JBA Consulting

Noise Impact Assessment

T9699 Hooklands Farm, Ashington, West Sussex

1st December 2023

LANDSCAPE BUND NOISE IMPACT ASSESSMENT

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1.0	18/07/2023	David Kendal	Richard Budesha	Phil McIlwain
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Contents

Introduction

Temple Group has been appointed by JBA Consulting to undertake a noise impact assessment for the Proposed Development at Hooklands Farm, Ashington, West Sussex.

The landowner is proposing to construct two landscape bunds along the southeastern boundary of the site, parallel to the A24. JBA have been appointed as planning consultant and Penfold Verrall are to carry out both the construction and transportation of materials. The bund is intended to further attenuate the noise emitted from the adjacent Basinghill Road (A24) and will be constructed from recovered inert waste at the site.

The purpose of the assessment is two-fold, first to assess the impact of noise from the construction phase and second is to assess the effectiveness of the proposed landscape bund as noise mitigation (screening) from the A24.

Attended and unattended noise measurements have been completed at the site to characterise the existing typical noise environment over the daytime and night-time. The measured noise levels have then been assessed in line with the local and national planning policy guidance and relevant standards.

Details of the assessment methodology used, together with the results of the survey undertaken and the subsequent conclusions drawn are presented in this report.

A glossary of acoustic terms and their meanings has been included in **Appendix A.**

Noise Principles and Standards Used

Planning Policy

National Planning Policy Framework

The National Planning Policy Framework[1] (NPPF) sets out the government's planning policies for England and how these are expected to be applied. It was revised in 2018 following a review of the 2012 document and was updated in September 2023.

The recently revised NPPF comments on noise in the following ways:

Paragraph 174: Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.

Paragraph 185: Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

mitigate and reduce to a minimum 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; and

identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

Noise Policy Statement for England

The Noise Policy Statement for England[2] (NPSE) seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. The statement applies to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise.

The statement sets out the long-term vision of the government's noise policy, which is to "promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development".

The guidance promotes the effective management and control of noise, within the context of Government policy on sustainable development and thereby aims to:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life; and

[1] Department of Communities and Local Government (September 2023), The National Planning Policy Framework
[2] Defra (March 2010), The Noise Policy Statement for England

- Where possible, contribute to the improvements of health and quality of life.

The statement adopts established concepts from toxicology that are currently being applied to noise impacts. The concept details noise levels, at which the effects of an exposure may be classified into a specific category. The classification categories as detailed within NPSE are as follows:

- No Observed Effect Level (NOEL) - the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established.
- Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected; and
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

It is recognised that SOAEL does not have a single objective noise-based level that is applicable to all sources of noise in all situations and therefore the SOAEL is likely to be different for different sources, receptors and at different times of the day.

No guidance has been issued at the time of writing to identify the SOAEL and LOAEL for typical noise sources and receptors.

Planning Practice Guidance – Noise

The National Planning Practice Guidance[3] (NPPG) expands on the use of SOAEL:

"If the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused."

The NPPG also goes on to identify unacceptable noise exposure:

"At the highest extreme, noise exposure would cause extensive and sustained changes in behaviour without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be prevented from occurring."

In addition, NPPG refers to further considerations to mitigating noise on residential developments. NPPG states that the noise impact may be partially offset if the residents of those dwellings have access to:

- a relatively quiet facade (containing windows to habitable rooms) as part of their dwelling, and/or;
- a relatively quiet external amenity space for their sole use, (e.g. a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced with increasing noise exposure and could be such that significant adverse effects occur, and/or;

[3] Department for Communities and Local Government (DCLG) (July 2019), National Planning Practice Guidance

- a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings, and/or;
- a relatively quiet, protected, external publicly accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance).

Regional and Local Policy

Horsham District Planning Framework

The local policy for the Horsham District Council outlines the following relating to noise pollution;[4]

Current local planning policy for Horsham is set out within the document; *Horsham District Planning Framework (excluding South Downs National Park) November 2015*. Noise is dealt with within Environmental Protection - Policy 24 which is found on Page 98 and 99 of the document and paragraph 9.11 states: 9.11 Noise pollution can have a significant impact on the quality of life and health of individuals and communities. To help avoid adverse noise impacts from development, authorities in both East and West Sussex have produced a Planning Guidance Document on this issue. Applicants should therefore address the issues raised in this document prior to making an application.

Noise is also dealt with in a later policy Development Principles - Policy 33 on Page 112 this policy states: In order to conserve and enhance the natural and built environment developments shall be required to: ... 2. Ensure that it is designed to avoid unacceptable harm to the amenity of occupiers/users of nearby property and land, for example through overlooking or noise, whilst having regard to the sensitivities of surrounding development.

West Sussex Waste Local Plan

The West Sussex Waste Local plan sets out a summary of key points relating to noise. These include the cumulative impacts of traffic noise when controlling waste on and off-site.

Planning Noise Advice Document Sussex

The Planning Noise Advice Document Sussex[5] provides guidance on noise assessment and has been taken into account for this assessment. Some of the most relevant parts of this guidance have been outlined below:

2.1 Good Design

"*Good design is a key aspect of sustainable development, creates better places in which to live and work and helps make developments acceptable to communities" (National Planning Policy Framework 2021, paragraph 126). "Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of noise pollution"*

[4] Horsham District Planning Framework 2015

[5] Planning Noise Advice Document Sussex. Basic Principles. Good design

(National Planning Policy Framework 2021, paragraph 174(e)).

2.1.1. Applications often do not consider the acoustic design alongside other factors such as visual appearance and this can be to the detriment of the whole scheme of development. A scheme that is properly considered with a detailed risk assessment from the outset, can optimize land use, offer good quality living and recreational space while providing good architectural and environmental solutions.

2.1.3. Noise and vibration associated with major development such as demolition, protracted construction or large civil engineering activities should also be considered in developing the proposal and best practice should be adopted at all times, as prescribed in BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise; and BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Vibration."

Technical Standards and Guidance

British Standard 5228

The introductory scope provides an overview of the purpose of the British standard. The following sections illustrate relevant points pertaining to health and safety measures relating to noise and vibration on-site.

This part of BS 5228 gives recommendations for basic methods of noise control [F] relating to construction sites, including sites where demolition, remediation, ground treatment or related civil engineering works are being carried out, and open sites, where work activities/operations generate significant noise levels, including industry-specific guidance.

The legislative background to noise control is described and recommendations are given regarding procedures for the establishment of effective liaison between developers, site operators and local authorities.

This part of BS 5228 provides guidance concerning methods of predicting and measuring noise and assessing its impact on those exposed to it.

Section E.3.3

Criteria - 5 dB(A) Change Method

"Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site nose) exceeds the pre-construction ambient noise by 5dB or more, subject to lower cutoff values of 65 dB, 55 dB and 45 dB $L_{Aeq,T}$ from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect.

These evaluative criteria are generally applicable to the following resources:

- residential buildings
- hotels and hostel;
- buildings in religious use;
- buildings in educational use; and
- buildings in health and/or community use

For public open space, the impact might be deemed to cause significant effects if the total noise exceeds the ambient noise ($L_{Aeq,T}$) by 5 dB or more for a period of one month or more. However, the extent of the area impacted relative to the total available area also needs to be taken into account in determining whether the impact causes a significant effect."

7 Project supervision

7.1 General

"The intention throughout any construction programme should be to minimize levels of site noise whist having due regard to the practicability and economic implication of any proposed control or mitigation measures.

Planners, developers, architects, engineers and environmental health officers can all assist in preventing excessive noise levels. Prevention can be achieved by giving careful consideration to the plant, processes, activities and programme associated with any construction project.

Local authorities should ensure that any noise level limits or restrictions being imposed are necessary and practicable."

British Standard 7445

British Standard 7445 Part 1 (BS 7455-1:2003)6 defines the basic quantities to be used for the description of noise in community environments and describes basic procedures for the determination of these quantities.

The methods and procedures described in this British Standard are intended to be applicable to sounds from all sources, individually and in combination, which contribute to the total noise at a site.

British Standard 7445 Part 2 (BS 7455-2:1991)7 describes methods for the acquisition of data which provide descriptors that enable:

- a description of the environmental noise in a specified area of land to be made in a uniform way.
- the compatibility of any land use activity or projected activity to be assessed with respect to existing or predicted noise.

Using the data as a basis, authorities may establish a system for selecting the appropriate land use, as far as levels of noise are concerned, for a specified area, or the sources of noise - existing or planned - which are acceptable with respect to land use, existing or planned.

[6] British Standards Institute (BSI), (2003): 'BS 7445 – Description and Measurement of Environmental Noise. Part 1: Guide to Quantities and Procedures'. BSI, London.
[7] British Standards Institute (BSI), (1991): 'BS 7445 – Description and Measurement of Environmental Noise. Part 2: Guide to the Acquisition of Data Pertinent to Land Use'. BSI, London.

World Health Organisation

The World Health Organisation (WHO) Guidelines for Community Noise[8] also sets out guidance on suitable internal and external noise levels in and around residential properties. The following internal noise levels are recommended by the WHO:

35 dB L_{Aeq} in living rooms over a 16-hour day;

30 dB L_{Aeq} in bedrooms during the 8-hour night; and

45 dB L_{AFmax} in bedrooms during the 8-hour night.

This document states that, in dwellings, the critical effects of noise are on sleep, annoyance and speech interference. These indoor noise levels correspond to sound pressure levels at the outside facades of the living spaces (bedrooms) of 45 dB L_{Aeq} and 60 dB L_{Amax}. These external values have been obtained by assuming that the noise reduction of a facade from outside to inside with a window partly open is 15 dB(A).

According to this document, to protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB L_{Aeq} for a steady, continuous noise.

Additional WHO environmental noise guidelines were published in 2018, however the 1999 document is currently considered to be the most relevant guidance given its reference in BS 8233 and ProPG.

Consultation

On the 11th of July 2023, David Kendal, a consultant at Temple contacted Horsham District Council planning department via email. The correspondence summarised the proposed methodology for undertaking the noise survey and subsequent noise impact assessment. The outcome of this is communication is to be confirmed. No response has been received to date at the time of writing.

[8] World Health Organisation (1999), WHO Guidelines for Community Noise.

The Proposed Development and Surroundings

Hooklands Farm is in a rural location adjacent to a busy A-road. The nearest noise sensitive receptor to the Proposed Development is 140 m from the nearest edge of the site boundary. The receptor is a residential dwelling and is located on London Road, which runs parallel to the A24, to the west of the development. **Figure 1**. shows the site.

The bund is to be created on the southeastern perimeter of the Hooklands Farm site. The volume of solid material needed is 110,230 m^3. A bulldozer and excavator are to be used between the hours of 07:30 until 18:00, however, work is due to cease at 17:00.

A temporary haul road is to be built through the bund footprint, reaching out to the eastern permitter of the site. The bund materials are to be distributed either side of the haul road, 50 % beginning at the far end (easternly side) then working back towards the start of the haul road. An excavator will be used to move material to enable the bulldozer to push material out in layers until the finished levels of the bund are achieved.

The site is to be frequented by lorry's that will deliver the material during the referenced working hours. It is estimated that 40 lorries trips will be made per day, which equates to an average of 4-5 per hour depending upon the intended construction hours.

Measurement Methodology

Unattended Noise Monitoring

An unattended environmental noise survey was carried out at the site of Hooklands Farm between Thursday the 22nd and Tuesday the 27th of June 2023 to obtain full daytime and night-time ambient noise levels during weekdays and at the weekend. The environmental noise survey was undertaken in accordance with BS 7445: Part 2.

The microphone for MP1 was positioned at a height of 2 m, whereas MP2 was positioned at 1.5 m above the ground level. Both microphones were positioned a minimum of 3.4 m away from any reflective surface and therefore are considered to have measured free-field levels. The sound level meter microphones were fitted with a windshield and appropriate corrections applied.

The sound level meters were set to log continuously over 15-minute periods measuring octave band and A -weighted L_{eq}, L_{Fmax}, L_{10} and L_{90} parameters.

The unattended measurement positions are shown in **Figure 1**. Photos of each measurement position can be seen in **Appendix C**.

Attended Noise Monitoring

An attended noise survey was carried out at one location on Tuesday the 27th to further assess noise emitting from the A24 road.

The sound level meter was mounted on a tripod located 4 m from the nearside edge of the road (A24) at a height of approximately 1.5 m above local ground level. The microphone was considered to have measured free-field levels.

The meter was set to log in 15-minute periods measuring octave band and A-weighted L_{eq}, L_{Fmax}, L_{10} and L_{90}.

No unusual acoustic events occurred during measurements, and the data is considered to provide a fair representation of the typical acoustic environment at the relevant measurement locations.

The attended measurement position is shown in **Figure 1** below. Photos of the measurement position are presented in **Appendix C**.

Meteorological Conditions

During the time of the survey there were little to no adverse weather patterns pertaining to the results. Previous weather data has been verified using Weather Underground weather station IPULBO43.

Figure 1 Survey measurement locations

Equipment

The equipment used is detailed in **Table 1** below. The sound level meters were calibrated before and after their respective measurement periods and no significant variation in level was observed. The equipment is subject to manufacturer's certificates of periodic verification within one year for the field calibrator and two years for sound level meters. Copies of these certificates are available upon request.

Table 1 Survey Equipment

Manufacturer	Item	Type	Serial Number	Calibration Date
RION	Sound Level Meter	NA-28	00680885	07/02/2022
RION	Sound Level Meter	NA-28	01170653	22/02/2022
RION	Calibrator	NC-74	34936353	01/11/2022

Noise Survey Results

Survey Observations

During the daytime visit to site, observations regarding perceptible noise sources influencing the baseline were noted by the surveyor at each measurement location, a summary of which is presented in **Table 2**. Two unattended surveys were conducted on site; the observations are detailed as they occurred whilst on site.

Table 2. Survey Observations

Location	Location Description	Observation of Noise Sources
MP1	At the location of the farmhouse within the grounds of Hooklands Farm.	Road noise from A24 dominant alongside bird song.
MP2	Far south-westerly corner of Hooklands Farm site (field area).	Road noise from A24 dominant, bird song. Crickets chirping.

Unattended Noise Results

A summary of the results of the daytime and night-time continuous noise measurements at the unattended locations are presented in **Table 3**. Graphs showing the time history of the measured results for the unattended monitoring locations are given in **Appendix D.**
The daytime/night-time $L_{Aeq,\,T}$ has been calculated for each day, and the typical $L_{Aeq,\,T}$ is the arithmetic average of all the daytime/night-time values.

Table 3. Unattended Noise Survey Results

		MP1	MP2
Typical $L_{Aeq,T}$, dB	Daytime	55	61
	Night-time	49	53

Attended Noise Results

A measurement was taken 4 m away from the edge of the east-bound carriage way along the A24 road. This was to verify consistency for purposes of building a model. Two 15-minute measurements have been assessed and produced similar measurement values. The results of the attended measurements are shown in **Table 4** below.

Table 4. Attended Measurement Results

Time/Duration	Location	L_{A10} dB	$L_{Aeq,15mInutes}$ dB
14:00-14:15	4m from the A24 east-bound carriageway	87	82
14:15-14:30		87	82

Noise Assessment

Construction Noise

On-Site Construction Noise Predictions (Mobile Plant within a Defined Area)

To quantify potential impacts from on-site construction noise, worst-case construction activity noise levels, $L_{Aeq,10hour}$ have been predicted in accordance with BS 5228:1 at a point 1 m from the façade of the nearest noise sensitive receptors (London Road Cottages). Calculations have been based on a plant list provided by Penfold Verrall, which states the following plant will be used on site to construct the bunds:

- Bulldozer (Caterpillar D6T LGP)
- Excavator (Volvo EC220EL)

The calculation has been carried out as per the method for mobile plant in a defined area (section Annex F.2.4) from BS 5228:1. The traverse length is assumed to be 200 to 250 m to represent the bulldozer and excavator working in the southwestern corner of the site closest to the London Road Cottages, which is considered to be worst case. The assessment also includes likely percentage on times for the construction plant. A 3 dB façade correction has been applied to the overall $L_{Aeq,10hour}$ figure. The results of this assessment are shown in **Table 5**.

Table 5. BS 5228:1 Predicted on Site Construction Noise Levels

Plant Type	Sound Data Source	L_{WA} dB	Traverse Length (m)	On-time (%)	Minimum Distance from Receptor (m)	$L_{Aeq,10hour}$ at Receptor dB
Tracked excavator	Manufacturers Specification	102	250	75	200	43
Bulldozer/ Spreader	BS5228-1 (D.8.16)	108	250	75	200	49
					Total	**50**

Construction Traffic Haul Route Predictions (Mobile Plant on a Regular Well-Defined Route)

For the transit of lorries on the haul road the calculation method for mobile plant on a defined route has been used. The calculation method is set out at Annex F.2.5 of BS 5228:1. The following expression is used to determine the $L_{Aeq,T}$ value at the receptor point:

$$L_{Aeq,T} = L_{WA} - 33 + 10\log_{10}Q - 10\log_{10}V - 10\log_{10}d$$

Where

- V is the vehicle speed.
- Q is the number of vehicles per hour; and
- d is the distance of the receiving position from the centre of the haul road.

Penfold Verrall has provided an estimate of 40 lorries per day, which is an average of 4 per hour, however we have assumed 8 per hour to cover and busy periods of the day, which would equate to 16 vehicle movements (to and from). The trucks present a 90-degree angle of view between the worst-case façade (rear façade of London Road cottages) and the haul road, and therefore a -3 dB correction has been applied in line with BS 5228:1. The calculation also assumes a speed of 25km/h which is considered worst case, as it is expected that a typical haul route would have a speed limit of 16 km/h (10mph). The results of the Haul Route noise assessment are presented in **Table** .

Table 6. BS 522:1 Haul Route Noise Assessment

Plant Type	Sound Data Source	Number of Vehicles per Hour	L_{WA} dB	Average Speed (km/h)	Angle of View	$L_{Aeq,T}$ at Receptor dB
Articulated dump truck	BS5228-1 (C.5.16)	16	109	25	90	**59**

Cumulative Construction Noise Assessment

The predicted combined on-site and haul route noise levels have been assessed at the nearest noise sensitive receptors on London Road. The predicted noise levels have been assessed in comparison with the 5 dB(A) change criteria set out in BS 5228:1, which states that a 5 dB(A) change in levels including pre-construction and ambient noise is a potentially significant increase when considering residential buildings.

A CadnaA model has been calibrated with on-site measurements to predict the prevailing ambient levels at the cottages on London Road. Noise levels from the rear façade facing away from the A24 Basing Hill have been used in the assessment as this will represent the worst-case change in noise levels at the receptors. The results of the cumulative noise assessment are presented in in **Table 7**.

Table 7. Predicted increase in noise levels assessed according to BS5228-1

On-site construction noise (Table 5) $L_{Aeq,10hour}$ at Receptor	50 dB(A)
Haul route traffic noise (Table 6) $L_{Aeq,T}$ at Receptor	59 dB(A)
Combined construction noise (Table 5 + Table 6) at Receptor $L_{Aeq,T}$	60 dB(A)
Existing Ambient Noise level at rear of London Road Cottages $L_{Aeq,16hr}$	63 dB(A)
Combined construction noise and existing ambient level $L_{Aeq,T}$	65 dB(A)
Increase of noise due to construction activity	+2dB(A)

The assessment indicates that during worst case construction periods the ambient noise levels is predicted to rise by no more than +2dB(A). In line with BS 5228:1 criterion, this is not considered significant.

It should be noted that the calculation methodology used assumes that no screening or other forms of attenuation are provided, and typical worst-case distances have been used.

The nature of the construction works mean that the conservative situation predicted may only exist for a matter of days, or even hours. There would be regular periods, even during a single day, when the assumed plant would not be in operation, for example during breaks or changes of working routine.

Landscape Bund Assessment

Using the contour data provided to Temple by Penfold Verrall, a 3D model has been constructed for the existing ground contours and the final Proposed Development. The effect of the bund on noise levels at Hooklands Farm have been calculated and mapped in CadnaA. The results of this assessment are show in **Table 8** and **Figures 2 and 3**.

Table 8. Levels experiences for existing and the proposed bund construction.

Location Description	$L_{Aeq, 16hr}$ at existing site dB	$L_{Aeq, 16hr}$ with completed bunds dB	dB Change +/-
Hooklands Farm, Farmhouse - 1st floor	55 (Measured)	53 (Predicted)	Minus 2dB
Farmhouse Garden – Ground floor	51 (Calibrated based upon measured levels)	51 (Predicted)	Minus 1dB*
Notes on table: *this is effectively a -1dB change 51.4 to 50.7 dB = 0.7 reduction			

Figure 2. Daytime Road Noise Prediction at Existing Site (LAeq, 16hr). Contours showing 1st floor predicted levels

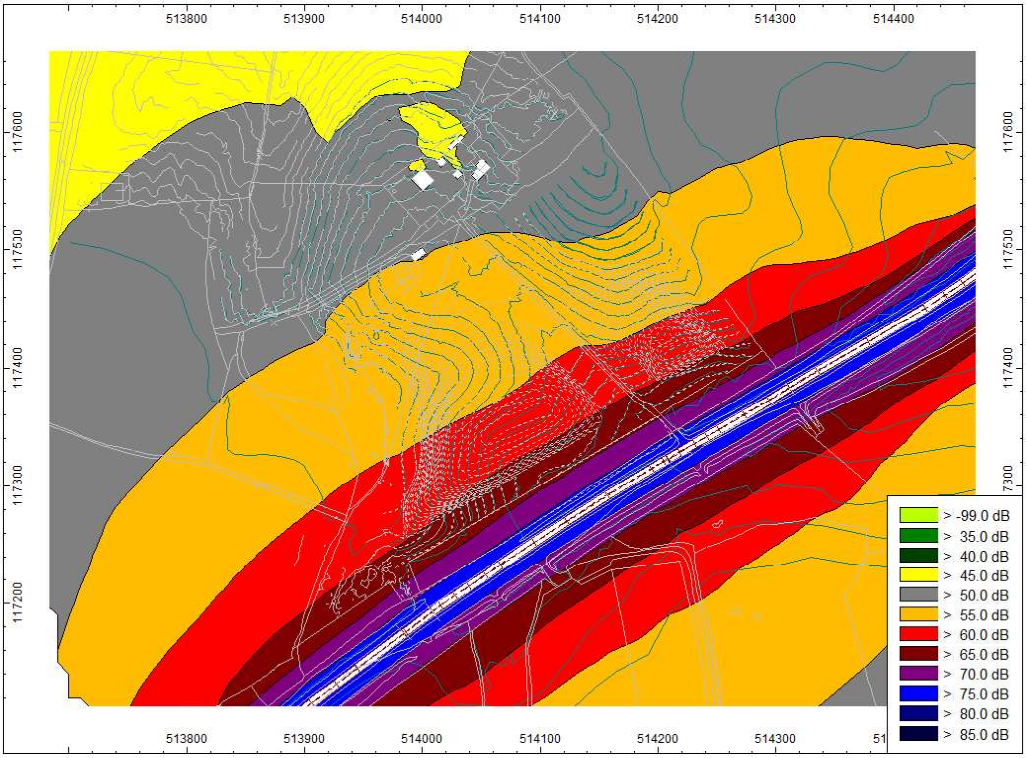
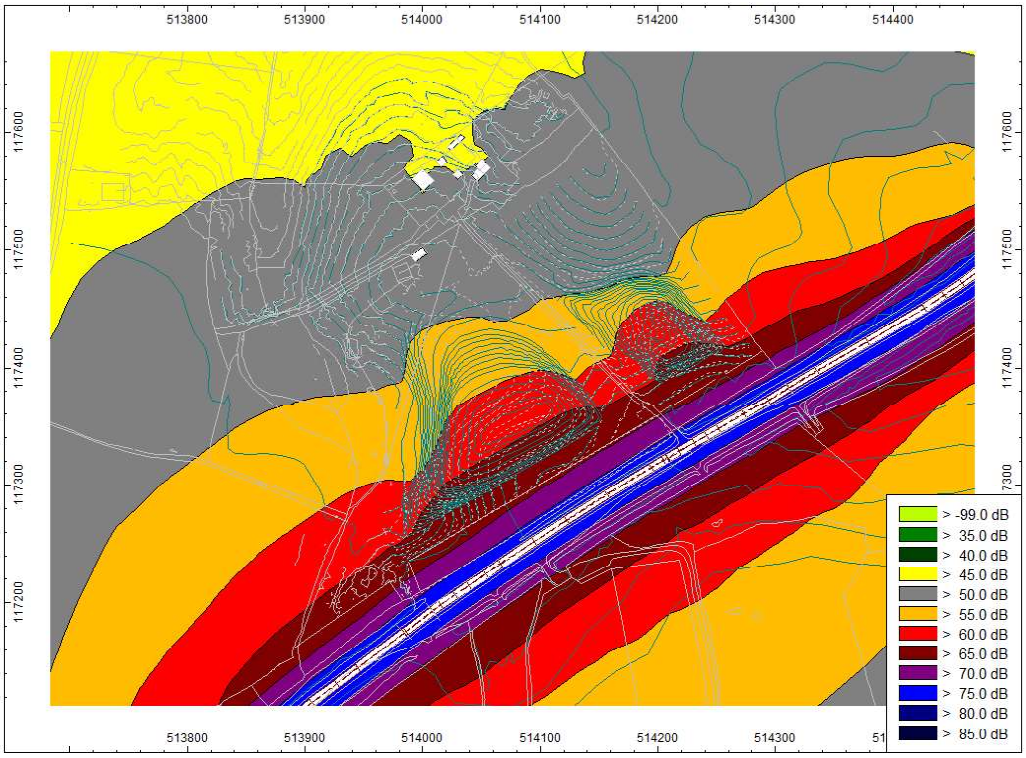


Figure 3. Daytime Road Noise Prediction with Proposed Bund (LAeq, 16hr). Contours showing 1st floor predicted levels



Discussion

The assessment demonstrates that the landscape bund will provide at most approximately 2 dB reduction from road traffic noise at Hooklands Farm. The attenuation provided is small, but expected for the following reasons:

- The bund is split into two smaller areas and is not continuous, therefore, there are still significant areas of the road that are unscreened e.g. in-between where the drive is and on either side.
- Acoustic screening is also most effective when the screening object (the bunds in this case) are located close to the source or receiver, in this case the bunds are located 70m away from the road.

Conclusion

Temple Group has been appointed by JBA Consulting to undertake a noise impact assessment for the proposed creation of landscape bunds at Hooklands Farm. Unattended and attended noise measurements have been completed at the site to characterise the existing noise environment over daytime and night-time.

Assessments of noise during the construction of the proposed development have been undertaken for on-site plant and for haul route movements. Predicted cumulative construction noise levels have then been assessed at the nearest noise sensitive receptors which are residential dwellings on London Road. The assessment indicates that during worst case construction periods the ambient noise levels at the nearest noise sensitive receptors are predicted to rise by no more than +2dB(A). In line with BS 5228:1 criterion, this is not considered significant.

Predicted noise attenuation provided by the landscape bunds has also been calculated in CadnaA using existing and proposed ground contour data. The assessment predicts a maximum reduction in road traffic noise levels at Hooklands Farm of approximately 2 dB. This low reduction is mostly attributable to the unscreened sections of road on either side of the bund and in between, as well as the large distance between the bund peaks and the road.

Appendix A Acoustic Glossary

Decibel (dB)

This is the unit sound pressure levels are presented in. They are a logarithmic ratio between the sound pressure and a reference sound pressure (20 µPa). A 3dB increase is a doubling of sound energy but is generally a just noticeable increase; a 10 dB increase is a 10-fold increase in sound energy and is generally perceived as being twice as loud.

dB(A)

This indicates that the overall dB noise level has been 'A-weighted'; this is a weighting applied to instrument-measured sound levels to account for the relative loudness perceived by the human ear.

L_{Aeq}

This represents the A-weighted 'ambient noise level' also known as the equivalent continuous sound level. As almost all sounds vary or fluctuate with time it is helpful to have an average of the total acoustic energy experienced over its duration. The L_{Aeq},16hr for example, describes the equivalent continuous sound level over the 16-hour period between 7am and 11pm.

L_n

Another method of describing, with a single value, a noise level which varies over a given time period is to consider the length of time for which a particular noise level is exceeded. If a level of X dB(A) is exceeded for say 6 minutes within one hour, then that level can be described as being exceeded for 10% of the total measurement period. This is denoted as the L_{A10} = X dB.

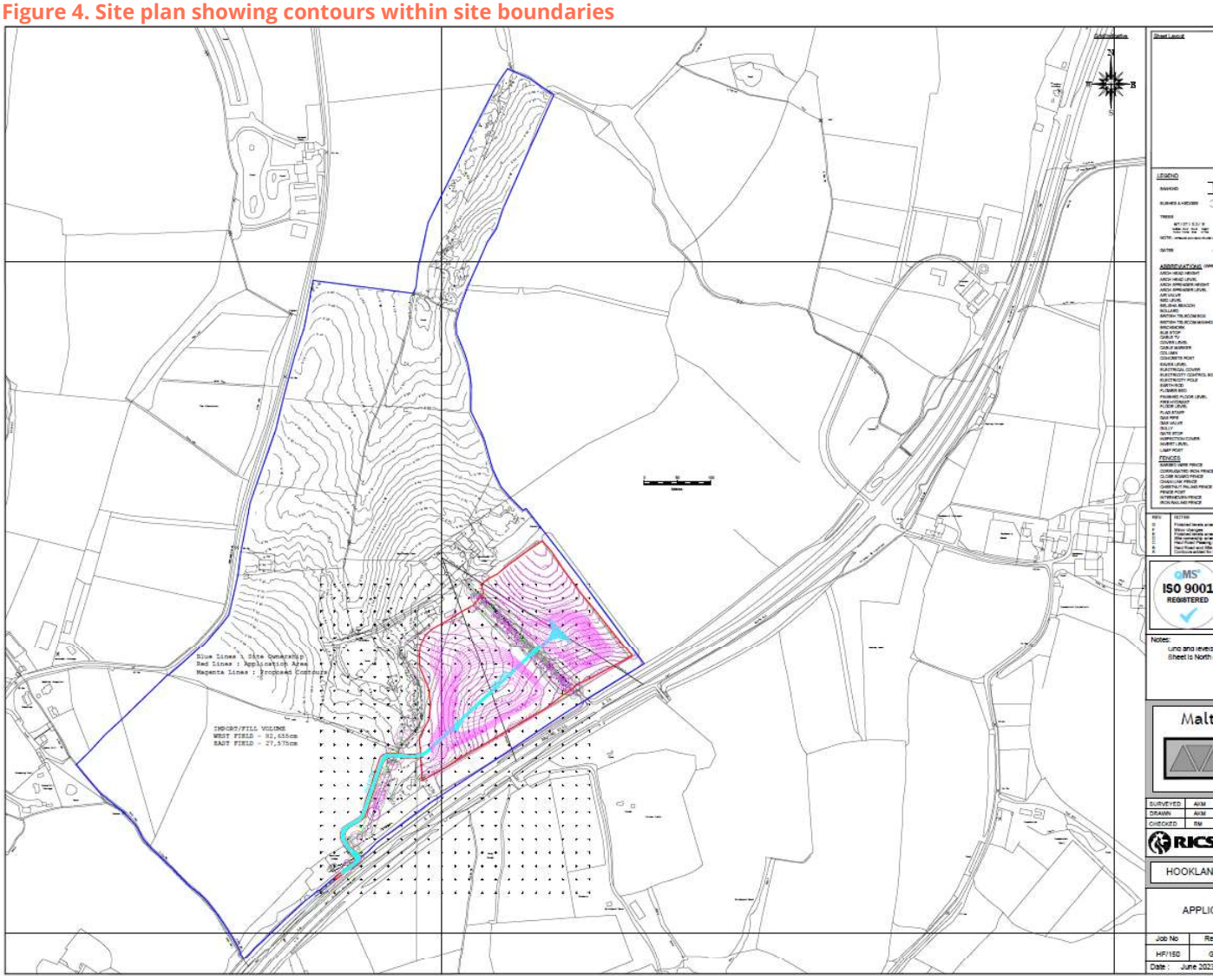
The L_{A10} index is often used in the description of road traffic noise, whilst the L_{A90}, the noise level exceeded for 90% of the measurement period, is the usual descriptor for underlying background noise.

L_{AFmax}

The maximum RMS A-weighted sound pressure level, using the Fast time weighting.

Appendix B Site Plans

Figure 4. Site plan showing contours within site boundaries



Appendix C Survey Photos

Figure 5. Measurement Position 1 (Farmhouse)

Figure 6. Measurement Position 2 (Field)

Figure 7. Attended Road Noise Measurement (Road)

Appendix D Unattended Measurement Time History

Figure 8. House baseline measurement (MP1)

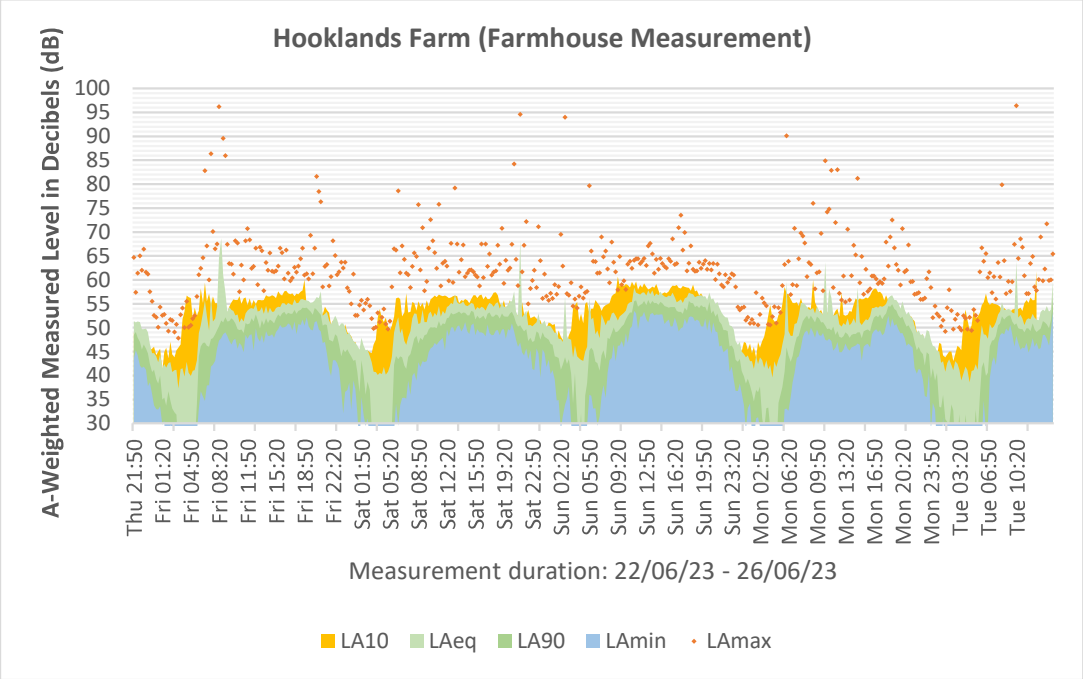
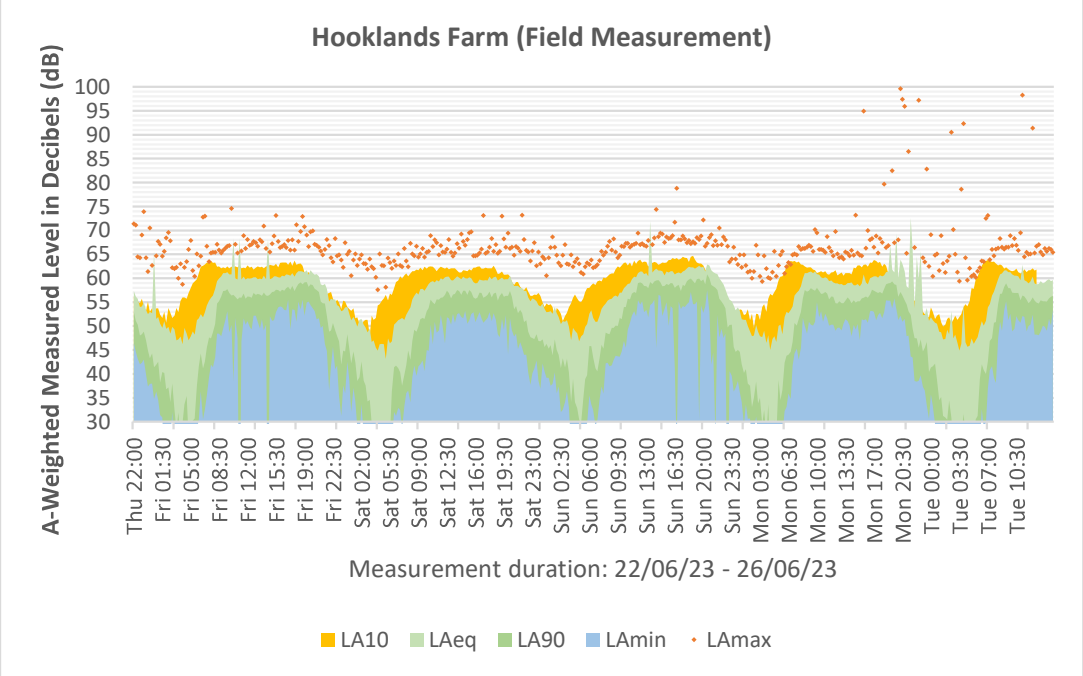


Figure 9. Field baseline measurement (MP2)



Appendix E Manufacturers Specifications

Table 10. Manufacturers specification for Volvo excavator (reproduced)

Unit	Sound level dB
Sound pressure level of cab of Volvo EC220E according to ISO 6396	
L_{pA} (standard)	69
L_{pA} (tropical)	70
External sound level according to ISO 6395 and EU Noise Directive 2000/14/EC	
L_{WA} (standard)	102
L_{WA} (tropical)	103

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