interference patterns of areas of constructive and destructive interference (higher and lower sound pressure level) at distance at those sound frequencies.

Slight differences in operating frequencies will also introduce beating patterns at distant locations, repeating changes to the interference pattern over short periods of time. We need to understand if and how the chosen model accounts for this, and how this is likely to affect sound pressure levels which will be experienced at distant locations.

Question 1h Response

Uncertainty has been comprehensively considered in Section 9 of the NIA. The different elements of uncertainty have been quantified wherever possible and, in all cases, where the uncertainty leads to underprediction of LFN. See Table 9-2 Summary of Uncertainty which includes the quantification figures and the concluded statement of this section (point 9.5.3) which considers uncertainty in the round with respect to predicted reductions in LFN in comparison to Wolf Minerals operations.

The noise model upon which the NIA is based did not incorporate beating. It was deemed more appropriate to add a penalty of 5dB in accordance with published guidance. Section 7.3 of the NIA details how the known beating effect has been accounted for.

Conclusion

This document and the supporting documents address all of the outstanding issues highlighted within Schedule 5 Notices with respect to the permit application for the MPF at Hemerdon Mine (Permit reference: EPR/AP3203ML/A001).

With respect to Notice 1a, a Noise Management Plan incorporating the control of audible and LFN from the MPF has been provided. This is a working document and will be developed further in consultation with the EA as the site moves into the operational phase.

With respect to Notice 2b, all previous assessments of predicted emissions of LFN from an operational MPF have been superseded by the substantially revised Noise Impact Assessment (NIA) for LFN. This NIA is based on real time data including that gathered during the site trial in June / July 2023 which was carried out in close consultation with the EA.

The reductions in predicted levels of LFN in comparison to the Wolf Minerals operation are shown in Table 6-3 of the NIA. They range from 19.2 to 28.2dB. There is a 17dB reduction is from the proposed

mitigation (11dB for enclosures and 6dB for deck venting). This is before the assessment of uncertainty - see paragraph 9.5.3 of the NIA for conclusions with uncertainty factored in.

It can also be said that these predictions are conservative for several reasons:

- There will be a lower throughput over screens than in Wolf Minerals days due to the new ore sorting technology. The total screening area of the new operation will be 120.2 m^2 compared to 172.08 m^2 under the previous operator.
- The data from the trial used in the model included:
    - a chute at the outlet of the acoustic enclosure – in reality there will be chutes on the inlet and the outlet.
    - full ply covering which is a worst case. Screen covering will be maintained below 90% coverage under all conditions.
- The acoustic modelling has assumed a 0.3 acoustic efficiency value which is deemed to be conservative.
- It has been assumed that beating would be noticeable at all assessment locations.
- No attenuation from building structure at noise sensitive receptors has been assumed.

By using real data in the acoustic model, uncertainty has been reduced.

DRL are committed to installing two proven mitigation options namely acoustic enclosures and deck venting for all 12 screens. In addition, if LFN monitoring shows there to be off-site impacts of LFN from the MPF then additional mitigation options will be considered in line with the Options Appraisal report and incorporated into the Noise Management Plan.