



# Great Billing Sand and Gravel Extraction and Restoration

**Environmental Statement**

On behalf of

**anglianwater**

Project Ref: 30755 | Rev: Final | Date: September 2017

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## 9 Noise and Vibration

### 9.1 Introduction

- 9.1.1 This Chapter has been prepared by Wardell Armstrong LLP and reports the likely significant effects of the Proposed Development in terms of Noise and Vibration in the context of the Site and surrounding area. In particular, it considers the likely significant effects of the noise and vibration levels likely to be generated due to the working of the site, transportation of materials and restoration of the site. The calculated levels have been compared against suitable criteria and the potential impacts evaluated.
- 9.1.2 This Chapter (and its associated figures and appendices) is not intended to be read as a standalone assessment and reference should be made to the front end of this ES (Chapters 1 – 5).

### 9.2 Policy Context

#### Control of Pollution Act 1974

- 9.2.1 The Control of Pollution Act 1974 (COPA 1974) gives the local authority power to serve a notice under Section 60 imposing requirements as to the way in which works are to be carried out. This could specify times of operation, maximum levels of noise which should be emitted and the type of plant which should or should not be used. This is a common way of enforcing reasonable levels of construction noise.
- 9.2.2 Contractors may obtain prior consent under Section 61 of COPA 1974. Section 61 enables anyone who intends to carry out works to apply to the local authority for consent. Under Section 61 the local authorities and those responsible for construction work, have an opportunity to settle any problems, relating to the potential noise, before work starts.

#### National Planning Policy Framework

- 9.2.3 In March 2012 the 'National Planning Policy Framework' (NPPF) was introduced as the current planning policy guidance within England. Paragraph 123 of the NPPF states:

*'Planning policies and decisions should aim to:*

- *avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.'*

## Noise Policy Statement for England' (NPSE)

9.2.4 In terms of 'adverse effects' the NPPF refers to the 'Noise Policy Statement for England' (NPSE), which defines three categories, as follows:

*'NOEL – No Observed Effect Level*

- *This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*

*LOAEL – Lowest Observed Adverse Effect Level*

- *This is the level above which adverse effects on health and quality of life can be detected.*

*SOAEL – Significant Observed Adverse Effect Level*

- *This is the level above which significant adverse effects on health and quality of life occur.'*

9.2.5 However, whilst the above terms are provided in NPSE, paragraph 2.22 acknowledges that these terms require further research in order to establish what is meant in terms of 'adverse impact'.

9.2.6 '2.22 It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.'

## National Planning Practice Guidance

The national Planning Practice Guidance, first published in March 2014, is available for mineral sites. In assessing the acceptable noise levels as a consequence of the development, reference should be made to the Planning Practice Guidance on assessing environmental impacts from mineral extraction, paragraph 021:

*'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 beepers, 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.'*

- 9.2.7 The national Planning Practice Guidance also describes circumstances where higher noise limits can be considered for particularly noisy short-term activities that cannot meet the limits set for normal activities Paragraph 22 states that:

*"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."*

### British Standard for Vibration

- 9.2.8 Guidance on the assessment of vibration from development sites is given in British Standard 5228 -2:2009 "Code of Practice for noise and vibration control on construction and open sites – Part 2: Vibration" (BS5228-2).
- 9.2.9 The sensitive receptors most likely to be affected by vibration generated by the earthworks and construction phase works of the development are detailed in **Table 9.5**.
- 9.2.10 It is not possible to mitigate vibration emissions from an open site. It is important therefore to examine the proposed working method to ascertain what, if any, operations would be likely to cause unacceptable levels of vibration at nearby sensitive locations. It is possible that these operations could be modified to reduce their vibration impacts.
- 9.2.11 BS5228-2 2009 indicates that vibration can have disturbing effects on the surrounding neighbourhood; especially where particularly sensitive operations may be taking place. The significance of vibration levels which may be experienced adjacent to a site is dependent upon the nature of the source.
- 9.2.12 Human perception of vibration is extremely sensitive. People can detect and be annoyed by vibration before there is any risk of structural damage. Cases where damage to a building has been attributed to the effects of vibration alone are extremely rare; even when vibration has been considered to be intolerable by the occupants.
- 9.2.13 It is not possible to establish exact vibration damage thresholds that may be applied in all situations. The likelihood of vibration induced damage or nuisance will depend upon the nature of the source, the characteristics of the intervening solid and drift geology and the response pattern of the structures around the site. Most of these variables are too complex to quantify accurately and thresholds of damage, or nuisance, are therefore conservative estimates based on a knowledge of engineering.
- 9.2.14 Where ground vibration is of a relatively continuous nature, there is a greater likelihood of structural damage occurring, compared to transient vibration; for example, that caused by transiting vehicles.

- 9.2.15 BS5228-2 indicates that the threshold of perception is generally accepted to be between a peak particle velocity (PPV) of 0.14 and 0.3mm/sec. In an urban situation it is unlikely that such vibration levels would be noticed. The Highways Agency Research Report No. 53 “Ground Vibration caused by Civil Engineering Works” 1986 suggests that, when vibration levels from an unusual source exceed the human threshold of perception, complaints may occur. The onset of complaints due to continuous vibration is probable when the PPV exceeds 3mm/sec.
- 9.2.16 British Standard BS6472: 2008 “Guide to Evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting” (BS6472-1) suggests that adverse comments or complaints due to continuous vibration are rare in residential situations below a PPV of 0.8mm/sec.
- 9.2.17 Continuous vibration is defined as “vibration which continues uninterrupted for either a daytime period of 16 hours or a night-time period of 8 hours”. The proposed earthworks and construction works at the site will not cause continuous vibration as defined in BS6472-1.
- 9.2.18 BS5228-2 2009 suggests that the onset of cosmetic damage is 15mm/sec (15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz for residential or light commercial type buildings).

### Local Planning Policy

- 9.2.19 Northamptonshire County Council Minerals and Waste Local Plan (Adopted October 2014) includes the following policies which refer to noise and vibration:
- 9.2.20 Policy 22: Addressing the impact of proposed minerals and waste development:
- “Proposals for minerals and waste development must demonstrate that the following matters have been considered and addressed:*
- *protecting Northamptonshire’s natural resources and key environmental designations (including heritage assets),*
  - *avoiding and / or minimising potentially adverse impacts to an acceptable level, specifically addressing air emissions (including dust), odour, bioaerosols, noise and vibration, slope stability, vermin and pests, birdstrike, litter, land use conflict and cumulative impact,*
  - *impacts on flood risk as well as the flow and quantity of surface and groundwater,*
  - *ensuring built development is of a design and layout that has regard to its visual appearance in the context of the defining characteristics of the local area,*
  - *ensuring access is sustainable, safe and environmentally acceptable, and*
  - *ensuring that local amenity is protected.*
  - *where applicable a site-specific management plan should be developed to ensure the implementation and maintenance of mitigation measures throughout construction, operation, decommissioning and restoration works.”*
- 9.2.21 Policy 34: Preventing land use conflict
- *“Proposals for new development adjacent or in close proximity to committed or allocated minerals or waste related development (including associated rail head / links, wharfage, minerals storage / processing facilities and sewage treatment works) should only be permitted where it can be demonstrated that it would not adversely affect the continued operation of the facility or prevent or prejudice the use of the site.*

- *Proposals for development considered to be incompatible with committed or allocated minerals or waste development will be required to undertake an assessment of potentially adverse impacts identifying practical measures, including the use of separation areas, for preventing the occurrence (either now or in the future) of land use conflict and potential adverse environmental effects resultant from ongoing occupation and usage (of the proposed development) this may include an assessment of potential impacts including bio-aerosols, odour, noise, dust, etc. The following should be taken into consideration in proposals for incompatible development in determining adequate separation areas:*
  - nature of both the minerals and / or waste development (committed or allocated) and proposed development (including duration),
  - compatibility of the proposed activity with the minerals and / or waste development (committed or allocated),
  - characteristics of any potential adverse environmental effects likely to arise as a result of land use conflict, and
  - any additional measures considered necessary to mitigate potentially adverse impacts.”

9.2.22 The adopted updated local plan also includes the above policies.

## 9.3 Methodology

### Consultation and Scope of Works

9.3.1 A request for a scoping opinion was submitted to Northamptonshire County Council in October 2015 detailing the proposed noise and vibration assessment methodology. The noise survey details and general areas for consideration were agreed by return. The scoping opinion provided by Northamptonshire County Council in January 2016 contained the following response regarding noise:

*“Dust and noise are considered likely to be the most difficult amenity issues to mitigate with regard to this site. It is acknowledged that control measures are proposed but the Environmental Statement (ES) would need to demonstrate that impacts from dust and noise would be mitigated under these proposals. It is suggested that noise and dust management plans should be submitted at the application stage to help address these issues up front.*

*The proposed approach on noise and vibration is generally considered to be appropriate by the Environmental Protection Officers (EHO). The NBC EHO refers to the need to use broadband reversing alarms and the noise management plan should also include a management process to seek to achieve similar alarms on HGV’s delivering waste soils to the site. The off-site nuisance impact of tonal reversing alarms should not be underestimated....*

### Cumulative Impact

*It is considered important that the assessment addresses cumulative impacts on amenity (noise, dust, odour), landscape, biodiversity (including green infrastructure) and highways matters. This assessment should relate to both impacts generated from the subject site and in conjunction with surrounding developments, (existing, approved, proposed and likely) in particular the two permitted quarries at Earls Barton Spinney and land west of Grendon Road, Earls Barton “*

9.3.2 The proposed noise assessment methodology was also discussed and agreed with the Senior Environmental Health Officer at Northampton Borough Council and the Team Leader (Environmental Protection) at Wellingborough Council.



- 9.3.3 The scope of this assessment therefore comprises consideration of terrestrial noise and vibration associated with the proposed sand and gravel extraction at the nearest human receptors the proposed development, i.e. proposed residential areas.

### Noise Survey

- 9.3.4 To establish background noise levels representative of the sensitive receptors located in the vicinity of the site, Wardell Armstrong carried out daytime noise surveys at locations agreed with the Local Authorities. The noise surveys were carried out over the daytime period to include the proposed hours of operation of the site.

### Assessment Criteria

- 9.3.5 The extraction and restoration phases of the development will generate additional traffic movements on the existing road network. These additional vehicle movements have the potential to increase road traffic noise levels at existing receptors located adjacent to the main routes to and from the development.
- 9.3.6 The future traffic noise levels at a number of sensitive receptors; both with and without the development in place, have been predicted using the calculation procedures set out in the Department of Transport's memorandum, "Calculation of Road Traffic Noise" (CRTN), 1988. The memorandum was prepared to enable entitlement under the Noise Insulation Regulations 1975 to be determined; but it is stated in the document, that the guidance is equally appropriate for the calculation of traffic noise for land use planning purposes.
- 9.3.7 The procedures outlined in CRTN assume typical traffic and noise propagation conditions that are consistent with moderately adverse wind velocities and directions during specified periods. In CRTN, all noise levels can be expressed in terms of the index  $L_{10(18\text{ hour})}$  dB(A).
- 9.3.8 For this noise assessment, CRTN has been used to determine the noise levels at each existing sensitive receptor, for a total of 2 scenarios:
- Scenario 1: 2026 – Future Year (Without Development); and
  - Scenario 2: 2026 – Future Year (With Development).
- 9.3.9 The traffic information for the development has been derived from the work undertaken by Cannon Consulting Engineers and has been provided as 18 hour AAWT flows. HGV percentages were also provided.
- 9.3.10 The changes in road traffic noise levels have been assessed against a set of significance criteria. The criteria shown in **Table 9.1** are based upon guidance contained within the Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7, 2011 (DMRB) for the assessment of short term changes in road traffic noise. The criteria do not relate to the actual existing noise levels but only the predicted changes.

Table 9.1: Road Traffic Noise Assessment Significance Criteria

Magnitude of Impact	Criteria for Assessing Short Term Changes in Road Traffic Noise
Major Adverse	> 5.0 dB increase in traffic noise (equating to a clearly perceptible increase in the loudness of noise).
Moderate Adverse	3.0 – 4.9 dB increase in traffic noise (equating to an increase in the loudness of the noise which is at or about the threshold of perception)
Minor Adverse	1.0 – 2.9 dB increase in traffic noise
Negligible	0.1 – 0.9 dB increase in traffic noise.

9.3.11 The significance of an environmental effect is determined by the interaction of magnitude and sensitivity. The criteria used in this assessment are shown in **Tables 9.2 to 9.5**.

Table 9.2: Magnitude of Noise Impact

Magnitude of Noise Impact	Description
Large	Impact resulting in a considerable change in baseline environmental conditions predicted either to cause statutory objectives to be significantly exceeded or to result in severe undesirable/desirable consequences on the receiving environment.
Medium	Impact resulting in a discernible change in baseline environmental conditions predicted either to cause statutory objectives to be marginally exceeded or to result in undesirable/desirable consequences on the receiving environment.
Small	Impact resulting in a discernible change in baseline environmental conditions with undesirable/desirable conditions that can be tolerated
Negligible	No discernible change in the baseline environmental conditions, within margins of error of measurement

9.3.12 The magnitude of vibration impacts have been classified in accordance with **Table 9.3** below;



Table 9.3: Magnitude of Vibration Impact

Magnitude of Vibration Impact	Description
Large	> 10mm per sec. Vibration likely to be intolerable for more than brief exposure. Approaching the level at which cosmetic damage may occur in light structures.
Medium	5mm - 10mm per second. Tolerance less likely even with prior warning and explanation.
Small	1mm – 5mm per second. Complaints are likely, but can be tolerated if prior warning and explanation given.
Negligible	<1mm per second. Below level at which complaints are likely.

Table 9.4: Sensitivity of Receptor

Sensitivity	Receptor Type
High	Receptor/resource has little ability to absorb change without fundamentally altering its present character, or is of international or national importance. For example, hospitals, residential care homes, and internationally and nationally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).
Moderate	Receptors/resource has moderate capacity to absorb change without significantly altering its present character. For example, residential dwellings, offices, schools, and play areas. Locally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).
Low	Receptor/resource is tolerant of change without detriment to its character or is of low or local importance. For example, industrial estates.
Negligible	Receptor/ resource is not sensitive to noise.

9.3.13 The significance of an environmental impact for noise and vibration from each phase of the works is determined by the interaction of magnitude and sensitivity. The Effect Significance Matrix used in this assessment is shown in **Table 9.5**.

Table 9.5: Effect Significance Matrix

Magnitude	Sensitivity			
	High	Moderate	Low	Negligible
Large	Very Substantial	Substantial	Moderate	None
Medium	Substantial	Substantial	Slight/Moderate	None
Small	Moderate	Slight/Moderate	Slight	None
Negligible	None	None	None	None

9.3.14 The potential noise effects associated with the Proposed Development have been assessed in accordance with the above guidance to determine whether noise and vibration impacts occur at receptors. Where likely adverse effects are identified, appropriate mitigation measures are proposed to avoid, reduce or compensate for the adverse effects.

## 9.4 Baseline Conditions

### Desk Study

9.4.1 From Ordnance Survey mapping it is possible to identify 8 sensitive receptors most likely to be affected by noise from the site. These locations are shown on **Figure 9.1** in **Appendix H.1** and in **Table 9.6**.

Table 9.6: Identified Noise Sensitive Locations

Location	Address	Grid references		Approximate distance from site boundary (m)
		Easting	Northing	
ESR 1	Lower Ecton Lane Caravan Park	481870	262258	17
ESR 2	Esso Nene Valley Way	482404	262494	20
ESR 3	96 High Street Ecton	482796	263152	590
ESR 4	22 Pynkeny Close	485101	262947	875
ESR 5	Eden House, 366 Grendon Road	485812	261710	1,400
ESR 6	57 Cogenhoe Mill Caravan Site, Mill Lane	483302	261489	239
ESR 7	21 Crow lane, Little Billing	481465	261811	58
ESR 8	Great Billing WRC	482182	261935	5

9.4.2 An assessment of the change in road traffic noise levels has also been carried out at six existing, sensitive receptor locations. The existing receptor locations (identified as CRTN 1 to CRTN 6) have been chosen along those routes most likely to be affected by traffic associated with the proposed development. Receptors adjacent to affected junctions have been considered. Details of the sensitive receptor locations are given in **Table 9.7** and shown on **Figure 9.2** in **Appendix H.1**.

Table 9.7: Identified Road Traffic Noise Sensitive Locations

CRTN Location	Address	Grid references		Use
		Easting	Northing	
CRTN 1	97 Station Road	481355	262140	Residential
CRTN 2	4 Station End	481376	262256	Residential
CRTN 3	1 Ecton Lane Park	481673	262176	Residential
CRTN 4	8 Crow Lane	481443	261881	Residential
CRTN 5	21 Crow Lane	481465	261810	Residential
CRTN 6	Ecton Brook Primary School, Ecton Brook Road	481816	262465	School

9.4.3 Impacts will also be felt at receptors adjacent to and beyond those listed above. However, impacts at these receptors will be less than at the listed receptors.

### Background noise survey

9.4.4 To establish background noise levels representative of those currently experienced at the chosen sensitive receptor locations 1 to 8, Wardell Armstrong carried out daytime noise surveys on the 14<sup>th</sup> and 15<sup>th</sup> April 2016. The noise surveys were carried out over the daytime period of 0925-1715 hours on a weekday to include the proposed hours of operation of the site.

9.4.5 To provide background noise monitoring data representative of the 8 sensitive locations, monitoring was carried out at 6 locations. The locations are shown on **Figure 9.3** in **Appendix H.1** and summarised in **Table 9.8**.

Table 9.8: Noise Monitoring Locations

Noise Monitoring Location	Description of Location	Representative of sensitive location(s)
ML1	6.5m from Crow Lane, to the west of the site	ESR 7
ML2	Approx 20m from A45 nene Valley Way, to the northwest of the site	ESR 1, ESR 2, ESR 8

Noise Monitoring Location	Description of Location	Representative of sensitive location(s)
ML3	4m from high street, to the north of the site	ESR 3
ML4	3.5m from mill road, at the entrance to the caravan site, to the south of the site	ESR 6
ML5	3.5m from Station Road, to the east of the site	ESR 5
ML6	6m from Pynkeny Close, to the northeast of the site	ESR 4

9.4.6 A-weighted<sup>1</sup> L<sub>90</sub><sup>2</sup> values were recorded for each survey period to provide background noise levels in accordance with the requirements of the Planning Practice Guidance. The A-weighted L<sub>eq</sub><sup>3</sup> values were also recorded for each survey to provide additional information. The measured noise levels are detailed in full in **Appendix H.2**.

9.4.7 The noise measurements were made using a class 1 sound level meter situated on a tripod 1.5 metres above the ground and more than 3 metres from any other reflecting surfaces. The sound level meter and calibrator were in calibration at the time of the survey and the meter was field-calibrated to a reference level of 94 dB at 1 kHz prior to the survey and on completion. The noise monitoring results are summarised in **Table 9.9**.

Table 9.9: Summarised Background Noise Monitoring Results

Location	Average Measured L <sub>eq</sub> dB(A)	Lowest Measured L <sub>90</sub> dB(A)
ML1	71	59
ML2	72	67
ML3	58	47
ML4	53	45
ML5	69	45
ML6	51	46

<sup>1</sup> **A weighting:** An electronic filter in a sound level meter which mimics the frequency response of the human ear, under defined conditions.

<sup>2</sup> **L<sub>90</sub>:** The sound pressure level which is exceeded for over 90% of a given monitoring period.

<sup>3</sup> **L<sub>eq</sub>:** Equivalent continuous sound pressure level – the steady state sound pressure level providing the same amount of acoustic energy as the time varying sound pressure level, for a given reference period.

9.4.8 The most significant sources of noise noted during the attended noise monitoring at each location and the range of noise levels measured are as follows:

- Location 1: Road traffic was the dominant source of noise. Birdsong, was also audible during the noise survey.
- Location 2: Constant road traffic on the A45 and occasional vehicle movements along Lower Ecton Lane were the dominant sources of noise. Birdsong and occasional animal noises were also audible during the noise survey.
- Location 3: Distant road traffic on the A45 and occasional vehicle movements along High Street were the dominant sources of noise. Birdsong and occasional aircraft overflights were also audible during the noise survey.
- Location 4: Distant road traffic on the A45 and occasional vehicle movements along Mill Lane were the dominant sources of noise. Birdsong and occasional aircraft overflights were also audible during the noise survey.
- Location 5: The Earls Barton quarry was the dominant source of noise during the survey. Intermittent road traffic on station road and building work from a nearby premises was also audible during the noise survey.
- Location 6: Road traffic on the A45 was the dominant source of noise. Birdsong, aircraft overflights and occasional distant gunshots were also audible during the noise survey.

9.4.9 Weather conditions during all survey periods were considered appropriate in accordance with the requirements of relevant guidance, with no high wind-speeds or rain that can impact upon noise measurements. The data is therefore considered suitable for use in this noise assessment.

### Noise Criteria

9.4.10 The noise limits for ESR 1 to 8 have been determined using the background noise monitoring data in accordance with the Planning Practice Guidance (minerals). The guidance states that *“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).*

9.4.11 The measured background noise levels at ML 1 to ML 6 were all 45dB(A) or above and therefore the maximum noise limit of 55dB(A) LAeq, 1h will apply to ESR1 to ESR 8.

9.4.12 In addition to the criteria for long term activities consideration needs to be given to short term activities. In accordance with the Planning Practice Guidance (Minerals) examples of short term activities include soil stripping, the construction and removal of baffle mounds, soil storage mounds and spoil heaps, construction of permanent landforms and aspects of site road construction and maintenance. The only short term activities likely to take place are soil stripping and construction of soil storage mounds and the removal of the storage mounds as part of the site restoration.

- 9.4.13 In accordance with Planning Practice Guidance (Minerals) the short term works should be subject to increased temporary daytime noise limits of up to 70dB  $L_{Aeq\ 1h}$  (free field) for periods of up to 8 weeks in a year at the specified noise-sensitive properties.

## 9.5 Potential Effects

### Noise Sources

- 9.5.1 Machinery on open sites generate noise levels that fluctuate due to the mobility of the activities. The degree to which noise propagates to nearby properties is dependent on a number of factors, which include:
- The noise output of sound power level of the plant;
  - The distance to properties;
  - The absorbing or reflecting effect of intervening ground;
  - The effects of any natural or purpose built screening;
  - The duration of activities on site.
- 9.5.2 The main sources of noise at the site will be associated with the stripping of topsoil, extraction and transportation of sand and gravel and restoration of the worked phases along with the processing of materials at the processing and concrete plants.
- 9.5.3 Within the plant area there will be two wheeled loaders for material management, including vehicle loading and loading the concrete plant.
- 9.5.4 Day to day excavation will be by a hydraulic excavator that will load to articulated dump trucks. It is expected that there will be two to three articulated dump trucks used to transport material.
- 9.5.5 Excavated material will be taken to the plant and operations area via internal unbound roads.
- 9.5.6 As the location of mobile plant follows the progression of the working face, the distance between the operations and the individual properties is subject to change. Noise levels at each property will generally decrease as the activity progresses further away from the property; however, this will depend on the height of the plant above and below surrounding ground levels and the height of any intervening ground within each phase of extraction.
- 9.5.7 The noise predictions calculated for this assessment consider all potential sources on the site which form part of this current application including the HGV movements to and from the area of extraction.
- 9.5.8 The predictions are based on published and/or measured sound power levels for the size and type of plant anticipated to be used in the site during the proposed extraction works. The calculations are set out in BS5228:1 'Code of practice for noise and vibration control on construction and open sites' (2009). Details of the likely operational plant together with appropriate sound power levels are given in **Table 9.10**. The sound power levels have been taken from Wardell Armstrong's measurement archive, manufacturers' information or from BS5228 for similar types of equipment.

Table 9.10: Plant Inventory

Activity	Plant	Sound Power Level dB(A)
Soil Stripping	Materials handling (D6 Dozer)	108
	Materials handling (Tracked Excavator CAT 345)	107
Extraction	Materials removal and extraction (Tracked Excavator CAT 345)	107
	Volvo L150E Wheeled Loading Shovel	105
	Articulated Dump Truck (23t)	106
Restoration	Materials handling (D6 Dozer)	108
	Materials handling (Tracked Excavator CAT 345)	107
Plant and Operations Area	Conveyor	83
	Conveyor Drive Unit	105
	Wheeled Loading Shovel (Volvo L150E) x2	105
	Impact Crusher	118
	Log Washer	108
	Screen x2	98
	Sand Recovery Unit	98
	Logwasher	83

9.5.9 During soil stripping, it is anticipated that the bulldozer will strip the topsoil. The tracked excavator will then consolidate the stripped soil into soil storage mounds. The soil storage mounds will be located along the boundaries of each phase and, where located between operations and existing sensitive receptors, will minimise the noise impact from extraction works.

9.5.10 During sand and gravel extraction, it is anticipated that the excavator will create a small stockpile of excavated material close to where it is working. The loading shovel will then directly feed to road haulage vehicles; removing material from the excavated stockpile and transporting it to the plant operations area to be processed.



- 9.5.11 During restoration, it is anticipated that the tracked excavator will remove soil from the soil storage mounds and create smaller soil mounds. The bulldozer will then redistribute the soil to restore the site.
- 9.5.12 The following model parameters have been used in the SoundPlan noise modelling:
- Noise from mobile plant and internal haul road has been assessed as point and line sources as appropriate.
  - There will be an average of 9 HGV movements per hour travelling on the internal haul route within the site at an average speed of 15kph.
  - Noise from HGV movements on the local road network has been assessed with reference to CRTN 1988, with  $L_{Aeq}$  levels calculated using the TRL formula.
  - For a calculated 1 hour  $L_{Aeq}$ , it is assumed that the plant has a 100% on time. This represents a worst case scenario.
  - Sound power levels for each item of plant have been included in accordance with **Table 9.9**.
  - 3-5m high bunds will be located between the operations and nearby sensitive receptors as shown on the phasing plans.

### Noise Predictions

- 9.5.13 Operational noise levels have been predicted at each of the potentially sensitive receptors around the site for each scenario. The noise level predictions take account of the sound power level of the plant operating, the distance between sensitive receptors and the plant at different stages of operation, and the nature of intervening ground (slope, screening bunds and soft ground).
- 9.5.14 It is recognised that noise modelling is indicative and that modelled noise levels can differ to noise levels measured once works are actually taking place. This could be due to a number of reasons such as varying meteorological conditions which cannot be included in the model; though the model does assume good noise propagation conditions. However, the modelling does indicate where the most significant issues are likely to arise and where measures may be required to mitigate noise from the future quarrying activities.
- 9.5.15 It is considered that the sand and gravel extraction works should be classed as normal, longer term operations and therefore assessed against the  $55dB_{L_{Aeq} 1 \text{ hour}}$  noise limit; in accordance with the Planning Practice Guidance (Minerals). It is however considered that soil stripping and earth mound construction, as well as site restoration, should be assessed against the temporary noise limit of  $70dB_{L_{Aeq} 1 \text{ hour}}$  in accordance with the Planning Practice Guidance (Minerals). These activities form essential site preparation and restoration work and will provide longer term environmental benefits to the site and its environs. Details of the short term noise modelling scenarios carried out, and assessed against the  $70dB_{L_{Aeq} 1 \text{ hour}}$  criterion, are shown below. These scenarios have been chosen to correspond to the short term activities associated with works at the site:
- Short Term Scenario 1: Soil stripping Phase 1
  - Short Term Scenario 2: Soil stripping Phase 2
  - Short Term Scenario 3: Soil stripping Phase 3
  - Short Term Scenario 4: Soil stripping Phase 4

- Short Term Scenario 5: Soil stripping Phase 5
- Short Term Scenario 6: Soil stripping Phase 6
- Short Term Scenario 7: Soil stripping Phase 7
- Short Term Scenario 8: Soil stripping Phase 8
- Short Term Scenario 9: Soil stripping Phase 9
- Short Term Scenario 10: Soil stripping Phase 10

9.5.16 The location of each item of plant is shown on **Figures 9.4 to 9.13** in **Appendix H.1**. Each location has been selected to be representative of noise levels when soil stripping and restoration operations take place in the phases located closest to the nearest existing sensitive receptors to the site and is therefore considered suitably robust.

9.5.17 Details of the normal operation noise modelling scenarios carried out, and assessed against criteria set in accordance with the Planning Practice Guidance (Minerals), are shown below:

- Scenario 1: Year 5 Extraction Phase 2, Restoration Phase 1
- Scenario 2: Year 7 Extraction Phase 4, Restoration Phase 1, 2 and 3
- Scenario 3: Year 9 Extraction Phase 6, Restoration Phase 3, 4, and 5
- Scenario 4: Year 11 Extraction Phase 8, Restoration Phase 6 and 7
- Scenario 5: Year 14 Extraction Phase 10, Restoration Phase 6, 7, 8, and 9
- Scenario 6: Year 14 Extraction Phase 10, Restoration Phase 6, 7, 8, and 9, No bunds other than around the Plant and Operations Area

9.5.18 For each of the scenarios the excavator, loading shovel, bulldozer and HGVs are positioned at the existing ground level to represent a worst case scenario. The location of each item of plant and the proposed haul road is shown on **Figures 9.14 to 9.19** in **Appendix H.1**. Each location has been selected to be representative of noise levels when operations take place in the phases located closest to the nearest existing sensitive receptors to the site and is therefore considered suitably robust.

9.5.19 The noise modelling has assumed that earth bunds will be located between the extraction operations and nearby sensitive receptors when extraction is undertaken in the phases closest to the nearby sensitive receptors, as shown on **Figures 9.14 to 9.19**.

## Results and Evaluation

9.5.20 The noise prediction results for each of the short term scenarios are set out in **Table 9.11**.

Table 9.11: Modelled Short Term Noise Levels

Scenario	Noise Level at Sensitive Receptor Locations (dB L <sub>Aeq</sub> 1 hour)							
	ESR 1	ESR 2	ESR 3	ESR 4	ESR 5	ESR 6	ESR 7	ESR 8
1: Soil stripping Phase 1	24.9	29.2	28.6	24.7	17.5	43.6	24.7	28.6
2: Soil stripping Phase 2	21.5	25.0	24.4	28.0	22.6	37.3	21.6	24.1
3: Soil stripping Phase 3	19.5	22.7	25.6	30.6	24.9	33.2	19.8	21.7

Scenario	Noise Level at Sensitive Receptor Locations (dB L <sub>Aeq</sub> 1 hour)							
	ESR 1	ESR 2	ESR 3	ESR 4	ESR 5	ESR 6	ESR 7	ESR 8
4: Soil stripping Phase 4	18.1	21.1	24.8	33.4	24.2	27.0	18.4	19.9
5: Soil stripping Phase 5	18.5	24.0	27.0	30.1	25.3	24.9	18.5	22.2
6: Soil stripping Phase 6	21.6	27.3	30.3	27.7	20.0	27.3	20.5	25.5
7: Soil stripping Phase 7	25.5	31.2	33.8	22.9	18.5	31.2	24.4	30.8
8: Soil stripping Phase 8	27.6	34.2	34.2	21.5	19.0	34.0	25.2	31.2
9: Soil stripping Phase 9	25.9	31.6	30.6	21.6	19.5	35.6	24.8	29.3
10: Soil stripping Phase 10	23.2	27.5	29.5	27.3	21.1	33.5	22.8	25.9

9.5.21 The results set out in **Table 9.11** show that the soil stripping and soil storage mound construction works will not cause an exceedance of the 70dB(A) L<sub>Aeq</sub> 1 hour noise criterion, which had been determined from the Planning Practice Guidance (Minerals), during the short term temporary operations.

9.5.22 In addition, noise levels at existing sensitive receptors are generally less than 55dB L<sub>Aeq</sub> 1 hour during the short term works, more than 15dB(A) below the noise limit for short term temporary operations. The higher levels of noise set out in **Table 9.11** will be experienced as soil stripping commences at existing ground level in the phase nearest to the receptor. However, the stripping at existing ground level and at its closest location to these receptors will only be carried out for a limited period; and considerably less than the 8 weeks per year permitted by the Planning Practice Guidance (Minerals). The noise generated by the plant will reduce significantly as the soil storage mounds are constructed between the site and receptors and as the plant moves further away from the receptors and into the void created by the extraction.

9.5.23 It is therefore considered that the impact of the short term works at the existing receptors most likely to be affected will be direct, short term and of small magnitude when assessed in accordance with the criteria contained in **Table 9.3**. The sensitivity of receptors is considered to be low to moderate in accordance with **Table 9.4** and the effect significance is therefore considered to be **slight to slight/moderate** when assessed in accordance with **Table 9.5**. As the noise levels are within the limits set in accordance with the Planning Practice Guidance (Minerals), it is considered that this effect is not significant and no further noise mitigation measures are required.

9.5.24 The noise prediction results for each of the long term scenarios are set out in **Table 9.12**.

Table 9.12: Modelled Normal Operations Noise Levels

Scenario	Noise Level at Sensitive Receptor Locations (dB LAeq 1 hour)							
	ESR 1	ESR 2	ESR 3	ESR 4	ESR 5	ESR 6	ESR 7	ESR 8
1: Year 5 Extraction Phase 2, Restoration Phase 1	40.1	45.8	36.4	29.8	26.3	43.7	37.1	46.9
2: Year 7 Extraction Phase 4, Restoration Phase 1, 2 and 3	40.2	45.8	37.0	36.6	30.2	43.5	37.2	46.9
3: Year 9 Extraction Phase 6, Restoration Phase 3, 4, and 5	40.1	45.8	37.2	36.8	30.4	40.6	37.1	46.9
4: Year 11 Extraction Phase 8, Restoration Phase 6 and 7	40.4	46.1	38.1	31.2	26.4	40.7	37.4	47.0
5: Year 14 Extraction Phase 10, Restoration Phase 6, 7, 8, and 9	40.6	46.3	39.4	32.1	28.1	42.5	37.8	47.1
6: Year 14 Extraction Phase 10, Restoration Phase 6, 7, 8, and 9, No bunds other than around the Plant and Operations Area	40.6	46.4	40.7	32.1	28.1	44.6	37.8	47.2

9.5.25 The results set out in **Table 9.12** show that there will be no exceedances of the noise criteria which have been determined from the results of the noise survey and in accordance with the Planning Practice Guidance (Minerals). It should be noted that the higher levels of noise set out in **Table 9.12** will be experienced as extraction commences, at a higher ground level. However, the extraction at a higher ground level and at its closest location to these receptors will only be carried out for limited period. The noise generated by the plant will reduce significantly as the plant moves further away from sensitive receptors and into the void created by the extraction.

9.5.26 It is therefore considered that the impact of the long term works at the existing receptors most likely to be affected will be direct, long term and of small magnitude when assessed in accordance with the criteria contained in **Table 9.3**. The sensitivity of receptors is considered to be low to moderate in accordance with **Table 9.4** and the effect significance is therefore considered to be **slight to slight/moderate** when assessed in accordance with **Table 9.5**. As the noise levels are within the limits set in accordance with the Planning Practice Guidance (Minerals), it is considered that this effect is not significant. It will not therefore be necessary to recommend further noise mitigation measures.

### Assessment of vehicular noise

9.5.27 In addition to the consideration of noise generated during extraction, the scoping report requested that the noise impact of traffic be considered.

9.5.28 Noise prediction calculations have been carried out to assess the potential change in road traffic noise at existing receptor locations due to the additional traffic generated by the

brickearth extraction. The prediction calculations have been carried out in accordance with the method specified in CRTN 1988 for existing receptor locations.

- 9.5.29 Details of the sensitive receptor locations assessed are given in **Table 9.7** and shown on **Figure 9.2** (i.e. CRTN 1 to CRTN 6). Impacts may also be felt at receptors adjacent to and beyond those listed above, however impacts at these receptors will be less than at the listed receptors. With increasing distance from these road links, impacts will decline to zero.
- 9.5.30 Road traffic noise levels at the façades of existing receptors have been determined using the Soundplan 7.4 computer modelling software. This software predicts road traffic noise levels in accordance with the CRTN prediction method, based on the number and composition of vehicles travelling along the local road links (i.e. the number and proportion of HGVs and LGVs), together with the speed of vehicles, distance of the receptor from the edge of the carriageway and angle of view of the road link. The traffic data used has been supplied by Cannon Consulting Engineers. Further detail regarding the traffic assessment is provided in Chapter 8 of this ES.
- 9.5.31 The predicted 2026 “with development “and 2026 “without development” noise levels are shown in **Table 9.13** for each of the receptors considered.

Table 9.13: CRTN Predictions for 2026 Future Year (With and Without Development)

Receptor	Predicted L <sub>10</sub> (18 hour) dB(A) at the façade of the receptor		
	2026 Without Development	2026 With Development	Change
CRTN 1	59.9	60.0	+0.1
CRTN 2	63.1	63.2	+0.1
CRTN 3	70.9	72.1	+1.2
CRTN 4	60.5	60.8	+0.3
CRTN 5	60.1	60.4	+0.3
CRTN 6	60.1	60.3	+0.2

- 9.5.32 The changes in noise levels at the sensitive receptors have then been assessed against the criteria contained in **Table 9.2**. The results show the highest increase in road traffic noise will be +1.2dB(A) at CRTN 3 (1 Ecton Lane Park) when comparing the 2026 Without Development to the 2026 “With Development” scenario. The change at all other receptors is less than +0.3dB. It is therefore considered that the impact of the increase in road traffic noise at the existing receptors most likely to be affected will be long term, direct and minor adverse at CRTN 3 and negligible at all other receptors when the magnitude is assessed in accordance with the criteria contained in **Table 9.3**. The sensitivity of receptors is considered to be moderate to low in accordance with **Table 9.4** and the effect significance is therefore considered to be **negligible to slight/moderate** when assessed in accordance with **Table 9.5**. Based on the above, mitigation measures would not be required.

## Vibration Assessment

- 9.5.33 The works have the potential to increase vibration levels at residential properties in the vicinity of operations during the proposed working hours.
- 9.5.34 Wardell Armstrong's archives contain field trial measurements of ground vibration associated with types of plant likely to be used at the proposed development. The representative, measured levels, made by Wardell Armstrong using a Vibrock B801 Digital Seismograph, are set out in **Table 9.14**.

Table 9.14: Measured Vibration Levels of Plant Under normal Operating Conditions (Figures in ppv mm per second)

Plant Type	Distance from Source		
	10m	20m	30m
25-30 tonne excavator	0.175	0.075	Background
25 tonnes dumptruck (Volvo A25) Loaded	1.000	0.150	Background
Empty	0.225	0.050	Background
Dozer	1.050	0.400	Background
Loading shovel	1.025	0.150	Background

- 9.5.35 The nearest sensitive properties to the proposed works, as detailed in **Table 9.5**, will vary depending on the active phase of the development. As a worst case scenario, earthworks and extraction works may potentially take place at a distance of approximately 250m from buildings at sensitive properties. At this distance, it is unlikely that vibration due to the operation of various items of plant will be perceptible. The affected sensitive receptors are considered to be of medium sensitivity in accordance with **Table 9.4**. It is considered that the magnitude will be negligible in accordance with **Table 9.3**. The vibration generated by the site operations will therefore have an impact significance of **none** at the sensitive receptors located in the immediate vicinity of the development in accordance with **Table 9.5**.
- 9.5.36 It is therefore not considered that any mitigation measures will be needed to minimise potential impacts.

## 9.6 Mitigation and Enhancement

### Noise

- 9.6.1 The proposed phasing plans show that a number of earth bunds will be created both around the proposed plant and operations area, and around a number of the proposed extraction phases



- 9.6.2 As the noise levels are within the limits set in accordance with the Planning Practice Guidance (Minerals), it is considered that this effect is not significant. It will not therefore be necessary to recommend further noise mitigation measures.
- 9.6.3 It is however recommended that the following best practice measures are implemented at the site where possible:
- All plant and machinery should be regularly maintained to control noise emissions, with particular emphasis on lubrication of bearings and the integrity of silencers;
  - Site staff should be aware that they are working adjacent to a residential area and avoid all unnecessary noise due to misuse of tools and equipment, unnecessary shouting and radios;
  - A further measure to reduce noise levels at the sensitive receptors would include, as far as possible, the avoidance of two noisy operations occurring simultaneously in close proximity to the same sensitive receptor;
  - Adherence to any time limits imposed on noisy works by the Local Authority;
  - Implement set working hours during the week and at weekends; and
  - Ensure engines are turned off when possible.

## Vibration

- 9.6.4 At this stage it is not proposed to introduce any specific vibration mitigation measures to any receptors.

## 9.7 Residual Effects

- 9.7.1 The impact of the short term works at the existing receptors most likely to be affected will be small in accordance with the criteria contained in **Table 9.4**. The sensitivity of receptors is considered to be moderate to low in accordance with **Table 9.3** and the effect significance is therefore considered to be **negligible to slight/moderate** when assessed in accordance with **Table 9.5**. As the noise levels are within the limits set in accordance with the Planning Practice Guidance (Minerals), it is considered that this effect is not significant and no further noise mitigation measures are required.
- 9.7.2 The impact of the long term works at the existing receptors most likely to be affected will be small in accordance with the criteria contained in **Table 9.4**. The sensitivity of receptors is considered to be moderate to low in accordance with **Table 9.3** and the effect significance is therefore considered to be **negligible to slight/moderate** when assessed in accordance with **Table 9.5**. As the noise levels are within the limits set in accordance with the Planning Practice Guidance (Minerals), it is considered that this effect is not significant. It will not therefore be necessary to recommend further noise mitigation measures.
- 9.7.3 The vibration impacts of the operation of the site are considered to be negligible. It is therefore considered that the residual impact will be **None**, in accordance with **Table 9.5**.

## 9.8 Cumulative Effects

- 9.8.1 In accordance with the requirements of Northamptonshire County Council, the cumulative noise impacts of the nearby permitted quarries has been considered, including those at Earls Barton Spinney and land west of Earls Barton Quarry, Grendon Road.



- 9.8.2 The cumulative impact will depend upon the timing and location of works in each quarry including the operations at the proposed development. It is possible that the proposed development may take place at the same time as nearby consented quarry operations, however noise levels from the proposed development at the sensitive receptors nearest to the consented quarries (ESR 4 and ESR 5) are more than 10dB(A) below both the short term and long noise limits. Therefore, even if the consented quarries operate at the maximum permitted noise levels, the cumulative noise from the proposed development would not result in any exceedances of the noise limits. Cumulative noise impacts are therefore not considered to be significant.
- 9.8.3 The vibration impacts of the operation of the site are considered to be negligible, Cumulative vibration impacts are therefore not considered to be significant.

## 9.9 Summary

- 9.9.1 A noise assessment has been carried out to consider the potential noise levels likely to be generated by the operation of the site and the potential impact on existing noise sensitive receptors.
- 9.9.2 A noise survey has been carried out to obtain background noise level information representative of the existing noise sensitive receptors identified. Using the background noise measurements and taking into consideration the Planning Practice Guidance (Minerals); noise limits have been identified for each receptor.
- 9.9.3 The noise assessment considers the potential noise levels likely to be generated, due to the working of the site and transportation of materials, at 8 representative receptor locations. The noise levels have been calculated using Soundplan 7.4 noise modelling computer software. The predicted short term and long term modelled noise levels have been assessed against the appropriate noise criteria.
- 9.9.4 The short term noise levels generated during the soil stripping and soil mound construction will not exceed the 70dB  $L_{Aeq, 1 \text{ hour}}$  noise limit. In addition, existing sensitive receptors are generally less than 55dB  $L_{Aeq, 1 \text{ hour}}$  during the short term works, more than 15dB(A) below the noise limit for short term temporary operations. The stripping at existing ground level and at its closest location to the existing sensitive receptors will only be carried out for a limited period; and less than the 8 weeks per year permitted by the Planning Practice Guidance (Minerals).
- 9.9.5 The impact of the short term works at the existing receptors most likely to be affected will be small. The sensitivity of receptors is considered to be moderate to low and the effect significance is therefore considered to be short term, direct, **negligible to slight/moderate**. As the noise levels are within the limits set in accordance with the Planning Practice Guidance (Minerals), it is considered that this effect is not significant and no further noise mitigation measures are required.
- 9.9.6 The impact of the long term works at the existing receptors most likely to be affected will be small. The sensitivity of receptors is considered to be moderate to low and the effect significance is therefore considered to be long term, direct, **negligible to slight/moderate**. As the noise levels are within the limits set in accordance with the Planning Practice Guidance (Minerals), it is considered that this effect is not significant. It will not therefore be necessary to recommend further noise mitigation measures.

- 9.9.7 The CRTN prediction calculations of vehicle movements on the haul road and local road network indicates that there will be a negligible impact associated with the development generated traffic on the local road network, resulting in an impact significance of negligible to minor.
- 9.9.8 Without mitigation measures vibration is unlikely to be perceptible when operations take place closest to existing sensitive receptors, resulting in an impact significance of none. It will not therefore be necessary to recommend further noise and vibration mitigation measures.

## 9.10 References

- British Standards Institution. (2009) +A1 2014 Code of Practice for noise and vibration control on construction and open sites – Part 2: Vibration (BS5228:2014). London: BSI.
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