

NOISE ASSESSMENT

on behalf of

ONSIDE YOUTH ZONES

for the site at

BARNESLEY YOUTH ZONE

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Summary

A noise assessment was undertaken by Miller Goodall Ltd, on behalf of OnSide Youth Zones, to predict the potential noise impact of Barnsley Youth Zone off Schwäbisch Gmünd Way, Barnsley.

This was requested by the Local Authority to support a planning application for the development and ensure the amenity of local residential noise-sensitive receptors is not impeded. Assessments were carried out using a BS 4142 methodology with comparison to BS 8233:2014, WHO and Sport England guidance.

Measurements were made at several locations across the site, including close to the nearest residential dwellings, to identify the pre-development background noise levels. This data was subsequently used to predict the potential impact of noise from likely activities associated with the proposed development when in use. The activities and equipment in question are the rooftop building services plant, noise breakout from internal activities (indoor activity areas) and the use of an external rooftop kick pitch.

An assessment of predicted noise levels was undertaken and determines the impact from associated activities as low. Therefore, the proposed development is considered suitable on noise grounds.

Record of changes

Prepared By: Will Bladon AMIOA

Reviewed By: Michael Rickard MIOA

Signed:



Signed:



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1 Introduction

- 1.1 Miller Goodall Ltd has, on behalf of OnSide Youth Zones, undertaken a noise assessment in respect of the impact of noise from the proposed Barnsley Youth Zone that falls within the administrative boundary of Barnsley Metropolitan Borough Council.
- 1.2 The assessment has been requested to determine site constraints in the context of the proposal, and ensure the amenity of local noise-sensitive residential receptors surrounding the site is secured.

2 Site Description

- 2.1 The site will be located in central northeast Barnsley on currently disused land between Schwäbisch Gmünd Way and Harbrough Hill Road, as shown with a red line boundary in Appendix 1. The surrounding area is a mixture of residential, commercial and industrial land uses.
- 2.2 Barnsley Railway Station is located directly to the west of the proposed site, Mottram Way and Mottram Street both lie to the north. The closest residential receptors are situated on the southern side of Mottram Street.
- 2.3 A national grid substation is located to the south of the site, with Buzz Bingo and The Slots Room beyond. The current entrance to the site is from the east, off Harbrough Hill Road. There are more residential occupiers across Harbrough Hill Road.

3 Proposed Development

- 3.1 Barnsley Youth Zone is a facility provided for young people ages 8-19 years old (25 for those with a disability) somewhere to go, something to do and someone to talk to in their leisure time. Internal spaces of the currently proposed option are arranged around a central recreation space and atrium and include;
 - Climbing wall
 - Arts, crafts and fashion room
 - Fitness suite
 - Performing Arts room
 - Music room
 - Sports hall
 - Health & wellbeing room
 - Several ancillary rooms.
- 3.2 Externally, there will be;
 - Vehicle parking
 - External recreation area
 - Soft landscape and planting
 - A kick-pitch on the roof (2nd floor).
- 3.3 This assessment is undertaken on the understanding that;

- The operating hours are 09:00-22:00 hours on weekends and school holidays and 16:00-22:00 hours during school term times
- The building will be fully mechanically ventilated
- All plant is anticipated to operate during the proposed operating hours only (i.e., in the daytime).

3.3.1 Occasional vehicular trips to the site and the majority of uses are not anticipated to generate significant noise at the nearest receptors. Consequently, the assessment of operational noise from the site has been limited to;

- Building services plant
- Noise break-out from the fitness suite, performing arts room and music room
- Rooftop kick pitch.

3.3.2 The proposed site plans are shown in Appendix 2.

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;
- 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”.

¹ Noise Policy Statement for England, Defra, March 2010

- 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 in July 2021. 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.”

- 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;

² National Planning Policy Framework, Ministry of Housing, Communities and Local Government, June 2019

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

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

- 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 Acoustic Standards and Guidance

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

- 5.1.1 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 GCN⁵. 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

- 5.1.2 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.
- 5.1.3 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 $L_{Aeq,8hr}$

⁵ World Health Organisation Guidelines for Community Noise, 1999

5.1.4 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.”

5.1.5 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^6 or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values”.

5.1.6 For Internal spaces, the Standard states that;

“..to avoid sleep disturbance, sound pressure levels at the outside facades of living spaces should not exceed 45 dB L_{Aeq} (taken as a façade level, and equating to a free-field external level of 42 dB L_{Aeq}) and 60 dB L_{AFmax} so that people may sleep with bedroom windows open.”

External Amenity

5.1.7 BS 8233:2014 adopts guideline external noise values provided in WHO for external amenity areas such as gardens, patios and private outdoor amenity spaces. BS 8233:2014 adopts guideline external noise level limits provided in WHO for external amenity areas such as gardens and patios. The standard states that it is “desirable” that the external noise does not exceed 50 dB $L_{Aeq,16hr}$ with an upper guideline value of 55 dB $L_{Aeq,16hr}$ whilst recognising in paragraph 7.7.3.2 that development in higher noise areas, such as urban areas or those close to the transport network, may require a compromise between elevated noise levels (i.e., above 55 dB $L_{Aeq,16hr}$) and other factors that determine if development in such areas is warranted. In such circumstances, the development should be designed to achieve the lowest practicable noise levels in external amenity areas, but should not be prohibited.

5.1.8 The standard also states:

“Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.”

⁶ Sound exposure level or L_{AE}

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

5.2.1 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_{AFmax} for individual noise events should be applicable. It is to be noted that the WHO Night Noise Guidelines for Europe 2009⁷ makes reference to research that indicates sleep disturbance from noise events at indoor levels as low as 42 dB L_{AFmax} . 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_{AFmax} more than 10 – 15 times per night.

5.2.2 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} .

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

5.3.1 BS 4142:2014+A1:2019⁸ 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.

5.3.2 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).

5.3.3 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.

5.3.4 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*

⁷ WHO Night Noise Guidelines for Europe 2009

⁸ BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

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.

- 5.3.5 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.

- 5.3.6 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.

5.4 **Sport England: Artificial Grass Pitch (AGP) Acoustics – Planning Implications: 2015**

- 5.4.1 Sport England have produced a guidance document on noise from AGPs with the aim of:

- Increasing awareness of good design in sports facilities;
- Helping key building professions, clients, user representatives and other stakeholders to follow best practice; and
- Encouraging well-designed sports facilities that meet the needs of sports and are a pleasure to use.

- 5.4.2 The guidance discusses the use of other guidance such as the WHO GCN but states:

“Exceedance of the WHO [GCN] guideline values does not necessarily imply significant noise impact and indeed it may be that significant impacts do not occur until much higher levels of noise exposure are reached”.

- 5.4.3 The guidance then discusses the comparison of the AGP noise against the existing noise climate and states:

“A ‘slight’ impact is considered for an increase less than 3 decibels”

- 5.4.4 This increase is generally in line with acoustic principles that a 3 dB(A) increase is the minimum perceptible under normal conditions.

- 5.4.5 As part of drafting the guidance, measurements were taken of noise levels during nine sports sessions on three separate AGP's with sports including; football, hockey and rugby, in order to obtain a ‘*typical*’ noise level generated from a ‘*typical*’ AGP sports session. Noise level measurements were taken at a distance of 10 metres behind the mid-way points along goal lines and sidelines. They were found to be highest behind the sideline halfway line.

- 5.4.6 The document states that;

“The most significant noise levels were found to be generally derived from the voices of players, with the exception of hockey where impact noises of balls hitting perimeter strike boards and goal back boards were more noticeable. Such impact noises can be mitigated by incorporating shock absorbing noise reduction measures. Assuming such mitigation measures, the most significant noise source from typical AGP sports sessions is therefore voice and as such, a typical noise level can be determined.”

5.4.7 The document provides a '*typical*' free-field noise level (with impact mitigation measures) of 58 dB $L_{Aeq,1hr}$ at a distance of 10m perpendicular from the sideline halfway line.

5.4.8 The guidance recommends;

- predicting the impact of the use of an AGP based on the data provided within the guidance and topographical information about the site, along with the buildings and site layout;
- the noise criterion for AGP's in close proximity to residential properties in the daytime and evenings, in line with WHO guidelines, is 50 dB $L_{Aeq(1 \text{ hour})}$ upper noise limit, external to residential properties with external living areas, to avoid moderate annoyance.

5.4.9 The guidance suggests that on level ground a sports pitch should be located a minimum of 40m distant (measured from the sideline) from the nearest ground-level noise-sensitive receptor in order to achieve WHO guideline noise levels at the receptor and to avoid moderate annoyance.

6 Noise Survey

6.1 Measurements of Existing Noise Sources

6.1.1 Noise measurements were undertaken at several locations at the proposed development in accordance with BS 7445-1: 2003⁹ by Will Bladon 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 ^{10,11} Integrating Real Time 1/3 Octave Sound Analyser	NTi XL2-TA	NTi Audio	A2A-11111-E0	13/09/2021	05451/1
Microphone	NTi MC230A	NTi Audio	A14423	13/09/2021	05451/1
Class 1 Calibrator ¹²	CAL 200	Larson Davies	14154	07/09/2020	04796/1
Class 1 ^{13,14} Integrating Real Time 1/3 Octave Sound Analyser	NTi XL2-TA	NTi Audio	A2A-15860-E0	01/03/2021	05145/1
Microphone	NTi MC230A	NTi Audio	A16445	01/03/2021	05145/1

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

⁹ BS 7445-1: 2003 Description and measurement of environmental noise - Part 1: Guide to quantities and procedures

¹⁰ IEC 61672-1 (2002) Electroacoustics – Sound level meters Part 1: Specifications

¹¹ IEC 61260 (1995) Electroacoustics – Octave-band and fractional-octave-band filters

¹² IEC 60942 (2003) Electroacoustics – Sound calibrators

¹³ IEC 61672-1 (2002) Electroacoustics – Sound level meters Part 1: Specifications

¹⁴ IEC 61260 (1995) Electroacoustics – Octave-band and fractional-octave-band filters

6.1.2 Specific, background and ambient 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 3.

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

Measurement Location	Date	Time	Weather conditions
NML1	17/12/2021	11:20 to	3°C, 6 Oktas, 0-1 m/s, NW
	19/12/2021	20:15	4°C, 7 Oktas, 1-2 m/s, NW
NML2	20/12/2021	14:05 to	6°C, 5 Oktas, 0-1 m/s, NE
	21/12/2021	05:30 and	4°C, 6 Oktas, 1-2 m/s, SE
	21/12/2021	10:15 to	5°C, 6 Oktas, 1-2 m/s, S
	22/12/2021	09:35	-1°C, 5 Oktas, 2-3 m/s, SE
ST1	20/12/2021	14:20 – 14:40	6°C, 7 Oktas, 0-1 m/s, NE
ST2	20/12/2021	15:00 – 15:15	6°C, 7 Oktas, 0-1 m/s, NE
ST3	21/12/2021	08:55 – 09:15	4°C, 5 Oktas, 0-1 m/s, SW
ST4	21/12/2021	09:15 – 09:30	4°C, 5 Oktas, 0-1 m/s, SW

6.1.3 Measurements were made under free-field conditions at a height of 1.5 m above the ground. The noise sources within the vicinity of the measurement locations are summarised in Table 4, below:

Table 4: Description of noise sources affecting the site

Measurement Location	Description of Measurement Location and Condition	Noise Sources
NML1	Directly adjacent to Schwäbisch Gmünd Way, opposite the railway station car park	Road traffic noise from Schwäbisch Gmünd Way and Harborough Hill Road
NML2	Northern boundary, adjacent to the rear of the Mottram Street receptors, also close to Mottram Way. South of 23 Mottram Street	Road traffic noise from Schwäbisch Gmünd Way, Mottram Way and Harborough Hill Road, residential activity
ST1 (short-term)	Middle of the entire site, slightly east of proposed Youth Zone	Road traffic noise from Schwäbisch Gmünd Way and Harborough Hill Road, Harborough Hill dominant
ST2 (short-term)	Directly adjacent to Harborough Hill Road	Road traffic noise from Harborough Hill Road

Measurement Location	Description of Measurement Location and Condition	Noise Sources
ST3 (short-term)	Northern boundary, south of 33 Mottram Street	Road traffic noise from Schwäbisch Gmünd Way and Harborough Hill Road
ST4 (short-term)	Northern boundary, south of 45 Mottram Street	Road traffic noise from Schwäbisch Gmünd Way and Harborough Hill Road

6.2 Monitoring Results

- 6.2.1 A summary of the broadband measurement data for NML1 and NML2 are provided in Chart 1 and Chart 2 on the next page. All data are sound pressure levels in dB re 20 μ Pa. The data is shown in 5-minute sequential samples.
- 6.2.2 The data follows a typical diurnal and nocturnal pattern. Overall, noise levels are higher at NML1 because of its positioning closer to Schwäbisch Gmünd Way. NML2 is nearer the middle of the site so is less exposed.
- 6.2.3 A summary of the short-term measurements is shown in Appendix 4. The data for these measurements are shown in 1-minute sequential samples and show that the levels across site fluctuate depending on distance to Harborough Hill Road. From site observation, there was a fairly continuous flow of traffic on this road.

Chart 1 – NML1 Noise Graph 5-minute samples

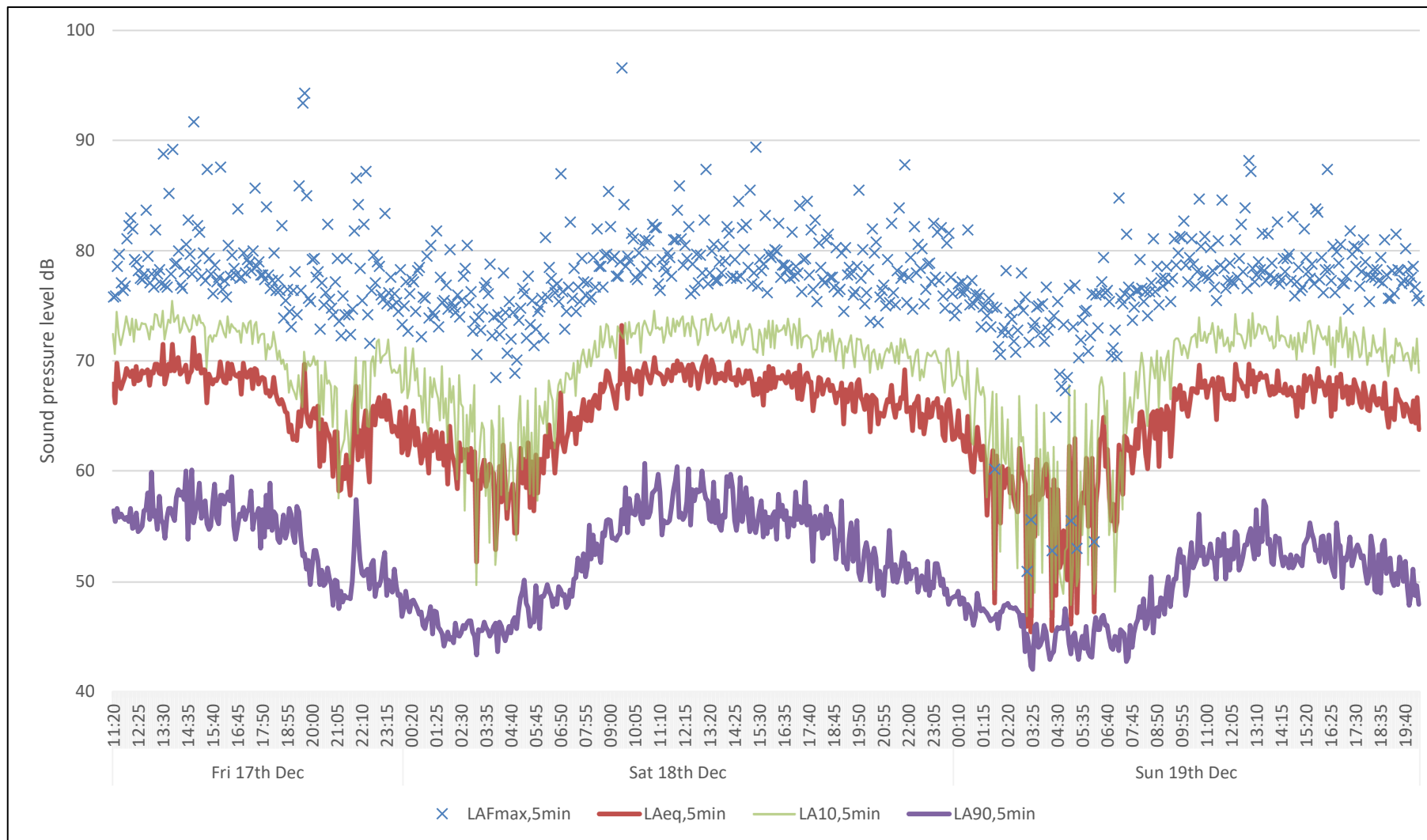
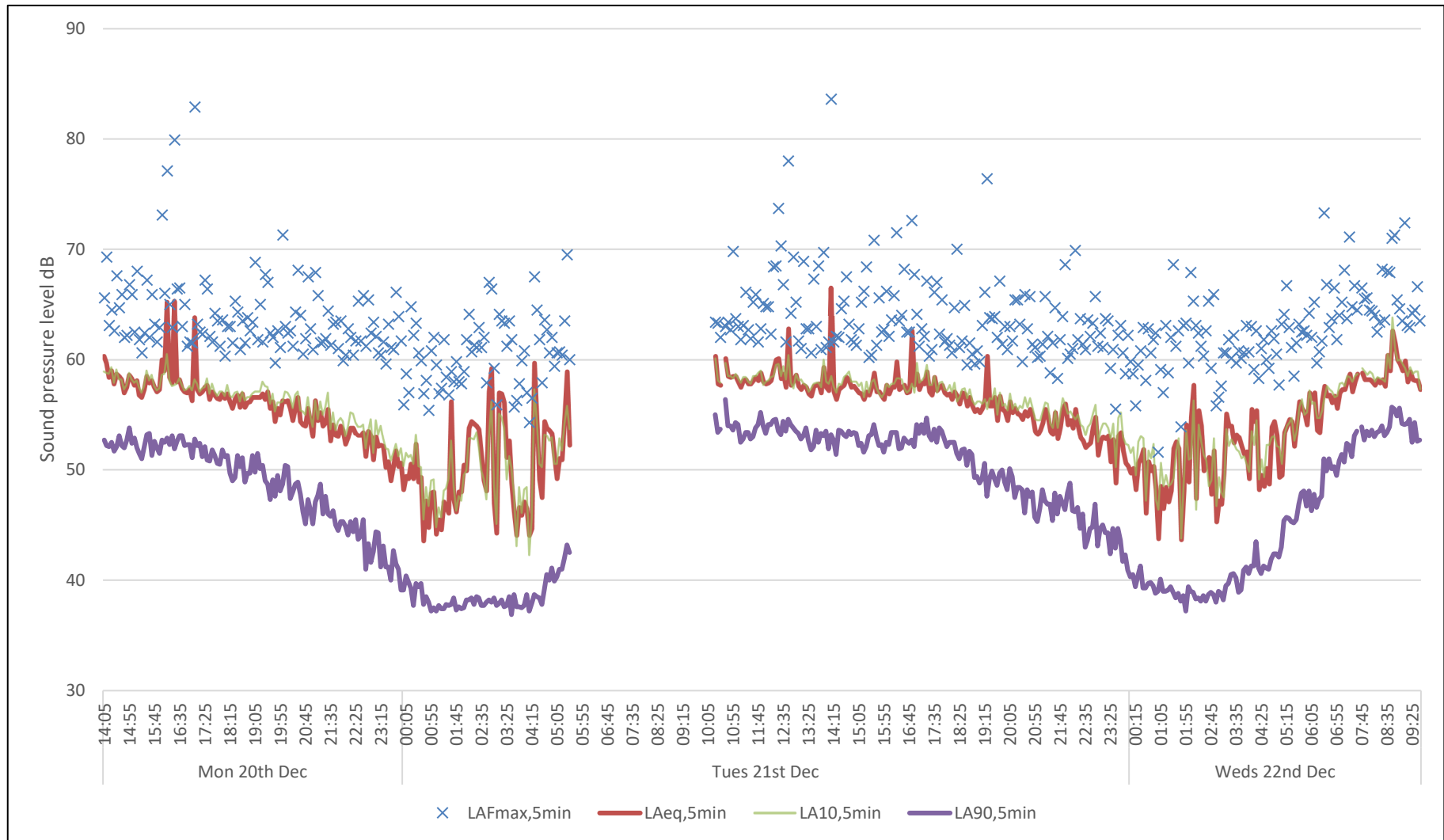


Chart 2 – NML2 Noise Graph 5-minute samples



6.2.4 As can be seen above, NML1 was measured from a Friday afternoon to a Sunday evening. NML2 measured from a Monday afternoon until Wednesday morning with a brief period of missing data on the Tuesday morning. This was due to the external battery cutting out and needing replacement.

6.3 Determination of Background Sound Levels

6.3.1 The typical background sound levels for the noise-sensitive receptors were derived from NML2 as this is the closest monitoring location. The background sound levels for the assessment periods were derived using statistical analysis of the measured L_{A90} levels, in accordance with the procedure given in Section 8 of BS 4142:2014.

6.3.2 The representative background sound level for the overall daytime period at the nearest noise sensitive receptors is deemed to be 53 dB $L_{A90,1\text{hour}}$.

6.3.3 As the Youth Zone is operating until 22:00 hours, a worst-case daytime period background sound level has been assumed for the last hour of opening (21:00-22:00). The representative background sound level for this period at the nearest noise sensitive receptors is deemed to be 46 dB $L_{A90,1\text{hour}}$. Furthermore, we were unable to obtain background sound level data for the Sunday evening (21:00-22:00 period) at NML2. Analysis of the difference in Saturday and Sunday evening background sound levels measured at NML1 suggests that levels may be approximately 3 dB lower on Sunday evenings compared to other evenings. Therefore the 'worst-case' background sound level on a Sunday evening at residential receptors is predicted to be 43 dB $L_{A90,1\text{hr}}$.

6.3.4 A worst-case background sound level of 43 dB $L_{A90,1\text{hr}}$ has therefore been used in the BS 4142 assessments presented later in this report.

7 Impact of Noise from the Proposed Development

7.1.1 The main noise sources expected at the site have been outlined below. The assumed noise source levels are based on previous experience with other Youth Zone developments that were surveyed after completion by Miller Goodall, and also includes measurement data from other similar projects.

7.1.2 Building Services Plant Noise

7.1.3 For heating, cooling and ventilation purposes the various rooms within the building will be served by plant equipment. It is anticipated that these will operate continuously during opening hours of the development. We have been advised that the plant will not operate when the site is not open.

7.1.4 The operating hours are understood to be 09:00-22:00 hours on weekends and school holidays and 16:00-22:00 hours during term time.

7.1.5 The assessed externally mounted plant and equipment serving the areas of the building are detailed in Table 5. The plant schedule shown in the table is indicative only at this stage, based on what has been installed previously at other Youth Zones, and further assessment may be required as the design progresses.

Table 5: Summary of external plant

Unit	Type	No. of items	Sound Power Level, L_w dBA
Air Handling unit	18084	3	85
Condensing unit	PURY-P600-YSNW-A	2	68
Condensing unit	PUHZ-ZRP-35-VKA2	2	68
Condensing unit	PUHZ-ZRP-125-YKA3	1	67
Condensing unit	PURY-P350-YNW-A	1	61

7.1.6 Music Room, Fitness Room and Performing Arts

- 7.1.7 The internal noise levels used for assessing the fitness suite, performing arts room and music room breakout are provided in Table 6. Measurements were made by Colin Foster of Miller Goodall Ltd at Winstanley College on 28th June 2017 in the various spaces described below.

Table 6: Internal source noise levels

Description	Reverberant Sound Pressure Level, dB, at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Fitness Suite	80	85	85	85	85	80	70	70	88
Performing Arts Room	85	91	88	84	85	82	77	73	89
Music Room	77	87	89	87	84	80	80	79	90

- 7.1.8 The assessment has assumed a nominal double-glazing specification of R_w 31 dB, which is the typical performance expected of a 4mm/12mm/4mm glazing configuration. The actual glazing installed is likely to be of a higher specification than assumed here. The building is fully mechanically ventilated and therefore opening windows are not required for provision of normal background ventilation rates.

7.1.9 External Kick Pitch

- 7.1.10 The kick pitch is expected to produce a free-field noise level of 58 dB L_{Aeq} at a distance of 10 m from the side-line at the half way mark at a height of 1.5m above pitch level. This is in line with Sport England guidelines for typical noise levels from artificial grass pitch (AGP) activity.

8 Assessment of Noise from Proposed Development

8.1 Building Services Plant

8.2 Noise from building services plant has been assessed using BS 4142:2014 methodology and is summarised in Table 7 below. A basic desktop calculation has been carried out as exact plant equipment and locations are not currently known. The following simple equation has been used to predict noise levels at the nearest receptors:

$$\text{Level at receptor (dBA)} = L_{wA(\text{Plant Total})} - 20 \times \log(r) - 8$$

Where r is the distance between source (plant area) and receptor (nearest house)

8.3 Our calculations assume that the rooftop plant is 80 m away from the nearest receptor. Our calculations only take account of the reduction of noise that occurs over distance, and incorporate ground reflections from the roof; however, they do not include any correction for screening that is likely to occur from the building roof itself. The simplified assessment is therefore considered suitably worst case at this stage.

8.4 The plant will not be operational out of opening hours and has been assessed against the assumed 'worst-case' 1 hour period between 2100 – 2200hrs on a Sunday. 29 Mottram Street, the closest residential building to the plant area, has been used in this assessment as the nearest noise-sensitive receptor.

Table 7: Building Services Plant Noise BS 4142 Assessment

Worst-case receiver	Background sound level L_{A90} (2100-22hrs Sunday)	Specific sound level $L_{Aeq}(1\text{hour})$	Corrections dB	Rating Level (including corrections) dB	Difference between BS4142 rating level and background sound level	Predicted Impact
29 Mottram Street	43	44	0*	44	+1	Low

* Plant noise is assumed to be continuous and non-tonal

8.5 As indicated in the table above, noise from building services plant is predicted to be low impact according to BS 4142 methodology. This is when assessing against a predicted 'worst-case' background sound level and does not include any reductions due to screening of the plant by the building roof itself.

8.6 We would recommend that a suitably worded planning condition be applied for plant noise limits; however, notwithstanding this the development will be seeking BREEAM Pol 5 acoustic credits for achieving recommended plant noise limits.

8.7 Breakout Noise (Fitness Suite, Performing Arts Room and Music Room)

8.8 A basic desktop calculation has been carried out for the breakout noise assessment. In our previous experience, the risk of breakout music noise impacts for the Youth Zone developments is low, given the times these spaces operate and the fact that glazed facades are fully sealed with mechanical services providing background ventilation rates. The risk is particularly low for this site given the distances involved to the nearest houses.

8.9 Calculations are based on Rathe's method of calculating noise radiation from a finite planar source:

0 dB reduction over distance within plane wave zone;

-10 x log (r_{line}) over distance within line source zone;

-20 x log (r_{point}) over distance within point source zone.

Where (r_{line}) is the distance over which sound level is reduced by 3 dB per doubling of distance

And (r_{point}) is the distance over which sound level is reduced by 6 dB per doubling of distance

Basic reductions of 5 / 10 dB have been applied for partial / full screening and directivity effects

8.10 Our calculations assume that the facades of the amplified music spaces are 118m away from the nearest receptor to the east (37 Harborough Hill Road, nearest with a direct line of sight), and 125m away from 29 Mottram Street. Our calculations only take account of the reduction of noise that occurs over distance, and assume that the entire façade area is a single glazed element, which is considered worst-case as glazing is typically the weakest performing acoustic element in a building façade, particularly at low frequencies which are the most onerous component of entertainment noise and which invariably dictate the resultant music noise level at distant receptors. The simplified assessment is therefore considered suitably worst case.

8.11 The highest combined noise level from breakout noise is predicted to be 19 dB $L_{Aeq, 1hr}$ at 29 Mottram Street and 25 dB $L_{Aeq, 1hr}$ at 37 Harborough Hill Road (closest directly exposed receptor). The noise at 37 Harborough Hill Road is 18 dB below the 'worst-case' background noise level between 21:00-22:00 and therefore breakout noise from internal activities is predicted to be inaudible at the nearest receptors.

8.12 The ventilation strategy is proposed to be fully mechanical throughout the building, with a sealed façade, and on that basis no further mitigation is deemed necessary.

8.13 Kick Pitch

8.14 The kick pitch is located 60 m away from the nearest receptor's facade, and 50 m away from the nearest amenity area (rear garden of 29 Mottram Street). The Sport England guidance suggests that in order to comply with WHO Guidelines, a sports pitch needs to be located at a minimum of 40 m away. This guidance was created to avoid moderate annoyance to local residential receptors.

8.15 As the kick pitch is on the 2nd floor roof, most of the activity will not have a direct line of site to the houses on Mottram Street and there is likely to be a screening effect from the building itself which would reduce noise levels further than what has been assumed in our simplified assessment.

- 8.16 Furthermore, the Sport England document states that at greater heights, the noise level from an AGP is higher as the sound emanates upwards and outwards. For this site, where the pitch is elevated on the roof and the receptors are geographically 'lower', the opposite is true.
- 8.17 Noise from the kick pitch is considered acceptable with no additional mitigation options being required.

9 Conclusions

- 9.1 A noise assessment was undertaken to predict the impact of noise from Barnsley Youth Zone off Schwäbisch Gmünd Way. Given the relatively high background sound levels and distances involved from the noise sources, simplified 'worst-case' desktop calculations were utilised to predict the potential impact of activities from the site.
- 9.2 The assessment concluded that the site will pose an overall low impact at the closest noise-sensitive receptors.
- 9.3 It is considered that a suitable and commensurate level of protection against noise will be provided to the existing residential occupiers.

APPENDICES

Appendix 1: Site Location



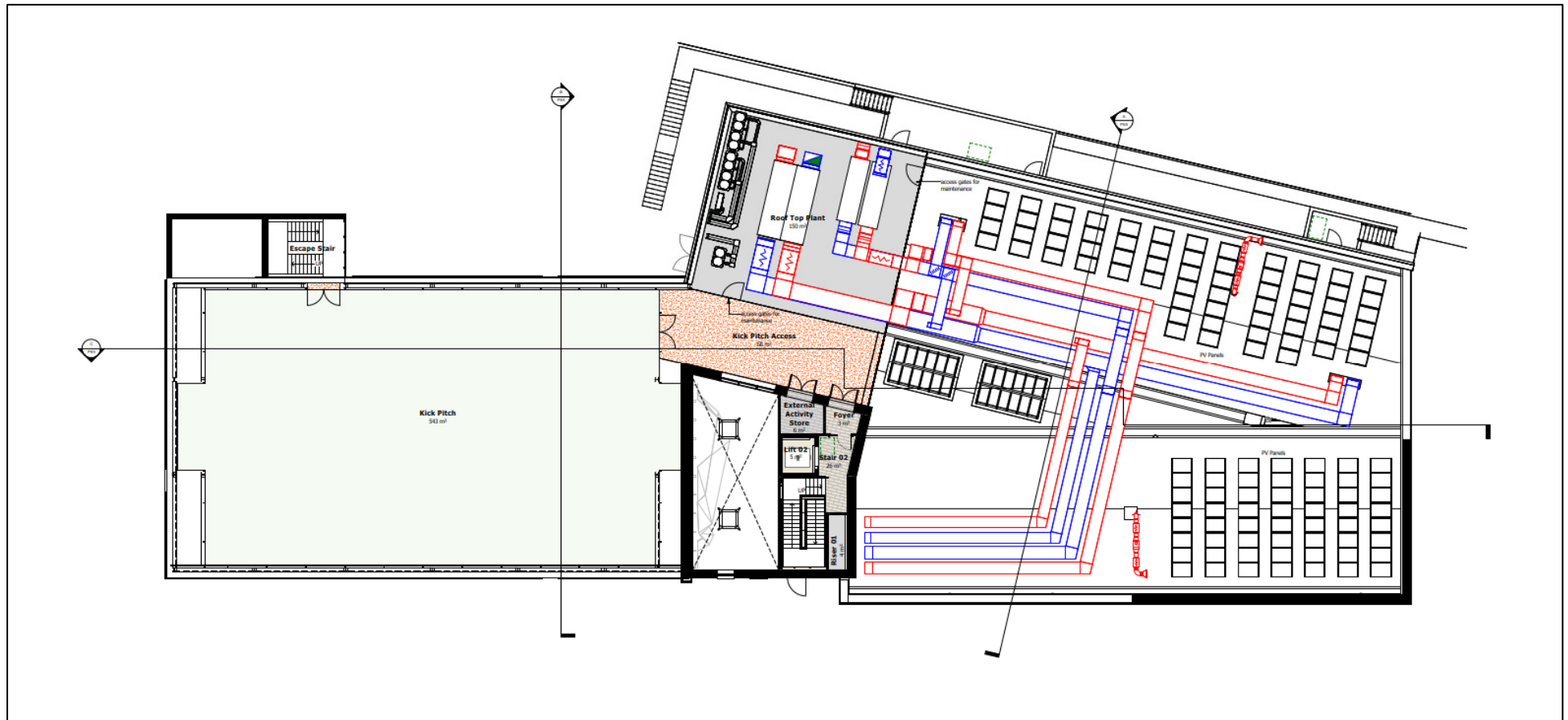


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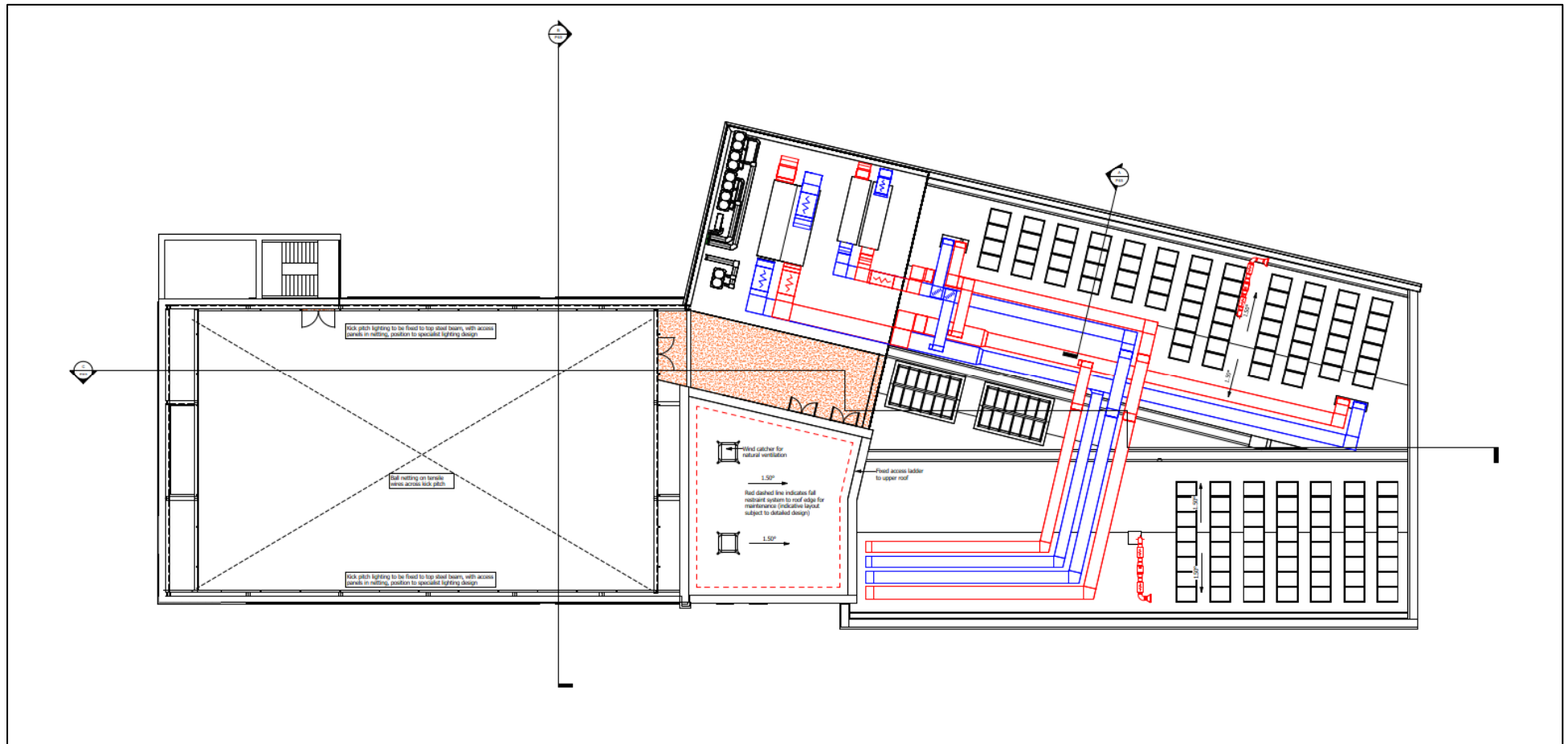
Appendix 2c: Proposed First Floor Plan



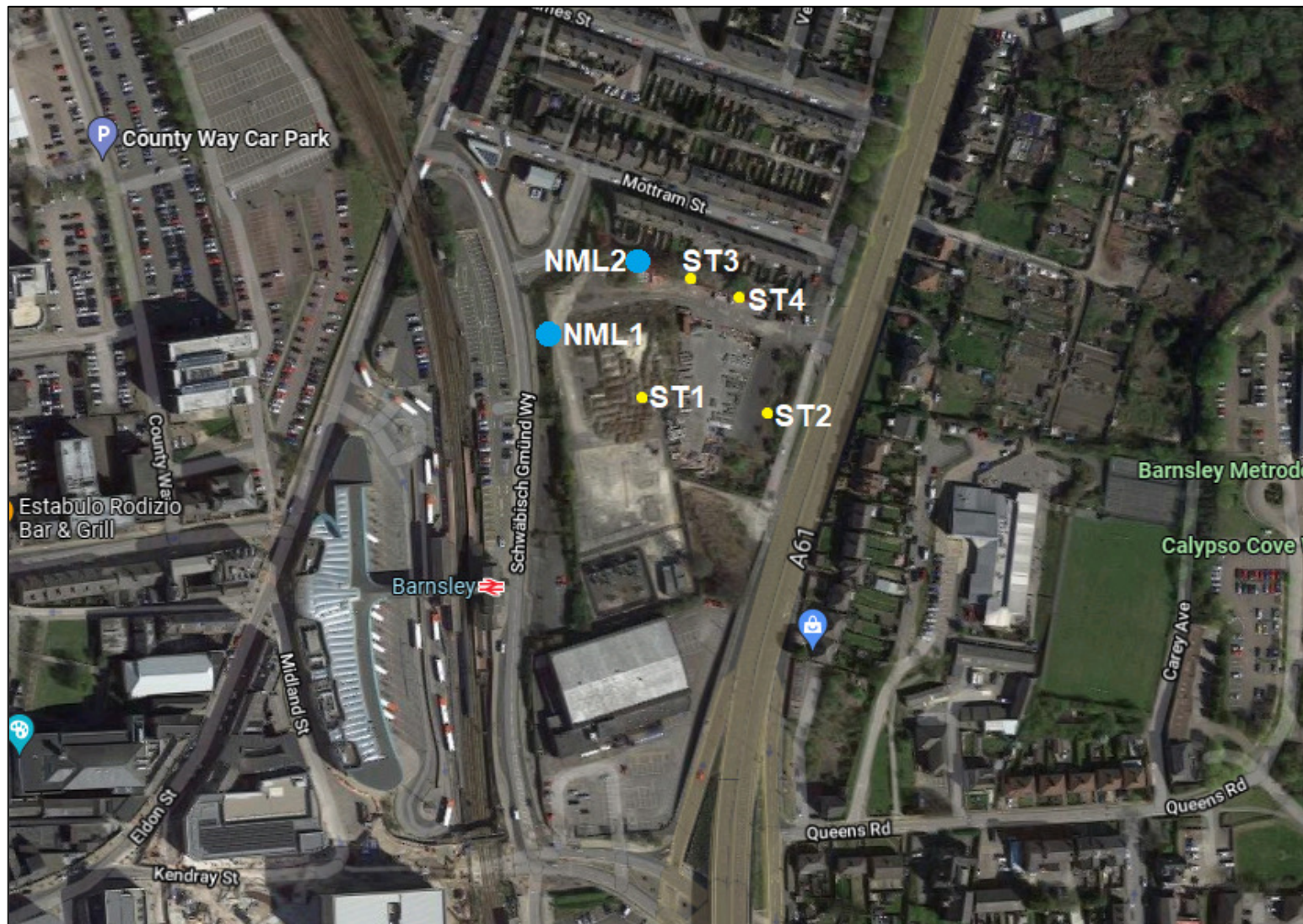
Appendix 2d: Proposed Kick Pitch Level Plan



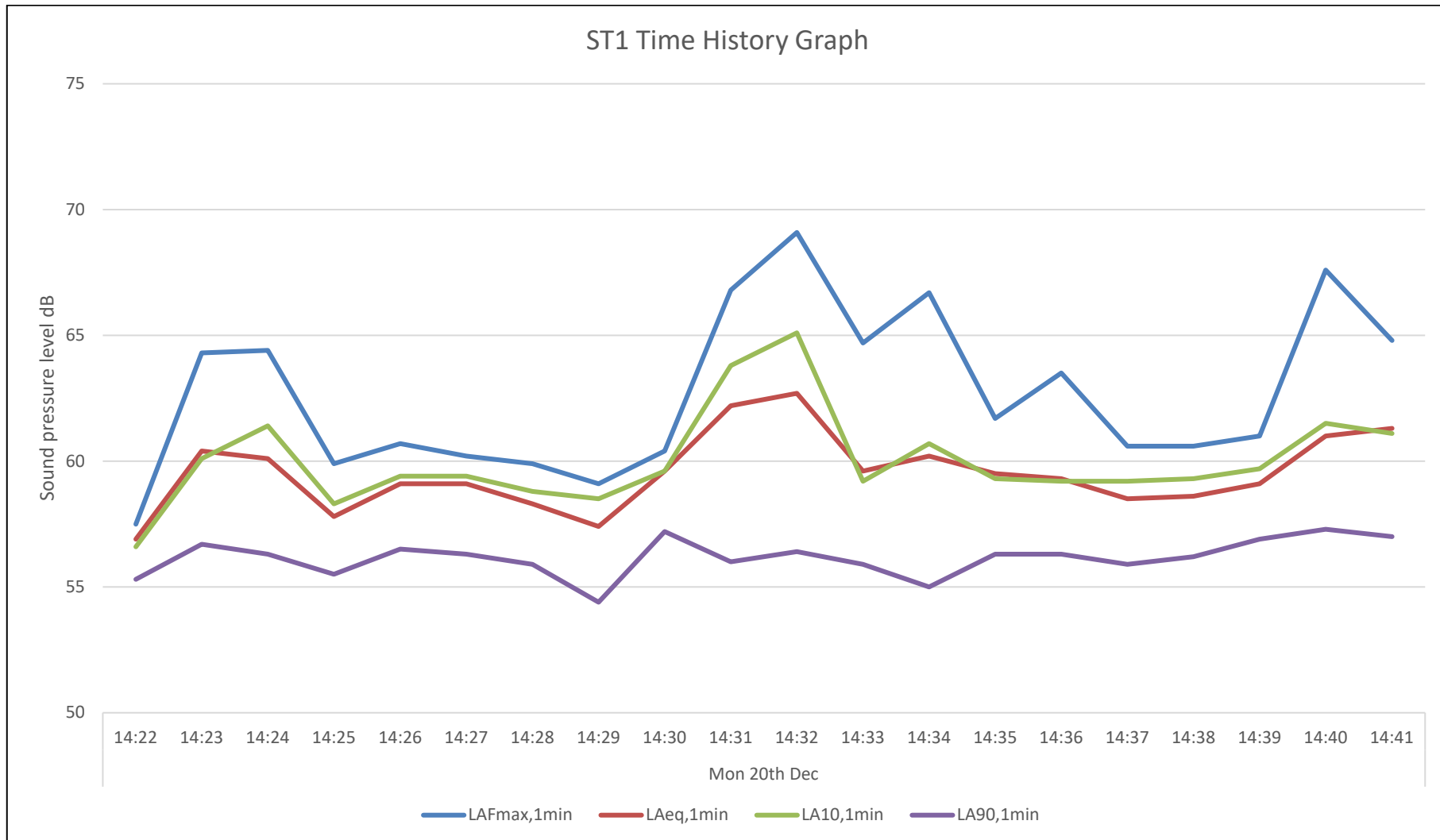
Appendix 2e: Proposed Roof Plan

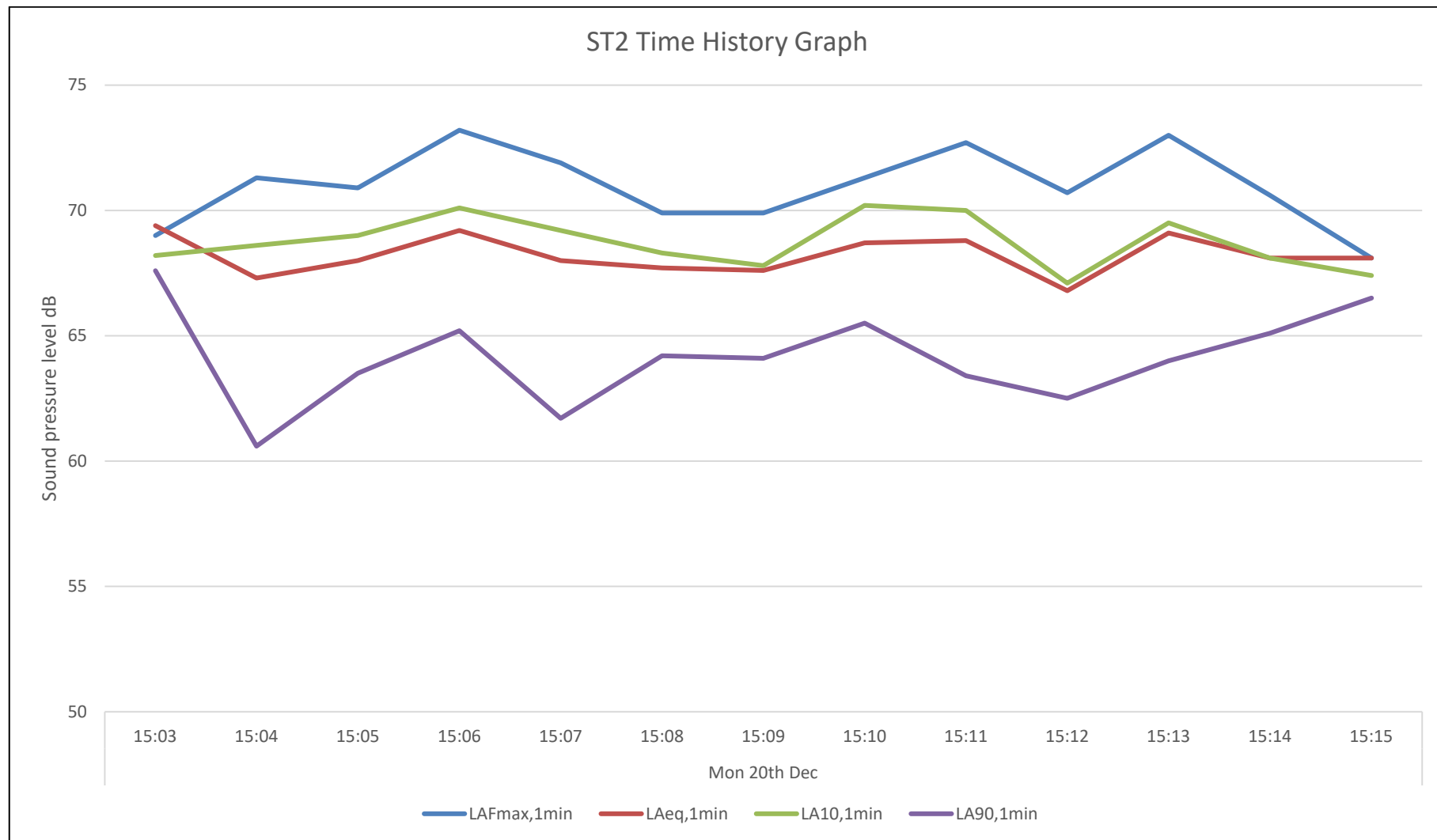


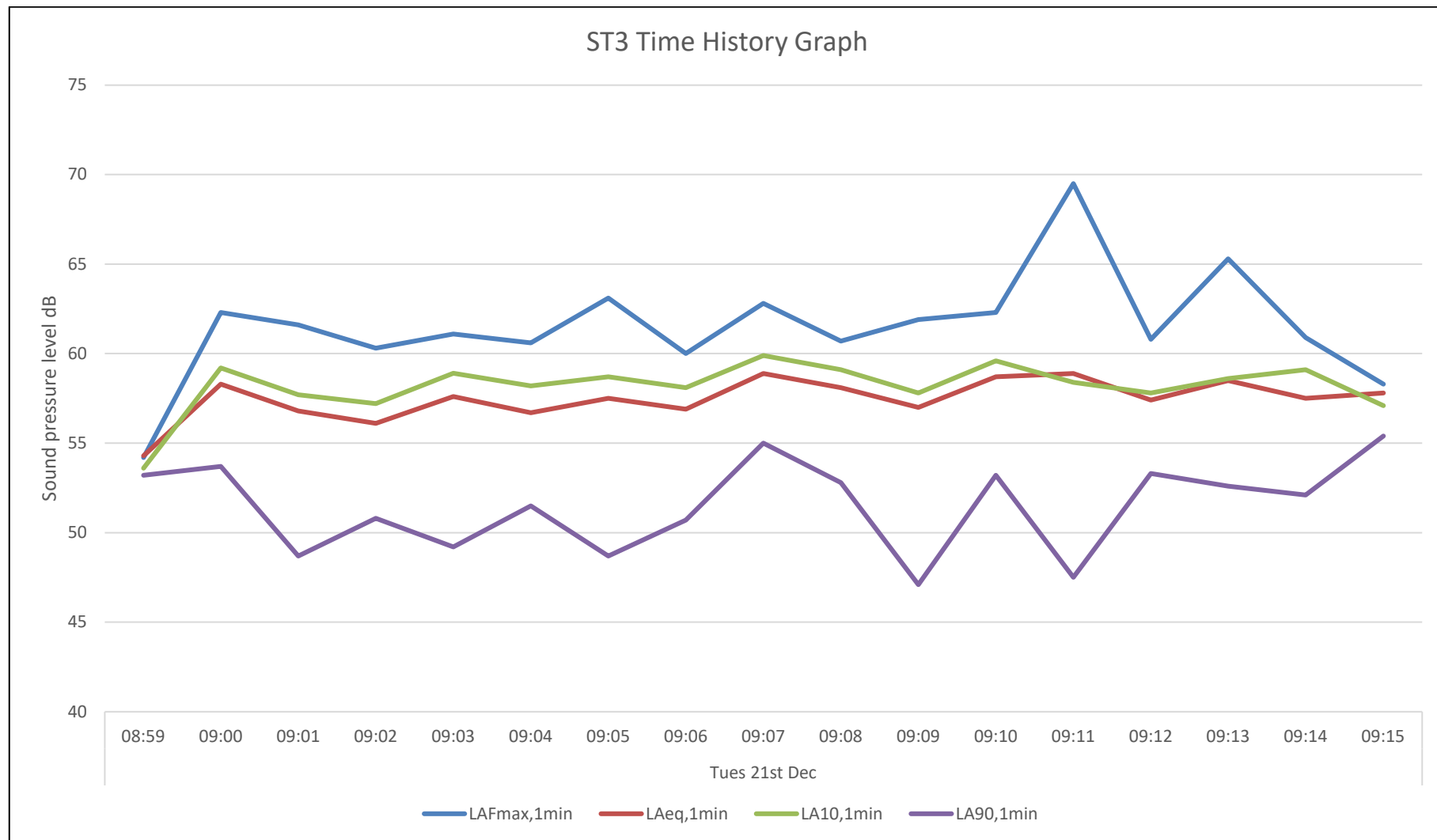
Appendix 3: Monitoring Locations

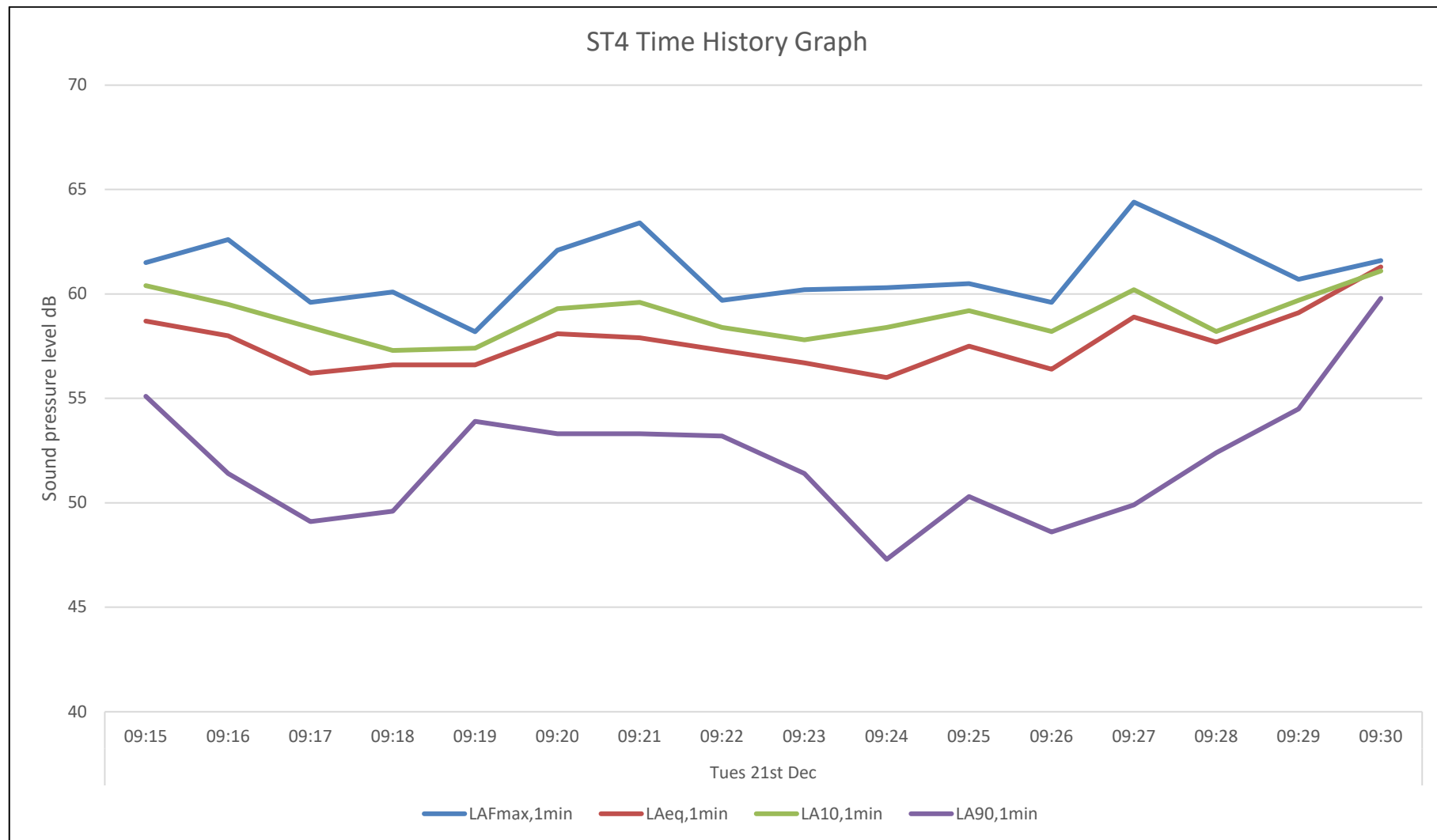


Appendix 4: Short Term Measurements Time History Graphs









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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.

$L_{A10(18\text{ hour})}$ Often referred to as the UK road traffic noise index, this is the arithmetic average of the values of L_{A10} hourly for each of the 18 one hour periods between 06:00 and 00:00.

L_{day} The A-weighted long-term average sound level as defined in ISO 1996-2: 1987, determined over all the daytime periods (07:00 – 19:00) of a year. Referenced in the Environmental Noise Directive 2002/49/EC.

$L_{evening}$ The A-weighted long-term average sound level as defined in ISO 1996-2: 1987, determined over all the evening periods (19:00 – 23:00) of a year. Referenced in the Environmental Noise Directive 2002/49/EC.

L_{night} The A-weighted long-term average sound level as defined in ISO 1996-2: 1987, determined over all the night-time periods (23:00 – 07:00) of a year. Referenced in the Environmental Noise Directive 2002/49/EC.

L_{den} The equivalent continuous sound pressure level of a notionally steady sound having the same energy as a fluctuating sound over a 24 hour period equivalent to 00:00 to 24:00 but with weightings of 5 dB and 10 dB applied to evening and night-time periods respectively to reflect the greater noise sensitivity of the population at those times. L_{den} is derived using the L_{day} , $L_{evening}$ and L_{night} noise indices and is referenced in the Environmental Noise Directive 2002/49/EC.

NOEL No observed effect level: the level of noise exposure below which no effect at all on health or quality of life can be detected.

LOAEL Lowest observed adverse effect level: the level of noise exposure above which adverse effects on health or quality of life can be detected.

SOAEL Significant observed adverse effect level: the level of noise exposure above which significant adverse effects on health or quality of life can be detected.

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.

$D_{nT,w}$ The weighted standardized level difference is a single figure rating used to describe the sound insulation of a construction separating two rooms, for example a wall or floor, and is defined in BS EN ISO 16283-1:2014 (formerly BSEN ISO 140-4:1998). It is derived by measurement of an in-situ construction and therefore takes into account the effects of flanking transmissions, workmanship etc.

$D_{ne,w}$ The weighted element-normalized level difference is a single figure rating used to describe the sound insulation of small elements within a larger construction and is defined in BS EN ISO 10140-2:2010 (BSEN ISO 140-10:1991). It is most often used to rate the sound insulation performance of ventilator units e.g. trickle vents.

C_{tr} A single-number spectrum adaptation term used to characterise the sound insulation rating with respect to urban traffic. It is defined in ISO 717-1:2013.

