

NOISE ASSESSMENT

on behalf of

LIDL GREAT BRITAIN LTD

for the site at

**LOWRY HOUSE, MAULDETH ROAD WEST,
CHORLTON, M21 7SP**

REPORT DATE: 26 OCTOBER 2023

REPORT NUMBER: 102838

Miller Goodall Ltd
Ground Floor
Ashworth House
Deakins Business Park
Blackburn Road
Egerton
Bolton
Lancashire
BL7 9RP

Tel: 01204 596166

www.millergoodall.co.uk

Company registration number 5201673



Summary

A noise assessment has been undertaken at Lowry House, Mauldeth Road West, Chorlton, M21 7SP in respect of the impact of noise from a proposed Lidl Store onto the closest noise sensitive receptors (NSRs).

Unattended noise monitoring was carried out from Friday 17th June 2022 to Monday 20th June 2022 to determine existing background and ambient sound levels.

CadnaA noise modelling was utilised to predict the impact of plant noise and HGV movements from the site at the closest NSRs. The noise impact was assessed against BS 4142:2014+A1:2019.

The BS 4142:2014+A1:2019 assessment concluded that, with the proposed mitigation in the form of 2 and 2.5 m tall barriers included, the impact of associated noise from the proposed development would result in a low impact for the daytime and significant adverse impact for the night-time for both the closest noise sensitive receptors. It is therefore recommended that delivery hours are restricted to 07:30-20:00hrs Monday to Saturday (including bank holidays) and 09:00 – 17:00hrs on Sunday.

The noise impact at the nearby 'Hough End Hall Academy and Mosque' was assessed to 45 dB $L_{Aeq,T}$ internally. This was based on the open plan office guideline level found in BS8233. With recommended mitigation installed, the resulting internal rating level was predicted to be 10 dB below this guideline level after a 13dB reduction was applied, assuming for an open window. The noise impact at the mosque is therefore at or below the No Observed Effect Level and no further action is required.

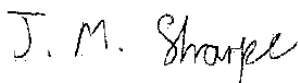
It is considered that a suitable and commensurate level of protection against noise will be provided to the occupants of nearby residences after mitigation measures are put in place. Therefore, the site is suitable for development on noise grounds.

Record of changes

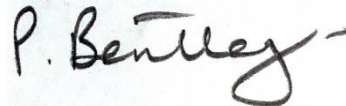
Prepared By: James Sharpe AMIOA

Reviewed By: Paul Bentley MIOA

Signed:



Signed:



Date:

9 September 2023

Date:

9 September 2023

Version	Date	Change	Initials
1	9 th September 2022	First issue	JS
2	24 th November 2022	Updated site plans	JS
3	26 th October 2023	Updated site plans	WW

This page is left blank intentionally

Contents

Summary	2
Contents	4
1 Introduction.....	6
2 Site Description	6
3 Proposed Development	6
4 Policy Context	6
4.1 Noise Policy Statement for England	6
4.2 National Planning Policy Framework.....	7
4.3 Planning Practice Guidance – Noise	8
5 Local Authority Consultation	9
6 Acoustic Standards and Guidance	10
6.1 BS 4142:2014+A1:2019 ‘Methods for rating and assessing industrial and commercial sound’	10
6.2 BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings.....	11
6.3 World Health Organisation (WHO) Guidelines for Community Noise 1999	11
7 Noise Survey.....	12
7.1 Measurements of Existing Noise Sources.....	12
7.2 Determination of representative background sound levels	17
8 Impact of Noise from the Proposed Development	17
8.1 Noise Modelling.....	17
8.2 Noise Sensitive Receptor and Prediction Heights	17
8.3 Modelling of HGV Delivery Noise	18
8.4 Modelling of Plant Noise	19
8.5 Mosque Noise Impact Assessment	19
8.6 BS 4142:2014+A1:2019 Assessment.....	20
9 Mitigation Measures	22
9.1 BS 4142:2014+A1:2019 Assessment with Noise Barriers.....	22
9.2 Delivery Hours Restrictions	22
9.3 Plant Assessment with Mitigation	23
10 Consideration of Other Discipline Requirements	23
11 Conclusions	23
APPENDICES	25
Appendix 1a: Site Plan.....	26
Appendix 1b: Elevation Plans	27

Appendix 2: Site Boundary and Noise Monitoring Locations.....28

Appendix 3a: Noise Model Output – Cumulative Daytime with No Mitigation29

Appendix 3b: Noise Model Output – Cumulative Night time with No Mitigation30

**Appendix 3c: Noise Model Output – Cumulative Daytime with 2.5m barrierMitigation
31**

**Appendix 3d: Noise Model Output – Cumulative Night time with 2.5m barrier Mitigation
32**

Appendix 3e: Noise Model Output – Plant, Night time with Mitigation33

Glossary of Terms35

1 Introduction

- 1.1.1 Miller Goodall Ltd has, on behalf of Lidl Great Britain Ltd, undertaken a noise assessment in respect of the impact of associated noise sources from a proposed new Lidl store at Lowry House, Mauldeth Road West, Chorlton, M21 7SP.

2 Site Description

- 2.1.1 The site is located at Lowry House, Mauldeth Road West, Chorlton, M21 7SP. The proposed location for the site is currently occupied by a vacant former school/college building known as “Lowry House”. The site is bounded to the north by Chorlton High School, to the south-east by Mauldeth Road West, to the south-west by Nell Lane and to the north-west by Hough End Hall Academy and Mosque. To the west of the site is a vacant former residential/commercial building.
- 2.2 There are residential areas to the south-east, south, north-east and north-west of the site.

3 Proposed Development

- 3.1.1 The proposal is to develop the site for commercial use involving the erection of a new Lidl store. Road access to the development site is located off Nell Lane. The Lidl store will sit in the north-eastern part of the site, whilst the southern portion will be allocated to car parking. The delivery/service yard will be next to the store’s north-eastern elevation; one loading bay is located off the north-eastern façade. A designated fixed plant area is situated at roof level at the north-eastern portion of the building, directly above the delivery bay. Site plans are shown in Appendix 1.
- 3.1.2 Intended operational hours for the Lidl store are as follows:
- 3.1.3 Opening hours: 08:00 – 22:00hrs Monday to Saturday (including bank holidays); and 10:00 – 16:00hrs on Sunday.
- 3.1.4 Delivery Hours: Unrestricted (i.e. 24/7 Monday to Sunday).

4 Policy Context

4.1 Noise Policy Statement for England

- 4.1.1 The Noise Policy Statement for England (NPSE¹), published in March 2010, sets out the long-term vision of Government noise policy. The Noise Policy aims, as presented in this document, are:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse effects on health and quality of life;

¹ Noise Policy Statement for England, Defra, March 2010

- mitigate and minimise adverse effects on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.”

4.1.2 The NPSE makes reference to the concepts of NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level) as used in toxicology but applied to noise impacts. It also introduces the concept of SOAEL (Significant Observed Adverse Effect Level) which is described as the level above which significant adverse effects on health and the quality of life occur.

4.1.3 The first aim of the NPSE is to avoid significant adverse effects, taking into account the guiding principles of sustainable development (as referenced in Section 1.8 of the Statement). The second aim seeks to provide guidance on the situation that exists when the potential noise impact falls between the LOAEL and the SOAEL, in which case:

“...all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development”.

4.1.4 Importantly, the NPSE goes on to state:

“This does not mean that such adverse effects cannot occur”.

4.1.5 The Statement does not provide a noise-based measure to define SOAEL, acknowledging that the SOAEL is likely to vary depending on the noise source, the receptor and the time in question. NPSE advises that:

“Not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available”

4.1.6 It is therefore likely that other guidance will need to be referenced when applying objective standards for the assessment of noise, particularly in reference to the SOAEL, whilst also taking into account the specific circumstances of a proposed development.

4.2 National Planning Policy Framework

4.2.1 The National Planning Policy Framework (NPPF²) initially published in March 2012, was updated most recently in September 2023. One of the documents that the NPPF replaces is Planning Policy Guidance Note 24 (PPG 24) “Planning and Noise”³.

4.2.2 The revised NPPF advises that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives). One of these is an environmental objective which is described in par. 8 (c):

“to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.”

² National Planning Policy Framework, Ministry of Housing, Communities and Local Government, September 2023

³ Planning Policy Guidance 24: Planning and Noise, DCLG, September 1994

4.2.3 At par. 174 we are advised that:

“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. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans...”

4.2.4 Par. 185 goes on to state:

“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:

a) 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;

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

4.2.5 Par. 187 seeks to ensure that any development does not prejudice the legally permitted operations and activities of other, existing non-residential uses, stating:

“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

4.3 Planning Practice Guidance – Noise

4.3.1 As of March 2014, a Planning Practice Guidance⁴ for noise was issued which provides additional guidance and elaboration on the NPPF, the guidance was updated in July 2019. It advises that when plan-making and decision-taking, the Local Planning Authority should consider the acoustic environment in relation to:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and
- Whether or not a good standard of amenity can be achieved.

4.3.2 In line with the Explanatory Note of the NPSE, the PPG goes on to reference the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of

⁴ Planning Practice Guidance – Noise, <https://www.gov.uk/guidance/noise--2> 22nd July 2019.

noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that:

“...the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation”.

4.3.3 Examples of these factors include:

- The source and absolute noise level of the source along with the time of day that it occurs;
- Where the noise is non-continuous, the number of noise events and pattern of occurrence;
- The frequency content and acoustic characteristics of the noise;
- The effect of noise on wildlife;
- The acoustic environment of external amenity areas provided as an intrinsic part of the overall design;
- The impact of noise from certain commercial developments such as night clubs and pubs where activities are often at their peak during the evening and night.

4.3.4 The PPG also provides general advice on the typical options available for mitigating noise. It goes on to suggest that Local Plans may include noise standards applicable to proposed developments within the Local Authority's administrative boundary, although it states that:

“Care should be taken, however, to avoid these being implemented as fixed thresholds as specific circumstances may justify some variation being allowed”.

4.3.5 The PPG was amended in December 2014 to clarify guidance on the potential effect of noise from existing businesses on proposed new residential accommodation. Even if existing noise levels are intermittent (for example, from a live music venue), noise will need to be carefully considered and appropriate mitigation measures employed to control noise at the proposed accommodation.

5 Local Authority Consultation

5.1 Manchester City Council were contacted in regards to the assessment methodology⁵. It was agreed that BS4142:2014 would be utilised to assess the impact of noise from the proposed Lidl Store at the closest noise sensitive receptors. Details of the survey location were also discussed and agreed upon.

5.2 The main concern was whether the nearby 'Hough End Hall Academy and Mosque' would be classed as a sensitive receptor. Sharon McAndrew at Manchester City Council indicated that the mosque was currently shut, however she advised on checking whether it was operational during the survey. The mosque was confirmed to be operational when visiting the site (daytime only opening hours).

⁵ Email from James Sharpe to Rebecca Twigg on 14th June 2022

6 Acoustic Standards and Guidance

6.1 BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

6.1.1 BS 4142:2014+A1:2019⁶ provides guidance on the assessment of the likelihood of complaints relating to noise from industrial sources. It replaced the 1997 edition of the Standard in October 2014 and was amended in June 2019. The amended version corrected a number of printing errors and further clarified that the standard is used to assess external noise levels, and not internal noise levels (although this can form part of the discussion regarding context). The key aspects of the Standard are summarised below.

6.1.2 The standard presents a method of assessing potential noise impact by comparing the noise level due to industrial sources (the Rating Level) with that of the existing background noise level at the nearest noise sensitive receiver in the absence of the source (the Background Sound Level).

6.1.3 The Specific Noise Level - the noise level produced by the source in question at the assessment location - is determined and a correction applied for certain undesirable acoustic features such as tonality, impulsivity or intermittency. The corrected Specific Noise Level is referred to as the Rating Level.

6.1.4 In order to assess the noise impact, the Background Sound Level is arithmetically subtracted from the Rating Level. The standard states the following:

- *Typically, the greater this difference, the greater the magnitude of the impact,*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context,*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context,*
- *The lower the Rating Level is relative to the measured Background Sound Level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the Rating Level does not exceed the Background Sound Level, this is an indication of the specific sound source having a low impact, depending on the context.*

6.1.5 In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014+A1:2019 edition places emphasis upon an appreciation of the context, as follows:

An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.

6.1.6 The 2014 edition of BS 4142 also introduced a requirement to consider and report the uncertainty in the data and associated calculations and to take reasonably practicable steps to reduce the level of uncertainty.

⁶ BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

6.2 BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

- 6.2.1 This standard carries the full weight of an adopted British Standard, provides recommended guideline acoustic design criteria for new dwellings and is supported by guidance contained within WHO GCN⁷. The guideline noise design criteria of BS 8233 apply to external noise “*without a specific character*” (previously and sometimes termed or referred to as “*anonymous noise*”) such as that associated with road and rail traffic.

Internal Amenity

- 6.2.2 The Standard states that for external noise without a specific character, such as road traffic, it is desirable that the internal ambient noise level does not exceed the guideline values shown in Table 1, below.
- 6.2.3 The note to paragraph 7.7.1 states that where noise has a specific character (i.e. it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content) “*lower noise limits might be appropriate*”.

Table 1: BS 8233: 2014 guideline indoor ambient noise levels for dwellings

Location	Activity	07:00 to 23:00	23:00 to 07:00
Living Room	Resting	35 dB $L_{Aeq,16hr}$	-
Dining room/area	Dining	40 dB $L_{Aeq,16hr}$	-
Bedroom	Sleeping (daytime resting)	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

- 6.2.4 Note 7 to Table 4 of BS 8233 states:

“Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.”

- 6.2.5 Guidance on reasonable acoustic design criteria for individual noise events are also provided, and the Standard advises that:

“regular individual noise events...can cause sleep disturbance. A guideline value may be set in terms of SEL ⁸ or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values”.

6.3 World Health Organisation (WHO) Guidelines for Community Noise 1999

- 6.3.1 The WHO Guidelines 1999 recommends that to avoid sleep disturbance, indoor night-time guideline noise values of 30 dB L_{Aeq} for continuous noise and 45 dB $L_{AF,max}$ for individual noise events should be applicable. It

⁷ World Health Organisation Guidelines for Community Noise, 1999

⁸ Sound exposure level or L_{AE}

is to be noted that the WHO Night Noise Guidelines for Europe 2009⁹ makes reference to research that indicates sleep disturbance from noise events at indoor levels as low as 42 dB $L_{AF,max}$. The number of individual noise events should also be taken into account and the WHO guidelines suggest that indoor noise levels from such events should not exceed approximately 45 dB $L_{AF,max}$ more than 10 – 15 times per night.

6.3.2 The WHO document recommends that steady, continuous noise levels should not exceed 55 dB L_{Aeq} on balconies, terraces and outdoor living areas. It goes on to state that to protect the majority of individuals from moderate annoyance, external noise levels should not exceed 50 dB L_{Aeq} .

7 Noise Survey

7.1 Measurements of Existing Noise Sources

7.1.1 Noise measurements were undertaken at two locations consistent with the proposed development in accordance with BS 7445-1: 2003¹⁰ by James Sharpe of Miller Goodall Ltd. The calibration of the sound level meter was checked before and after measurements with negligible deviation (<0.1 dB). Details of the equipment used are shown in Table 2, below.

Table 2: Noise monitoring equipment

Equipment Description	Type Number	Manufacturer	Serial No.	Date Calibrated	Calibration Certification Number
Class 1 ^{11, 12} Integrating Real Time 1/3 Octave Sound Analyser	NOR 140	Norsonic	1407510	15/12/2021	05552/1
Microphone	NOR 1225	Norsonic	384687	15/12/2021	05552/1
Class 1 Calibrator ¹³	NOR 1251	Norsonic	34123	02/09/2021	05409/1
Class 1 ^{14, 15} Integrating Real Time 1/3 Octave Sound Analyser	NOR 140	Norsonic	1406017	03/11/2021	05520/1
Microphone	NOR 1225	Norsonic	358159	03/11/2021	05520/1

⁹ WHO Night Noise Guidelines for Europe 2009

¹⁰ BS 7445-1: 2003 Description and measurement of environmental noise - Part 1: Guide to quantities and procedures

¹¹ IEC 61672-1 (2002) Electroacoustics – Sound level meters Part 1: Specifications

¹² IEC 61260 (1995) Electroacoustics – Octave-band and fractional-octave-band filters

¹³ IEC 60942 (2003) Electroacoustics – Sound calibrators

¹⁴ IEC 61672-1 (2002) Electroacoustics – Sound level meters Part 1: Specifications

¹⁵ IEC 61260 (1995) Electroacoustics – Octave-band and fractional-octave-band filters

Class 1
Calibrator¹⁶

Type 4231

Brüel & Kjær

2478249

20/07/2020

04743/1

*No reference number available, but the certificate is available upon request.

7.1.2 Noise monitoring was undertaken at the times specified in Table 3, below. Weather conditions were determined both at the start and on completion of the survey. It is considered that meteorological conditions were appropriate for environmental noise measurements. Measurement locations are shown in Appendix 1.

Table 3: Dates, times and weather conditions during noise measurements

Measurement Locations	Date/Time	Weather conditions		
		Description	At Start of Survey	On Completion
MP1 and MP2	17/06/22, 11:00 to 20/06/22, 09:50	Temperature:	26°C	16°C
		Precipitation:	Dry	Dry
		Cloud cover (oktas – see opposite):	5	0
		Any fog/snow/ice?	No	No
		Any damp roads/wet ground?	No	No
		Wind speed:	4 m/s	2 m/s
		Wind direction:	W	NNW
		Conditions that may cause temp. inversion?	No	No
		<div> <p>Cloud Cover</p> <p>Symbol Scale in oktas (eighths)</p> <p>0 Sky completely clear</p> <p>1</p> <p>2</p> <p>3</p> <p>4 Sky half cloudy</p> <p>5</p> <p>6</p> <p>7</p> <p>8 Sky completely cloudy</p> <p>(9) Sky obstructed from view</p> </div>		

7.1.3 Measurements were made with the microphone protruding 1m out of two of the first-floor windows at Lowry House. The measurement locations are shown in Appendix 2.

7.1.4 The dominant noise sources within the vicinity of the measurement locations are summarised in Table 4.

¹⁶ IEC 60942 (2003) Electroacoustics – Sound calibrators

Table 4: Description of noise sources affecting the site

Measurement Locations	Noise Sources
MP1	Local road traffic noise from Mauldeth Road West
MP2	Distant tram noise, distant road traffic noise

- 7.1.5 There were some people cutting down trees along Mauldeth Road West during the install of the equipment. This data has subsequently been excluded as it is not representative of a typical noise environment.
- 7.1.6 A 3dB façade correction has been applied to all measured data at MP1 and MP2.
- 7.1.7 A summary of the broadband measurement data for MP1 and MP2 is provided in Charts 1 and 2 below. All data are sound pressure levels in dB re 20 µPa.

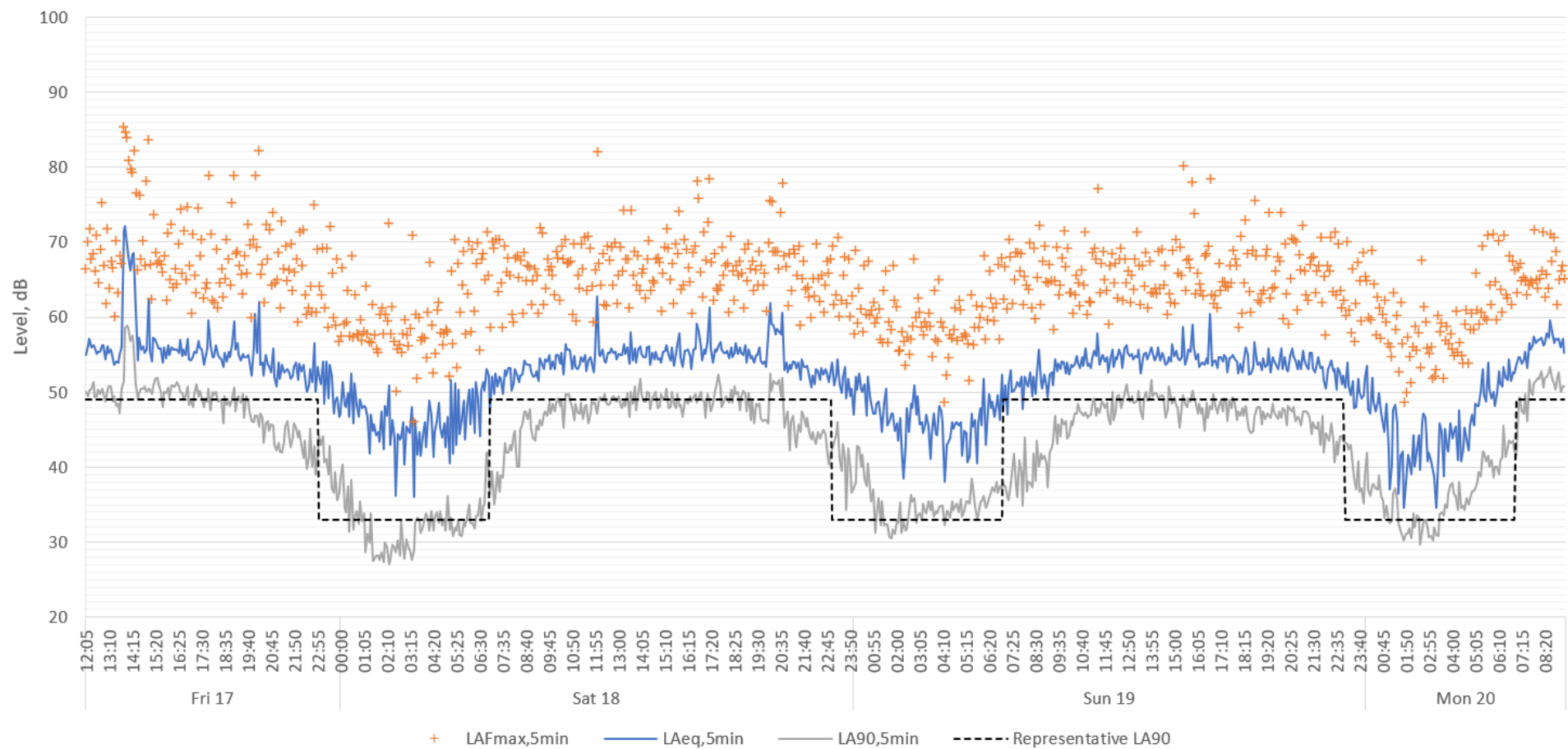
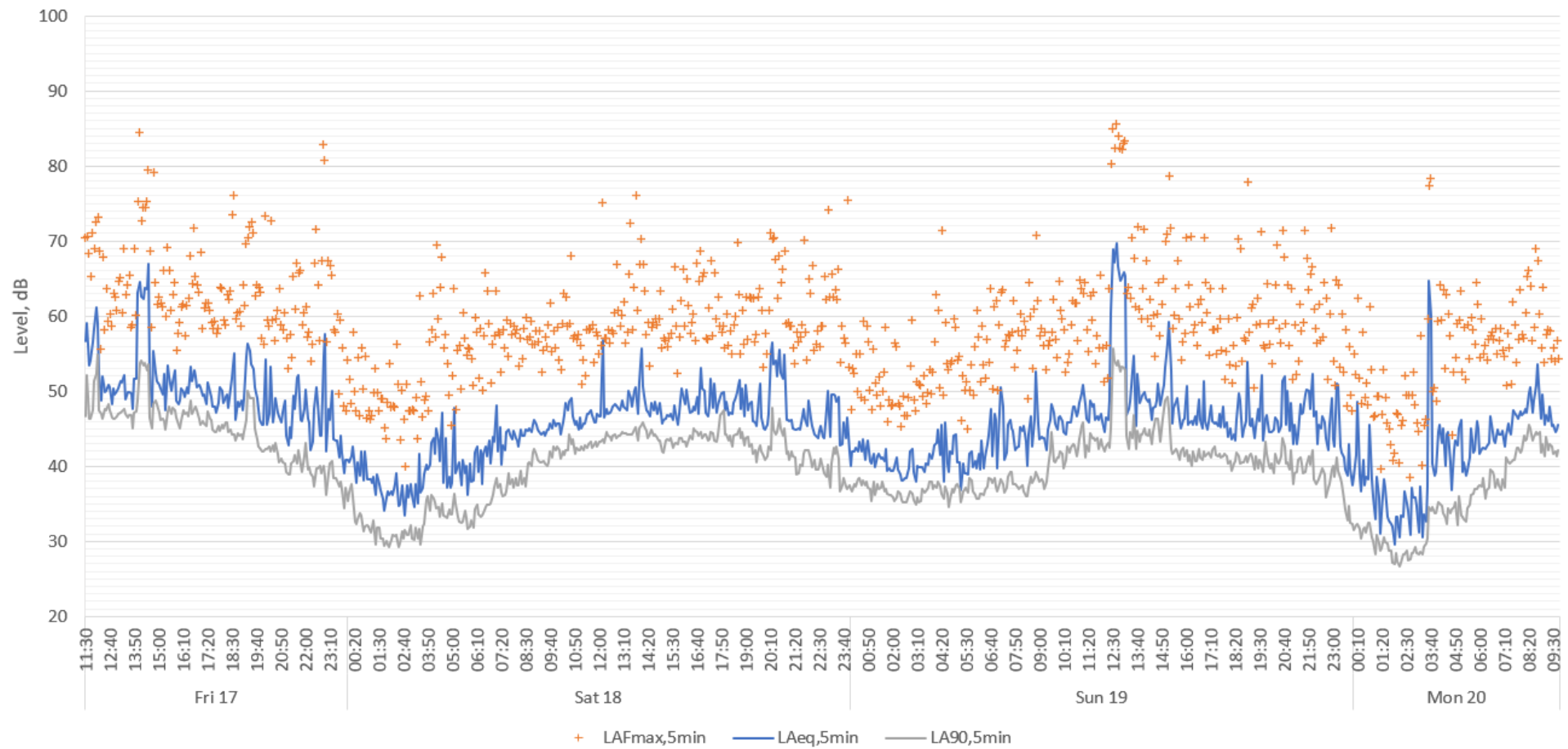
Chart 1: Broadband noise data at MP1

Chart 2: Broadband noise data at MP2



7.1.8 Each measurement period consisted of sequential 5-minute samples which therefore allowed the variation in noise level over time to be assessed.

7.2 Determination of representative background sound levels

7.2.1 Mode average background sound levels ($L_{A90,5min}$) have been determined for the day and night periods at MP1 and this is displayed on Chart 1 as a representative L_{A90} level trace. The representative background sound levels, for use in the BS 4142 assessment, are considered to be as follows:

- Daytime L_{A90} : 49 dB
- Night time L_{A90} : 33 dB

8 Impact of Noise from the Proposed Development

8.1 Noise Modelling

8.1.1 Prediction of noise levels at sensitive receptors was carried out using the CadnaA software package.

8.1.2 The general horizontal plan information of the area surrounding and including the proposed development site was imported from Google Earth. This was used to determine road positions, building footprint areas and relative locations.

8.1.3 The following parameters were assigned to the model:

- Propagation model: ISO 9613¹⁷
- Default ground absorption: 0.1 (hard ground)
- Two orders of reflection
- Buildings are reflecting (smooth, non-structured facade)

8.1.4 The parameters for modelled noise sources are described in the sections below.

8.2 Noise Sensitive Receptor and Prediction Heights

8.2.1 The nearest Noise Sensitive Receptors (NSRs) are shown in the noise grids in Appendix 2. These have been determined as 537 and 541 Mauldeth Road West.

8.2.2 The noise level grids in the appendix are calculated at a height of 1.5m above ground level for daytime assessments and 4m above ground for night-time assessments. The noise levels reported at the closest NSRs are again 1.5m above ground for daytime and 4m above ground for night-time.

¹⁷ ISO 9613-2: 1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation

8.3 Modelling of HGV Delivery Noise

- 8.3.1 Octave band data for a typical delivery is shown below in Table 5. This data, measured at 7 m from the mid-point of the wagon when parked (16.5 m articulated vehicle), shows the measured noise level at a Lidl store in Wigan, Greater Manchester.
- 8.3.2 The refrigeration plant on the HGV is located near the driver's cab. This has therefore been measured separately for the purposes of calibrating the refrigeration plant as a point source within the noise model.
- 8.3.3 Table 5 below shows a single figure value for the entire measurement and a calibrated value for a 15 m line source, 2 m above ground level, which represents the delivery wagon in the noise modelling. L_w Sound Power Levels derived from source measurements of the refrigeration plant are also shown in Table 5, and this is modelled as a point source.
- 8.3.4 The delivery movements from the site entrance to the loading bay have been mapped by following the access road on the site plan. The HGV drives into the car park before turning and reversing into the loading bay. On egress, the HGV pulls forward and leaves the site onto Nell Lane. Noise data for a moving HGV can be found in Table 4. This data is based on a logarithmic average of previously measured data along with all listed access road lorry movement data found in Table C.11 of BS5228-1-2009+A1:2014. A duplicate line source modelling a moving refrigeration plant has also been included.
- 8.3.5 Delivery noise within the model was calibrated to the measurement data presented in Table 5.

Table 5: Sound power levels for HGV sources in the model

Noise Source	Sound Power Level, dB, at Octave Band Centre Frequency (Hz)								dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	8.0 kHz	
Measured Noise Levels (dB) at 7 m from side of Wagon									
Total Delivery ($L_{eq,T}$)	70	63.5	58.2	56.8	60.0	58.3	53.2	46.4	64.2
Calibrated Model Noise Source for Wagon (dB) ($L_{w,m}^{-1}$ 15m line source)									
Total Delivery	97.0	90.5	85.1	83.9	87.0	85.4	80.5	74.3	91.2
Derived L_w Sound Power Level (dB) of Refrigeration Plant									
Refrigeration Plant	80.2	69.0	63.0	62.2	59.9	53.2	47.1	39.8	93.9
Moving HGV Noise Source (L_w)									
Log average of previously measured data and BS 5228 levels	79.0	71.0	66.0	67.0	70.0	68.0	64.0	61.0	102.1

8.4 Modelling of Plant Noise

8.4.1 Measurement spectra of similar VRF's and Dry Coolers obtained by Miller Goodall at other Lidl sites were adjusted to match the broadband manufacturer's data for use in the model resulting in the following data shown in Table 6. Precise fit-outs are determined during the final design stages of the project, but for a store of this type plant compliment would typically contain:

- 2 no 45.0 kW Variable Refrigerant Flow (VRF) units
- 1 no 28.0 kW Variable Refrigerant Flow (VRF) unit
- 2 no. 100 kW Dry Coolers

Table 6: Noise source data used for the plant items within CadnaA

Description	Sound Power Level, L_w dB at Octave Band Centre Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
45.0 kW VRF	84.8	82.8	75.8	74.8	74.8	70.8	66.8	59.8	78.9
28.0 kW VRF	79.8	77.8	70.8	69.8	69.8	65.8	61.8	54.8	73.9
100 kW Dry Cooler	75.3	79.3	74.3	69.2	63.2	56.8	50.1	40.6	71.0

8.4.2 For this site, the fixed plant area is located at roof level, directly above the loading bay.

8.4.3 Each item of plant was modelled as a separate point source. The VRF and Dry Cooler units, which have fans pointing vertically were modelled with vertical directivity (as opposed to an omni-directional source). Each item of plant was assumed to be 1 m above roof level at its location.

8.4.4 The plant is in constant operation throughout the day and the night. The Dry-Coolers operate intermittently, cycling on and off for a few minutes at a time according to load requirements, but this intermittency is masked by emissions from the VRF Units, which are 8 dB louder than the Dry Cooler Units.

8.5 Mosque Noise Impact Assessment

8.5.1 The predicted external level at the nearby 'Hough End Hall Academy and Mosque' has been assessed to 35 dB $L_{Aeq,T}$ internally which is based on the guideline level range for places of worship found in BS8233. A façade reduction of 13 dB has been assumed based on a façade reduction with open windows.

8.5.2 Table 7 shows the noise impact assessment for the mosque. This results is based on the installation of the recommended barriers discussed in further detail in Section 9.

Table 7: Mosque Impact Assessment

NSR	Predicted External $L_{Aeq,T}$	Façade reduction (open window)	Internal Level $L_{Aeq,T}$	BS 8233:2014 Guideline Limit $L_{Aeq,16hr}$	Difference between predicted level and BS 8233 criteria	Impact Assessment Outcome	Action Required
Hough End Hall Academy and Mosque	48	-13	35	35	0	NOEL	None

8.5.3 It can be seen from Table 7 that after a façade reduction of 13 dB is applied, the internal level meets the recommended limit for a place of worship. Therefore, the impact is at the No Observed Effect Level and no action is required.

8.6 BS 4142:2014+A1:2019 Assessment

8.6.1 A BS 4142 noise impact assessment has been undertaken in order to assess the potential noise impact at the closest, most sensitive residential receptors to the proposed development site and is detailed in this section of the report.

8.6.2 HGV Delivery Assessment

8.6.3 This assessment considers the impact of the deliveries to the new store if there were no restrictions to delivery hours or mitigation measures. It assesses the cumulative impact of both the HGV delivery event and the plant area in the daytime and night-time. A character correction of +6 dB has been applied at the closest NSRs to this assessment due to the impulsive nature of a HGV delivery event (assumed 'clearly perceptible' at the receptors).

8.6.4 A BS 4142 assessment of cumulative noise impact at the closest NSRs is shown in Table 8.

Table 8: BS 4142:2014 Cumulative noise impact assessment

Assessment Period	Background Sound Level $L_{A90,T}$	Receptor Location	Specific Sound Level $L_{Aeq,T}$	Corrections dB	Rating Level (including corrections dB)	Difference between Rating Level and Background Sound Level	Initial Estimate of Impact
Daytime	49	537 Mauldeth Road West	47	+ 6 (impulsivity)	53	+4	Less likely adverse or significant adverse impact depending on context

Table 8: BS 4142:2014 Cumulative noise impact assessment

Assessment Period	Background Sound Level $L_{A90,T}$	Receptor Location	Specific Sound Level $L_{Aeq,T}$	Corrections dB	Rating Level (including corrections dB)	Difference between Rating Level and Background Sound Level	Initial Estimate of Impact
Night-time	49	541 Mauldeth Road West	36	0	42	-7	Low impact
	33	537 Mauldeth Road West	51		57	+24	Significant adverse impact depending on context
	33	541 Mauldeth Road West	38		44	+11	Significant adverse impact depending on context

8.6.5 It can be seen from Table 8 that the initial estimate of noise impact of the HGV delivery events and fixed plant area, based on the BS 4142 methodology, indicates the impact would be less likely to be adverse or significant adverse at the closest sensitive receptors in the daytime period.

8.6.6 During the night-time period, the initial estimate of impact from HGV delivery events and fixed plant area based on the BS 4142 methodology is significant adverse depending on context at the closest sensitive receptor. Due to the initial impact mitigation measures are recommended.

8.6.7 Fixed Plant Assessment

8.6.8 This assessment indicates the impact of the plant area only during the night-time. No character correction is applied to this assessment as the plant is not characterised as tonal, impulsive or intermittent.

A BS 4142 assessment of plant noise impact at the most affected locations of the proposed development site is shown in Table 9 below.

Table 9: BS4142:2014 Plant noise impact assessment

Assessment Period	Background Sound Level $L_{A90,T}$	Receptor Location	Specific Sound Level $L_{Aeq,T}$	Corrections dB	Rating Level (including corrections dB)	Difference between Rating Level and Background Sound Level	Initial Estimate of Impact
Night-time	33	537 Mauldeth Road West	37	0	37	+4	Low to Adverse impact
	33	541 Mauldeth Road West	34		34	+1	

8.6.9 It can be seen from Table 9 above that the initial estimate of noise impact of the plant area, based on the BS 4142 methodology, indicates a likelihood of low to adverse impact at the closest, most sensitive receptors of the proposed development site in the night-time.

9 Mitigation Measures

9.1 BS 4142:2014+A1:2019 Assessment with Noise Barriers

9.1.1 To mitigate the closest NSR from adverse impacts from delivery and plant noise, we have added a 2.5m noise barrier adjacent to the loading bay (seen in Appendix 3c in light blue) in the model and a 2m noise barrier along the southeast and northeast edge of the proposed plant area. (seen in Appendix 3c in red).

9.1.2 The barriers are to be constructed from continuous, imperforate material with a minimum mass of 12 kg/m² and is to extend from the ground to their minimum specified heights. Close-boarded or overlapped timber panelling would be suitable in this regard; hit-and-miss fencing would not. Alternatively, a proprietary acoustic fence with a minimum weighted sound reduction index of 25 dB R_w would be appropriate.

9.1.3 A further cumulative BS4142 assessment including the recommended barriers is shown in Table 10.

Table 10: BS 4142:2014 Cumulative noise impact assessment with 2.5m Barrier

Assessment Period	Background Sound Level $L_{A90,T}$	Receptor Location	Specific Sound Level $L_{Aeq,T}$	Corrections dB	Rating Level (including corrections dB)	Difference between Rating Level and Background Sound Level	Initial Estimate of Impact
Daytime	49	537 Mauldeth Road West	42	+ 6 (impulsivity)	48	-1	Low impact depending on context
	49	541 Mauldeth Road West	34		40	-9	Low impact
Night-time	33	537 Mauldeth Road West	45		51	+18	Significant Adverse
	33	541 Mauldeth Road West	37		43	+10	Significant Adverse

9.1.4 As can be seen in Table 10, the BS4142 assessment indicates a likely low impact at both the closest NSRs (537 and 541 Mauldeth Road West) in the daytime with the inclusion of the 2.5m barrier. The night time remains at a significant adverse impact for both closest NSRs.

9.2 Delivery Hours Restrictions

9.2.1 In order to further reduce the noise impacts from delivery noise, we would recommend that deliveries are restricted at the site to daytime only and between 07:30 – 20:00hrs for Monday – Saturday including bank

holidays. We recommend that deliveries on Sundays be restricted to one hour before and one hour after store opening hours as an additional mitigation measure. Therefore, Sunday delivery hours would be 09:00 – 17:00hrs.

9.3 Plant Assessment with Mitigation

- 9.3.1 This assessment indicates the impact of the plant area only during the night-time with the included barrier mitigation to the north of the delivery bay and at the northeast and southeast of the rooftop plant. No character correction is applied to this assessment as the plant is not characterised as tonal, impulsive or intermittent.
- A BS 4142 assessment of plant noise impact at the most affected locations of the proposed development site is shown in Table 11 below.

Table 11: BS 4142:2014 Plant noise impact assessment

Assessment Period	Background Sound Level <i>L</i> _{A90,T}	Receptor Location	Specific Sound Level <i>L</i> _{Aeq,T}	Corrections dB	Rating Level (including corrections dB)	Difference between Rating Level and Background Sound Level	Initial Estimate of Impact
Night-time	33	537 Mauldeth Road West	29	0	29	-4	Low impact
	33	541 Mauldeth Road West	28		28	-5	

- 9.3.2 It can be seen from table 11 above that the estimate of noise impact of the plant area with mitigation, based on the BS 4142 methodology, indicates a likelihood of low impact at the closest, most sensitive receptors of the proposed development site in the night-time.

10 Consideration of Other Discipline Requirements

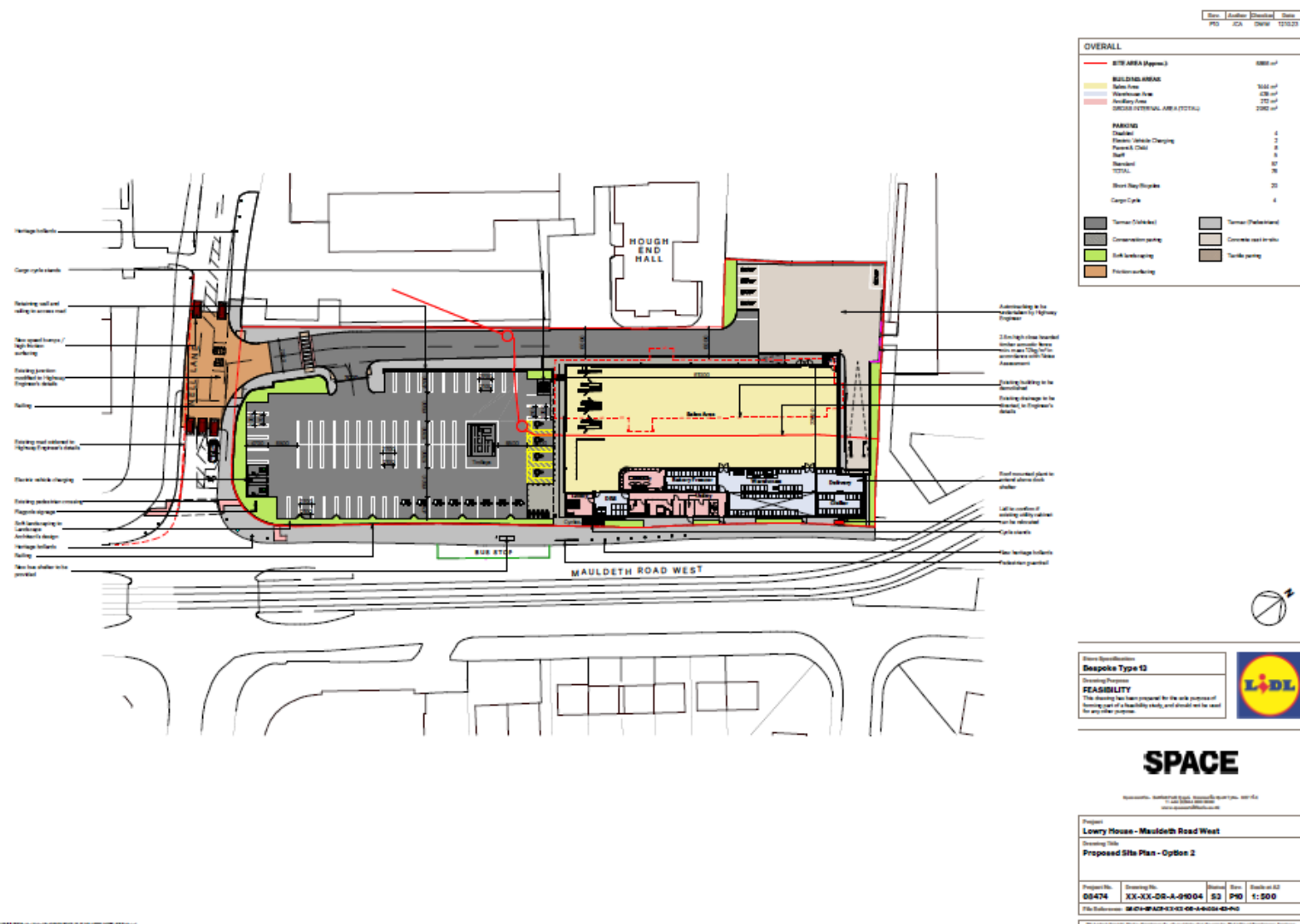
- 10.1.1 It is recommended that you confirm the suitability of all recommended noise mitigation measures with your architects, structural engineers, building contractors, fire consultants and material manufacturers prior to procurement and field application so that when the recommended noise control measures are implemented on site they will satisfy the requirements of all disciplines, therefore, should not cause any health and safety issues.

11Conclusions

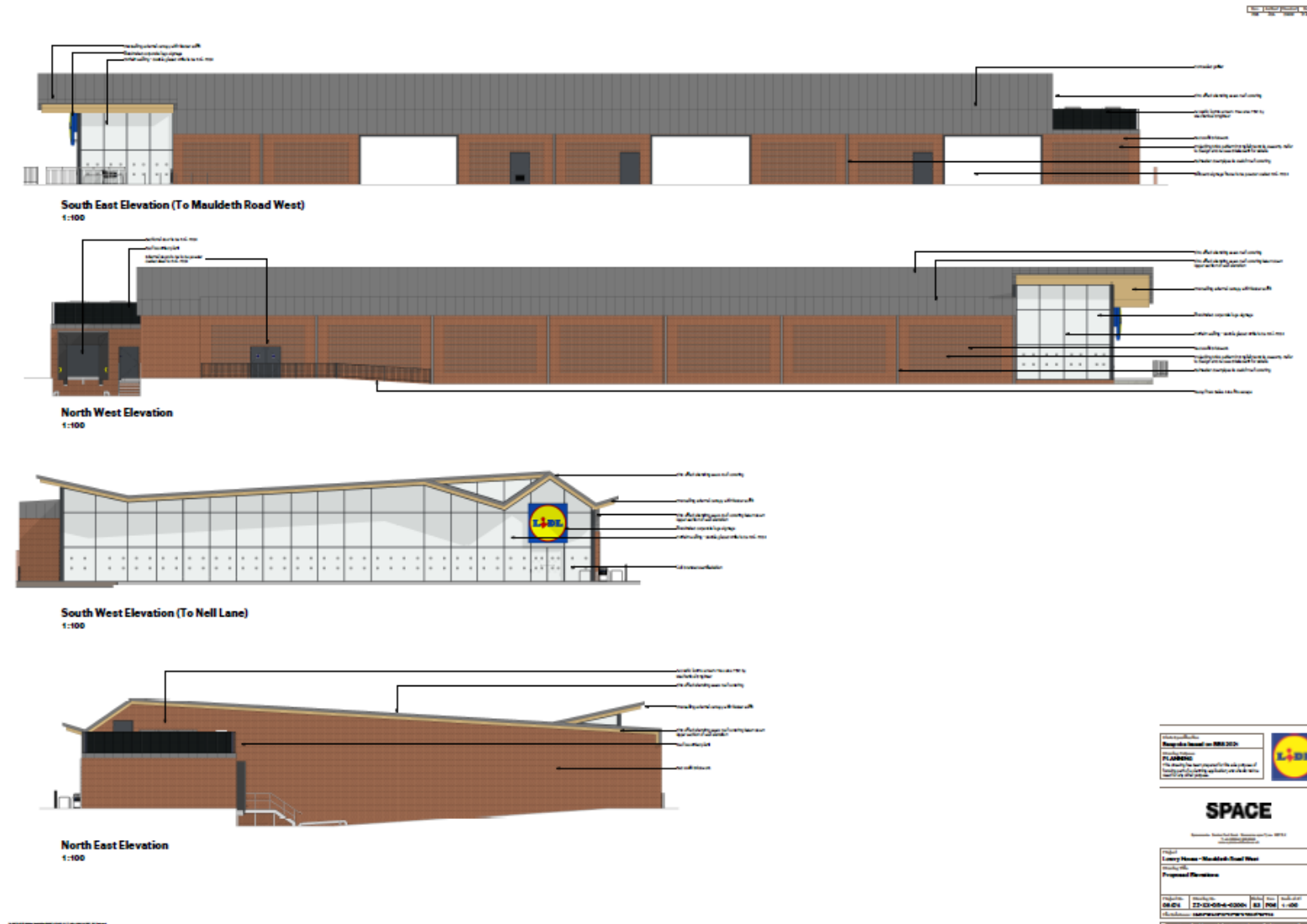
- 11.1.1 A noise assessment has been undertaken at Lowry House, Mauldeth Road West, Chorlton, M21 7SP in respect of the impact of noise from a proposed Lidl Store onto the closest noise sensitive receptors (NSRs).
- 11.1.2 Unattended noise monitoring was carried out from Friday 17th June 2022 to Monday 20th June 2022 to determine existing background and ambient noise levels.

- 11.1.3 CadnaA noise modelling was utilised to predict the impact of plant noise and HGV movements from the site at the closest NSRs. The noise impact was assessed against BS 4142:2014+A1:2019.
- 11.1.4 The BS 4142:2014+A1:2019 assessment concluded that, with the proposed 2.5m barrier along the northeast boundary of the site and a 2m high barrier on the southeast and northeast edges of the plant area, the impact of associated noise from the proposed development would result in a low impact for the daytime and significant adverse impact for the night-time for both the closest noise sensitive receptors. It is therefore recommended that delivery hours are restricted to 07:30-20:00hrs Monday to Saturday (including bank holidays) and 09:00 – 17:00hrs on Sunday.
- 11.1.5 The noise impact at the nearby 'Hough End Hall Academy and Mosque' was assessed to 35 dB $L_{Aeq,T}$ internally and meets the guidance limit for a place of worship in BS 8233. The noise impact at the mosque is therefore at the No Observed Effect Level and no further action is required.
- 11.1.6 It is considered that a suitable and commensurate level of protection against noise will be provided to the occupants of nearby residences after mitigation measures are put in place. Therefore, the site is suitable for development on noise grounds.

APPENDICES



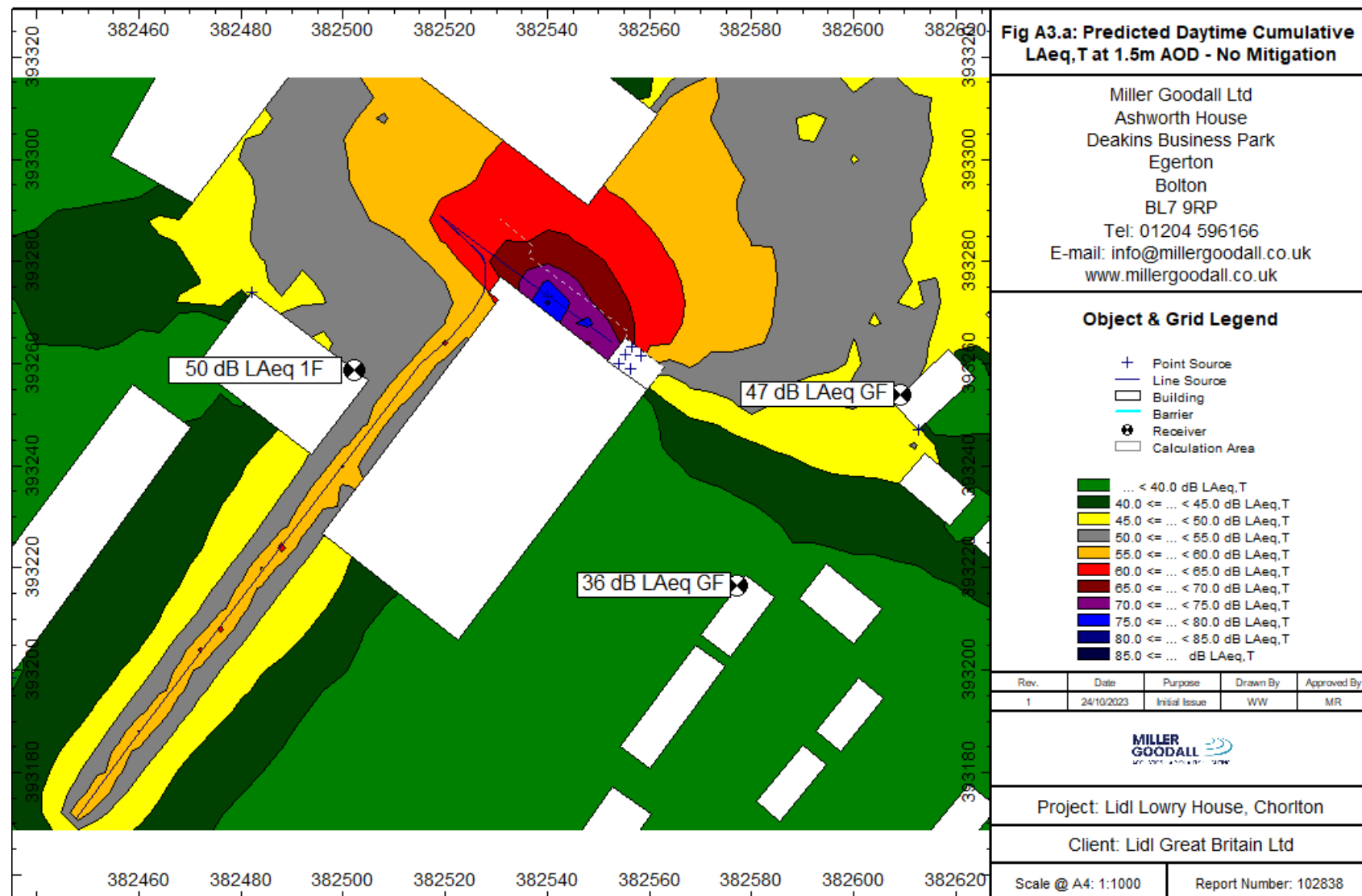
Appendix 1b: Elevation Plans



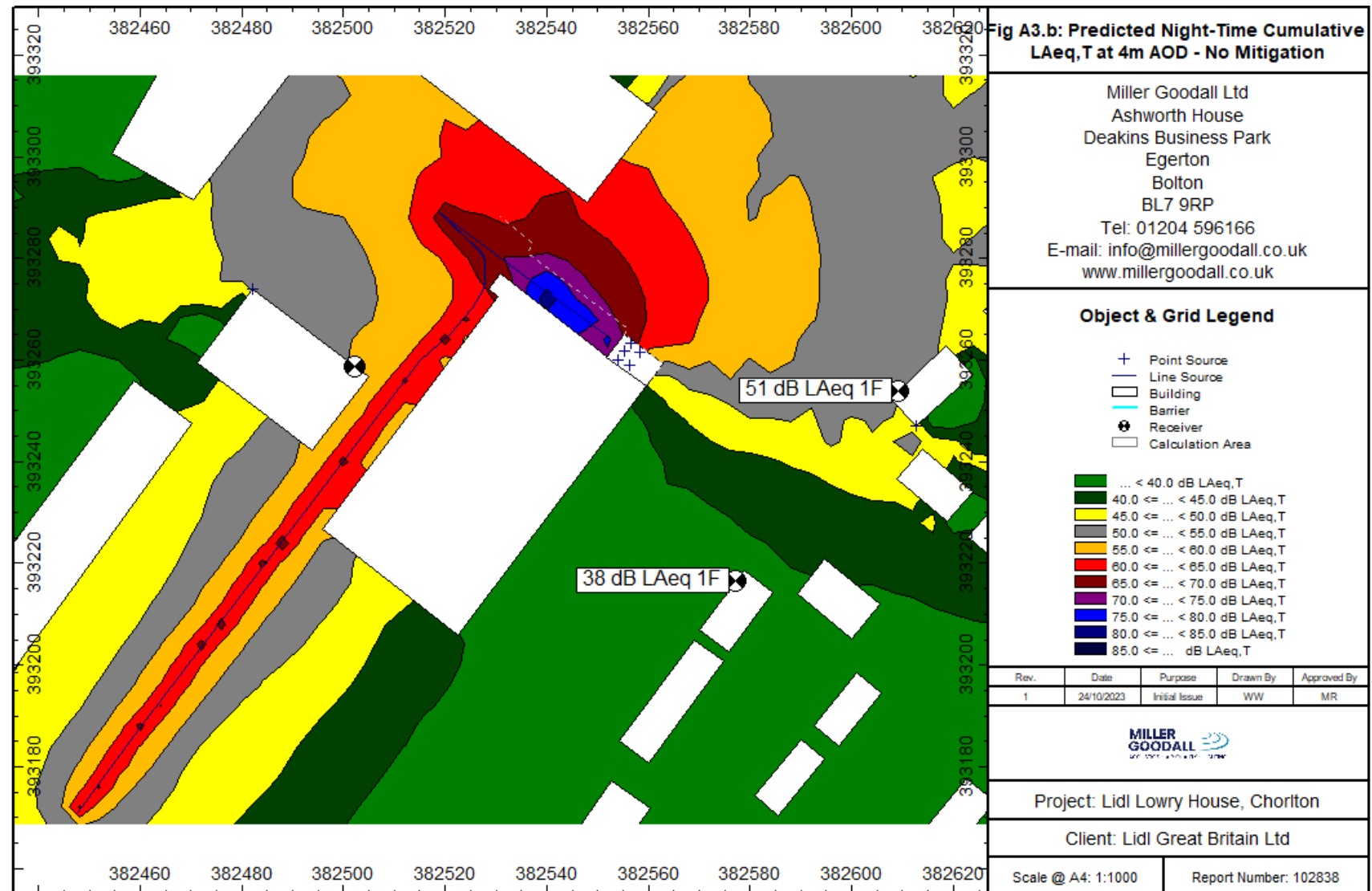
Appendix 2: Site Boundary and Noise Monitoring Locations



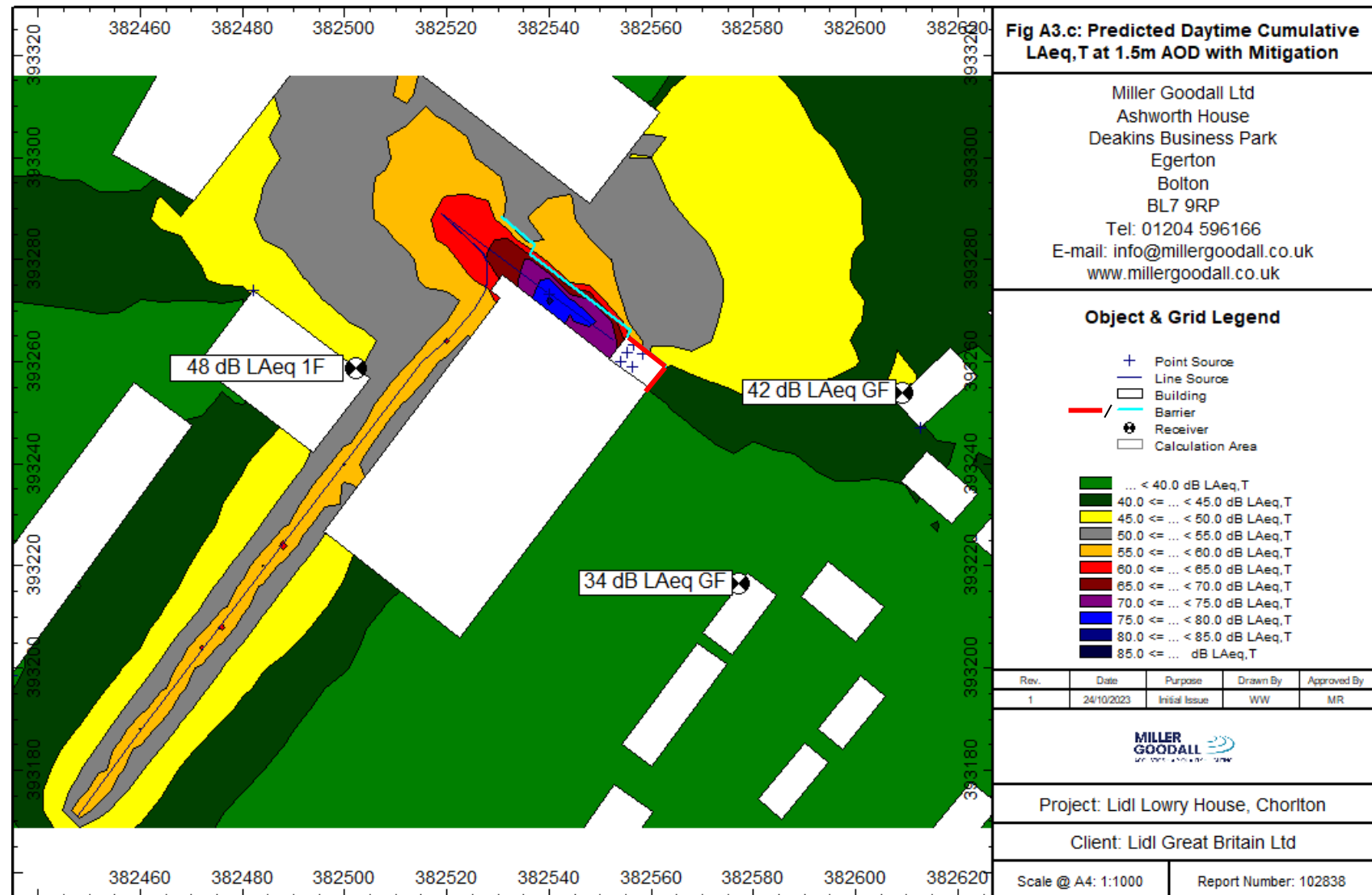
Appendix 3a: Noise Model Output – Cumulative Daytime with No Mitigation



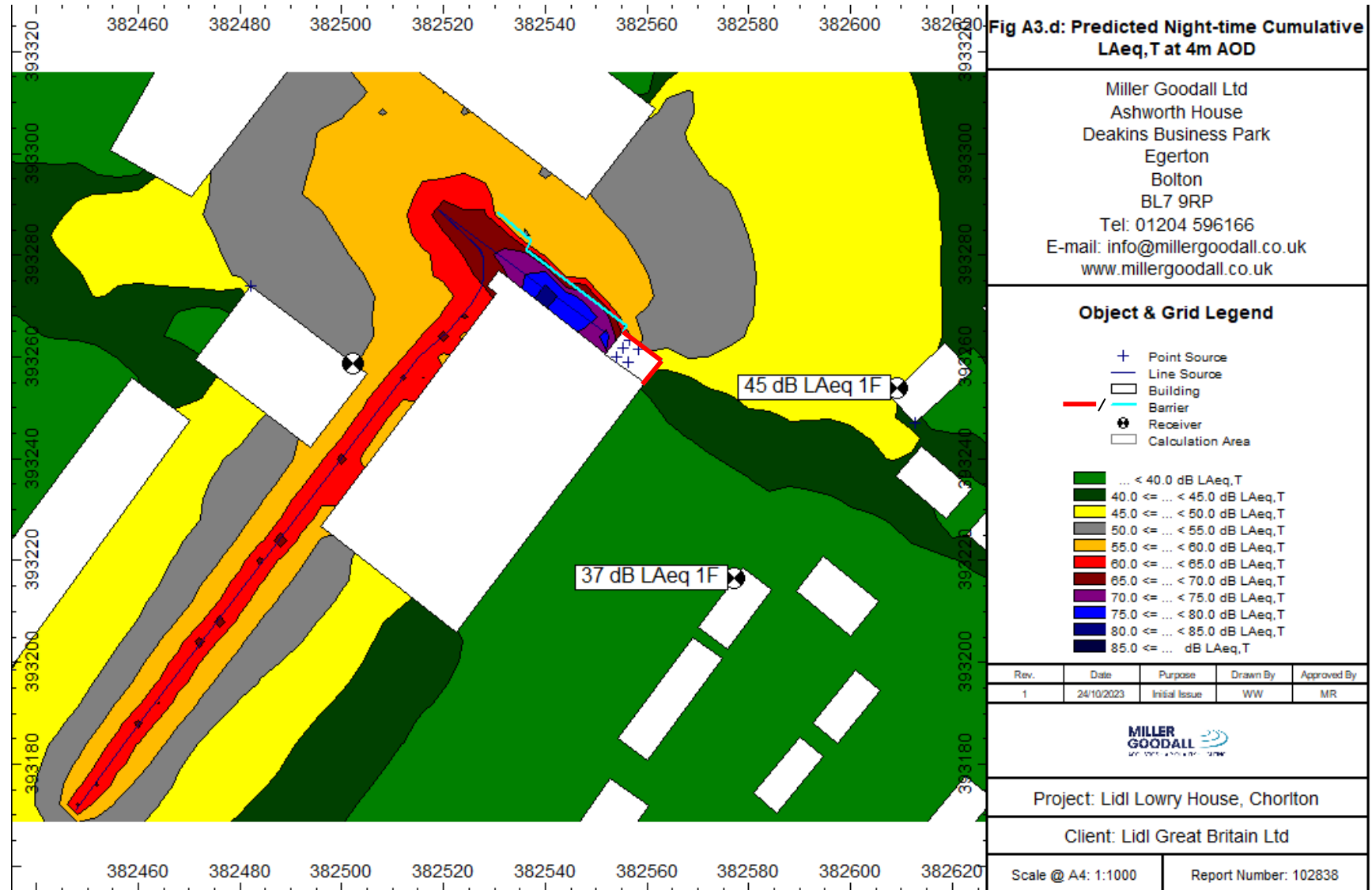
Appendix 3b: Noise Model Output – Cumulative Night time with No Mitigation



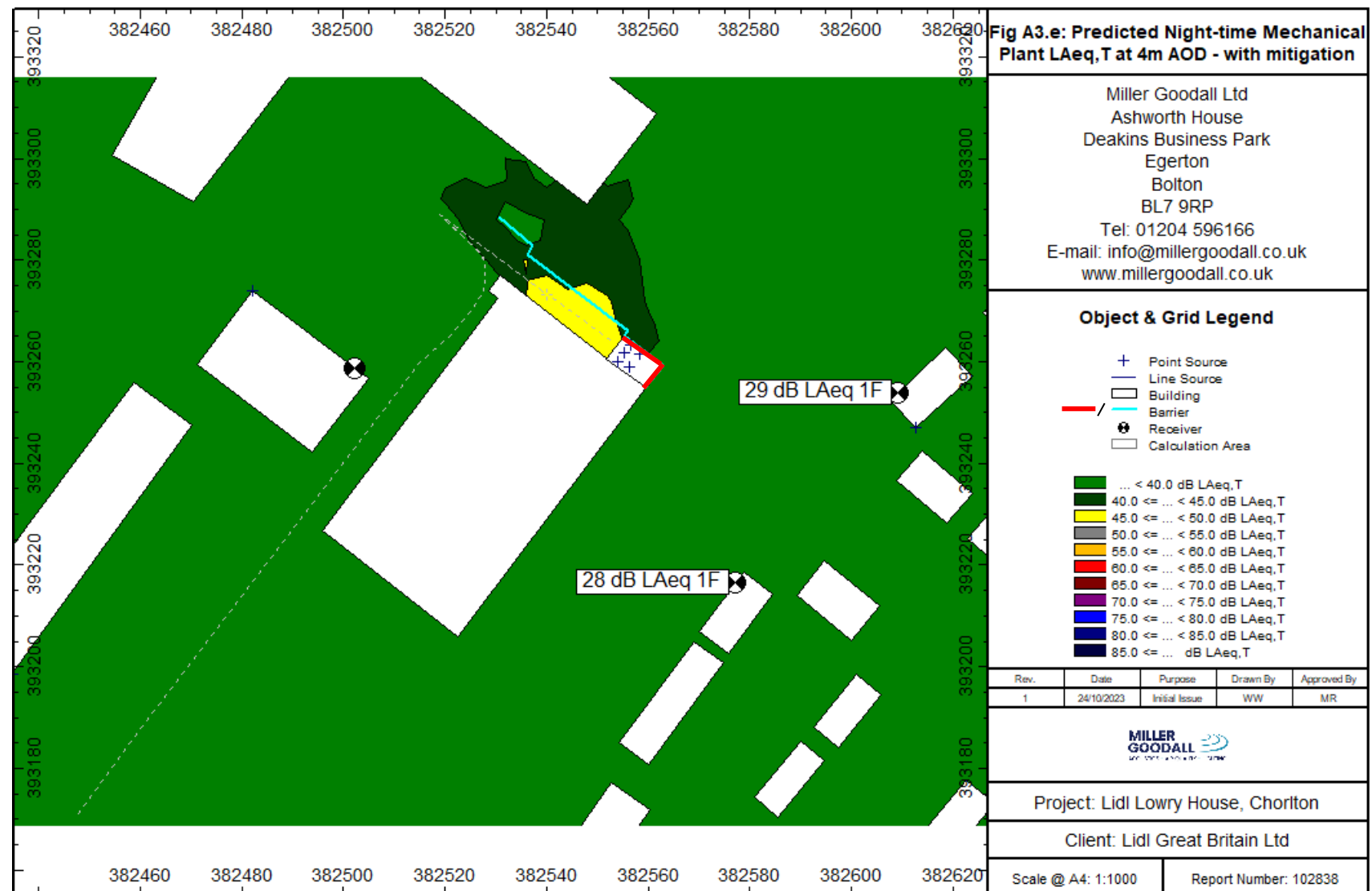
Appendix 3c: Noise Model Output – Cumulative Daytime with 2.5m barrier Mitigation



Appendix 3d: Noise Model Output – Cumulative Night time with 2.5m barrier Mitigation



Appendix 3e: Noise Model Output – Plant, Night time with Mitigation



This page is left blank intentionally

Glossary of Terms

Decibel (dB) The unit used to quantify sound pressure levels; it is derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 μPa , the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain. A change of 1 dB is usually only perceptible under controlled conditions.

dB L_A Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB L_A broadly agree with an individual's assessment of loudness. A change of 3 dB L_A is the minimum perceptible under normal conditions, and a change of 10 dB L_A corresponds roughly to halving or doubling the loudness of a sound. The background noise level in a living room may be about 30 dB L_A ; normal conversation about 60 dB L_A at 1 meter; heavy road traffic about 80 dB L_A at 10 meters; the level near a pneumatic drill about 100 dB L_A .

$L_{A90,T}$ The A weighted noise level exceeded for 90% of the specified measurement period (T). In BS 4142: 2014+A1:2019 it is used to define background noise level.

$L_{Aeq,T}$ The equivalent continuous sound level. The sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter.

L_{Amax} The highest A weighted noise level recorded during the time period. It is usually used to describe the highest noise level that occurred during the event.

R_w Single number rating used to describe the sound insulation of building elements and is defined in BS EN ISO 10140-2: 2010 (formerly BSEN ISO 140-3:1995). It is derived by measurement under laboratory conditions and does not take into account the effects of flanking transmissions.

This page is left blank intentionally

