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INTRODUCTION

10.1 This chapter of the ES considers the potential for the proposed development to impact upon the noise environment in the vicinity of the application site. The chapter describes the scope, relevant legislation, assessment methodology and the baseline conditions that exist around the application site. The chapter then assesses the potential environmental effects the proposals, which have been described in Chapter 3 of this Volume, would have on the baseline noise environment. It then considers the mitigation measures required to prevent, reduce or offset any significant adverse effects (should they be identified) and the likely residual effects after these measures have been employed.

10.2 Technical terms or references are occasionally used in this Chapter. To assist the reader, a Glossary of Terminology, including a table of example noise levels that may be found in general life, are included in **Appendix 10/1**.

METHODOLOGY

10.3 This assessment considers the potential impact of operational noise resultant from the quarry development upon nearby existing Noise Sensitive Receptors (NSRs),and also the cumulative impact of operational noise from the Hatfield and Astwick quarries combined. It has been completed in accordance with the legislation and guidance detailed in the following sections of this chapter.

Legislation and Planning Policy Guidance

Hertfordshire County Council Scoping Opinion

10.4 Within the Scoping Opinion document provided by Hertfordshire County Council in connection with the 2016 ES it was requested that the EIA includes a noise assessment for all phases of extraction and restoration and that the noise assessment is completed with reference to:

- BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound.
- BS8233:2014 Guidance on sound insulation and noise reduction in buildings.
- World Health Organisation thresholds for disturbance from noise.
- Noise Policy Statement for England.
- National Planning Policy Guidance

10.5 It is considered that BS4142:2014 *Methods for rating and assessing industrial and commercial sound* is not relevant guidance for assessing noise from mineral extraction sites particularly as the Government issues specific guidance separately with the web-based Planning Practice Guidance which has been adopted for this assessment.

10.6 BS8233:2014 *Guidance on sound insulation and noise reduction for buildings* is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, and is therefore not applicable for the assessment of noise from minerals extraction sites.

10.7 The assessment does not comment on the World Health Organisations thresholds for disturbance from noise as it is considered that the Planning Practice Guidance itself is based around the 'Guideline values for community noise in specific environments' guidance contained within the document Guidelines for Community Noise, which have since been superceded by the 'Environmental Noise Guidelines for the European Region' (2018).

10.8 It is assumed that "National Planning Policy Guidance" refers to the web-based Planning Practice Guidance which has been adopted for this assessment.

Planning Practice Guidance

10.9 The web-based Planning Practice Guidance (PPG) sets out the Government's planning policies for England and has a specific category for mineral developments.

10.10 With respect to noise, it requires those making mineral development proposals to carry out a noise impact assessment which should identify all sources of noise and, for each source, take into account the emission level, its characteristics, proposed operating location, on-time and its potential impact at the nearby noise-sensitive receptors.

10.11 The guidance also sets out the basis of the parameters to be considered for the control or mitigation of any potential impacts including:

- consider the main characteristics of the production process and its environs, including the location of noise-sensitive receptors;
- assess the existing acoustic environment around the site of the proposed operations, including the gathering of background noise levels at nearby noise-sensitive receptors;
- estimate the likely future noise from the development and its impact;
- identify proposals to minimise, mitigate and remove noise emissions at the source; and
- monitor the resulting noise to check compliance with any proposed or imposed conditions.

10.12 Paragraph 020 of the guidance describes how mineral planning authorities should determine the impact of noise from minerals sites, stating:

"Mineral planning authorities should take account of the prevailing acoustic environment and in doing so consider whether or not noise from the proposed operations would:

- *give rise to a significant adverse impact;*
- *give rise to an adverse impact; and*
- *enable a good standard of amenity to be achieved.*

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure would be above or below the significant observed adverse effect level and the lowest observed effect level for the given situation."

10.13 Paragraph 021 of the guidance sets out appropriate noise standards for mineral extraction sites for normal operations, i.e. those that would be undertaken over a period greater than eight weeks in any working year. The guidance states:

"Mineral planning authorities should aim to establish a noise limit, through a planning condition, at the noise-sensitive property that does not exceed the background noise level (LA90,1h) by more than 10dB(A) during normal working hours (0700 to 1900). Where it will be difficult not to exceed the background level by more than 10dB(A) without imposing unreasonable burdens on the mineral operator, the limit set should be as near that level as practicable. In any event, the total noise from the operations should not exceed 55dB(A) LAeq,1h (free field). For any operations during the period 22.00 – 07.00 noise limits should be set to reduce to a minimum any adverse impacts, without imposing unreasonable burdens on the mineral operator. In any event the noise limit should not exceed 42dB(A) LAeq,1h (free field) at a noise sensitive property."

10.14 Paragraph 022 of the guidance sets limits for operations which may give rise to particularly noisy short-term activities. The guidance states:

"Mineral planning authorities should aim to establish a noise limit, through a planning condition, at the noise-sensitive property that does not exceed the background noise level (LA90,1h) by more than 10dB(A) during normal working hours (0700 to 1900). Where it will be difficult not to exceed the background level by more than 10dB(A) without imposing unreasonable burdens on the mineral operator, the limit set should be as near that level as practicable. In any event, the total noise from the operations should not exceed 55dB(A) LAeq,1h (free field). For any operations during the period 22.00 – 07.00 noise limits should be set to reduce to a minimum any adverse impacts, without imposing unreasonable burdens on the mineral operator. In any event the noise limit should not exceed 42dB(A) LAeq,1h (free field) at a noise sensitive property."

Activities such as soil-stripping, the construction and removal of baffle mounds, soil storage mounds and spoil heaps, construction of new permanent landforms and aspects of site road construction and maintenance.

Increased temporary daytime noise limits of up to 70dB(A) LAeq 1h (free field) for periods of up to eight weeks in a year at specified noise-sensitive properties should be considered to facilitate essential site preparation and restoration work and construction of baffle mounds where it is clear that this will bring longer-term environmental benefits to the site or its environs.

Where work is likely to take longer than eight weeks, a lower limit over a longer period should be considered. In some wholly exceptional cases, where there is no viable alternative, a higher limit for a very limited period may be appropriate in order to attain the environmental benefits. Within this framework, the 70 dB(A) LAeq 1h (free field) limit referred to above should be regarded as the normal maximum."

British Standard 5228-1:2009+A1:2014

10.15 Operational noise levels have been calculated in accordance with BS5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise. This standard sets out a methodology for predicting noise levels arising from a wide variety of open site activities and contains tables of sound power levels generated by a wide variety of mobile and fixed plant and machinery, including those typically found within mineral sites.

10.16 Noise levels generated by open site operations and experienced at local receptors will depend upon a number of variables, the most significant of which are likely to be:

- the periods of operation of the plant at the development site, known as the "on-time";
- the distance between the noise source and the receptor, known as the "stand-off";
- the attenuation due to ground absorption or barrier screening effects; and
- reflections of noise due to the presence of hard vertical faces such as walls.

10.17 Noise levels generated by construction or related operations and experienced at local receptors will depend on a number of variables, the most significant of which are:

- the sound power emissions of processes and/or plant;
- the periods of operation of processes and/or plant;
- the distance between the sources and the receptors;
- the presence of screening mounds, buildings or barriers;
- the potential reflection of sound; and
- soft ground attenuation.

10.18 Predicted noise levels in this chapter have been determined using proprietary noise modelling software, CadnaA, and the calculation methodologies contained in BS5228-1:2009+A1:2014. The sound power levels used as input data for the noise model are those contained in the standard, specified in the plant manufacturers' data sheets, from sound emission badges on plant or from field measurements of similar plant.

10.19 Due to the location of the proposed development relative to the nearby properties, the predictions have been based on 100% soft ground between the sources and receptor locations under weather conditions considered favourable for noise propagation leading to a conservative result.

10.20 The Standard also describes examples of acceptable limits for noise generated by construction operations at nearby sensitive receptor locations. The most simplistic being based upon the breach of fixed noise limits. The Standard states in paragraph E.2:

> "*Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut.*"

10.21 The paragraph goes on to state:

> "*Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:*
>
> - *70 decibels (dBA) in rural, suburban areas away from main road traffic and industrial noise;*
> - *75 decibels (dBA) in urban areas near main roads in heavy industrial areas.*
>
> *These limits are for daytime working outside living rooms and offices.*"

Assessment Methodology

10.22 The assessment considers the likely noise impacts generated by operations associated with the proposed development, with reference to measured background noise levels at locations representative of the nearest noise-sensitive properties.

10.23 Environmental advantages and disadvantages have been identified and, where appropriate, mitigation measures and/or scheme changes to offset potentially adverse impacts have been suggested.

10.24 Operational noise levels generated by the various items of plant/machinery have been predicted to the façade to the nearby noise-sensitive receptors facing the site. The results have been assessed against criteria derived in accordance with the Planning Practice Guidance.

Significance Criteria

10.25 *The Guidelines for Environmental Noise Impact Assessment ('the Guidelines')* address the key principles of noise impact assessment and are applicable to all development proposals where noise effects are likely to occur. In accordance with the guidelines the following must be determined:

- the noise impact;
- the noise effect; and
- the significance of the effect.

Operational Impact

10.26 The impact of operational noise upon residential receptors is determined with reference to PPG.

10.27 In accordance with PPG:

"Mineral planning authorities should aim to establish:

- *a noise limit at the noise-sensitive property that does not exceed the background noise level (LA90,1h) by more than 10dB(A) during normal working hours (0700 to 1900).*
- *Where this is not possible without imposing unreasonable burdens on the mineral operator, the limit set should be as near that level as practicable. In any event, the total noise from the operations should not exceed 55dB(A) LAeq,1h (free field).*
- *For any operations during the period 22.00 – 07.00 noise limits should be set to reduce to a minimum any adverse impacts, without imposing unreasonable burdens on the mineral operator. In any event the noise limit should not exceed 42dB(A) LAeq,1h (free field) at a noise sensitive property."*

10.28 Based on the above, the impact of operational noise upon residential receptors is as detailed in Table 10-1. The impact will first be identified for Hatfield Aerodrome operating in isolation. In the cumulative assessment, operational noise from Astwick Quarry (CEMEX) will also be considered.

Table 10-1
Operational Noise Residential Receptors – Impact Magnitude

Magnitude	Description
Major	Limit value exceeded by more than 5dB
Moderate	Limit value exceeded between 3.0 and 4.9dB
Minor	Limit value exceeded between 1.0 and 2.9dB
Negligible	Limit value exceeded between 0.1 and 0.9dB

Magnitude	Description
None	Limit value not exceeded

Effect

10.29 Generic noise effects are detailed in the Guidelines. Where an adverse impact is identified the guidelines present the following generic relationship between noise impact and noise effect:

- Negligible Impact Noise Effect: "Noise impacts can be heard, but do not cause any change in behaviour or attitude, e.g. turning up volume on television; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is perceived change in the quality of life";
- Minor Impact Noise Effect: "Noise impact can be heard and causes small changes in behaviour and/ or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Potential for non-awakening sleep disturbance. Affects the character of the area such that there is a perceived change in the quality of life";
- Moderate Impact Noise Effect: "Causes a material change in behaviour and/or attitude, e.g. voiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area"; and
- Major Impact Noise Effect: "Significant changes in behaviour and/or inability to mitigate effect of noise leading to psychological stress or physiological effects e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory".

The Significance of the Effect

10.30 The significance of the noise effect will depend on the receptor type and its sensitivity to the noise impact. The sensitivity of the receiving environment is shown in Table 10-2.

Table 10-2
Sensitivity Criteria for Acoustic Receptors

Sensitivity	Definition
Very High	Residential properties (night-time), Schools and healthcare building (daytime)
High	Residential properties (daytime), Special Areas of Conservation, Special Protection Areas, Sites of Special Scientific Interest (or similar areas of special interest)
Medium	Offices and other non-noise producing employment areas
Low	Industrial areas

10.31 The sensitivity of the receiving environment together with the magnitude of impact defines the level of effect as shown in Table 10-3.

Table 10-3
Level of Effect – Magnitude / Sensitivity

Magnitude	Sensitivity			
	Very High	High	Medium	Low
Major	**Major**	**Major**	**Major**	**Moderate**
Moderate	**Major**	Moderate	Moderate	Minor
Minor	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible
None	None	None	None	None

10.32 In the context of the EIA Regulations (refer to Chapter 1), where the purpose of the assessment is to identify 'significant effects', a 'Major' effect in Table 10-3 is considered to be significant.

BASELINE CONDITIONS

Baseline Conditions

10.33 For the previous assessment (as reported in the 2016 ES), environmental baseline noise surveys were undertaken on 23rd September 2015 to capture the prevailing noise climate at the nearby noise-sensitive receptor locations agreed with the local authority.

10.34 Updated baseline noise surveys have been undertaken on 27th May 2021 and 28th June 2021 to ascertain whether there have been any shifts in noise climate the measurement locations.

10.35 Access to Popefield Farm and The Lodge could not be gained during the 2016 assessment, therefore alternative, nearby, representative locations were chosen. For consistency, the same locations were used during the 2021 baseline survey.

10.36 Since the previous baseline monitoring was completed in 2015, a new residential development located on land adjacent to the garden centre/nursery to the west of the application site, called Jove Gardens, has been built. Therefore, as part of the updated baseline monitoring for 2021, a noise meter was installed at this location.

10.37 The noise monitoring locations were chosen as being representative of the nearest noise-sensitive receptors identified and are shown on **Figure HQ 10/1**, namely:

1) Popefield Farm, Hatfield Road, to the south;
2) The Lodge and No.403 St Albans Road West, to the south;
3) No.616 Hatfield Road, to the southwest;
4) Pasture View, to the west;
5) Walker Grove, to the east; and
6) Jove Gardens, to the west.

10.38 At each monitoring location the following parameters were measured:

- $L_{Aeq,T}$ - The A-Weighted equivalent continuous noise level over the measurement period.

- L_{A90} - The A-weighted background noise level, i.e. the noise level exceeded for 90% of the measurement period thereby excluding short duration noise events.
- L_{A10} - The A-weighted noise level exceeded for 10% of the measurement period, usually used to describe road traffic noise.
- L_{Amax} - The maximum A-weighted noise level during the measurement period.

Figure 10-1
Noise Monitoring Locations

10.39 The noise monitoring equipment used during the surveys is detailed in Table 10-3. The sound level meter was field calibrated before and after the surveys and no significant drift in calibration was found to have occurred. The calibration chain is traceable via the United Kingdom Accreditation Service (UKAS) to National Standards held at the National Physical Laboratory (NPL). The equipment had been calibrated within the 24-months preceding the surveys.

Table 10-3
Noise Monitoring Equipment

Location	Description of Equipment	Serial Number
1. Popefield Farm	Rion NL-52 Type 1 sound level meter	976174
	Rion NC-74 Acoustic calibrator	34478298
2. The Lodge and No.403 St. Albans Road West	Cirrus CR171B Type 1 sound level meter	G301839
	Cirrus CR515 Acoustic calibrator	93674

Location	Description of Equipment	Serial Number
3. No.616 Hatfield Road	Cirrus CR171B Type 1 sound level meter	G301707
	Cirrus CR515 Acoustic calibrator	94806
4. Pasture View	Cirrus CR171B Type 1 sound level meter	G079816
	Cirrus CR515 Acoustic calibrator	81268
5. Walker Grove	Cirrus CR171C Type 1 sound level meter	G301707
	Cirrus CR515 Acoustic calibrator	94806
6. Jove Gardens	Cirrus CR171C Type 1 sound level meter	G300561
	Cirrus CR515 Acoustic calibrator	87922

10.40 Weather conditions during the surveys were within the parameters suitable for baseline monitoring, being predominantly dry with 50-80% cloud cover. The temperature was between 14-17°C and wind speeds were below 5m/s throughout the survey periods.

10.41 The results of the baseline surveys are presented in full in **Appendix 10/2** and are summarised in Table 10-4. The noise climate in the area consisted of close and distant road traffic noise dependant on the receptor location, occasional aircraft overhead and natural sounds, such as birdsong, wind in nearby trees, etc.

Table 10-4
Measured 2021 Baseline Levels

Location	$L_{Aeq,T}$	L_{A90}	L_{A10}	L_{Amax}
1. Popefield Farm	58.6	52.3	60.4	77.3
2. No.403 St. Albans Road West & The Lodge	73.4	56.8	77.2	88.8
3. No.616 Hatfield Road	72.2	60.6	75.8	87.9
4. Pasture View & Radio Nursery	45.5	42.5	47.0	61.2
5. Walker Grove & Nimrod Drive	44.0	32.3	40.0	75.5
6. Jove Gardens	45.5	41.0	47.2	71.0

10.42 Comparing the 2021 noise monitoring data to that measured in 2015 the following is noted:

- Ambient noise levels at Popefield Farm are similar, but the background noise level has increased slightly by 1.4dB(A);
- Ambient noise levels at No 403 St Albans Road and No 616 Hatfield Road have increased by around 4.1dB(A) and 5.3dB(A) respectively. Similarly, background noise levels have increased by 3.8dB(A) and 6.1 dB(A) respectively;
- Ambient noise levels at Pasture View/Radio Nursery have decreased by 5.9 dB(A), whilst the background noise levels have decreased by around 4.4 dB(A); and
- Ambient noise levels at Walker Grove and Nimrod Drive have decreased by 12.5dB(A) with background noise levels decreasing by 8.5 dB(A).

Environmental Design Measures

10.43 The operational layout, location of the processing plant, route of internal haul roads and location of screening bunds and fences have been designed to offer maximum protection from potential impacts, and to protect the amenity at nearby residential receptors.

10.44 Operational hours have also been limited to the following periods to protect the amenity of nearby residents during the most sensitive periods:

- Monday to Friday (07:00 to 18:00 hours).
- Saturday (07:00 to 13:00 hours).

10.45 A bund with an acoustic fence on top (having a combined height of 5m) has been included in the assessment, to run along the entire western boundary of the site, to protect the amenity at the nearby residential receptors.

Potential Impacts

10.46 As set out in Chapter 3 above, the development proposals would involve the winning and working, including processing, of 8Mt of sand and gravel over a period of approximately 32 years based on an annual output of 250,000tpa.

10.47 The quarry would be worked on a phased basis allowing for the stripping, extraction (with associated processing) and progressive restoration of the application site.

10.48 The web-based Planning Practice Guidance contains the current Government advice on noise emissions from minerals extraction sites in England and is directly applicable to assessing the potential noise impacts from the operational phases of the proposed development.

10.49 The absolute limit of 70dB $L_{Aeq,1hr}$ for temporary operations and noise limits for normal operations derived from the measured background noise levels in accordance with the current guidance, i.e. background +10dB, and detailed in Table 10-5, are considered appropriate for this assessment. The noise levels have been rounded to the nearest whole number.

Table 10-5
Derived Noise Limits for Normal Operations, free-field, dB

Location	Derived Background Noise Level, L_{A90}	Derived Noise Limit, LAeq,1hr
1. Popefield Farm	52.3	55
2. No.403 St. Albans Road West & The Lodge	56.8	55
3. No.616 Hatfield Road	60.6	55
4a. Pasture View	42.5	53
4b. Radio Nursery	42.5	53
5a. Walker Grove	32.3	42
5b. Nimrod Drive	32.3	42
6. Jove Gardens	41.0	51

10.50 Operational plant and equipment details have been provided by the applicant and are set out in Table 10-6 together with the adopted sound power levels or internal reverberant noise levels for plant buildings. The sound power levels are taken from manufacturers' datasheets, machine noise emission badges where available or the tables contained in BS5228-1:2009+A1:2014.

10.51 Plant buildings, i.e. the primary screen building, secondary screen building and crusher building, would be constructed as steel portal frame buildings which would be clad in 0.7mm plastic coated sheet steel which has a Weighted Sound Reduction Index of 24dB Rw. The internal reverberant noise levels within these buildings have been calculated within the CadnaA noise modelling software and take into account the noise generating sources within the building, the surface area of the buildings and an absorption co-efficient, alpha low, of 0.2.

Table 10-6
Plant & Equipment

Operation	Plant/Equipment Item (or similar)	Sound Power Level, L_{WA}, dB each
Construction, including Site Preparation & Plant Site Establishment	Caterpillar CAT336D 40t Hydraulic Excavator	105
	Volvo A30G Articulated Dumper	108
	Komatsu D51EX-22 Bulldozer	106
	CAT16M Motor-grader	108
	Komatsu WA380-7 Wheeled Loading Shovel (x2)	106
	Crane (x2)	107
	Telehandler	99
	Various Hand Tools (total)	104
	Delivery Trucks	111*
Extraction	Caterpillar CAT325D 30t Hydraulic Excavator	104
	Volvo A30G Articulated Dumper - S&G to plant site (x6)	108
	Caterpillar CAT336D 40t Hydraulic Excavator - Inter-burden removal	105
	Volvo A30G Articulated Dumper - Inter-burden removal (x4)	108
	Komatsu D51EX-22 Bulldozer - Inter-burden placement	106
Processing	Feed Hopper	97
	Primary Screening House - internal reverberant noise level	98
	Washing & Screening House - internal reverberant noise level	94
	Crusher House - internal reverberant noise level	100
	Sand plant	95
	Stockpiler Conveyors (x8)	81
	Komatsu WA380-7 Wheeled Loading Shovel (x2)	106
Transport	HGV - 32t Rigid Bodied Tipper Wagons (Sand & Gravel)	111*
	HGV - 32t Rigid Bodied Tipper Wagons (Inert Fill)	111*
	HGV - Mixer Trucks	111*

Construction Phase Assessment

10.52 The construction phase of the proposed development is estimated to take between 12 and 18 months to complete and has been assessed in accordance with the noise limits set out in British Standard 5228-1:2009+A1:2014 using the Potential significance based on fixed noise limits methodology. For the purpose of this assessment, the lower noise limit of 70dB(A) has been adopted.

10.53 Construction operations include the establishment of the site access road, stripping of soils in the processing plant area, lagoon areas and initial working phase, erection of the processing plant and construction of the perimeter screening bunds.

10.54 The predictions are based on the worst-case scenario when all activities are being undertaken simultaneously and when screening mound construction is taking place at its closest approach to the receptor being considered. For example, the predictions at Popefield Farm have been made during the construction of the screening bund directly adjacent to the property whilst construction operations within the plant site area are also being undertaken.

10.55 The results of the assessment are shown in Table 10-7. The predicted noise levels have been rounded to the nearest whole number.

Table 10-7
Predicted Noise Levels Generated by Construction Operations, free-field, dB

Location	Predicted Noise Level, $L_{Aeq,1hr}$	Derived Noise Limit, $L_{Aeq,1hr}$	Difference
1. Popefield Farm	61	70	-9
2. No.403 St. Albans Road West & The Lodge	59		-11
3. No.616 Hatfield Road	57		-13
4a. Pasture View	53		-17
4b. Radio Nursery	56		-14
5a. Walker Grove	48		-22
5b. Nimrod Drive	50		-20
6. Jove Gardens	59		-11

10.56 Table 10-7 shows that the worst-case predicted noise levels generated by construction operations would remain below the 70dB(A) noise limit adopted for the assessment.

10.57 It should also be noted that noise levels generated by construction operations are the worst-case noise levels with all operations combined, including the bund construction at the site boundary. Therefore, the predicted noise levels would only occur for a limited duration of the construction phase.

10.58 Based on the results of the construction noise assessment, mitigation measures to reduce potential impacts at the nearby receptors are considered unnecessary. However, good site management practices would be followed at all times.

Mineral Extraction and Processing Operational Assessment

10.59 Sand and gravel would be extracted using hydraulic excavators and transported to the plant site using a fleet of articulated dump trucks where it would be processed into a range of graded aggregates and sands which would be dispatched from the site typically using HGVs. Aggregates would be loaded using wheeled loading shovels.

10.60 Site restoration would take place on a phased basis following behind the working face. Overburden and inter-burden stripped from operational phases would be placed within the base of the previously worked phase, with imported inert infill materials placed on top of the site derived wastes and shaped to create the designed landscape features. Restoration is currently intended to be a combination of nature conservation, including grassland and small waterbodies, as well as amenity after-uses.

10.61 Based on an annual output of 250,000tpa with the majority exported by 32t rigid bodied trucks having a payload of around 20t, there would be five 32t trucks per hour visiting the site, i.e. 10 movements (five in and five out). In addition, there would also be 3 trucks (6 movements) delivering inert waste for restoration purposes.

10.62 Therefore, in total there would be 16 HGV movements along the site access road in a worst-case 1-hour period. The site speed limit along the access road will be 25kph (15mph).

10.63 Noise predictions represent a worst-case scenario in terms of plant and equipment locations where mobile equipment is operating at its closest approach to the nearby receptors or in locations where attenuation provided by the screening bunds is at a minimum, i.e. plant working away from the perimeter bund. For the extraction phase, predictions include extraction of the UMH and LMH materials, inter-burden removal and progressive restoration operations.

10.64 All predictions are based on plant operating at full power and 100% on-time. No allowance has been made for breaks and/or temporary shutdowns of the plant and equipment. As such the predictions are worst case and conservative.

10.65 The results of the predictions for worst-case operational noise levels in Phases A, B, F and G, i.e. the closest phases to noise-sensitive receptor locations, are shown in Table 10-8. The predicted noise levels have been rounded to the nearest whole number. The worst-case phase prediction is shown in bold.

Table 10-8
Predicted Operational Noise Levels

Location	Prediction Worst-case Noise Levels, dB				
	Phase A	Phase B	Phase F	Phase G South	Phase G North
1. Popefield Farm	53	50	**54**	51	49
2a. No.403 St. Albans Road West	**54**	48	48	45	44
2b. The Lodge	**55**	49	48	45	45
3. No.616 Hatfield Road	47	47	49	**52**	51
4a. Pasture View	45	45	46	47	**48**
4b. Radio Nursery	46	46	47	**49**	**51**
5a. Walker Grove	**42**	**42**	**42**	40	40
5b. Nimrod Drive	**43**	**43**	42	39	40
6. Jove Gardens	47	47	48	50	**50**

10.66 Table 10-9 shows the worst-case results assessed against the derived noise limits.

Table 10-9
Predicted Operational Noise Levels Generated, free-field, dB

Location	Predicted Noise Level, $L_{Aeq,1hr}$	Derived Noise Limit, $L_{Aeq,1hr}$	Difference
1. Popefield Farm	54	55	-1
2a. No.403 St. Albans Road West	54	55	-1
2b. The Lodge	55	55	0
3. No.616 Hatfield Road	52	55	-3
4a. Pasture View	48	53	-5
4b. Radio Nursery	51	53	-2
5a. Walker Grove	42	42	0
5b. Nimrod Drive	43	42	+1
6. Jove Gardens	50	51	-1

10.67 Table 10-9 shows that at the majority of locations the worst-case predicted noise levels generated by day-to-day operations would be at or below the derived noise limit adopted for the assessment.

10.68 At Location 5b (Nimrod Drive), there is a marginal exceedance of 1dB, which would not be noticeable and is therefore not of concern. As this still meets the 55dB $L_{Aeq,1hr}$ limit, this is considered to be acceptable with respect to Paragraph 022 of PPG.

10.69 It should also be noted that these are worst-case operational noise levels when all operations are taking place simultaneously and at their most exposed elevation or closest approach. For the majority of the life of the development operations would be undertaken at greater distances and/or lower elevations within the void and therefore noise levels are likely to be lower than those shown.

10.70 Table 10-9 also shows that the predicted worst-case noise levels would be equal to or slightly above the derived noise limit at Location 5b (Nimrod Drive). This would still fall into the LOAEL level of effect, however, as it meets the 55dB limit, as per Paragraph 022 of PPG. At the remainder of the Locations, the predicted worst-case noise levels would be below the derived noise limits thus falling into the NOEL level of effect. (refer to paragraph 10.23 for definitions of these effect levels).

10.71 Based on the results of the operational noise assessment, mitigation measures to reduce potential impacts at the nearby receptors, other than those included within the design of the site, are considered unnecessary. However, good site management practices would be followed at all times.

CUMULATIVE IMPACTS

10.72 The cumulative effect of worst-case operational noise levels at the proposed Hatfield Aerodrome Quarry development and the working area at CEMEX Hatfield Quarry (Astwick) have been assessed against the defined noise limit.

10.73 Table 10-10 summarises the cumulative effect. The cumulative noise level of operations at Hatfield Aerodrome and Astwick Quarry is presented, and a comparison is made with the noise limit at each Receptor.

10.74 The Astwick Quarry and background noise levels at the receptors have been rounded to the nearest whole number. The cumulative impact is assessed against the values contained in Table 10-1.

Table 10-10
Cumulative Impacts, free-field, $L_{Aeq, 1hr}$ dB

Location	Hatfield Aerodrome Level at Receptors	Astwick Quarry Level at Receptors	Combined Level at Receptors	Background Noise Level	Limit PPG Criteria	Difference between Cumulative level and Limit	Impact
1. Popefield Farm	54	26	54	52	55	-1	None
2a. No.403 St. Albans Road West	54	26	54	57	55	-1	None
2b. The Lodge	55	26	55	57	55	0	None
3. No.616 Hatfield Road	52	26	52	61	55	-3	None
4a. Pasture View	48	28[1]	48	43	53	-5	None
4b. Radio Nursery	51	28	51	43	53	-2	None
5a. Walker	42	27	42	32	42	0	None

[1] Operation noise levels were not predicted at this receptor in the Astwick Quarry assessment, so the predicted noise level from the nearby Radio Nursery receptor has been used as a guide.

Location	Hatfield Aerodrome Level at Receptors	Astwick Quarry Level at Receptors	Combined Level at Receptors	Background Noise Level	Limit PPG Criteria	Difference between Cumulative level and Limit	Impact
Grove							
5b. Nimrod Drive	43	28	43	32	42	+1	Minor
6. Jove Gardens	50	28[1]	50	41	51	-1	None

10.75 Table 10-10 shows that the impact in accordance with PPG is 'None' for all receptors, apart from Nimrod Drive where the impact is defined as 'Minor'. As this still meets the 55dB $L_{Aeq,1hr}$ limit, this is considered to be acceptable with respect to Paragraph 022 of PPG.

10.76 Table 10-10 shows that the cumulative noise level at the receptors from the operation of both quarries are no higher than noise from the Hatfield Aerodrome in isolation. This is due to the noise level from the Astfield Quarry at receptors being significantly (i.e. typically between 15-30dB) below the noise levels from Hatfield Quarry.

10.77 It should be noted that at Location 4b (Radio Nursery) the given existing measured noise levels were measured away from the working nursery, at Pasture view, so the limit is lower than it needs to be.

10.78 The predictions are based on worst case scenarios with 100% on time and all operations occurring simultaneously at the closest position to the receptor. It is considered that noise levels would be less than that calculated.

MITIGATION MEASURES

Good Site Practice

10.79 Surface minerals extraction sites, by their nature, generate noise due to the use of heavy machinery. During the proposed development the potential risk of noise impacting on the nearby noise-sensitive receptors would vary depending on the type of activities being undertaken at the time and the effectiveness of any noise control measures that are in place. The site design incorporates several features that provide mitigation against potential noise impacts; these features include, but are not limited to:

- the construction of perimeter screening mounds/bunds between operations and noise-sensitive receptors.
- acoustic fencing.
- enclosing the processing plant with buildings.
- the use of broadband reverse warning systems on all mobile machinery.

10.80 In addition to the noise mitigation measures incorporated into the site design, good site management practices and other specific measures would also provide additional noise mitigation. These measures would include:

- activities within the review site would be undertaken in locations where noise attenuation from existing landforms would maximise the benefit to the noise-sensitive properties;
- internal haul routes would, wherever possible, be routed such that separation distances to the noise sensitive properties is maximised;
- all haul roads would be kept clean and maintained in a good state of repair to avoid unwanted rattle and "body slap" from vehicles;
- all mobile plant used at the proposed extension would have noise emission levels that comply with the limiting levels defined in EC Directive 86/662/EEC and any subsequent amendments;
- all mobile plant and heavy goods vehicles entering the site will move in a circular pattern to minimise, as far as is practical and safe, noise from reverse warning systems;
- plant would be operated in a proper manner with respect to minimising noise emissions, for example, minimisation of drop heights and no un-necessary engine revving;
- plant would be subject to regular maintenance. All plant at the site would be fitted with effective exhaust silencers and would be maintained in good working order to meet manufacturers' noise rating levels. Defective silencers would be replaced immediately;
- plant that is used intermittently, would be shut down when not in use; and,
- pumps, generators and compressors would be located behind existing screening mounds or landform, would be electrically powered and fitted with an acoustic covers where necessary. Diesel powered pumps, generators and compressors, if used, will be installed within acoustic enclosures.

10.81 In view of the calculated levels for receptors on the western boundary it is proposed that a noise management plan would be prepared. This plan would detail noise monitoring to be undertaken at the receptors, the mitigation measures to be employed and the procedures to be followed should a breach of the noise limits occur. This noise management plan is given in **Appendix 10/3**.

CONCLUSIONS

10.82 This noise assessment has considered the potential for noise generated by the proposed Hatfield Quarry development to give rise to noise impacts at the nearest noise-sensitive receptors to the application site. The assessment has been made against noise limits derived in accordance with the relevant guidance based on the results of baseline noise measurements made during a period representative of a typical working day. The assessment has found that:

- worst-case noise levels generated by construction operations would remain below the 70dB(A) noise limit adopted for the assessment. It should also be noted that construction noise levels would also remain below the 55dB(A) noise limit derived in accordance with the relevant guidance for day-to-day operations except during construction of the perimeter screening mounds to the south and west;
- worst-case noise levels generated by operational activities, including all truck movements on the access road, would be at or below the noise limits derived in accordance with the relevant guidance at most locations. At Location 5b (Nimrod Gardens), the noise limit has been marginally exceeded, but the level is below 55dB and so is considered acceptable in accordance with Paragraph 022 of PPG;
- the cumulative effects of operational noise from both the proposed Hatfield and Astfield quarries would result in an impact of 'None' at all of the receptors, apart from Location 5b (Nimrod Gardens) where the impact is considered to be 'Minor'. Consequently, the level of

effect at all of the receptors is 'None', apart from Location 5b (Nimrod Gardens) where the level of effect is 'Minor.

10.83 Based on the results of the assessment, it is considered that all practical means have been employed in the design of the site to protect the amenity of the nearby noise-sensitive receptors. A number of good site practice measures have been suggested to further reduce the risk of any potential adverse noise impacts.

10.84 It is concluded that noise should not pose a material constraint for proposed development.

APPENDIX 01
Glossary of Terminology

To assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0dB (the threshold of hearing) to over 120dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table 01-1
Sound Levels Commonly Found in the Environment

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

Acoustic Terminology

dB (decibel) — The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10-5Pa).

dB(A) — A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

LAeq — LAeq is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.

L10 & L90 — If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L10 is the level exceeded for 10% of the time and as

such can be regarded as the 'average maximum level'. Similarly, L90 is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L10 index to describe traffic noise.

LAmax

L_{Amax} is the maximum - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.

APPENDIX 02

Measured Baseline Noise Levels

Table 02-1
Measured Noise Levels, Popefield Farm (representative position), free-field, dB

Date	Time	L_{Aeq}	L_{A90}	L_{A10}	L_{AFMax}
28/06/2021	13:45	57.7	51.6	60.1	71.2
28/06/2021	14:00	57.3	51.8	60	69.8
28/06/2021	14:15	60.5	54.3	62.9	77.3
28/06/2021	14:30	58.3	52.8	60.7	73.9

Table 02-2
Measured Noise Levels, 403 St Albans Road West / The Lodge, free-field, dB

Date	Time	L_{Aeq}	L_{A90}	L_{A10}	L_{AFMax}
27/05/2021	10:45	73.3	56.7	77	86.1
27/05/2021	11:00	73.6	57.9	77.3	88.8
27/05/2021	11:15	73.4	55.3	77.1	86.4
27/05/2021	11:30	73.4	56.8	77.3	88

Table 02-3
Measured Noise Levels, 616 Hatfield Road, free-field, dB

Date	Time	L_{Aeq}	L_{A90}	L_{A10}	L_{AFMax}
27/05/2021	10:45	72.6	63	76.1	83.1
27/05/2021	11:00	72.6	58.3	76.3	86.6
27/05/2021	11:15	71.9	59.5	75.5	83.5
27/05/2021	11:30	71.8	61.7	75.2	87.9

Table 02-4
Measured Noise Levels, Pasture View, free-field, dB

Date	Time	L_{Aeq}	L_{A90}	L_{A10}	L_{AFMax}
28/06/2021	12:30	45.1	42.3	46.6	61.2
28/06/2021	12:45	44.9	42.4	46.3	58.8
28/06/2021	13:00	45.5	42.9	47	59.6
28/06/2021	13:15	45.2	42.1	46.8	56.8
28/06/2021	13:30	45.8	43.2	47.7	57.7
28/06/2021	13:45	44.2	41.8	45.9	54.5
28/06/2021	14:00	45.6	42.5	47.5	60.1
28/06/2021	14:15	46.4	43.9	47.8	59

28/06/2021	14:30	46	43.1	47.6	59.1

Table 02-5
Measured Noise Levels, Walker Grove, free-field, dB

Date	Time	L_{Aeq}	L_{A90}	L_{A10}	L_{AFMax}
27/05/2021	10:15	47.8	33.6	46.8	75.5
27/05/2021	10:30	36.5	32.4	38.2	60
27/05/2021	10:45	44.5	31.9	40.9	64.3
27/05/2021	11:00	38.4	32.1	39	59.6

Table 02-6
Measured Noise Levels, Jove Gardens, free-field, dB

Date	Time	L_{Aeq}	L_{A90}	L_{A10}	L_{AFMax}
28/06/2021	11:15	46	42.3	48.1	54.1
28/06/2021	11:30	46.9	40.9	48.1	64.9
28/06/2021	11:45	45.2	42.5	46.9	56.4
28/06/2021	12:00	45	41.1	46.8	58.5
28/06/2021	12:15	46.2	40.5	49.7	64.1
28/06/2021	12:30	47	41.7	49.7	62.9
28/06/2021	12:45	47.2	42.3	50.6	58
28/06/2021	13:00	43.9	41.2	45.2	57.9
28/06/2021	13:15	45.1	40.9	47.3	58.8
28/06/2021	13:30	42.8	40	44.2	63.5
28/06/2021	13:45	42	39.2	43.3	64.9
28/06/2021	14:00	43.8	40.9	44.2	64.5
28/06/2021	14:15	45.5	42.1	47	69
28/06/2021	14:30	46.3	40.5	49.5	71

APPENDIX 03
Noise Management Plan

General Noise Management

Plant Operations

Within the constraints of efficient site operations and the requirements of the relevant British Standards, the following is advisable;

- limit the use of particularly noise plant, i.e. do not use particularly noisy plant early in the morning;
- limit the number of plant items in use at any one time;
- plant maintenance operations should be undertaken as far away from noise-sensitive receptors as possible;
- reduce the speed of vehicle movements;
- ensure that tailgates are shut and locked before leaving the tipping area;
- ensure that operations are designed to be undertaken with any directional noise emissions pointing away from noise-sensitive receptors where practicable;
- when replacing older plant, ensure that the quietest plant available is considered wherever possible; and
- sequence activities so that early development provides screening to the nearby noise-sensitive receptors from subsequent operations.

Training

The current site induction programme and site rules should be revised to include good working practice instructions for site staff/managers and contractors to help minimise noise whilst working on the site.

Good working practice guidance/instructions should include, but not be limited to, the following points:

- avoid un-necessary revving of engines;
- plant used intermittently should be shut down between operational periods;
- avoid reversing wherever possible;
- ensure that tailgates are shut and locked before leaving the tipping area;
- driving carefully and within the site speed limit at all times; and
- report any defective equipment/plant as soon as possible so that corrective maintenance can be taken.

Maintenance

A weekly inspection of all plant shall be made to ensure that:

- Any plant found to be requiring interim maintenance should be identified by the operator and repairs undertaken by a qualified engineer as soon as possible;

- Regular and effective maintenance of plant can play an important part in keeping noise levels under control; and
- Always ensure that doors fitted to acoustic enclosures around fixed plant remain closed; the fitting of self-closing mechanisms is advisable.

Public Relations

It is essential to maintain good public relations with local residents at nearby noise-sensitive receptor locations:

- endeavour to be good neighbours, i.e.:

  - Get to know the neighbours; be concerned about them and try to understand their problems; encourage them to know the site personnel; listen as well as talk,
  - hold regular liaison meetings and provide information as freely as possible,
  - create a good impression by running a tidy and efficient site,

- ensure there are lines of communication, e.g.:

  - nominate a point of contact for issues relating to the site,
  - support a liaison committee,
  - give advance notice and explanation of activities that might cause complaint,
  - keep systematic records of complaints and the remedial actions taken,
  - follow up complaints with correspondence and action,

- ensure that site staff are environmentally aware and are trained to cope with issues;
- do not rely on the letter of the law where there are obvious problems, but culpability cannot be easily proved;
- be prepared to be flexible, and
- try to co-operate and avoid being adversarial.

Action Plan

A noise monitoring scheme, outlined in the following section, details the actions which should be undertaken following a complaint being received by a local resident.

Noise Monitoring Scheme

In the event of a noise complaint being received the noise monitoring scheme will prompt remedial actions to ensure ongoing future compliance.

Noise Sensitive Locations

The closest noise-sensitive receptors are considered to be:

- Pasture View, Nursery Gardens and Jove Gardens to the west;
- 616 Hatfield Road, Popefield Farm, 403 St Albans Road West and The Lodge to the south; and
- Walker Grove and Nimrod Drive to the east.

Where possible, the noise monitoring locations selected should allow noise information that is representative of the identified locations to be gathered without the necessity to access private land.

Noise Measurement Equipment

Environmental noise levels shall be measured using sound level meters conforming to Type 1 or better of the latest versions of British Standard EN 61672-1:2003 *Electro-acoustics, Sound Level Meters, Specifications*.

The sound level meters shall be field-calibrated before and after monitoring using an acoustic calibrator conforming to the latest version of British Standard EN 60942:2003 *Electro-acoustics – Sound Calibrators*.

All sound level meters shall be calibrated to a traceable standard by a UKAS-accredited laboratory, or equivalent, within a 24-month period before the survey and all acoustic calibrators shall be calibrated to a traceable standard by a UKAS-accredited laboratory, or equivalent, within a 12-month period before the survey.

Noise Survey Methodology

Noise measurements shall be undertaken by a suitably qualified person at the complainant's property. The noise measurements shall be undertaken during a normal working day, during typical working hours, avoiding meal breaks and times when plant and equipment within the site are not operational.

Noise levels shall also be measured during a period when the site is not operational, for example during a lunch break or shift change, to enable the noise levels attributable to site operations alone to be determined by decibel subtraction.

The sound level meter shall be positioned such that the microphone is located 1.2 to 1.5 metres above local ground level in free-field conditions, i.e. at least 3.5 metres from the nearest vertical, reflecting surface, at all survey locations.

Operational noise levels shall be measured over a minimum of a one-hour period during the normal working day.

A note of the prevailing weather conditions shall be made at the time of the survey and the audibility of the site shall be noted at each measurement location during each measurement period.

Reporting

On completion of each noise survey a report shall be required in a format suitable for submission to the Local Planning Authority.

The report shall contain, as a minimum:

- the results of the noise survey, i.e. noise levels during site operations and noise levels with the site not operating, in terms of the L_{Aeq}, and L_{A90} noise indices;
- details of the instrumentation used including calibration details;
- details of the prevailing weather conditions on the day of the survey;
- details of the audibility of the site; and
- details of any extraneous noise sources that influenced the noise climate.

Non-compliance with Noise Limits/Receipt of Complaint

If it is determined that the measured noise levels from Site operations are exceeding the consented noise limits at the complainant's property an investigation shall be instigated within one working day to identify the cause of the non-compliance

Such an investigation may involve the identification and cessation of the activity or activities considered to be the cause of the non-compliance/complaint and/or the investigation of mitigation measures to reduce the noise emission levels from the activity or activities, for example the replacement of noisy plant with quieter alternatives and/or the use of temporary screening mounds.

Any deviation from agreed working practices shall be identified immediately and conformance to the working practice reinstated.

A further noise survey shall be undertaken as soon as possible following the implementation of mitigation to re-assess the noise levels against the consented noise limits.

A complaints response system shall be maintained by Robert Brett & Sons Limited for the site, enabling any complaints regarding noise to be reported and appropriate action taken.

Data Retention

The noise survey data obtained during the monitoring shall be retained by Robert Brett & Sons Limited or by agreement by their sub-consultant for the full duration of the permitted operations.