



Architectural & Environmental Acousticians  
Noise & Vibration Engineers

DISCHARGE OF CONDITIONS 19 & 20

LAND AT TEVERSHAM ROAD, FULBOURN

CASTLEFIELD INTERNATIONAL LIMITED

RP01-18333

## DISCHARGE OF CONDITIONS 19 & 20

**PROJECT:** LAND AT TEVERSHAM ROAD, FULBOURN

**CLIENT:** CASTLEFIELD INTERNATIONAL LIMITED

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1	22 August 2019	Sam Bryant, MPhys MIOA, Associate Director	-	Minor updates following client review
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## 1. INTRODUCTION

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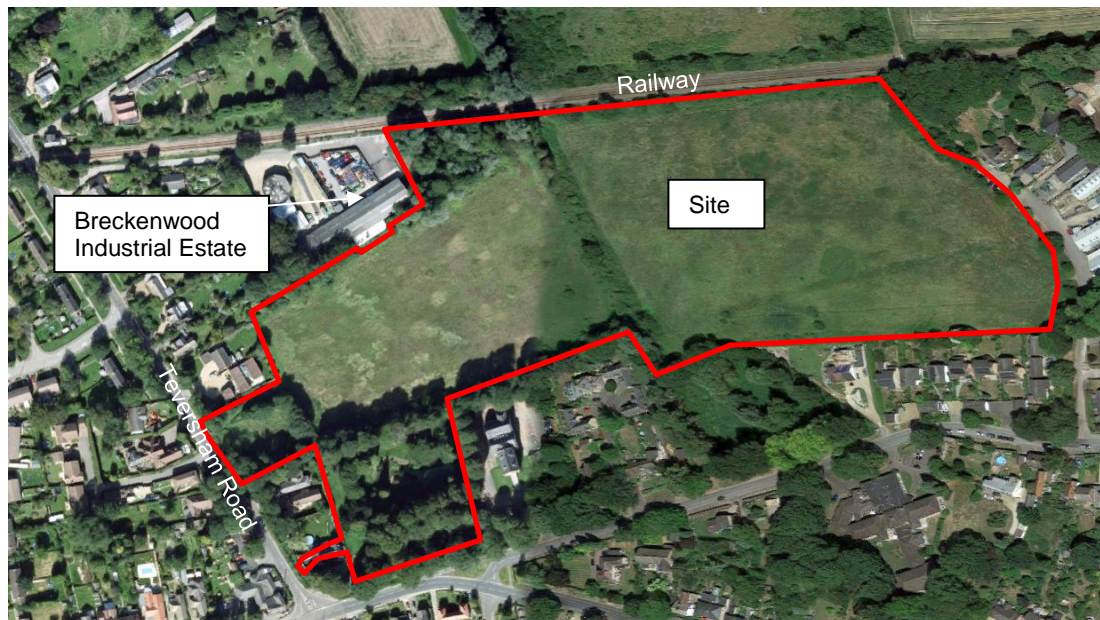
- 1.1 Cass Allen Associates has been instructed by Castlefield International Limited to assess the acoustic design of a new development known as Land at Teversham Road, Fulbourn.
- 1.2 The assessment has been carried out in accordance with the requirements of noise related planning conditions for the development. The conditions are:
19. Concurrently with any reserved matters application and prior to commencement of development a noise mitigation/ insulation scheme to protect occupants externally and internally from rail noise to the north and noise emanating from the Breckenwood Industrial Estate to the north west, shall be submitted to and approved in writing by the local planning authority. The noise insulation scheme shall have regard to site layout/orientation, internal room configuration, building fabric and glazing acoustic performance and adequate provision of rapid ventilation for thermal comfort or similar and shall demonstrate that the external and internal noise levels recommended in British Standard 8233:2014 "Guidance on sound insulation and noise reduction for buildings"(or as superseded) shall be achieved. If the internal noise levels recommended in BS 8233 cannot be achieved with partially open windows/ doors, then any scheme shall have particular regard to alternative forms of rapid/ purging ventilation such as mechanical or passive acoustic vents to facilitate ventilation/ thermal comfort cooling. The scheme as approved shall be fully implemented before the residential use hereby permitted is occupied and shall be retained thereafter.  
(Reason - To ensure that sufficient noise mitigation/ attenuation is provided to all residential properties to protect occupiers externally and internally from the impact of rail and industrial noise and to safeguard the health, amenity and quality of life of future residents in accordance with paragraphs 109 and 123 of the NPPF and Policy NE/15 Noise Pollution of the adopted LDF 2007
20. No dwellings or private gardens shall be sited within the residential no build/ exclusion zone as detailed on the Barton Willmore drawing 'Land at Teversham Road, Fulbourn Project, Drawing title: 50m Exclusion Zone B, dated 1st April 2014, Project No. 22403' unless and until a detailed noise mitigation strategy and/ or detailed insulation scheme to address the off-site operational noise of the Breckenwood Industrial Estate, has been submitted to and approved in writing by the Local Planning Authority. Occupation of any dwelling within the identified exclusion zone shall not take place until those works have been completed in accordance with the approved details and post installation acoustic/ noise testing to demonstrate effectiveness of the works have been certified as complete and approved in writing by the local planning authority. The scheme/ strategy shall be maintained as such thereafter.  
(Reason: To ensure that sufficient noise mitigation/ attenuation is provided to all residential properties to protect occupiers externally and internally from the impact of industrial noise and to safeguard the health, amenity and quality of life of future residents in accordance with paragraphs 109 and 123 of the NPPF and Policy NE/15 Noise Pollution of the adopted LDF 2007.)
- 1.3 It is important to note that Planning Condition 20 does not preclude development within the "50m Exclusion Zone". Instead it requires that a scheme of sound insulation is proposed to mitigate commercial noise for dwellings within that zone is submitted. Planning Condition 19 refers specifically to the Breckenwood Industrial Estate and considers that the noise levels provided in BS8233:2014 are appropriate design targets for this noise source. The mitigation requirements for dwellings within the 50m zone are therefore based on achieving the same BS8233:2014 guidance.
- 1.4 Condition 20 also requires internal noise level measurements in the finished development to be carried out. This will be agreed and carried out in due course and this report focusses on the design aspect of that condition.
- 1.5 This report contains technical terminology; a glossary of terms can be found at [www.cassallen.co.uk/glossary](http://www.cassallen.co.uk/glossary).

## 2. DEVELOPMENT DESCRIPTION

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- 2.1 The proposal is to develop the site into a number of residential dwellings and associated amenity space. The site is located in a predominantly residential area with Teversham Road to the west and a railway line to the north. The Breckenwood Industrial Estate is situated to the north west of the site.
- 2.2 An annotated aerial photo of the site and development layout is shown in Figure 1 below.

**Figure 1 Site and Surrounding Area – Red Line Approximate Only**



### 3. NOISE AFFECTING THE DEVELOPMENT

3.1 Planning Conditions 19 and 20 require assessment of internal and external noise levels due to surrounding noise sources. Where noise levels are anticipated to exceed the levels required by the planning conditions without specific acoustic upgrades to façade elements etc., noise mitigation measures have been proposed.

#### Design criteria – Internal noise levels

3.2 As discussed above, Planning Condition 19 requires the site to be designed such that noise due to the rail and the commercial use meet the recommendations given in BS8233:2014 ‘*Guidance on sound insulation and noise reduction for buildings*’. Whilst Condition 20 does not contain any reference to specific Standards, it is considered that compliance with Condition 19 in the “50m exclusion zone” demonstrates that sufficient mitigation is achievable for development in this area.

3.3 Relevant BS8233 design criteria are summarised in Table 1 below.

**Table 1 BS8233:2014 Internal Noise Criteria**

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB LAeq, 16hour	-
Dining	Dining room/area	40 dB LAeq, 16hour	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq, 16hour	30 dB LAeq, 8hour

3.4 BS8233 also states that it is desirable that noise levels in external amenity areas of residential developments do not exceed 50 dB LAeq and that 55 dB LAeq,T should be regarded as a upper guideline value.

3.5 The following acoustic design criteria have therefore been adopted for the development:

- Average noise levels in living rooms during the day should not exceed 35 dB LAeq,0700-2300hrs;
- Average noise levels in bedrooms should not exceed 35 dB LAeq,0700-2300hrs during the day and 30 dB LAeq,2300-0700hrs during the night;
- Where possible, average noise levels in external amenity areas during the day should be lower than 50-55 dB LAeq,0700-2300hrs.

#### Existing site noise levels

3.6 A noise survey was carried out at the site from 3<sup>rd</sup> and 7<sup>th</sup> July 2019 to assess existing noise levels in the area. The full methodology and results of the noise survey are provided in Appendix 1.

3.7 While operational, average noise levels across the western section of the site were dictated by plant noise emissions from the Breckenwood Industrial Estate. In the absence of commercial noise, average noise levels across the site are generally dictated by rail movements, distant road traffic and natural noises (tree rustling/ birdsong etc.)

3.8 Timetables for the adjacent railway line indicate that there are around 34 train movements per day with no passenger train movements at night. Additionally, review of recent use of the railway

indicates that there are typically from 0 to 2 freight train passes per night. World Health Organisation *Guidelines for Community Noise* 1999 recommends that indoor sound pressure levels “should not exceed approximately 45dB LAmax more than 10-15 times per night”. Clearly the number of freight train movements are significantly less than this figure. As such the impact of the railway on the average noise levels at the site is minimal and it is not necessary to consider individual noise events during the night. Additionally, it is therefore not considered necessary to install noise barriers or other specific external mitigation to control rail noise.

- 3.9 Based on the results of the site noise survey, a 3D computer noise model was developed to predict and assess the noise levels that will exist across the entire development.
- 3.10 The 3D noise model was developed using Cadna/A v2019 environmental noise modelling software.
- 3.11 The layout of the development and surrounding area was input into the model. To calculate the spread of noise levels around the site, average noise levels were input for the commercial noise sources and railway and calibrated to the results of the on-site noise measurements.
- 3.12 The methodology and results of the noise modelling are provided in Appendix 2.

#### **Internal noise levels in noise-sensitive rooms**

- 3.13 The facades of the development will be a masonry construction. This type of construction provides high levels of sound insulation and consequently noise ingress into habitable rooms will be dictated by the acoustic performance of glazing and ventilators (where applicable).
- 3.14 The ventilation scheme for the apartments closest to Breckenwood Industrial Estate (i.e. Blocks C, C1, D, D1 as shown in Figure 2 below) is Mechanical Ventilation with Heat Recovery (MVHR) i.e. System 4 from Building Regulations Part F. Therefore, there will be no background ventilators in the external façades (e.g. trickle ventilators etc.) of these units. This represents the most effective method of controlling external noise ingress from ventilation systems.

**Figure 2 Apartment Block Locations**



- 3.15 All other units will be ventilated using Mechanical Extract Ventilation (MEV) i.e. System 3 of Part F. Where this is the case there will be one background ventilator leading directly into all habitable rooms.
- 3.16 Planning Condition 19 states:
- If the internal noise levels recommended in BS 8233 cannot be achieved with partially open windows/ doors, then any scheme shall have particular regard to alternative forms of rapid/ purging ventilation such as mechanical or passive acoustic vents to facilitate ventilation/ thermal comfort cooling.*
- 3.17 The only dwellings which would not achieve the BS8233 recommended levels with open windows (when taking into account a 15 dB noise reduction through 'a partially open window' as advised by BS8233) are anticipated to be the apartments directly overlooking the Breckenwood Industrial Estate (i.e. Blocks C, C1, D and D1). These units are provided with MVHR systems which will have various duty settings available to the occupier depending on the ventilation requirements at the time. It is therefore considered that the development is compliant with the section of Condition 19 above.
- 3.18 The MVHR/ MEV system should be selected to ensure that noise ductwork terminations does not exceed acceptable levels within habitable rooms. Appropriate specifications for noise levels from the ventilation system (operating at typical maximum duty) would be as follows:
- Bedrooms and living rooms – 30 dB LAeq,T; and,
  - Other habitable areas – 35 dB LAeq,T.
- 3.19 Calculations were carried out using façade modelling software in accordance with the methodology given in BS8233:2014 to calculate the sound insulation performance required of the glazing and ventilators to achieve condition-compliant internal noise levels.



- 3.20 The calculations were carried out based on the dimensions/details for facade elements taken from project drawings.
- 3.21 The results of the calculations are summarised in Table 2 below. Given the nature of the noise environment when the commercial unit is operational, ensuring that the sound insulation performance in the 125Hz octave band is sufficient is key to ensuring appropriate internal noise levels are achieved. As such, the acoustic performance requirements of the glazing and ventilation are given both as a minimum requirement in that octave band as well as an overall ‘broadband’ sound insulation performance that would typically meet this requirement. The acoustic performance of the glazing to be installed will be reviewed by Cass Allen at the appropriate time to ensure compliance with the below.

**Table 2 Acoustic Requirements for Façade Elements**

Location/ Rooms	Glazing Sound Insulation Performance Requirements (inc. Frames)		Ventilator Performance Requirements (where applicable)
	125 Hz Octave Band Requirement	Example Broadband Performance	
Apartment bedrooms closest to and directly overlooking Breckenwood Industrial Estate (2300-0700hrs)	26 dB R	35 dB Rw+Ctr	N/A
Apartment living rooms closest to and directly overlooking Breckenwood Industrial Estate (0700-2300hrs)	26 dB R	35 dB Rw+Ctr	N/A
House bedrooms closest to Breckenwood Industrial Estate (2300-0700hrs)	20 dB R	27 dB Rw+Ctr	31 dB Dne,w + Ctr
House living rooms closest to and directly overlooking Breckenwood Industrial Estate (0700-2300hrs)	20 dB R	27 dB Rw+Ctr	31 dB Dne,w + Ctr
All other bedrooms (2300-0700hrs)	20 dB R	27 dB Rw+Ctr	31 dB Dne,w + Ctr
All other living rooms (0700-2300hrs)	20 dB R	27 dB Rw+Ctr	31 dB Dne,w + Ctr

- 3.22 It should be noted that 27 dB Rw+Ctr glazing and 31 dB Dne,w + Ctr ventilators are considered to be non-acoustically upgraded (i.e. standard products capable of providing suitable thermal performance/ ventilation rates) and therefore will be readily achieved.

- 3.23 It can be seen from the above that acceptable internal noise levels are anticipated to be achieved at all locations across the development (including within the “50m Zone”) subject to the installation of the specified glazing and ventilation systems.

#### **Noise levels in external amenity areas**

- 3.24 The layout of the development has also been reviewed in relation to the BS8233 recommendation that noise levels in external amenity areas should ideally not exceed 50 – 55 dB LAeq,T.
- 3.25 The noise survey results indicate that noise levels in external amenity areas are predicted to generally achieve the BS8233 recommended levels. The proposed development is therefore also considered to be acceptable based on noise levels in external amenity areas.

#### **Summary**

- 3.26 In summary of the above, it is considered that internal and external noise levels across the site will be achieved in the finished development with the above noise mitigation measures. It is therefore our view the Condition 19 and the design element of Condition 20 may be discharged.

## 4. CONCLUSIONS

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- 4.1 Cass Allen Associates was instructed by Castlefield International Limited to assess the acoustic design of the proposed development as required by Planning Conditions 19 and 20.
- 4.2 A survey was carried out at the site to establish the level, operating times and frequency content of noise emissions from the adjacent noise sources.
- 4.3 A 3D noise model of the development was constructed to calculate the spread of noise around the site and inform an acoustic façade specification for all dwellings as per the requirements of the planning conditions.
- 4.4 It is our view that this report contains the information required to discharge Planning Condition 19 and the design element of Planning Condition 20 for the development.

# Appendix 1 Survey Results

**Survey Summary:**

The survey comprised long-term unattended noise monitoring at the site. Noise levels at the site were generally very quiet and dictated by distant road traffic and intermittent industrial noise from the Breckenwood Industrial Estate.

**Survey Period:**

03/07/19 to 07/07/19

**Survey Objectives:**

To quantify noise levels at the site as they exist currently and determine noise emissions from the Breckenwood Industrial Estate.

**Equipment Used (Appendix 1, Table 1):**

Type	Manufacturer	Model	Serial Number
Sound level meter <sup>1</sup> (noise logger)	NTi Audio	XL2	A2A-13906-E0
Calibrator	NTi Precision Calibrator	CAL200	15011

**Note 1:** All sound level meters were calibrated before and after measurement periods and no significant drift in calibration was found to have occurred. The results of the measurements are therefore considered to be representative.

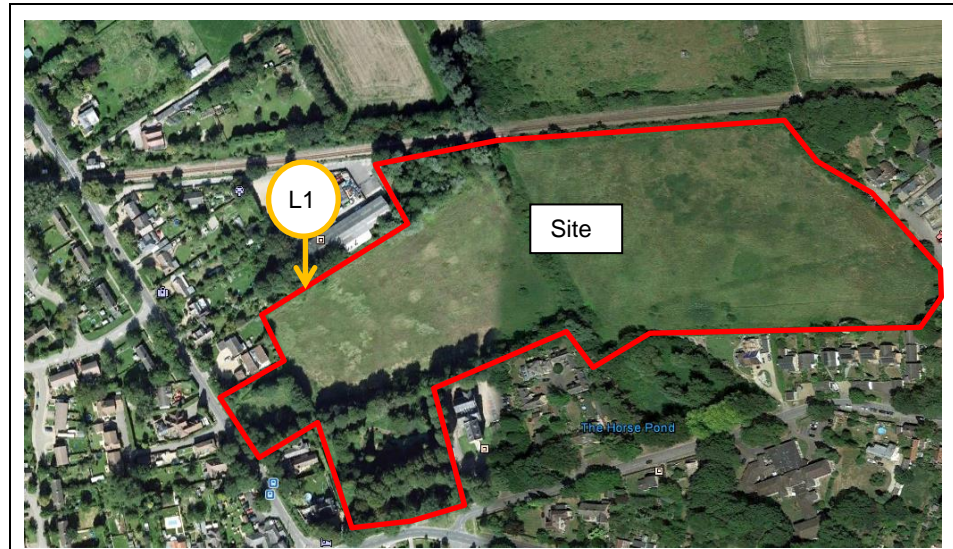
**Weather Conditions:**

The observed weather conditions were acceptable for acoustic measurement throughout the attended survey periods (low-medium wind speeds and no rain). Weather records for the area confirmed that weather conditions were also generally acceptable for acoustic measurement during the unattended monitoring.

**Measurement Positions (Appendix 1, Table 2):**

Position (refer plan below)	Description
L1	Unattended noise logging position. 1.5m above ground level. Free-field. Direct line of sight to commercial uses

**Site Plan showing Measurement Positions (Appendix 1, Figure 3):**



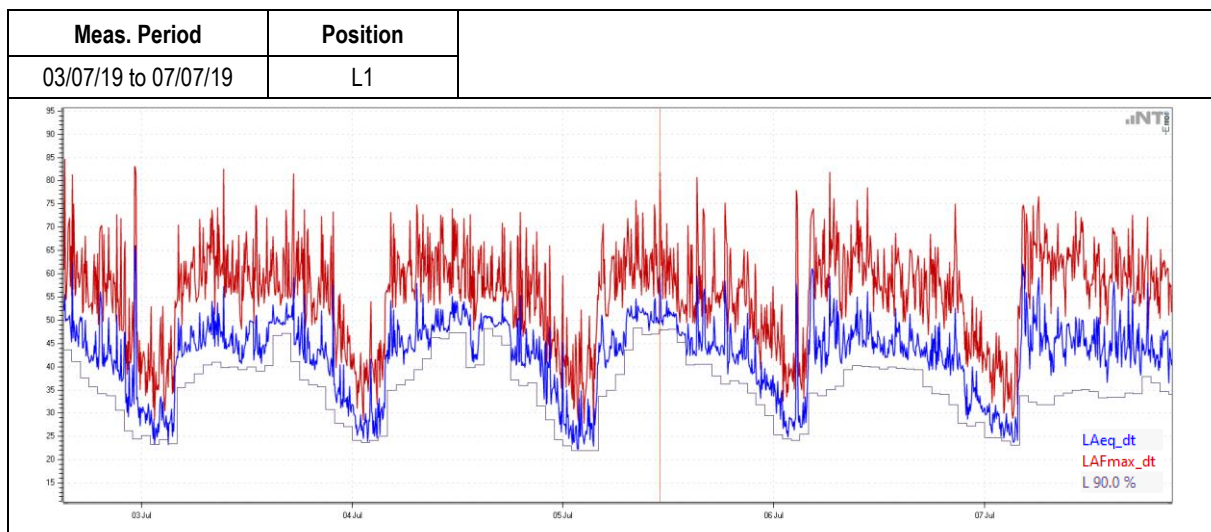
**Unattended Noise Monitoring Results (Appendix 1, Table 3):**

Meas. Period	Position	Daytime (0700-2300hrs)		Night-time (2300-0700hrs)		
		LAeq,16hr, dB	LA90,1hr dB <sup>1</sup>	LAeq,8hr, dB	LA90,5mins, dB <sup>1</sup>	LAm <sub>ax</sub> , dB <sup>2</sup>
03/07/19 to 07/07/19	L1	49	42	42	27	65

**Note 1:** Typical lowest measured during the period shown.

**Note 2:** Highest typical maximum noise level during the night-time (not exceeded more than 10-15 times per night).

**Unattended Noise Monitoring Results (Appendix 1, Figure 4):**



# Appendix 2 Modelling Results

Modelling Software:

CADNA/A Version 2019

Modelled Scenarios:

Commercial noise propagation across the site

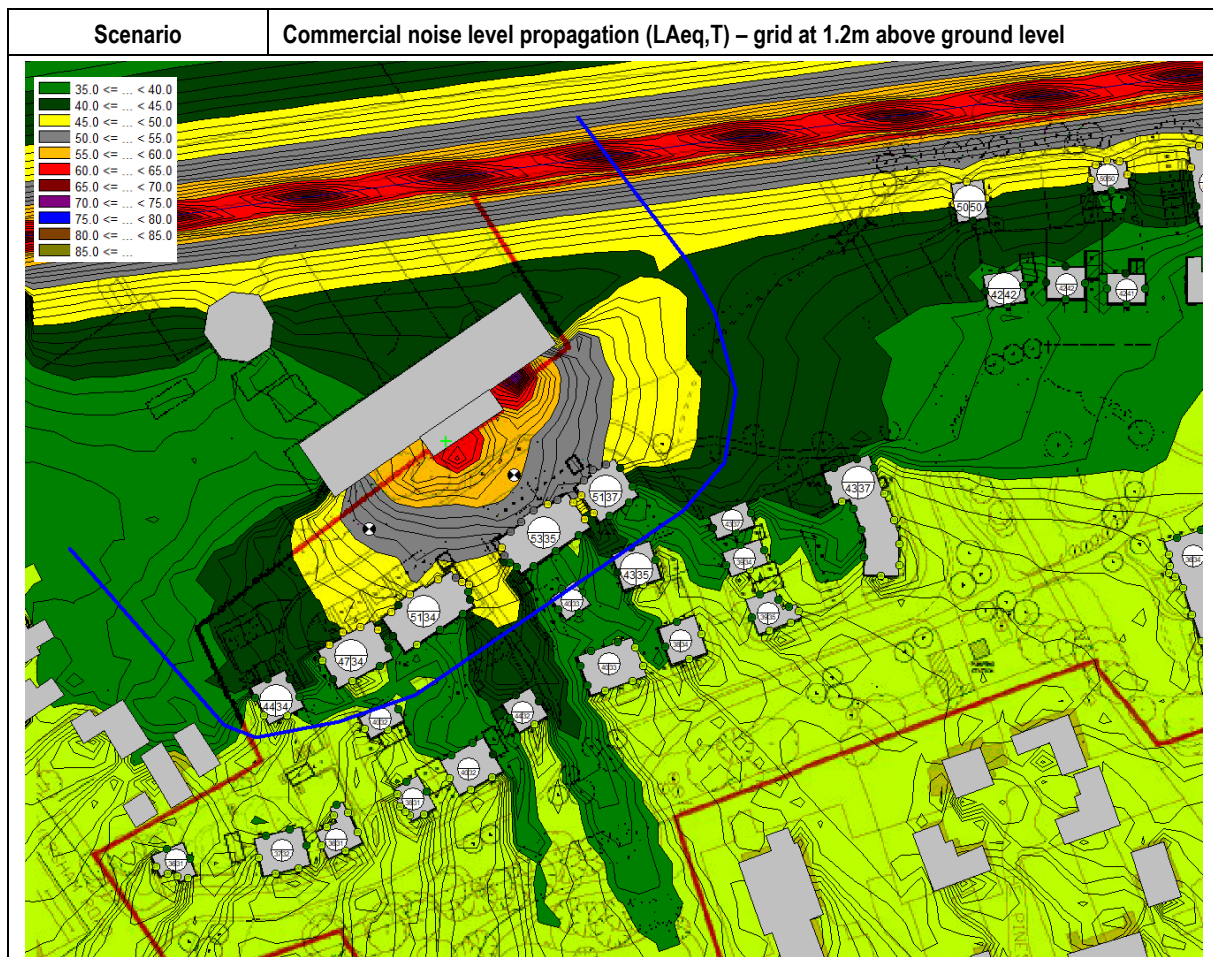
Data inputs:

- Noise survey results
- Topographical data for the site
- Development layout

Calculation Algorithms Used:

- ISO 9613-1:1993 Acoustics-Attenuation of sound during propagation outdoors – Part 1: Calculation of the absorption of sound by the atmosphere
- ISO 9613-2:1996 Acoustics-Attenuation of sound during propagation outdoors – Part 2: General method of calculation

Modelling Printout (Appendix 2, Figure 1):



## Appendix 3 Façade Acoustic Specification

Location/ Rooms	Key Colour	Glazing Sound Insulation Performance Requirements (inc. Frames)		Ventilator Performance Requirements (where applicable)	
		125 Hz Octave Band Requirement	Example Broadband Performance		
Apartment bedrooms closest to and directly overlooking Breckenwood Industrial Estate (2300-0700hrs)		26 dB R	35 dB Rw+Ctr	N/A	
Apartment living rooms closest to and directly overlooking Breckenwood Industrial Estate (0700-2300hrs)		26 dB R	35 dB Rw+Ctr	N/A	
House bedrooms closest to Breckenwood Industrial Estate (2300-0700hrs)	No Colour	20 dB R	27 dB Rw+Ctr	31 dB Dne,w + Ctr	
House living rooms closest to and directly overlooking Breckenwood Industrial Estate (0700-2300hrs)	No Colour	20 dB R	27 dB Rw+Ctr	31 dB Dne,w + Ctr	
All other bedrooms (2300-0700hrs)	No Colour	20 dB R	27 dB Rw+Ctr	31 dB Dne,w + Ctr	
All other living rooms (0700-2300hrs)	No Colour	20 dB R	27 dB Rw+Ctr	31 dB Dne,w + Ctr	

**NOTES:**

Values must include the Ctr correction. Manufacturers or suppliers should provide laboratory test data demonstrating that the proposed systems are capable of achieving the values given. Windows should be tested as complete systems (rather than just the glazing in isolation).

All floors:





