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Mill Hill Barton Fabis
Proposed Quarry
Noise Assessment

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WBM

WBM (the trading name of Walker Beak Mason Limited) is an established independent acoustic consultancy specialising in architectural & building acoustics, environmental noise, planning issues and expert work. WBM is a member of the Association of Noise Consultants and is also a Corporate Member of the Institute of Environmental Management & Assessment. The consultants are members of the Institute of Acoustics.

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1 Introduction

This chapter of the Environmental Statement (ES) has been prepared by Rachel Canham and Dr Robert Storey of Walker Beak Mason Limited (WBM). It considers the impact of noise of the Proposal, i.e. from the proposed extraction activities and subsequent restoration of a new quarry site in the vicinity of Mill Hill, Barton Fabis.

The noise implications of the proposed quarry have been assessed by comparing calculated site noise levels with site noise limits suggested in line with current government guidance and having regard to the baseline noise levels.

This chapter sets out the findings of multiple baseline noise surveys conducted between December 2022 and August 2023 at publicly accessible locations considered representative of the nearest dwellings to the application site. These are detailed in Appendices D to M to this chapter.

The chapter sets out the calculated noise levels at the nearest dwellings arising from the proposed quarry and compares those calculated noise levels with suggested site noise limits at the nearest dwellings. The noise levels at nearby ecological receptors and at proposed housing are also presented.

The noise limits are based on current advice from the government contained in the web document “Planning Practice Guidance (Minerals)”, first published in March 2014, which was published to complement the National Planning Policy Framework (NPPF), dated March 2012 and using the data from the baseline noise surveys conducted between December and August 2023.

Where relevant, mitigation measures are proposed to minimise the impacts of the proposed development during both the preparation and operational phases of the scheme. Any anticipated residual effects of the proposals are then stated.

With mitigation measures incorporated into the scheme, the calculated overall site noise levels for the Proposal for both normal operations and temporary works comply with the suggested site noise limits at the nearest dwellings to the proposed quarry. The nearest dwellings are shown in the plans in Appendix C.

To aid comprehension, a glossary of acoustic terms is presented in Appendix A.

2 Policy Context

2.1 National Planning Policy

Summaries of the national planning policy relevant to noise and mineral operations are presented in Appendix B.

These documents include the following:

National Planning Policy Statement for England (NPSE)

This document introduces the concept of observed effect levels with regard to noise including the Lowest Observed Adverse Effect Level (LOAEL) above which adverse effects on health and quality of life can be detected due to noise, and the Significant Observed Adverse Effect (SOAEL) which is the level above which significant adverse effects on health and quality of life occur due to noise. Where the impact lies somewhere between LOAEL and SOAEL, the NPSE requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life. However, as stated in paragraph 2.24 of the Explanatory Note to the NPSE "*This does not mean that such adverse effects cannot occur*".

National Planning Policy Framework (NPPF)

The NPPF sets out planning policies for England. With regard to noise in general , the main aims are to:

- Prevent new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of noise pollution.
- Mitigate and reduce to a minimum any potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.

With regard to noise and minerals:

- Set out criteria to ensure that proposed operations do not have unacceptable adverse impacts on the natural and historic environment or human health.
- When developing noise limits, recognise that some noisy short-term activities are unavoidable to facilitate minerals extraction.

- Minerals planning authorities should ensure that any unavoidable noise is controlled, mitigated or removed at source, and establish appropriate noise limits for extraction in proximity to noise sensitive properties.

Planning Practice Guidance: Noise (PPGN)

This document provides advice on how planning can manage potential noise impacts in new development. It makes reference to the Explanatory Note of the NPSE and also the NPPF.

Planning Practice Guidance: Minerals (PPGM)

Paragraphs 19 to 22 of the 'Minerals' chapter of the PPGM provide guidance on assessing noise from minerals sites and on setting noise limits at noise sensitive properties. These are summarised below:

- Daytime (07.00 to 19.00 hours) – site noise should not exceed the background noise by more than 10 dB, with an upper limit of 55 dB $L_{Aeq,1h\ (freefield)}$. Where it will be difficult not to exceed the background level by more than 10 dB without imposing unreasonable burdens on the mineral operator, the limit set should be as near that level as practicable (but at or below 55 dB)
- Evening (19.00 to 22.00 hours) – site noise should not exceed the background noise by more than 10 dB with an upper limit of 55 dB $L_{Aeq,1h\ (freefield)}$.
- Night (22.00 to 07.00 hours) – site noise should reduce to a minimum any adverse impacts, without imposing unreasonable burdens on the mineral operator, with an upper limit of 42 dB $L_{Aeq,1h\ (free\ field)}$.
- Temporary (daytime) – increased site noise up to 70 dB $L_{Aeq,1h\ (freefield)}$ up to 8 weeks per year for noisy short-tern activities (e.g. construction of bunds)

2.2 Local Planning Policy

The majority of the Site is located within the administrative boundary of Nottinghamshire County Council. A section of the northern part of the Site lies within the administrative boundary of Nottinghamshire City, and as such local planning policies for Nottinghamshire County Council and Nottinghamshire City have been considered, along with any other relevant planning policy from local councils.

Nottinghamshire Minerals Local Plan Adopted March 2021

Noise is mainly addressed in Policy DM1, Protecting Local Amenity:

"*Proposals for minerals development will be supported where it can be demonstrated that any adverse impacts on amenity are avoided or adequately mitigated to an acceptable level. The types of impacts that need to be considered include but are not restricted to:…*

- Noise…"

Nottingham City Land and Planning Policies Development Plan Document Local Plan Part 2 Adopted January 2020

Noise due to development is addressed in general terms in Policy IN2: Land Contamination, Instability and Pollution:

"*…Where development has the potential to give rise to future or continuing pollution, contamination or instability, planning permission will be granted (subject to appropriate conditions) where the following can be demonstrated:…*

d) the development proposals will not result in noise or vibration at such levels as are likely to adversely impact on health or quality of life…"

Rushcliffe Local Plan Part 2: Land and Planning Policies Adopted October 2019

Although not specific to minerals, noise is addressed in general terms in Policy 1, Development Requirements:

"*Planning permission for new development, changes of use, conversions or extensions will be granted provided that, where relevant, the following criteria are met:*

1. there is no significant adverse effect upon the amenity, particularly residential amenity of adjoining properties or the surrounding area, by reason of the type and levels of activity on the site, or traffic generated;…

5. noise attenuation is achieved and light pollution is minimised…"

3 Consultations

3.1 Baseline Noise

WBM liaised with environmental health representatives for Nottinghamshire County Council (using Via East Midlands), Nottingham City Council and Rushcliffe Borough Council from August-September 2022 to discuss and agree the baseline noise survey locations and methodology. The outcomes from these discussions were that WBM were to undertake extended noise monitoring, include the Trentside chalets as one of the monitoring locations and include monitoring on a Saturday. All of these requests have been incorporated into the baseline noise assessment.

A preliminary baseline noise survey strategy was circulated to Via East Midlands (for Nottinghamshire Council Council), Nottingham City Council and Rushcliffe Borough Council in February 2023. From the feedback received in March 2023 , the number of installed sound level meters was increased to three, and the survey location for Trentside was clarified.

All of the requests made by the relevant local authorities have been incorporated into the baseline noise assessment.

3.2 Noise Assessment

Other consultation information received from Via East Midlands (for Nottinghamshire Council Council), Nottingham City Council and Rushcliffe Borough Council environmental health regarding noise is tabulated below.

Table 3.1: Environmental Health Consultations Regarding Noise

Date	Organisation	Consultation Information
September 2022	Via East Midlands (for Nottinghamshire County Council, environmental health)	"*Noise Assessment* *The proposed approach to undertake noise modelling of the operations is welcomed and should be carried out using a suitable 3D base model to ensure the varied topography is fully taken into account. The proposal to include ecological receptors such as Brandshill Wood and Attenborough nature reserve is also welcomed. Consideration will also need to be given to noise levels on the bridleway that runs through the site. Any proposed noise limits for Brandshill Wood and Attenborough nature reserve will need to be fully justified, taking into account ecological receptors and amenity users.*

Date	Organisation	Consultation Information
September 2022	Via East Midlands (for Nottinghamshire County Council, environmental health) *continued*	"*The assessment should consider each phase of extraction and be representative of the worst case scenarios.* *It is essential that a full and comprehensive list of plant is included with a breakdown of sound power levels and percentage on-time. Where not 100% on-time, the assigned percentage should be justified.* *It is also essential that a full and thorough description of the activities during each phase is included along with a description of corrections such as soft ground and screening.* *<u>Mitigation</u>* *The previous noise assessment suggested a range of stand off distances for certain combinations of plant operations. There was significant doubt as to the workability and practicality of the approaches being outlined. It is recommended that where stand off distances are required, that these are of a fixed nature that can be physically demarcated so as to give comfort to the MPA that they will be adhered to. It may be possible to agree seasonal variations to these so as to minimise sterilisation of land for extraction.*"
September 2022	Nottingham City Council, Environmental Health	Supported the comments from Via East Midlands
September 2022	Rushcliffe Borough Council Environmental Health	"*We understand from the previous submission there will be a requirement for 24hour dewatering pumps during the extraction phase(s) and the potential impact from this type of ancillary equipment did not appear to have been considered in the previous assessment. I would expect the night-time background noise levels to be relatively low in locations such as Barton in Fabis and there is the potential the noise from equipment such as dewatering pumps could have an adverse impact on the neighbouring residents at night and over weekend periods when extraction operations are not taking place. I appreciate the sound from this type of equipment can be mitigated but it would to best to consider within the assessment so that (if necessary) appropriate mitigation measures can be put in place as part of a Noise Management Plan.* *I am aware there was some discussion last time about the height of the flood defence bunds around Barton in Fabis and the assumed level of screening that these could provide. It would be helpful if there was reliable topographical data to support any assumptions made in the assessment*."

In light of the responses received from Via East Midlands:

- Detailed topographical information for the site and surrounding area has been supplied to WBM for use in noise mapping calculations. Noise mapping calculations have been undertaken for the start and end of each phase of operations on site to show the difference in noise levels. A detailed breakdown of the assumptions used to generate the noise maps (including plant list and sound power levels) is provided in Appendix N, with the noise maps following in Appendix O.
- Full details of site operations have been provided, see Section 4.3 and Appendix N.
- Ecological receptors have been considered, see Section 6.3 and 10.1.
- The typical minimum baseline noise levels at night have been referenced to consider noise from dewatering pumps, see Table 5.3 and Table 6.2.

A Scoping Request was submitted in May 2023. The responses regarding noise are tabulated below.

Table 3.2: Response to Scoping Request Regarding Noise

Date	Organisation	Consultation Information
May 2023	Nottinghamshire County Council, Conservation	Referenced noise as an indirect impact. "…*Noise and disturbance impacts (on habitats/sites supporting noise-sensitive species, including breeding and wintering birds at Attenborough Gravel Pits SSSI/NR; breeding birds and potentially also bats and Badgers in Brandshill Wood/Clifton Wood/Millhill Spinney; nesting Barn Owls; and Otters using watercourses on and around the application site including River Trent)…"*
June 2023	Via East Midlands (for Nottinghamshire County Council Environmental Health)	Included details as previously discussed in September 2022
June 2023	Canal & River Trust	"…*The ES should include users of the River Trent (including boaters and walkers alongside the river and wildlife supported by the river) as potentially sensitive noise receptors and consider potential impact on them. Waterways are often particularly valued by people for their relative tranquillity and adverse impacts from noise can reduce the recreational value of the river to people and may serve to discourage it's use by boaters (including canoes and kayaks), anglers or as a route for walker to follow. The ES should identify any measures necessary to reduce/avoid adverse effects on waterway users*…"

Date	Organisation	Consultation Information
June 2023	SAVE*	Regarding noise, the responses referenced the use of the PPGM and use of 3D noise modelling, and also that the assessment should include the impact on people using rights of way and the nature reserve
June 2023	The Gardens Trust	Raised concerns on the impact on the Grade II registered parkland of Clifton Hall.
June 2023	Rushcliffe Borough Council, Planning	Included details as previously discussed in September 2022
August 2023	Nottinghamshire County Council, Planning	"*A single Noise Impact Assessment should be undertaken in accord with the Planning PracticeGuidance for Minerals and to inform a Noise chapter within the ES. Of crucial importance will be accurately capturing an extended and robust range of background noise results to take into account various receptors, both human (including fixed residential receptors and recreational visitors) and natural (e.g. Attenborough Nature Reserve). Locations will need the prior agreement of the County and City Councils and their respective advisors. The response from the County's advisors- Via is appended. Data will need collecting for different time periods and meteorological conditions.* "*The likely noise impacts from the proposed development should be assessed for each phase and on a robust worst case scenario- for example with simultaneous extraction and restoration operations. The assessment will need to consider the potential noise impacts at different times of the day, including Saturday mornings when background noise levels may be reduced and at night time if for example dewatering pumps are operated. The results should be modelled and presented using 3D noise modelling. Significant adverse impacts to all receptors should be avoided and full details of mitigation measures should be set out and which should be demonstrably achievable in practice*." Also mentions noise with regard to ecology, archaeology/cultural heritage, local amenity & impact on rights of way, cumulative impact, pollution & nuisance, population & human health. Vibration can be scoped out although comments are requested on the vibration from the conveyor.
* SAVE comprises 5 Parishes Community Groups (Barton in Fabis Parish Council, Gotham Parish Council, Kingston on Soar Parish Council, Thrumpton Parish Meeting, Ratcliffe on Soar Parish Meeting), Clifton Village Residents Association and Lark Hill Retirement Village Residents Association		

The issues raised mainly relate to noise affecting ecology, local amenity and impact on rights of way.

- The noise impact on ecological receptors is discussed in Section 6.3 and 10.1.
- The noise impact on local amenity is discussed in Section 6.1 and 6.2, Section 7.2 and in Section 8.
- The noise impact on public rights of way is discussed in Section 6.4 and 10.3.

4 Assessment Methodology

4.1 Assessment Area

The noise assessment considers the noise from quarry operations at the nearest residential receptors.

The nearest receptor is Burrows Farm which is immediately adjacent to the north boundary of the site.

The assessment also considers noise affecting receptors to the north adjacent to the Trent river (Trentside), north and east in Clifton (Barbury Drive, Lark Hill, Todd Close), to the south in Barton in Fabis (Chestnut Lane), and to the west in Beeston (The Strand).

Non-residential receptors are also considered.

4.2 Previous Assessment

A noise assessment was undertaken to support a previous application for a quarry at this site. The baseline noise survey results obtained in 2015 are referenced in this assessment for information.

4.3 Proposed Quarry Operations

The mineral to be extracted will be removed using an excavator and loaded into dump trucks for transport to a mobile field hopper located to the north of Phase 1. Concurrent with mineral extraction, a dozer will be used for landforming/restoration in the previously worked areas.

There will be dewatering pumps close to the field hopper and in the vicinity of the extraction/restoration areas to allow the extraction/restoration areas to be worked dry.

The hopper will be loaded using a smaller excavator and from there the field conveyor will move the mineral over the footpath to the plant site where it will be processed in the proposed plant ready for stockpiling and export by means of road going HGVs.

There will be a loading shovel in use on the plant site for loading of the plant, loading of HGVs and stock management.

There will be two lagoons to the north of the plant site that will also be managed using a dewatering pump.

Access to the site will be from Green Street into the plant site.

For the phase modelled as final restoration, the operations will be confined to the plant site with the stockpiled mineral being loaded into HGVs for export, while the plant site is restored following decommissioning of the processing plant.

The breakdown of the elements of the operation that have been modelled in the calculations for consideration against suggested site noise limits based on the recommendations in PPGM are summarised in a table in Appendix N.

4.4 Determining Receptor Sensitivity

The consequence of a noise impact will be dependent on the receptor and its sensitivity. A summary of the sensitivity of potential noise receptors is provided in the table below.

Table 4.1: Receptor Sensitivity & Methodology for Assessing Sensitivity of Receptors

Sensitivity	Example of Receptor
Very High	World Heritage Sites, Grade I Listed Buildings
High	Residential properties (permanent tenants) and schools and hospitals
Medium	Transient residential receptors such as users of hotels, users of public footpaths
Low	Commercial premises
Negligible	Assets with very little or no surviving cultural heritage interest

This assessment is focused on the residential properties closest to the proposed site which are all considered as being of high sensitivity. Consideration is also given to permitted residential development where housing is to be constructed. This permitted residential development is also considered as being of high sensitivity.

Additional consideration is also given to the non-residential, ecological receptors including Attenborough Nature Reserve, Brandshill Wood, Clifton Wood and Mill Hill Spinney. These are considered to be of medium sensitivity. Whilst there are no established noise thresholds for noise impacts from minerals operations on wildlife, any noise impact on human visitors to these areas will be of a transient nature, similar to a public footpath.

Users of footpaths / public rights of way and the river will have transitory use. These receptors are considered to have "medium" sensitivity. Increases in noise at these receptors due to activity at the quarry site may adversely affect the acoustic environment around these receptors however as users will not be exposed to increased noise for long periods, any adverse noise effects are considered not significant.

4.5 Determining Impact Magnitude

The criteria for assessing magnitude of impact are outlined in the following table. These are based on long established noise indicators taken from the recommendations for acceptable noise levels in the guidance document Planning Practice Guidance (Minerals).

Table 4.2: Assessing Magnitude of Impact for Calculated Site Noise Levels

Impact Magnitude	Typical Criteria Descriptors (dB)	
	Routine Operations	Temporary Operations
Slight	≤ 55 and ≤ L_{A90}+10	≤ 55 and ≤ L_{A90} + 10
Moderate	≤ 55 and > L_{A90}+10	≤ 70 and ≤ 8 weeks per year
Substantial	> 55 and > L_{A90}+10	> 70 and > 8 weeks per year

The Impact Magnitudes defined as "*slight*", "*moderate*" and "*substantial*" correspond to the NOAEL, LOAEL and SOAEL referred to in the Explanatory Note to the Noise Policy Statement for England (NPSE).

4.6 Determining Significance and Nature of Effects

The significance of effect is determined by combining the magnitude of impact with the sensitivity of the receptor.

In this assessment any significance of effect that is defined as being above moderate/minor (i.e. moderate, major/moderate or major) is considered to be adverse. Any significance of effect below and including moderate/minor is considered to represent a "*good standard of amenity*".

Table 4.3: Significance of Effects Matrix

		Magnitude of Impact			
		Substantial	**Moderate**	**Slight**	**Negligible**
Sensitivity	**Very High**	Major	Major	Major/Moderate	Neutral
	High	Major	Major/Moderate	Moderate/Minor	Neutral
	Medium	Major/Moderate	Moderate	Minor	Neutral
	Low	Moderate/Minor	Minor	Minor/Neutral	Neutral

4.7 Assessment Assumptions and Limitations

The main assumptions and data used in the SoundPLAN noise model calculations are detailed in Appendix N.

The greatest limitation of the assessment and the largest level of uncertainty is whether the proposed activity will give rise to the calculated noise level at the receiver locations in practice.

The calculations and assessment have been based on all components of the operations taking place simultaneously and for 100% of each hour during the expected working daytime periods to represent a realistic worst case scenario.

The use of the loading shovel is split between the end of the conveyor, the plant and the stockpiles (25% each) with the remaining 25% comprising the movements in between locations. In reality, this situation is unlikely to occur and noise levels would, in all likelihood, be lower than those presented in the assessment. HGV movements on the access road are expected to be up to 10 per hour and has been included in the assessment as such.

The site noise calculations do not include any allowance for air absorption, which would be minimal in any case and make no difference to the assessment.

The representative background sound level used in the assessment has been determined from multiple surveys on different times and dates, covering a range of wind directions. These levels are considered to be representative of the background sound levels that would be normal for the properties in the vicinity of the site.

5 Baseline Noise Surveys

5.1 Measurement Description

Baseline surveys were undertaken in December 2022, and April, May, July and August 2023. These comprised sample measurements at the nearest residential receptors, agreed in advance with representatives of Nottinghamshire County Council, Nottingham City Council and Rushcliffe Borough Council. The survey locations are shown in Appendix C and included:

- Barbury Drive
- Burrows Farm
- Chestnut Lane
- Lark Hill
- The Strand
- Todd Close
- Trentside

The sample noise measurements were obtained in different seasons and weather conditions. In total, 70 sample noise measurements were obtained at residential receptors over 7 different dates including a Saturday. In addition, sound level meters were installed at three locations (Burrows Farm, Chestnut Lane and Lark Hill) to obtain noise levels over 1-2 weeks.

Some sample noise measurements were also undertaken at locations of ecological interest and at locations where housing has been permitted but not yet constructed. 15 samples were obtained at these additional locations. These included:

- Attenborough Nature Reserve
- Brandshill Wood (north and south)
- Clifton Woods
- Mill Hill Spinney
- Permitted residential site to the north and east of the proposed quarry (Yew Tree Lane and Nottingham Gateway, also known as Fairham)

The survey details and results are presented in Appendices D to J for the sample measurements and Appendices K to M for the installed sound level meters.

5.2 Results

In general, road traffic noise (direct and distant) was a significant noise source at all receptors.

Summaries of the sample results obtained at each of the residential receptors are presented below. Each table includes the representative levels for that receptor – these have been determined from the minimum value from the mean, median and modal values, excluding those results which are adversely affected by peak morning/evening traffic.

Table 5.1a: Sample Survey Results at Residential Receptors – Barbury Drive

Date	Start Time	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB
14/12/2022	13:52	45	41
14/12/2022	15:42	49	43
03/04/2023	09:56	47	40
03/04/2023	15:15	52	45
15/04/2023	08:53	43	38
15/04/2023	11:46	54	42
12/05/2023	07:08	44	40
12/05/2023	12:34	49	44
23/05/2023	16:20	48	40
23/05/2023	17:40	51	42
28/07/2023	10:22	50	46
11/08/2023	11:01	53	48
Representative levels		**49**	**40**

Table 5.1b: Sample Survey Results at Residential Receptors – Burrows Farm

Date	Start Time	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB
14/12/2022	12:42	46	41
14/12/2022	15:12	43	40
03/04/2023	08:54	48	41
15/04/2023	07:09	44	37
15/04/2023	09:54	47	39
12/05/2023	09:42	50	45
23/05/2023	13:41	41	34
28/07/2023	12:44	42	38
11/08/2023	13:10	44	37
Representative levels		**44**	**39**

From the installed meter at Burrows Farm, and excluding the days where grass cutting occurred, the typical daytime levels were 47 dB $L_{Aeq,T}$ and 38 dB $L_{A90,T}$ on weekdays and 43 dB $L_{Aeq,T}$ and 40 dB $L_{A90,T}$ at weekends. The average background level for all days is 39 dB $L_{A90,T}$. There is good correlation between the sample survey results and those from the installed meter at this location.

Table 5.1c: Sample Survey Results at Residential Receptors – Chestnut Lane

Date	Start Time	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB
14/12/2022	13:14	45	39
03/04/2023	09:22	49	44
15/04/2023	09:30	48	39
15/04/2023	10:48	67	36
12/05/2023	10:08	51	42
23/05/2023	12:53	51	40
28/07/2023	11:40	42	36
11/08/2023	12:40	43	38
Representative levels		**49**	**39**

From the installed meter at Chestnut Lane, and excluding the day where work was undertaken in the tennis court, the typical daytime levels were 48 dB $L_{Aeq,T}$ and 39 dB $L_{A90,T}$ on weekdays and 49 dB $L_{Aeq,T}$ and 39 dB $L_{A90,T}$ at weekends. There is good correlation between the sample survey results and those from the installed meter at this location.

Table 5.1d: Sample Survey Results at Residential Receptors – Lark Hill

Date	Start Time	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB
14/12/2022	11:01	51	48
14/12/2022	14:26	52	49
03/04/2023	14:46	44	40
15/04/2023	08:10	48	44
15/04/2023	11:16	46	42
12/05/2023	07:49	50	46
23/05/2023	12:26	49	39
23/05/2023	15:33	47	42
23/05/2023	17:00	47	44
28/07/2023	09:35	51	47
28/07/2023	09:50	49	46
11/08/2023	15:24	52	49
Representative levels		**48**	**45**

From the installed meter at Lark Hill, the typical daytime levels were 52 dB $L_{Aeq,T}$ and 46 dB $L_{A90,T}$ on weekdays and 51 dB $L_{Aeq,T}$ and 45 dB $L_{A90,T}$ at weekends. There is reasonably good correlation between the sample survey results and those from the installed meter at this location.

Table 5.1e: Sample Survey Results at Residential Receptors – The Strand

Date	Start Time	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB
14/12/2022	10:05	61	40
03/04/2023	07:33	50	46
03/04/2023	15:54	48	38
15/04/2023	12:47	50	37
15/04/2023	13:04	52	37
12/05/2023	11:58	49	41
23/05/2023	11:32	57	38
23/05/2023	11:47	47	38
28/07/2023	15:47	49	38
11/08/2023	09:22	54	40
Representative levels		**49**	**38**

Table 5.1f: Sample Survey Results at Residential Receptors – Todd Close

Date	Start Time	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB
14/12/2022	11:30	60	55
14/12/2022	14:47	60	55
03/04/2023	10:20	57	51
15/04/2023	08:32	57	51
15/04/2023	12:06	57	51
12/05/2023	07:29	60	56
12/05/2023	12:56	59	54
23/05/2023	15:55	58	53
23/05/2023	17:20	58	53
Representative levels		**57**	**51**

Table 5.1g: Sample Survey Results at Residential Receptors – Trentside

Date	Start Time	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB
14/12/2022	12:02	43	41
14/12/2022	12:19	44	41
03/04/2023	08:29	49	44
15/04/2023	07:33	50	44
15/04/2023	10:17	48	43
12/05/2023	08:24	50	44
23/05/2023	14:14	60	39
23/05/2023	14:30	44	39
28/07/2023	14:09	43	39
11/08/2023	14:14	46	42
Representative levels		**43**	**39**

A summary of the representative daytime background levels ($L_{A90,T}$) for all residential receptors is presented overleaf.

Table 5.2: Representative Daytime Levels at Residential Receptors

Receptors	Representative Ambient Level $L_{Aeq,15min}$ dB	Representative Background Level $L_{A90,15min}$ dB
Barbury Drive	49	40
Burrows Farm	44	39
Chestnut Lane	49	39
Lark Hill	48	45
The Strand	49	38
Todd Close	57	51
Trentside	43	39

Evening and night-time levels were measured at the three locations where a sound level meter was installed. The average background level and typical lowest night-time background levels are presented below.

Table 5.3: Evening and Night-time Background Levels at Residential Receptors

Installed Sound Level Meter Location	Average Background Level $L_{A90,T}$ dB		Typical Lowest Background Level at Night dB $L_{A90,T}$
	Evening	Night	
Burrows Farm	37	33	29
Chestnut Lane	37	34	29
Lark Hill	43*	40	37
* corrected to freefield levels			

A summary of the baseline noise survey results at other locations i.e. ecological receptors and permitted housing developments is tabulated below.

Table 5.4: Measured Noise Levels at other Receptors

Other Receptor	Date	Start Time	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB
Attenborough Nature Reserve	28/07/2023	16:15	47	36
	28/07/2023	16:31	44	36
	11/08/2023	09:46	43	38
	Average Levels		**45**	**37**

Other Receptor	Date	Start Time	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB
Brandshill Wood North	28/07/2023	13:31	38	34
	11/08/2023	13:38	41	37
	Average Levels		**39**	**35**
Brandshill Wood South	28/07/2023	12:10	46	44
	11/08/2023	12:14	47	43
	Average Levels		**46**	**43**
Clifton Woods	28/07/2023	13:05	41	38
	11/08/2023	14:45	45	40
	Average Levels		**43**	**39**
Mill Hill Spinney	28/07/2023	11:12	55	49
	11/08/2023	11:46	57	49
	Average Levels		**56**	**49**
Permitted Residential (Yew Tree Lane)	28/07/2023	14:53	45	38
	11/08/2023	10:36	48	41
	Average Levels		**47**	**40**
Permitted Residential (Nottingham Gateway / Fairham)	28/07/2023	10:48	53	49
	11/08/2023	11:23	54	47
	Average Levels		**53**	**48**

5.3 Previous Noise Surveys

Baseline noise levels were measured by Vibrock in 2015, to support a previous planning application for the quarry. The baseline noise levels were measured between 10.00-14.00 hours on 23 September 2015 and 15 October 2015. The previous results were as follows:

Table 5.5: Measured Noise Levels at other Receptors

Receptors	Average Ambient Level $L_{Aeq,15min}$ dB	Average Background Level $L_{A90,15min}$ dB
Barbury Drive	51	45
Burrows Farm	51	41
Chestnut Lane	47	40
The Strand	56	36
Todd Close	58	50

Note that noise levels were not obtained at Lark Hill or Trentside.

The Vibrock background noise levels from 2015 are generally within 2 dB of those measured by WBM in 2022 / 2023, with the exception of Barbury Drive, where the previous data is 5 dB higher than the representative background.

6 Suggested Noise Limits

6.1 Residential Receptors

Paragraph 21 of the Planning Practice Guidance states:

"***What are the appropriate noise standards for mineral operators for normal operations?***

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 (0700-1900). 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 operations during the evening (1900-2200) the noise limits should not exceed the background noise level (LA90,1h) by more than 10dB(A) and 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.

Where the site noise has a significant tonal element, it may be appropriate to set specific limits to control this aspect. Peak or impulsive noise, which may include some reversing bleepers, may also require separate limits that are independent of background noise (e.g. Lmax in specific octave or third-octave frequency bands – and that should not be allowed to occur regularly at night.)

Care should be taken, however, to avoid any of these suggested values being implemented as fixed thresholds as specific circumstances may justify some small variation being allowed."

The suggested site noise limits for the ongoing (routine / normal) operations during the day are based on the above guidance for minerals sites:

Table 6.1: Suggested Daytime Noise Limits (Normal Operations)

Location	Representative Daytime Background Sound Level dB $L_{A90,\ 15min}$	Suggested Site Noise Limit dB $L_{Aeq,1h}$ (free field)
Barbury Drive	40	50
Burrows Farm	39	49
Chestnut Lane	39	49
Lark Hill	45	55
The Strand	38	48
Todd Close	51	55
Trentside	39	49

The above suggested site noise limits apply to normal operations during the day. For temporary operations, i.e. those from short-term noise operations such as bund formation, a limit of 70 dB $L_{Aeq,1h}$ would apply to all residential receptors.

Outside normal daytime hours, the only operations that occur are the use of dewatering pumps, which will operate overnight. Noise limits at night should be set that minimise any adverse impacts (upper limit of 42 dB), without imposing unreasonable burdens on the mineral operator.

The typical lowest background levels at night were 29 dB $L_{A90,T}$ at Burrows Farm and Chestnut Lane, and 37 dB $L_{A90,T}$ at Lark Hill. It is suggested that the following night-time limits should be applied, which are based on being 10 dB above the typical lowest background with an upper limit of 42 dB $L_{Aeq,1h}$.

Table 6.2: Suggested Night-time Noise Limit

Position	Typical Lowest Night-time Background Sound Level dB $L_{A90,\ 15min}$	Suggested Night Noise Limit dB $L_{Aeq,1h}$ (free field)
Barbury Drive	(29)	39
Burrows Farm	29	39
Chestnut Lane	29	39
Lark Hill	37	42
The Strand	(29)	39
Todd Close	(37)	42
Trentside	(29)	39

The background level at Lark Hill is consider representative for Todd Close and the background levels at Burrows Farm and Chestnut Lane are considered representative for Barbury Drive, The Strand and Trentside.

6.2 Permitted Residential Development

For the permitted residential site to the north of the proposed quarry (Yew Tree Lane), the average background level is 40 dB $L_{A90,T}$. As such, the suggested daytime site noise limit for normal operations for these dwellings would be 50 dB $L_{Aeq,1h}$.

For the large permitted residential site to the east of the proposed quarry (Nottingham Gateway, also known as Fairham), the average background level is 48 dB $L_{A90,T}$. As such, the suggested daytime site noise limit for normal operations for this development would be 55 dB $L_{Aeq,1h}$.

6.3 Ecological Receptors

There is no guidance in PPGM for suitable noise limits for ecological receptors.

For the various consultations associated with the previous application and assessment undertaken for the quarry, Nottinghamshire County Council Conservation Team advised that the use of 55 dB(A) as a noise limit has been found to be acceptable elsewhere in Nottinghamshire (October 2021).

It is proposed that this limit is maintained for this noise assessment. This was discussed and agreed with the ecology consultant for this ES.

6.4 Footpaths

Noise along footpaths / public rights of way are not covered by the noise guidance set out in the PPGM. There is little guidance on specific or relative noise levels that are appropriate for these types of receptors.

7 Calculation of Site Noise Levels

7.1 Noise Calculation Methodology

The Equivalent Continuous Noise Level, $L_{Aeq,T}$, is the preferred unit for assessing noise sources. It is the value of a continuous level that would have equivalent energy to the continuously varying noise over the specified period "T". This unit is recommended internationally for the description of environmental noise and is in general use. It is the chosen unit of BS 5228 for Construction and Open site noise; Planning Practice Guidance to the National Planning Policy Framework and BS 7445 for the Description and Measurement of Environmental noise.

The noise levels likely to arise at dwellings depend on the method of working and the sound power levels of the plant chosen to work a site as much as on the distance to the properties and the effects of intervening ground. Proper allowance can be made for these variables in order to calculate site noise levels.

The Planning Practice Guidance for the NPPF in paragraph 19 states those making development proposals should consider "*estimating the likely future noise from the development and its impact on the neighbourhood of the proposed operations*".

The Planning Practice Guidance published in March 2014 does not contain details of noise prediction methods and in the absence of detailed guidance in the NPPF, the calculations in this report are based on the methods contained in ISO 9613-2:1996 "Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation".

Site noise calculations of the mineral extraction, progressive restoration, operations on the plant site, use of the conveyor, site dewatering and associated mobile plant/HGV movements were undertaken using SoundPLAN noise mapping software.

Digital ground models (DGMs) were created of each of the phases using local ground heights to cover the area including both the site and the nearest residential and ecological receptors in the vicinity of the site.

The following phases for routine site operations (07:00 to 18:00 hours) were modelled:

- Initial works;
- Phase 1;
- Phase 2;
- Phase 3;
- Phase 4; and
- Final Restoration.

Two models were created for each phase of routine operations prior to restoration with the operations in the mineral extraction area modelled both at the top of the mineral deposit (highest point of working) and also at the base of the deposit (lowest point of working).

Additional scenarios were modelled for out of hours (18:00 to 07:00 hours) dewatering operations for the consideration of night-time site noise levels.

The calculations were undertaken as a worst case scenario with the operations of all plant taking place for 100% of the assessment period apart from the loading shovel at the plant site which was evenly split between the plant, the end of the conveyor and the stockpile areas (25% each with movement of the loading shovel also included at a rate of 4 movements per hour). Dump truck movements in the mineral extraction area were included as being between 6 and 12 movements per hour depending on the distance between the working area and the mobile field hopper.

It is expected that there would normally be up to 10 HGVs coming into/leaving the site during a typical hour, so HGV movements on the access road and within the plant site have been included as 10 one-way movements per hour.

The calculations include areas of 100% soft ground (fields, woods, grassed, bare ground) and 100% hard ground (roads, residential areas, commercial/industrial areas, water) based on a visual interpretation of the ground type from aerial photographs.

The sound power level data and assumptions used for the SoundPLAN noise model are presented in Appendix N. The SoundPLAN noise contour plots covering the assessment area are presented in Appendix O.

7.2 Calculated Site Noise Levels – Residential Receptors

Routine Operations

Site noise levels for the proposed site routine operations (with operations in the extraction area at the top of the mineral) during each phase are presented in the following table for comparison with the suggested site noise limits.

The calculations include the mobile plant items (excavator/dump trucks) working close to the boundary of each phase to represent the closest working location to the nearest assessment locations. The dozer for restoration is located in the model as being in the previously worked area in that phase, i.e. at the other end of the phase to mineral extraction.

The extraction heights used (top of the mineral with the soils and overburden removed) represent a worst case scenario for the calculated site noise levels as when the depth of working increases, there is the potential for greater noise attenuation from the working face of the quarry/topography benefitting the receiver locations.

For informative purposes the plant items included in each scenario are tabulated in Appendix N which details the noise mapping assumptions.

Table 7.1: Calculated Site Noise Levels – Routine Operations (highest ground level)

Location	Calculated Site Noise Levels – Routine Operations (highest ground level) dB $L_{Aeq,1h}$ (free field)						Suggested Site Noise Limit dB $L_{Aeq,1h,}$ (free field)
	Initial Works	Phase 1	Phase 2	Phase 3	Phase 4	Final Restoration	
Barbury Drive	36	36	36	36	36	37	50
Burrows Farm	46	47	46	46	46	39	49
Chestnut Lane	29	32	37	35	33	26	49
Lark Hill	32	32	31	32	33	33	55
The Strand	35	36	38	37	41	27	48
Todd Close	38	38	38	38	38	38	55
Trentside	35	37	36	37	40	29	49

The calculated site noise levels (highest ground level / top of mineral) are below the suggested site noise limits for routine site operations at all the receiver locations considered.

For completeness and to illustrate the range of site noise levels as the operations progress, the site noise levels for the proposed site operations (with operations in the extraction area at the base of the mineral) during each phase are presented in the following table.

Table 7.2: Calculated Site Noise Levels – Routine Operations (base of mineral)

Location	Calculated Site Noise Levels – Routine Operations (base of mineral) dB $L_{Aeq,1h}$ (free field)					Suggested Site Noise Limit dB $L_{Aeq,1h}$ (free field)
	Initial Works	Phase 1	Phase 2	Phase 3	Phase 4	
Barbury Drive	36	36	36	36	36	50
Burrows Farm	46	46	46	46	46	49
Chestnut Lane	28	31	36	35	31	49
Lark Hill	32	32	31	32	33	55
The Strand	35	36	36	37	38	48
Todd Close	38	38	38	38	38	55
Trentside	35	36	35	36	38	49

The calculated site noise levels (base of mineral) are below the suggested site noise limits for routine site operations at all the receiver locations considered.

Temporary Operations

Activities such as soil-stripping, the construction and removal of soil storage mounds and spoil heaps, construction of new permanent landforms and aspects of site road construction and maintenance, as noted in Paragraph 022 of the PPGM, can be regarded as temporary operations.

Paragraph 022 Reference ID: 27-022-20140306 states:

"*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*."

For 'temporary' operations Paragraph 22 Reference ID: 27-022-20140306 states:

"***What type of operations may give rise to particularly noisy short-term activities and what noise limits may be appropriate?***

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."

The highest calculated site noise levels ($L_{Aeq,1h}$) expected from the closest temporary operations in the proposed working areas, with one set of equipment as included in the noise model for temporary operations in each phase, are shown in the following table.

Table 7.3: Calculated Site Noise Levels (Temporary Operations)

Location	Calculated Site Noise Level Temporary Operations (at existing ground height) dB $L_{Aeq,1h}$ (free field)	Suggested Site Noise Limit dB $L_{Aeq,1h}$ (free field)
Barbury Drive	36(*)	70
Burrows Farm	47(*)	
Chestnut Lane	42	
Lark Hill	33	
The Strand	41	
Todd Close	38(*)	
Trentside	42	

(*) Where the calculated site noise level for temporary operations is less than the highest calculated site noise level for routine operations, the latter figure is presented.

The calculated site noise levels are below the suggested site noise limit for temporary operations and also the suggested site noise limits for routine operations at all the assessment locations considered.

Out of Hours/Night-time Dewatering Operations

There will be a need to dewater the extraction/restoration area overnight. This will involve the use of dewatering pumps (with associated diesel generator) at various points within the site including at the lagoons on the plant site and near the mobile field hopper as well as those for the extraction/restoration areas.

Calculations were also made of the out of hours dewatering operations to consider the night-time noise levels at the residential receptors.

Planning Practice Guidance (Minerals) provides the following advice regarding operations outside the daytime (07:00 to 19:00 hours) period in Paragraph 021:

"For operations during the evening (1900-2200) the noise limits should not exceed the background noise level (LA90,1h) by more than 10dB(A) and 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."

The following table presents the highest calculated dewatering noise levels (for all phases) at the residential receptors for comparison with the suggested site noise limits for night-time. The suggested night-time limit is based on the typically lowest background sound levels obtained from the nearest of the three installed sound level meters.

Table 7.4: Calculated Night-time Site Noise Levels (Dewatering)

Location	Calculated Site Noise Level Out of Hours Dewatering dB $L_{Aeq,1h}$ (free field)	Suggested Night Noise Limit dB $L_{Aeq,1h}$ (free field)
Barbury Drive	19	39
Burrows Farm	27	39
Chestnut Lane	21	39
Lark Hill	19	42
The Strand	21	39
Todd Close	22	42
Trentside	18	39

The calculated site noise levels for out of hours dewatering of the site are well below the suggested site noise limits for the night-time periods and are also below the typical lowest night time background sound level obtained from the baseline noise survey data.

8 Likely Significant Environmental Effects

8.1 Operational Phase (Extraction, Processing & Progressive Restoration)

Site noise limits have been suggested in line with the provisions of the web document "*Planning Practice Guidance*" for Minerals based on the representative background sound levels determined from the data gathered during the baseline noise surveys between December 2022 and August 2023.

Site noise calculations have been undertaken for the seven chosen assessment locations representative of the nearest residential receptors to the site.

A comparison of the highest calculated noise levels (for any of the phases of the development) at the nearest dwellings for routine operations on site with the suggested site noise limits along with an assessment of impact is shown in the following table. The calculated site noise levels and the suggested site noise limits in the tables below are all in terms of dB $L_{Aeq,1h\ (free\ field)}$.

Table 8.1: Calculated Site Noise Levels (Routine Operations – Highest Noise Levels)

Location	Receptor Sensitivity	Calculated Site Noise Level	Suggested Site Noise Limit	Complies with Noise Limit (Y/N)	Magnitude of Impact	Significance of Impact
		dB $L_{Aeq,1h\ (freefield)}$				
Barbury Drive	High	36	50	Y	Moderate/ Minor	Good standard of amenity
Burrows Farm	High	47	49	Y	Moderate/ Minor	Good standard of amenity
Chestnut Lane	High	37	49	Y	Moderate/ Minor	Good standard of amenity
Lark Hill	High	33	55	Y	Moderate/ Minor	Good standard of amenity
The Strand	High	41	48	Y	Moderate/ Minor	Good standard of amenity
Todd Close	High	38	55	Y	Moderate/ Minor	Good standard of amenity
Trentside	High	40	49	Y	Moderate/ Minor	Good standard of amenity

The calculated site noise levels for routine site operations comply with the suggested site noise limits at all of the assessment locations.

As all the receptors considered are of high sensitivity and the calculated site noise levels comply with the suggested site noise limits at all the assessment locations, i.e. the calculated site noise levels are less than the representative background noise levels plus 10 dB(A) and therefore represent a slight impact, it is considered that the impact at all the receiver locations is identified as being "*Moderate/Minor*" and that a good standard of amenity can be achieved.

As stated in Section 4.5, the Impact Magnitudes defined as "*slight*", "*moderate*" and "*substantial*" correspond to the NOAEL, LOAEL and SOAEL referred to in the Explanatory Note to the Noise Policy Statement for England (NPSE) and referenced in Section 2.1.

As the magnitude of impact has been identified as being "*Slight*" at all receiver locations, the calculated site noise levels at all the assessment locations demonstrates that site noise is below the lowest observed adverse effect level (LOAEL) and well below the significant observed adverse effect level (SOAEL).

As only those impacts identified as having a significant effect would have been taken forward for further consideration of additional mitigation measures, there is no significant residual impact with regard to noise. Additional mitigation has therefore not been considered.

At a distance, noise from machinery used at mineral workings does not usually contain a distinguishable tone nor does it tend to be impulsive. The use of reversing bleepers on site plant is a separate matter. Where reversing sirens or bleepers are used on mobile site plant and could give rise to noise problems, the use of quieter or silent types of alarm or warning devices that are more environmentally acceptable should be explored and is recommended. White noise reversing alarms are generally considered best practice over tonal alarms.

8.2 Temporary Operations (Site Preparation and Final Restoration)

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, as noted in Paragraph 022 of the PPGM, can be regarded as temporary operations.

The highest calculated site noise levels expected from the closest temporary operations on the proposed site, with one set of equipment as included in the noise model, are presented in the following table with a consideration of the magnitude and significance of impact.

Table 8.2: Calculated Site Noise Levels (Temporary Operations)

Location	Receptor Sensitivity	Calculated Site Noise Level	Suggested Site Noise Limit	Complies with Noise Limit (Y/N)	Magnitude of Impact	Significance of Impact
		dB $L_{Aeq,1h}$ (free field)				
Barbury Drive	High	36	70	Y	Moderate/ Minor	Good standard of amenity
Burrows Farm	High	47	70	Y	Moderate/ Minor	Good standard of amenity
Chestnut Lane	High	42	70	Y	Moderate/ Minor	Good standard of amenity
Lark Hill	High	33	70	Y	Moderate/ Minor	Good standard of amenity
The Strand	High	41	70	Y	Moderate/ Minor	Good standard of amenity
Todd Close	High	38	70	Y	Moderate/ Minor	Good standard of amenity
Trentside	High	42	70	Y	Moderate/ Minor	Good standard of amenity

Note: where the calculated site noise level for routine operations is greater than that calculated for temporary operations, the higher figure is presented.

The proposals comply with a 70 dB $L_{Aeq,1h\ (free\ field)}$ noise limit for temporary works in line with current Government guidance.

As the calculated site noise levels for the temporary operations such as soils stripping and final restoration also comply with the suggested noise limits for routine operations at all the locations considered, there is no indication of an adverse impact during these works.

8.3 Out of Hours Operations

The routine and temporary operations on the site will be restricted to the proposed daytime working hours (i.e. Monday to Friday 07:00-18:00 and Saturdays 07:00-13:00), but there will be a need to dewater the extraction/restoration area overnight.

The highest $L_{Aeq,T}$ noise levels expected from the out of hours dewatering operations on the site are presented in the following table with a consideration of the magnitude and significance of impact. Note that for the purpose of assessing the worst case noise impact of the dewatering operations, the night-time period (23:00 to 07:00 hours) is considered rather than the evening period (19:00 to 23:00 hours), which would be subject to the same calculated site noise levels, but has a higher suggested site noise limit for out of hours operations due to higher background sound levels during the evening than at night-time.

Table 8.3: Calculated Site Noise Levels (Out of Hours Operations)

Location	Receptor Sensitivity	Calculated Site Noise Level	Suggested Night Noise Limit	Complies with Noise Limit (Y/N)	Magnitude of Impact	Significance of Impact
		dB $L_{Aeq,1h}$ (free field)				
Barbury Drive	High	19	39	Y	Moderate/ Minor	Good standard of amenity
Burrows Farm	High	27	39	Y	Moderate/ Minor	Good standard of amenity
Chestnut Lane	High	21	39	Y	Moderate/ Minor	Good standard of amenity
Lark Hill	High	19	42	Y	Moderate/ Minor	Good standard of amenity
The Strand	High	21	39	Y	Moderate/ Minor	Good standard of amenity
Todd Close	High	22	42	Y	Moderate/ Minor	Good standard of amenity
Trentside	High	18	39	Y	Moderate/ Minor	Good standard of amenity

As the calculated site noise levels due to the night-time dewatering operations on the site comply with the suggested site noise limit for this activity, it has been demonstrated that a good standard of amenity can be retained at the nearest dwellings to the site,

8.4 Embedded Mitigation

Some features have been incorporated into the site design that will act as noise mitigation measures as follows:

- There is to be a bund located to the north of the conveyor;
- There is to be an assimilated landform to the south of the plant site and a temporary internal soils storage landform;
- The ground height of the plant site will be lowered prior to the plant being installed; and
- The existing flood defence along the southern boundary of the extraction area is also included in the Digital Ground Model .

No additional specific mitigation measures or bunding are proposed.

8.5 Post-Restoration

There will be no noise generating activity related to mineral workings post-restoration.

9 Assessment of Cumulative Impacts

The cumulative impacts from other sites in the vicinity are set out below.

9.1 Yew Tree Lane, Nottingham

This application refers to a residential development on land between Clifton Wood and Clifton Phase 4 Development, Yew Tree Lane, Nottingham. This site is immediately adjacent to existing residential properties on the eastern side of the proposed development.

There are two application references for this site with Nottingham City Council.

18/00056/POUT (approved Dec 2020) is for outline planning permission for residential with all matters reserved except access. This permission contains a condition (6) that required details of a Construction Management Plan to be submitted, including measures taken to reduce noise and distance to neighbouring properties. Another condition (10) requires submission of the Construction Environmental Management Plan to protect Clifton Woods from various impacts including construction noise. Information no. 5 sets times that construction work (and noise operations) can occur.

23/00674/PRES4 is an application for the approval of reserved matters for 265 dwellings, submitted April 2023. There does not appear to be a Construction Management Plan or Construction Environmental Management Plan submitted with the documents. Noise from construction has not been considered.

The nearest part of the permitted residential development is over 350m from the proposed quarry.

The nearest receptor location to the Yew Tree Lane development is Burrows Farm.

The only noise emissions from this site will be during the construction phase, which is temporary and should be controlled to suitable noise levels at the existing adjacent residential properties, which are closer than Burrows Farm. Condition 10 of 18/00056/POUT also requires protection of Clifton Woods. Therefore there should not be any long-term noise impact from this site.

The impact of the proposed quarry noise on this permitted residential development is considered in Section 10.2.

9.2 Nottingham Gateway (Fairham), South of Clifton

This is a large urban extension, immediately to the south of Clifton, Nottingham comprising up to 3000 dwellings and commercial/industrial buildings. Outline permission was granted under application reference 14/01417/OU, and there does not appear to be any conditions regarding noise.

The large development is the Nottingham Gateway, also known as Fairham. The Fairham Business Park is located to east of the A453, presumably to act as a buffer to the residential area (located to the south of Clifton, Nottingham) from traffic noise from the A453. The Fairham Business Park also provides a buffer from the proposed quarry to the residential areas. The nearest proposed residential area is at least 400m from the proposed quarry.

The only noise emissions from this site will be during the construction stages of the business park and residential phases. Construction noise is temporary and should be controlled to suitable noise levels at the existing adjacent residential properties, some of which will be closer to the construction works than the receptors for the proposed quarry. The Nottingham Gateway / Fairham site is currently under construction with several of the large business park buildings already built.

There should not be any long-term impact from this site.

The impact of the proposed quarry noise on this permitted residential development is considered in section 10.2.

9.3 Ratcliffe Power Station

A Local Development Order (LDO) has been granted by Rushcliffe Borough Council in July 2023 for development of the Ratcliffe on Soar Power Station under 22/01339/LDO. A request for a Scoping Opinion has also been made for mineral extraction to occur at the site prior to the development works at the power station (SC/4569)

The site is over 3km from the proposed quarry and 2.5km from the nearest receptor location in Barton Fabis. The noise assessment for the LDO considered receptors around the power station site. The noise assessment for the mineral extraction is yet to be undertaken.

Due to the distance from any of the properties potentially impacted by the proposed quarry considered in this assessment, the noise from the mineral extraction and the power station development is very likely to be insignificant at the noise sensitive receptors included in this assessment.

9.4 Cumulative Impacts Summary

Although there may be some short-term impact from construction noise affecting some receptors associated with the construction of the developments at Yew Tree Lane and Nottingham Gateway (Fairham), there should not be any long-term impact from these sites. Therefore there is no cumulative noise impact.

10 Other Receptors

10.1 Ecological Receptors

The noise levels affecting Attenborough Nature Reserve, Brandshill Wood, Clifton Wood and Mill Hill Spinney are considered in this section. The average measured daytime noise levels at these receptors are summarised below.

Table 10.1: Measured Noise Levels at Ecological Receptors

Ecological Receptor	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB
Attenborough Nature Reserve	45	37
Brandshill Wood North	39	35
Brandshill Wood South	46	43
Clifton Woods	43	39
Mill Hill Spinney	56	49

Mill Hill Spinney is located near to Green Street and the A453, and as such is exposed to higher levels of road traffic noise than the other receptors.

As indicated previously in this report, these receptors are considered to be of medium sensitivity. There are no established noise thresholds for noise impacts from minerals operations on wildlife, and any noise impact on human visitors to these areas will be of a transient nature, similar to a public footpath.

Based on previous guidance from Nottinghamshire County Council Conservation Team, it is proposed that a limit of 55 dB $L_{Aeq,1h\ (free\ field)}$ be adopted for the ecological receptors.

These ecological receptors are all covered by the SoundPLAN noise contour plots presented in Appendix O. The highest calculated site noise levels at those ecological receptors for routine site operations is presented in the following table, for both daytime and night-time.

Table 10.2: Calculated Site Noise Level (Routine Operations) at Ecological Receptors

Ecological Receptor	Calculated Site Noise Level, dB $L_{Aeq,1h\ (free\ field)}$	
	Daytime	Night-time
Attenborough Nature Reserve	<52	<27
Brandshill Wood	≤52	<34
Clifton Wood	≤46	<34
Mill Hill Spinney	≤55	<34

The calculations show that at all nearby ecological receptors, the site noise levels for routine operations will be equal to or (in most cases) significantly below the proposed noise limit of 55 dB $L_{Aeq,1h\ (freefield)}$. Additional mitigation has therefore not been considered.

With regard to the temporary operations on site such as soil stripping, landforming or final restoration work, the highest calculated site noise levels due to these operations (calculated at the nearest point to each ecological receptor) are as follows:

Table 10.3: Calculated Site Noise Level (Temporary Operations) at Ecological Receptors

Ecological Receptor	Highest Calculated Noise Level, dB $L_{Aeq,1h\ (free\ field)}$
	Temporary Operations (Daytime Only)
Attenborough Nature Reserve	52
Brandshill Wood	46
Clifton Wood	46
Mill Hill Spinney	38

In terms of external amenity for visitors to these ecological sites, the receptor sensitivity is considered to be 'medium', similar to a public footpath. As the receptor sensitivity is 'medium' and calculated noise levels will be equal to or significantly below the recommended noise limit (having a 'slight' impact magnitude) the significance of effect is 'minor'. It is concluded that a good standard of amenity will be retained for users of the ecological sites.

10.2 Permitted Residential Development

Nottingham Gateway (Fairham) Development

The calculated site noise levels across the permitted residential development area, for the worst case scenario of mobile plant operating at the top of the mineral (i.e. highest elevation of working) range from 25 to 40 dB $L_{Aeq,1h\ (free\ field)}$ during routine daytime operations.

The suggested site noise limit for normal operations for this development would be 55 dB $L_{Aeq,1h}$ during the day. The calculated daytime site noise levels are well below the suggested site noise limit.

At night, the calculated site noise levels across the permitted residential development range from 11 to 22 dB $L_{Aeq,1h\ (free\ field)}$ when out of hours dewatering operations are considered.

The suggested site noise limits for other receptors affected by quarry noise are 42 dB $L_{Aeq,1h\ (free\ field)}$ for Lark Hill and Todd Close, i.e. receptors that are most affected by traffic noise from the A453. For the other receptors, the suggested night-time limit is 39 dB $L_{Aeq,1h\ (free\ field)}$.

The calculated night-time site noise levels are well below the suggested site noise limits and below the typical lowest measured background sound levels.

Therefore it is considered that there will be a good standard of amenity at this proposed development with regard to site noise from the quarry.

Yew Tree Lane Development:

The calculated site noise levels across the permitted residential development area, for the worst case scenario of mobile plant operating at the top of the mineral (i.e. highest elevation of working) range from 27 to 45 dB $L_{Aeq,1h\ (free\ field)}$ during routine daytime operations.

The suggested site noise limit for normal operations for this development would be 50 dB $L_{Aeq,1h}$ during the day. The calculated daytime site noise levels are below the suggested site noise limit.

At night, the calculated site noise levels across the permitted residential development range from 13 to 22 dB $L_{Aeq,1h\ (free\ field)}$ when out of hours dewatering operations are considered.

The suggested site noise limits for other receptors affected by quarry noise are 42 dB $L_{Aeq,1h\ (free\ field)}$ for Lark Hill and Todd Close, i.e. receptors that are most affected by traffic noise from the A453. For the other receptors, the suggested night-time limit is 39 dB $L_{Aeq,1h\ (free\ field)}$.

The calculated night-time site noise levels are well below the suggested site noise limits and below the typical lowest measured background sound levels.

Therefore it is considered that there will be a good standard of amenity at this proposed development with regard to site noise from the quarry.

10.3 Consideration of Other Receptors

In the consultation response concerns were raised about users of the River Trent and associated footpaths, and Clifton Hall.

River Trent and Footpaths

There are footpaths around the area, including within or adjacent to the ecological receptors considered in Section 10.1.

From the noise mapping plots presented in Appendix O, it appears that the River Trent in the vicinity of the quarry would be exposed to up to 55 dB $L_{Aeq,1h\ (free\ field)}$. The highest noise levels occur when site operations are closest to the river, In Phase 3 and 4.

Noise along the river, footpaths and other rights of way are not covered by the noise guidance set out in PPGM. There is little guidance on specific or relative noise levels that are appropriate for these types of receptors. However, 55 dB $L_{Aeq,1h\ (free\ field)}$ is the upper daytime limit provided in PPGM for residential receptors, and is used as the limit for ecological receptors in this assessment.

The highest site noise levels experienced by members of the public using the river or footpaths would be experienced only for a brief period of time when the person is at the closest possible approach to the site operations. As the person travels along the right of way, the site noise level should reduce as the distance from the site operations increases.

Users of footpaths and the river will have transitory use. Footpath and river user receptors are considered to have “medium” sensitivity and as users will not be exposed to site noise for long periods, any adverse noise effects are considered not significant for transitory use.

Clifton Hall

Clifton Hall is a Grade II listed historic house and garden, open to the public but understood to have some residential use. It is located over 800m to the north of the quarry site, and is to the north of the permitted Yew Tree Lane Development. From review of the noise contours in Appendix O, the estimated site noise levels from routine operations would be ≤34 dB $L_{Aeq,1h\ (free\ field)}$ during the day and ≤15 dB $L_{Aeq,1h\ (free\ field)}$ at night.

Baseline noise was not measured at this receptor. However the estimated site noise is over 10 dB below the lowest noise limit for other residential receptors and is also below the representative baseline background noise determined for other sites.

The impact on this receptor is anticipated to be negligible and not significant.

11 Vibration

A detailed assessment for vibration has not been undertaken as sand and gravel extraction and associated on-site activities would not be expected to give rise to perceptible groundborne vibration at the nearest existing or permitted dwellings.

Vibration arising from machinery on mineral sites is not normally perceptible outside the boundary of the site. Indeed it is rarely perceptible beyond a few metres of working plant and therefore should not be a constraining factor in the development of the site.

Ground borne vibration from site HGVs on highways is sometimes cited as a potential environmental impact but in practice it is only perceptible within a few metres of a very bad pothole and imperceptible on roads complying with the design standards.

Airborne noise from HGV exhausts can sometimes by perceived as vibration by causing loose windows to rattle and in rare cases for suspended floors to vibrate. These effects are perceptible up to about 25 metres from the road. Research by the Transport Research Laboratory has found that people's reaction to vibration arising from HGV movements is very similar to their reaction to HGV noise but is less marked. In other words, people would complain more about the effect of vehicle noise than about any associated vibration.

All HGV vehicles will access the site using the site access off Green Street.

Vibration from the operations such as those that would be occurring on site will not normally be perceptible outside the site boundary and therefore vibration from the site would have no impact on dwellings in the vicinity of the development.

12 Summary and Conclusions

This chapter sets out the findings of baseline noise surveys conducted from December 2022 to August 2023 at positions representative of the nearest noise sensitive receptors to the proposed quarry, ecological receptors and locations of permitted residential development,

The noise implications of the development on existing residential receptors have been assessed by comparing calculated site noise levels with site noise limits suggested in line with current government guidance.

The calculated site noise levels, with embedded mitigation measures, comply with the suggested site noise limits at the residential and other noise sensitive receptors.

The calculated noise levels at residential and other noise sensitive receptors due to normal daytime and night-time operations, and also temporary operations, indicate a good standard of amenity or better and a moderate/minor impact, which is considered to be not significant.

Cumulative noise from other developments have been considered by WBM at the noise sensitive receptors, and this impact assessment is unchanged.

Noise at other receptors (footpaths, River Trent and Clifton Hall) have also been considered and found to be not significant.

In summary, the proposed quarry complies with national and local planning policy regarding noise.

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