Proposed new housing development

Denbighshire County Council

Maes Emlyn
Rhyl
LL18 3SF

GH/006988 R01, 9 March 2023

Prepared by

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Quality Standards Control

The signatories below verify that this document has been prepared in accordance with our quality control requirements. These procedures do not affect the content and views expressed by the originator.

This document must only be treated as a draft unless it has been signed by the Originators and approved by a Business or Associate Director.

DATE	ORIGINATORS	APPROVED
09 March 2023	Fauwaz Baig Senior Acoustic Consultant	Paul Edwards Associate Director

Limitations

This document has been prepared for the stated objective and should not be used for any other purpose without the prior written authority of GL Hearn; we accept no responsibility or liability for the consequences of this document being used for a purpose other than for which it was commissioned.

1 EXECUTIVE SUMMARY

GL Hearn has been commissioned to provide a noise impact assessment to support a planning application in relation to a proposed new housing development at the former Maes Emlyn Sheltered Housing site. This report provides a strategic noise assessment in relation to the proposed design and highlights any potential issues that may arise due to the baseline conditions prevalent at the development site.

As part of this assessment, an environmental noise survey was carried out between 23 to 30 January 2023 to determine the existing noise climate in the vicinity of the proposed development.

To achieve acceptable internal noise levels within habitable rooms, minimum sound insulation performance requirements have been specified for the glazing and ventilators in the proposed development.

Noise levels in the majority of the proposed gardens away from the railway line are predicted to achieve the BS8233 upper guideline value of 55 dB $L_{Aeq,16hr}$ during the daytime.

Gardens on the southern boundary are expected to exceed the BS8233 upper guideline value by up to 5 dB. With the recommended mitigation measures of an imperforate barrier with a minimum height of 2 m (minimum surface mass 10 kg/m^2) along the southern boundary, noise levels in these gardens are calculated to only marginally exceed the upper guideline value of 55 dB $L_{Aeq,16hr}$ by no more than 2 dB during the daytime for garden areas closer to the train tracks.

For context, a 1-2 dB difference is generally considered to be imperceptible under normal listening conditions. Without mitigation measures, the noise levels in the proposed gardens are predicted to be up to 5dB higher than the guideline value.

2 INTRODUCTION

GL Hearn has been commissioned to provide a noise impact assessment for a proposed new housing development at the former Maes Emlyn Sheltered Housing site in Rhyl.

This report details the results of the noise survey undertaken and comments on the site suitability for the proposed residential development in relation Planning Policy Wales, *Technical Advice Note (Wales) – Noise* and other relevant criteria.

A glossary of acoustics terms is provided in Appendix A.

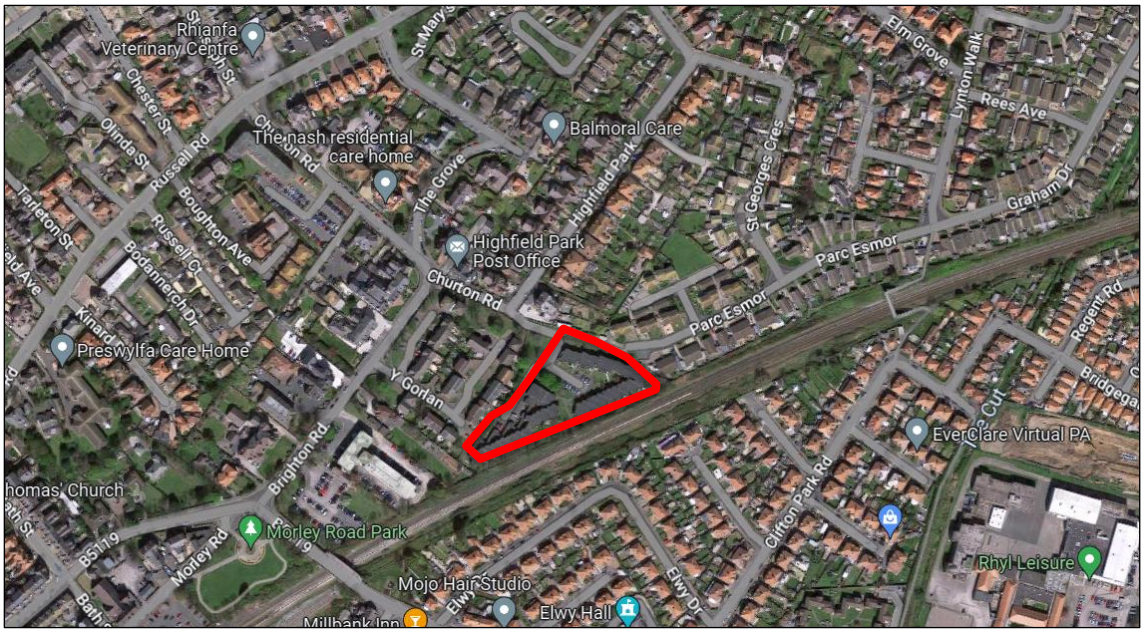
3 PROJECT DESCRIPTION

The proposed development is located at the former Maes Emlyn Sheltered Housing site. Train tracks are located at an approximate distance of 16m to the south of the scheme and residential properties on all other sides. Russell Road / Rhyl Coast Road are located to the north-west of the site boundary at an approximate distance of 280m.

The site and its surroundings are shown in Figure 1 along with an approximate site boundary in red.

The proposal comprises the development of 18No. 1 Bedroom Apartments, 3No. 2 Bedroom Apartments, 2No. 2 Bedroom (2 Storey) houses and 3No. (2 storey) 3 Bedroom houses. A drawing of the proposed site layout is provided in APPENDIX B.

Figure 1 Proposed development location



3.1 Planning Policy Wales

Planning Policy Wales (PPW) Edition 11 dated February 2021 sets out the land use planning policies of the Welsh Government. Section 1 states:

> *"1.1 Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. PPW, the TANs1, MTANs2 and policy clarification letters comprise national planning policy. "*

Relevant statements for noise affecting a residential use are provided in Section 6.7 and summarised below:

> *6.7.1 Clean air and an appropriate soundscape, contribute to a positive experience of place as well as being necessary for public health, amenity and well-being. They are indicators of local environmental quality and integral qualities of place which should be protected through preventative or proactive action through the planning system. Conversely, air, noise and light pollution can have negative effects on people, biodiversity and the resilience of ecosystems and should be reduced as far as possible.*
>
> *6.7.4 The planning system should maximise its contribution to achieving the wellbeing goals, and in particular a healthier Wales, by aiming to reduce average population exposure to air and noise pollution alongside action to tackle high pollution hotspots. In doing so, it should consider the long-term effects of current and predicted levels of air and noise pollution on individuals, society and the environment and identify and pursue any opportunities to reduce, or at least, minimise population exposure to air and noise pollution, and improve soundscapes, where it is practical and feasible to do so.*
>
> *6.7.5 In taking forward these broad objectives the key planning policy principle is to consider the effects which proposed developments may have on air or soundscape quality and the effects which existing air or soundscape quality may have on proposed developments. Air Quality and soundscape influence choice of location and distribution of development and it will be important to consider the relationship of proposed development to existing development and its surrounding area and its potential to exacerbate or create poor air quality or inappropriate soundscapes. The agent of change principle says that*

a business or person responsible for introducing a change is responsible for managing that change.

In practice, for example, this means a developer would have to ensure that solutions to address air quality or noise from nearby pre-existing infrastructure, businesses or venues can be found and implemented as part of ensuring development is acceptable.

6.7.6 In proposing new development, planning authorities and developers must, therefore:

- *address any implication arising as a result of its association with, or location within, air quality management areas, noise action planning priority areas or areas where there are sensitive receptors;*
- *not create areas of poor air quality or inappropriate soundscape; and*
- *seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscapes.*

6.7.7 To assist decision making it will be important that the most appropriate level of information is provided and it may be necessary for a technical air quality and noise assessment to be undertaken by a suitably qualified and competent person on behalf of the developer.

6.7.8 Good design, for example setting back buildings from roads to avoid canyon effects and using best practice in terms of acoustic design to ensure the appropriate and intended acoustic environment of completed developments should be incorporated at an early consideration in the design and planning process. Other mitigation measures must be capable of being effectively implemented for their intended purpose, and could include those related to:

- *traffic management and road safety;*
- *ensuring progress towards a shift to low or zero emissions means of road*
- *transport, such as electrical charging points;*
- *supporting low or zero emissions public transport;*
- *providing active travel infrastructure; and*
- *incorporating green infrastructure, where it can improve air quality by removing air pollution and aiding its dispersal, reduce real or perceived noise levels by absorbing and scattering noise and introducing natural sounds to soften man-made noise, provide areas of relative tranquillity, and reduce exposure by putting a buffer between sources of pollution and receptors.*

6.7.14 Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In circumstances where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission.

Location of Commercial, Industrial and other Potentially Polluting Development.

6.7.19 The health imperative of good air quality and appropriate soundscapes in contributing to the overall character and quality of places and the health and wellbeing of people and wildlife should be fully recognised. It will not be appropriate to locate sensitive uses, such as hospitals, schools, care homes and housing adjacent to busy roads or other transport routes, where there are no connectivity benefits to be gained and where health and amenity impacts associated with increased exposure of people to pollution will be unacceptable. Whilst some uses may be appropriate with the aid of good design air quality and soundscape considerations can be overriding factors, especially for sensitive uses, if they cannot be adequately mitigated and impacts minimised.

6.7.20 Where sensitive developments need to be located close to existing transportation infrastructure for sustainable movement and access they should be designed, as far as practicable, to limit harmful substances and noise levels within and around those developments both now and in the future. This may include employing the principles of good acoustic design and the inclusion of active travel or travel management measures as part of development proposals. Such development, however, should preferably be located away from existing sources of significant noise, which may include aircraft noise or roads, particularly new roads or those with programmed route improvements.

6.7.21 Regard should be paid to current air quality and noise levels and the quality of the existing soundscape and account taken of any relevant local air quality action plan, noise action plan and/ or local or regional air quality strategy as part of development strategies and proposals in development plans and before determining planning applications.

Soundscapes and Compatibility of Uses.

6.7.24 The potential impacts of noise pollution arising from existing development, be this commercial, industrial, transport related or cultural venues (such as music venues, theatres or arts centres), must be fully considered to ensure the effects on new development can be adequately controlled to safeguard amenity and any necessary measures and controls

should be incorporated as part of the proposed new development. This will help to prevent the risk of restrictions or possible closure of existing premises or adverse impacts on transport infrastructure due to noise and other complaints from occupiers of new developments. It will be important that the most appropriate level of information is provided and assessment undertaken."

PPW does not provide any quantifiable criteria and directs you to the Technical Advice Notes (TAN 11).

3.2 Technical Advice Note (Wales) – Noise

Planning Policy Wales (PPW) Edition 11 dated February 2021 sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes. The relevant planning criteria for proposed residential development is in Technical Advice Note (Wales) 11 *entitled "Noise" which was published in October 1997. The introduction states:*

"This note provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business. It outlines some of the main considerations which local planning authorities should take into account in drawing-up development plan policies and when determining planning applications for development which will either generate noise or be exposed to existing noise sources"

Table 11 provides Noise Exposure Categories, which relate to proposed residential developments near to a transportation noise source. Noise Exposure Categories, (NEC's) in relation to rail noise are addressed in ranges according to the freefield equivalent noise levels ($L_{Aeq, T}$) measured at the position of the proposed dwellings.

Table 1 TAN 11 Noise Exposure Categories (rail traffic)

Noise Source	Noise Exposure Category			
Rail Traffic	**A**	**B**	**C**	**D**
07.00 - 23.00 hrs	<55	55 – 66	66 – 74	>74
23.00 - 07.00 hrs	<45	45 – 59	59 – 66	>66

The Technical Advice Note (Wales) 11 gives advice to Local Planning Authorities on assessing proposals for residential developments near a source of noise, depending upon which of the four Noise Exposure Categories the proposed site falls into:

- *NEC A. Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.*
- *NEC B. Noise should be taken into account when determining planning applications and where appropriate, conditions imposed to ensure an adequate level of protection.*
- *NEC C. Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.*
- *NEC D. Planning permission should normally be refused.*

In addition, it states: *"Night-time noise levels (23.00 - 07.00): sites where individual noise events regularly exceed 82 dB L_{Amax} (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq,8h}$ (except where the $L_{Aeq,8h}$ already puts the site in NEC D)."*

3.3 British Standard 8233:2014 and World Health Organisation Guidelines for Community Noise, 1999

The below informative section is based on British Standard 8233:2014 and WHO 1999. By meeting the below criteria, the residential amenity should not be adversely affected. The below criteria would apply to all plots which fall into NEC B - D.

Indoor ambient noise levels

Section 7.7.2 Table 4 of the British Standard 8233:2014 provides internal ambient noise levels for dwellings from noise sources ‘without a specific character’. The British Standard guideline states that noise levels should not exceed those as noted

in Table 2 of the British Standard. These criteria are based on the guidance provided within WHO 1999 and are summarised below:

Table 2 British Standard 8233:2014 Internal Noise Criteria

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

Maximum Noise Levels

Section 7.7.2 Note 4 of the British Standard states "Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values". British Standard BS8233 provides no definitive criteria for maximum noise levels from individual events ($L_{Amax,F}$). Section 3.4 of the "Guidelines for Community Noise" published by the World Health Organisation in 1999 (WHO 1999) states *"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 L_{Amax} more than 10-15 times per night (Vallet & Verbey 1991)".*

External noise levels

Section 7.7.3.2 of BS 8233 states:

> *For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or*

making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

4 NOISE SURVEY

4.1 Introduction

Long-term noise monitoring was carried out at Position A between Monday 23rd to Monday 30th January 2023 along with a short-term manned noise survey undertaken at Position 1 on the 30th of January 2023 as shown in the figure below.

Figure 2 Measurement locations

At Position A, the microphone was attached to an extendable pole and attached to the external balcony railing of Flat 44 at a height of approximately 4.6m above the ground and at least 1.5m away from any reflective surfaces. Therefore, the sound pressure levels measured are considered to be free-field levels.

At Position 1, the microphone was mounted on a tripod at approximately 1.5m above local ground level and at least 3m from any other reflective surface, therefore the sound pressure levels measured are considered to be free-field levels.

4.2 Monitoring equipment

Monitoring equipment used during the survey is listed in the table below:

Table 3 Survey equipment

Position	Item	Manufacturer	Model	Serial number
A	Sound Level Meter	Rion	NL-52	00821104
	Calibrator	Larson Davis	CAL200	3230
1	Sound Level Meter	Rion	NL-52	00821130
	Calibrator	Svantek	SV30A	29084

4.3 Weather conditions

Weather conditions throughout the duration of the survey were suitable for reliable measurements of environmental noise.

4.4 Description of noise climate

While on site, the noise climate at Position A was comprised of noise from seagulls, other local wildlife, and distant traffic noise from the eastern direction. Train passes were also observed. At Position 1, less noise was observed from the train passes due to shielding provided by the building structure, traffic noise from the northern direction was audible.

4.5 Results

The noise survey measurements are summarised in the tables below:

Table 4 Long term measurement results from Position A

Position	Period, T	$L_{Aeq,T}$ (dB)	$L_{Amax,5min}$ (dB)	Typical $L_{A90,T}$ (dB)
A	Daytime (07:00 – 23:00)	Ranging from 58 - 61	89	40
	Night (23:00 – 07:00)	Ranging from 41 - 59	86	31

Table 5 Results from manned Position 1

Position	Period, T	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{A90,T}$ (dB)
1	12:07pm – 12:28pm	46	65	43

Time history graphs and tabulated results of the long-term noise survey are included in Appendix C.

5 NOISE RISK ASSESSMENT

5.1 Assumptions

Calculation assumptions

The following assumptions have been used in the calculations:

- Site layout as per drawing provided in APPENDIX B;
- Façade and room dimensions as per project drawings;
- Noise levels incident on the roof will be reduced by 10 dB due to self-screening;
- The scheme will be ventilated as per System 4 from Building Regulations Part F (i.e., continuous mechanical supply and extract with heat recovery)

External façade elements

- 102.5mm facing brickwork
- 50mm cavity
- Breather membrane
- 100mm woodfibre or similar approved insulation
- 145mm timber frame filled with woodfibre or similar approved insulation
- 9mm OSB sheathing
- Vapour control layer
- 25mm timber battens
- 12.5mm plasterboard

Roof construction

- Clay or concrete tiles on tanalised SW battens
- Roof felt underlay on timber trusses
- 300mm min. Loose loft insulation mineral wool roll over bottom chord of truss
- 15mm Plasterboard underdrawer to u/s truss

The calculated minimum sound insulation performances based on the above for façade and roof constructions is presented in Table 6.

Table 6 Calculated minimum sound insulation performance for building envelope

Construction	Minimum noise reduction, R (dB), at octave band centre frequency (Hz)*							R_w+C_{tr}, (dB)**
	63	125	250	500	1000	2000	4000	
Facade	30	35	44	46	53	58	74	47
Roof	14	33	44	50	55	56	57	46

Note* *Our calculations are based on these noise reduction spectra derived from the proposed façade/roof elements. Minor deviations in the spectral performance may be acceptable, providing the overall weighted sound insulation performance of the product including the C_{tr} correction factor is of the same minimum performance. We advise that any deviations in the noise reduction performance (both spectral and weighted values) of proposed products are checked with an acoustic consultant.*

Note* *It is important to note that the sound insulation performance requirements for the glazing elements outlined above are specified in terms of R_w+C_{tr} , where C_{tr} is a correction factor to be added to the weighted sound reduction index, R_w, to account for low- and medium-frequency noise associated with urban road traffic and low speed rail traffic. Care should be taken to ensure that the C_{tr} correction factor is included in the building element's sound insulation performance rating as there can be up to 10 dB difference between the Rw rating and the R_w+C_{tr} rating for a given construction.* ***R_w+C_{tr} values must not be confused with R_w values.***

Any changes to proposals (such as modifications to the building footprints/façade or roof elements), or the surrounding environment (such as new developments generating or reflecting noise nearby, or changes in traffic patterns or other noise sources) may affect internal noise levels within the proposed development.

5.2 Noise Exposure Category

From the measurements in Table 4, the site falls into Noise Exposure Category B due to rail traffic during the daytime and between Category A and borderline B/C at night (depending on the day of the week). Taking NEC C as a worst case, TAN 11 states that:

> *"Noise should be taken into account when determining planning applications and where appropriate, conditions imposed to ensure an adequate level of protection."*

We have also studied the data during night-time periods for the duration of the noise survey to calculate the number of L_{Amax} (S time weighting) during each night-time hour exceeding 82 dB as per advice given in TAN 11. The number of individual events did not exceed 82 dB more than 2 times in any one hour for the vast majority of the night-time hours. Based on this we consider that the 82 dB level is not

exceeded "several" times in any night-time hour. The results of the study are included in on page 29APPENDIX C.

5.3 Façade performance – glazing

Our calculations demonstrate that the criteria given in Table 2 for internal noise levels in habitable rooms (bedrooms, living rooms and dining rooms) can be met with the sound insulation performance values for glazing provided in Table 7. A marked-up drawing showing the glazing and ventilator performance requirements across the proposed development is shown in APPENDIX B.

Table 7 Sound reduction specification for glazing

Type	Façade element	Glazing specification*	Minimum noise reduction, R/D (dB), at octave band centre frequency (Hz)**						R_w+C_{tr} (dB)***
			125	250	500	1000	2000	4000	
A	Glazing	4mm/6-16mm/4mm ISO 12354-3	21	17	25	35	37	31	R_w+C_{tr} 25
B	Glazing	8/(6-16)/4 mm ISO 12354-3	22	21	28	38	40	47	R_w+C_{tr} 29
C	Glazing	Optiphon 6/16/9mm Pilkington	24	26	40	48	46	54	R_w+C_{tr} 34

Note* *The outline R_w+C_{tr} specifications and example glazing constructions above are based on indicative sound insulation data contained in BS EN ISO 12354-3 and manufacturer's data; the sound insulation performance of the proposed glazing systems should be checked for suitability with respect to achieving the internal noise criteria prior to specification.*

Note* *Our calculations are based on these noise reduction spectra and are provided for reference. Minor deviations in the spectral performance may be acceptable, providing the overall weighted sound insulation performance of the product including the C_{tr} correction factor is of the same minimum performance. We advise that any deviations in the noise reduction performance (both spectral and weighted values) of proposed products are checked with an acoustic consultant.*

Note* *It is important to note that the sound insulation performance requirements for the glazing elements outlined above are specified in terms of R_w+C_{tr} , where C_{tr} is a correction factor to be added to the weighted sound reduction index, R_w, to account for low- and medium-frequency noise associated with urban road traffic and low speed rail traffic. Care should be taken to ensure that the C_{tr} correction factor is included in the building element's sound insulation performance rating as there can be up to 10 dB difference between the R_w rating and the R_w+C_{tr} rating for a given construction.* ***R_w+C_{tr} / $D_{n,e,w}+C_{tr}$ values must not be confused with R_w or $D_{n,e,w}$ values***.

5.4 Plant noise limits

The proposed development will have mechanical ventilation with heat recovery systems. As such, any future mechanical plant items would need to meet the cumulative noise emission limits at the positions of the nearest noise sensitive receptors (NSRs) which are presented in the table below. The limits are derived from the noise surveys conducted at the development site.

To achieve minimal adverse impact upon the closest NSRs, as per advice given in BS 4142:2014+A1:2019, our proposed rated plant noise emission limits are given in the table below.

Table 8 Noise limits for external plant emissions

Period	Typical background noise level	Rated plant noise limit at NSR
Daytime (0700 to 1900 hours)	40 dB $L_{A90,1hr}$	40 dB $L_{Ar,Tr}$
Evening (1900 to 2300 hours)	36 dB $L_{A90,1hr}$	36 dB $L_{Ar,Tr}$
Night (2300 to 0700 hours)	31 dB $L_{A90,15min}$	31 dB $L_{Ar,Tr}$

5.5 External amenity

Based on the measured and calculated noise levels, the majority of the proposed gardens at the site, which would be opposite the train tracks, are predicted to be above 55 dB $L_{Aeq,16hr}$ during the daytime by up to 5 dB for the majority of the garden areas.

To reduce noise levels in the gardens near the southern perimeter of the site as far as practicable, it is recommended that minimum 2m-high imperforate barrier (minimum surface mass 10 kg/m^2) is used around the southern boundary that will have direct line of sight to the train tracks.

With the proposed barrier, noise levels in these gardens are calculated to marginally exceed the upper guideline value of 55 dB $L_{Aeq,16hr}$ by no more than 2 dB during the

daytime for garden areas nearer to the train tracks. For context, a 1-2 dB difference is generally considered to be imperceptible under normal listening conditions.

It is recognised in relevant guidance documents such as BS 8233, that *"…these guideline values are not achievable in all circumstances where development might be desirable"* and is in accordance with the principles of TAN 11, *"…where sensitive developments need to be located close to existing transportation infrastructure for sustainable movement and access they should be designed, as far as practicable, to limit harmful substances and noise levels within and around those developments both now and in the future".*

Figure 3 shows the proposed noise mitigation barrier in yellow.

Figure 3: Mitigation for amenity spaces

6 CONCLUSION

GL Hearn has carried out a noise impact assessment for a proposed new-build housing development on the former Maes Emlyn Sheltered Housing site.

The assessment takes into consideration the local authority requirements and considers the impact of noise at the proposed development. The report assesses the suitability of the site with respect to TAN 11 and British Standards 4142:2014+A1:2019, 8233:2014+A1:2019 / WHO (1999).

The site falls into Noise Exposure Category B due to rail traffic during the daytime and between Category A and borderline B/C at night (depending on the day of the week), which therefore requires noise mitigation measures to the building façade construction, namely external walls, windows, and ventilation to habitable rooms, to ensure an adequate level of protection.

The noted building fabric construction, Passivhaus building standards, and the proposed mechanical ventilation with heat recovery systems will aid in mitigating any noise generated by the nearby railway line. The predicted internal noise levels within the proposed dwellings from both road traffic and rail noise should be within the criteria of British Standard 8233:2014 as stated in Table 2.

As such, we would consider external noise to be suitably controlled within the habitable rooms of the proposed residential development and good internal conditions can be achieved. In terms of environmental noise, we would consider that acceptable conditions can be achieved within the dwellings on the site as long as the noise control measures noted above are followed.

Appendices

APPENDIX A Acoustic Glossary

APPENDIX A Glossary of terms

Decibel (dB)

The ratio of sound pressures which we can hear is a ratio of 10^6:1 (one million:one). For convenience, therefore, a logarithmic measurement scale is used. The resulting parameter is called the 'sound pressure level' (L_p) and the associated measurement unit is the decibel (dB). As the decibel is a logarithmic ratio, the laws of logarithmic addition and subtraction apply.

Frequency

The repetition rate of a sound wave. The subjective equivalent in music is pitch. The unit of frequency is the Hertz (Hz), which is identical to cycles per second. A thousand hertz is often denoted kHz, e.g. 2 kHz = 2000 Hz. Human hearing ranges approximately from 20 Hz to 20 kHz. For design purposes, the octave bands between 63 Hz to 8 kHz are generally used. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it.

Noise indices

Noise indices recorded during a survey that are of relevance to BB93 include the following:

$L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.

$L_{Amax,T(F,S)}$The A-weighted maximum sound pressure level over period of time T, with fast or slow time weighting.

$L_{A1,T}$ The A-weighted sound pressure level exceeded for 1% of the measurement period, T. Indicative of the maximum noise levels.

L_{A10} The A-weighted sound pressure level exceeded for 10% of the measurement period, T. L_{A10} is the index generally adopted to assess traffic noise.

$L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period, T. L_{A90} is widely accepted as indicative of the background noise level.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', e.g. L_{A90}) to approximate the frequency response of the human ear.

APPENDIX B Proposed development

1. Contractor to verify all dimensions and check level datums on site
2. All of the designs are the sole property of TACP Architects Ltd and may not be used without their written agreement
3. All prints, specifications and their copyright are the property of TACP Architects Ltd
4. Do not scale off drawings
5. All dimensions shall be checked on site before commencement of shop drawings, manufacture and all discrepancies must be reported to TACP Architects Ltd

Unit Key:

1 Bedroom - 2 Person Apartment
Quantity = 18no.
(GFLR units to be Part M Cat 3 wheelchair accessible)

2 Bedroom - 4 Person Apartment
Quantity = 3no.

2 Bedroom - 4 person House (2 Storey)
Quantity = 10no.

3 Bedroom - 5 Person House (2 Storey)
Quantity = 4no.

Site Key:

Parking Bay - Tarmacadam surface

1 no. space per bedroom (up to 3no. for 3 bed where possible) + 1 no. visitor space per 5 units
Quantity = 55 + 7 = 62 spaces

Spaces to be 4.8m x 2.6 m wide as standard.
Future possibility to widen 1 space per accessible adaptable unit (house types) to 3.6m and lengthen to 6m.
All ground floor apartments to have accessible parking bay as standard.

EV charging
1 charging point per house type.
Future provision for 1 point per apartment and per visitor bay - ducting to be installed.

Existing tree with RPA based on Arboricultural Survey

Existing tree to be removed

Proposed trees - please refer to landscape proposal plans

Proposed hedge - please refer to landscape proposal plans

Proposed amenity grass area - please refer to landscape proposal plans

Proposed ornamental planting - please refer to landscape proposal plans

External surfaces shown indicatively only - subject to detailed design and agreement of materials - refer to Landscape Proposal for materials.

Risk Assessments

DRAFT FOR INFORMATION ONLY

Revisions

Rev	Date	Description	By	Check
B	10/01/23	Further development in line with unit layouts and design team input.	KM	MG
C	17/01/23	Aperture positions at ground floor indicated as per unit type development. Alterations to rear garden surfacing and bike shed positions to suit window / door positions.	KM	MG
D	08/02/23	Updates in line with landscape proposals received and client comments regarding apartment block roof forms. Apartments also amended to suit M&E plant room requirements	KM	MG
E	20/02/23	Site plan updated to suit apartment design approved by client team.	KM	MG

Consultants

Client
Denbighshire County Council

Project Title
Maes Emlyn Housing, Rhyl

Drawing Title
Site layout

Scale	Date	Drawn By	Checked By	Office
As indicated@A0	07/11/22	KM	MG	Wrexham

Job Number	Project•Originator•Zone•Level•Type•Role•Number	Revision
22038	MEH-TACP-PS-ST-DR-A-701	E

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Architecture ● Interior Design ● Healthcare Planning ● Conservation ● Masterplanning ● Sustainable Design

APPENDIX C Noise Survey

Tabulated noise level results at Position A

Position A

Date	Start Time (hh:mm)	Duration (mins)	Measured Sound Pressure Levels (dB)							
			$L_{Aeq,T}$	Range $L_{Aeq,5min}$	$L_{A90,T}$	Range $L_{A90,5min}$	$L_{A10,T}$	Range $L_{A10,5min}$	$L_{AFmax,T}$	Range $L_{AFmax,5min}$
Mon 23/01/2023	13:00	60	61	43 - 68	41	39 - 43	52	45 - 58	87	51 - 87
Mon 23/01/2023	14:00	60	59	45 - 68	39	38 - 42	51	47 - 59	86	56 - 86
Mon 23/01/2023	15:00	60	62	45 - 69	42	40 - 44	52	48 - 57	88	60 - 88
Mon 23/01/2023	16:00	60	60	45 - 67	43	42 - 44	50	46 - 55	88	56 - 88
Mon 23/01/2023	17:00	60	59	43 - 65	42	41 - 43	47	44 - 50	85	50 - 85
Mon 23/01/2023	18:00	60	62	44 - 68	42	42 - 43	46	45 - 50	91	51 - 91
Mon 23/01/2023	19:00	60	56	42 - 63	41	40 - 43	45	44 - 47	84	50 - 84
Mon 23/01/2023	20:00	60	61	41 - 68	40	39 - 41	45	43 - 54	88	49 - 88
Mon 23/01/2023	21:00	60	58	40 - 64	38	37 - 39	43	42 - 45	85	45 - 85
Mon 23/01/2023	22:00	60	54	38 - 60	36	35 - 38	42	40 - 48	79	45 - 79
Mon 23/01/2023	23:00	15	39	36 - 41	34	33 - 35	42	38 - 44	52	44 - 52
Mon 23/01/2023	23:15	15	54	36 - 58	32	31 - 33	40	38 - 41	78	44 - 78
Mon 23/01/2023	23:30	15	56	35 - 61	32	32 - 32	39	38 - 42	79	43 - 79
Mon 23/01/2023	23:45	15	35	35 - 36	31	30 - 32	38	38 - 38	48	43 - 48
Mon 23/01/2023	00:00	15	35	33 - 36	29	29 - 29	38	35 - 40	47	42 - 47
Tue 24/01/2023	00:15	15	34	32 - 35	29	29 - 30	37	35 - 38	45	41 - 45
Tue 24/01/2023	00:30	15	32	32 - 33	28	27 - 29	35	34 - 35	45	40 - 45
Tue 24/01/2023	00:45	15	34	30 - 37	28	27 - 29	38	32 - 41	47	39 - 47
Tue 24/01/2023	01:00	15	56	29 - 61	26	26 - 27	34	31 - 39	82	40 - 82
Tue 24/01/2023	01:15	15	31	31 - 31	26	26 - 27	34	33 - 34	44	41 - 44
Tue 24/01/2023	01:30	15	31	27 - 32	26	26 - 28	34	29 - 35	45	37 - 45
Tue 24/01/2023	01:45	15	28	26 - 28	25	25 - 26	29	27 - 31	37	34 - 37
Tue 24/01/2023	02:00	15	29	27 - 30	25	25 - 26	31	29 - 32	40	35 - 40
Tue 24/01/2023	02:15	15	45	29 - 49	26	25 - 28	41	31 - 54	64	42 - 64
Tue 24/01/2023	02:30	15	29	28 - 30	26	26 - 26	32	29 - 34	45	39 - 45
Tue 24/01/2023	02:45	15	31	30 - 32	26	26 - 27	34	33 - 36	44	39 - 44
Tue 24/01/2023	03:00	15	28	28 - 28	26	26 - 26	30	29 - 30	36	34 - 36
Tue 24/01/2023	03:15	15	43	29 - 48	27	26 - 27	42	30 - 52	66	34 - 66
Tue 24/01/2023	03:30	15	32	30 - 33	27	26 - 27	35	33 - 37	45	40 - 45
Tue 24/01/2023	03:45	15	58	29 - 63	26	26 - 29	37	31 - 43	83	38 - 83
Tue 24/01/2023	04:00	15	43	32 - 47	27	27 - 28	42	35 - 52	63	39 - 63
Tue 24/01/2023	04:15	15	57	31 - 62	27	26 - 28	39	33 - 44	83	43 - 83
Tue 24/01/2023	04:30	15	34	33 - 35	28	27 - 29	37	36 - 38	49	46 - 49
Tue 24/01/2023	04:45	15	60	32 - 65	29	29 - 31	38	36 - 40	86	43 - 86
Tue 24/01/2023	05:00	15	53	34 - 58	31	31 - 32	39	36 - 41	79	43 - 79
Tue 24/01/2023	05:15	15	39	37 - 40	33	31 - 35	42	40 - 44	50	47 - 50
Tue 24/01/2023	05:30	15	59	38 - 64	34	33 - 35	42	41 - 44	86	45 - 86
Tue 24/01/2023	05:45	15	62	41 - 66	38	37 - 39	43	43 - 45	86	49 - 86
Tue 24/01/2023	06:00	15	52	41 - 57	38	37 - 39	45	43 - 47	77	48 - 77
Tue 24/01/2023	06:15	15	61	40 - 63	37	37 - 38	43	42 - 44	84	45 - 84
Tue 24/01/2023	06:30	15	59	40 - 63	38	38 - 39	43	42 - 49	82	47 - 82
Tue 24/01/2023	06:45	15	60	42 - 64	40	40 - 42	46	43 - 48	83	49 - 83
Tue 24/01/2023	07:00	60	61	44 - 69	43	41 - 47	52	45 - 61	87	53 - 87
Tue 24/01/2023	08:00	60	58	49 - 64	47	46 - 48	54	51 - 69	84	62 - 84
Tue 24/01/2023	09:00	60	60	48 - 66	45	44 - 46	54	49 - 61	87	64 - 87

Tue 24/01/2023	10:00	60	58	46 - 65	44	44 - 45	52	47 - 57	86	57 - 86
Tue 24/01/2023	11:00	60	58	47 - 63	44	44 - 45	53	48 - 59	84	56 - 84
Tue 24/01/2023	12:00	60	63	45 - 70	43	42 - 45	55	47 - 70	87	58 - 87
Tue 24/01/2023	13:00	60	61	46 - 66	43	41 - 46	51	48 - 58	87	59 - 87
Tue 24/01/2023	14:00	60	62	45 - 68	42	41 - 43	50	46 - 56	88	59 - 88
Tue 24/01/2023	15:00	60	62	44 - 71	40	38 - 45	51	46 - 58	86	62 - 86
Tue 24/01/2023	16:00	60	59	41 - 67	38	36 - 40	51	44 - 55	88	51 - 88
Tue 24/01/2023	17:00	60	57	41 - 65	39	38 - 42	45	42 - 49	85	46 - 85
Tue 24/01/2023	18:00	60	60	40 - 68	39	38 - 41	44	42 - 48	90	47 - 90
Tue 24/01/2023	19:00	60	58	39 - 66	38	37 - 39	42	41 - 53	87	44 - 87
Tue 24/01/2023	20:00	60	61	38 - 69	37	36 - 39	42	40 - 47	88	44 - 88
Tue 24/01/2023	21:00	60	60	39 - 69	37	36 - 39	43	41 - 58	87	45 - 87
Tue 24/01/2023	22:00	60	56	36 - 62	34	32 - 37	42	38 - 47	83	44 - 83
Tue 24/01/2023	23:00	15	51	36 - 56	32	32 - 33	38	38 - 39	77	44 - 77
Tue 24/01/2023	23:15	15	58	34 - 63	30	30 - 31	38	36 - 39	84	41 - 84
Tue 24/01/2023	23:30	15	52	34 - 56	30	29 - 30	38	37 - 39	77	46 - 77
Tue 24/01/2023	23:45	15	36	33 - 38	27	27 - 29	38	35 - 42	54	42 - 54
Tue 24/01/2023	00:00	15	32	30 - 33	28	27 - 31	34	33 - 35	41	39 - 41
Wed 25/01/2023	00:15	15	31	31 - 32	29	28 - 29	33	33 - 34	47	39 - 47
Wed 25/01/2023	00:30	15	31	31 - 32	28	27 - 28	33	32 - 34	42	37 - 42
Wed 25/01/2023	00:45	15	32	31 - 33	27	26 - 28	35	33 - 37	44	41 - 44
Wed 25/01/2023	01:00	15	54	31 - 59	27	26 - 28	34	32 - 37	81	39 - 81
Wed 25/01/2023	01:15	15	31	29 - 33	26	26 - 27	33	31 - 37	43	37 - 43
Wed 25/01/2023	01:30	15	28	27 - 29	26	25 - 27	30	28 - 31	44	32 - 44
Wed 25/01/2023	01:45	15	28	26 - 29	25	24 - 26	30	28 - 31	39	34 - 39
Wed 25/01/2023	02:00	15	28	28 - 29	25	24 - 26	31	30 - 33	39	36 - 39
Wed 25/01/2023	02:15	15	29	27 - 31	25	24 - 25	30	29 - 32	46	35 - 46
Wed 25/01/2023	02:30	15	29	28 - 30	25	25 - 25	32	30 - 33	55	39 - 55
Wed 25/01/2023	02:45	15	38	26 - 40	25	24 - 27	38	28 - 46	56	37 - 56
Wed 25/01/2023	03:00	15	29	29 - 30	26	26 - 27	31	31 - 32	39	35 - 39
Wed 25/01/2023	03:15	15	28	27 - 29	24	24 - 26	30	29 - 31	38	36 - 38
Wed 25/01/2023	03:30	15	29	27 - 30	25	25 - 26	32	29 - 33	40	36 - 40
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Wed 25/01/2023	04:15	15	58	29 - 63	26	26 - 28	35	31 - 43	85	35 - 85
Wed 25/01/2023	04:30	15	30	30 - 31	27	27 - 28	33	32 - 33	39	38 - 39
Wed 25/01/2023	04:45	15	61	31 - 66	29	27 - 29	37	33 - 44	86	43 - 86
Wed 25/01/2023	05:00	15	55	32 - 60	30	30 - 30	38	34 - 41	80	38 - 80
Wed 25/01/2023	05:15	15	35	33 - 35	31	30 - 32	37	35 - 37	48	42 - 48
Wed 25/01/2023	05:30	15	59	35 - 63	33	32 - 33	39	37 - 42	85	44 - 85
Wed 25/01/2023	05:45	15	61	36 - 66	33	33 - 33	40	39 - 43	86	44 - 86
Wed 25/01/2023	06:00	15	57	35 - 61	33	32 - 33	37	36 - 39	83	41 - 83
Wed 25/01/2023	06:15	15	62	36 - 64	34	34 - 35	40	38 - 42	85	47 - 85
Wed 25/01/2023	06:30	15	60	37 - 64	35	34 - 36	40	39 - 45	86	45 - 86
Wed 25/01/2023	06:45	15	60	39 - 65	37	36 - 39	44	41 - 49	83	48 - 83
Wed 25/01/2023	07:00	60	61	44 - 69	42	40 - 45	53	47 - 59	86	53 - 86
Wed 25/01/2023	08:00	60	57	47 - 65	46	45 - 46	52	48 - 56	85	57 - 85
Wed 25/01/2023	09:00	60	60	46 - 66	44	42 - 46	51	49 - 55	87	55 - 87
Wed 25/01/2023	10:00	60	60	45 - 66	42	40 - 44	52	47 - 55	87	60 - 87
Wed 25/01/2023	11:00	60	60	48 - 66	43	40 - 44	53	48 - 63	86	60 - 86

Wed 25/01/2023	12:00	60	58	46 - 65	45	44 - 47	51	48 - 60	86	54 - 86
Wed 25/01/2023	13:00	60	61	49 - 66	45	43 - 46	53	48 - 57	85	60 - 85
Wed 25/01/2023	14:00	60	60	47 - 68	42	41 - 44	51	48 - 56	86	60 - 86
Wed 25/01/2023	15:00	60	63	49 - 69	42	41 - 44	51	49 - 56	89	63 - 89
Wed 25/01/2023	16:00	60	60	45 - 66	43	43 - 44	51	46 - 54	86	58 - 86
Wed 25/01/2023	17:00	60	57	43 - 65	42	42 - 44	47	45 - 56	85	51 - 85
Wed 25/01/2023	18:00	60	61	43 - 66	42	41 - 43	46	44 - 49	87	46 - 87
Wed 25/01/2023	19:00	60	57	42 - 63	40	39 - 43	46	42 - 48	84	45 - 84
Wed 25/01/2023	20:00	60	61	39 - 66	38	37 - 39	43	40 - 47	86	46 - 86
Wed 25/01/2023	21:00	60	59	39 - 67	38	37 - 39	41	40 - 49	89	42 - 89
Wed 25/01/2023	22:00	60	57	40 - 64	39	39 - 40	42	41 - 45	83	43 - 83
Wed 25/01/2023	23:00	15	41	41 - 41	40	40 - 40	42	42 - 43	45	43 - 45
Wed 25/01/2023	23:15	15	60	41 - 64	40	40 - 41	42	42 - 44	84	45 - 84
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Thu 26/01/2023	00:30	15	58	42 - 63	41	40 - 41	42	42 - 42	83	44 - 83
Thu 26/01/2023	00:45	15	41	41 - 42	40	40 - 40	42	42 - 43	48	43 - 48
Thu 26/01/2023	01:00	15	41	41 - 41	40	40 - 40	42	42 - 43	46	43 - 46
Thu 26/01/2023	01:15	15	53	40 - 58	40	39 - 40	41	41 - 42	80	43 - 80
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Thu 26/01/2023	01:45	15	40	39 - 40	39	38 - 39	40	40 - 41	44	42 - 44
Thu 26/01/2023	02:00	15	39	39 - 40	38	38 - 38	40	40 - 41	43	42 - 43
Thu 26/01/2023	02:15	15	39	39 - 39	38	38 - 38	40	40 - 40	42	41 - 42
Thu 26/01/2023	02:30	15	39	39 - 39	38	38 - 38	40	39 - 40	42	41 - 42
Thu 26/01/2023	02:45	15	40	39 - 40	38	38 - 38	41	40 - 42	46	42 - 46
Thu 26/01/2023	03:00	15	39	38 - 39	38	37 - 38	39	39 - 40	44	40 - 44
Thu 26/01/2023	03:15	15	39	39 - 39	38	38 - 38	39	39 - 40	41	41 - 41
Thu 26/01/2023	03:30	15	39	38 - 39	38	38 - 38	39	39 - 39	57	41 - 57
Thu 26/01/2023	03:45	15	58	38 - 62	38	37 - 38	44	39 - 51	82	41 - 82
Thu 26/01/2023	04:00	15	39	38 - 39	38	37 - 38	40	39 - 40	43	40 - 43
Thu 26/01/2023	04:15	15	59	37 - 64	36	36 - 37	39	38 - 48	85	40 - 85
Thu 26/01/2023	04:30	15	38	37 - 38	36	36 - 37	39	38 - 39	44	40 - 44
Thu 26/01/2023	04:45	15	61	37 - 65	36	36 - 36	39	38 - 51	85	41 - 85
Thu 26/01/2023	05:00	15	37	37 - 37	36	36 - 36	38	38 - 38	43	40 - 43
Thu 26/01/2023	05:15	15	38	37 - 39	37	36 - 38	39	38 - 41	44	43 - 44
Thu 26/01/2023	05:30	15	57	37 - 62	36	36 - 37	40	38 - 42	84	42 - 84
Thu 26/01/2023	05:45	15	60	38 - 65	37	37 - 37	41	39 - 44	84	43 - 84
Thu 26/01/2023	06:00	15	54	38 - 58	37	37 - 37	40	39 - 41	80	41 - 80
Thu 26/01/2023	06:15	15	62	39 - 65	37	37 - 37	41	40 - 43	85	50 - 85
Thu 26/01/2023	06:30	15	58	38 - 63	36	36 - 37	41	39 - 47	83	42 - 83
Thu 26/01/2023	06:45	15	62	41 - 66	39	39 - 42	45	42 - 47	86	53 - 86
Thu 26/01/2023	07:00	60	61	45 - 70	43	41 - 46	52	47 - 60	87	54 - 87
Thu 26/01/2023	08:00	60	57	48 - 64	46	44 - 47	52	50 - 55	85	56 - 85
Thu 26/01/2023	09:00	60	61	46 - 66	42	41 - 44	51	48 - 53	87	60 - 87
Thu 26/01/2023	10:00	60	61	45 - 67	41	41 - 42	52	47 - 64	85	54 - 85
Thu 26/01/2023	11:00	60	61	45 - 67	42	41 - 43	51	48 - 61	85	57 - 85
Thu 26/01/2023	12:00	60	59	44 - 65	41	39 - 46	55	44 - 63	85	61 - 85
Thu 26/01/2023	13:00	60	64	41 - 69	40	39 - 42	53	43 - 57	89	54 - 89

Thu 26/01/2023	14:00	60	60	45 - 69	40	39 - 41	50	46 - 57	87	58 - 87
Thu 26/01/2023	15:00	60	64	42 - 71	39	39 - 40	49	42 - 62	88	52 - 88
Thu 26/01/2023	16:00	60	60	42 - 67	39	38 - 41	49	45 - 57	86	57 - 86
Thu 26/01/2023	17:00	60	60	39 - 65	37	36 - 40	46	41 - 53	90	48 - 90
Thu 26/01/2023	18:00	60	62	37 - 68	35	34 - 37	41	39 - 52	90	42 - 90
Thu 26/01/2023	19:00	60	54	38 - 62	36	35 - 37	41	40 - 45	80	45 - 80
Thu 26/01/2023	20:00	60	61	36 - 66	34	33 - 36	40	38 - 44	87	45 - 87
Thu 26/01/2023	21:00	60	60	34 - 66	31	29 - 37	40	36 - 46	86	42 - 86
Thu 26/01/2023	22:00	60	57	32 - 65	30	27 - 32	37	34 - 42	86	41 - 86
Thu 26/01/2023	23:00	15	52	32 - 56	31	31 - 31	36	34 - 40	77	38 - 77
Thu 26/01/2023	23:15	15	59	30 - 63	29	29 - 31	36	32 - 46	83	38 - 83
Thu 26/01/2023	23:30	15	52	32 - 57	31	30 - 31	35	34 - 37	78	37 - 78
Thu 26/01/2023	23:45	15	33	32 - 34	30	29 - 31	35	33 - 36	44	38 - 44
Thu 26/01/2023	00:00	15	31	30 - 32	29	28 - 30	33	32 - 34	38	36 - 38
Fri 27/01/2023	00:15	15	32	30 - 33	29	28 - 29	33	31 - 36	49	39 - 49
Fri 27/01/2023	00:30	15	31	30 - 31	29	29 - 30	32	32 - 33	41	36 - 41
Fri 27/01/2023	00:45	15	30	30 - 30	28	28 - 28	32	31 - 32	37	36 - 37
Fri 27/01/2023	01:00	15	66	29 - 71	28	28 - 28	32	30 - 47	92	35 - 92
Fri 27/01/2023	01:15	15	31	30 - 32	29	28 - 29	33	31 - 36	43	35 - 43
Fri 27/01/2023	01:30	15	31	30 - 31	29	29 - 30	32	31 - 33	39	33 - 39
Fri 27/01/2023	01:45	15	31	30 - 32	30	29 - 30	32	31 - 33	38	34 - 38
Fri 27/01/2023	02:00	15	30	30 - 30	29	28 - 29	31	30 - 31	37	34 - 37
Fri 27/01/2023	02:15	15	30	29 - 30	29	28 - 29	31	30 - 31	36	35 - 36
Fri 27/01/2023	02:30	15	33	32 - 35	29	28 - 29	33	31 - 34	61	41 - 61
Fri 27/01/2023	02:45	15	32	30 - 33	29	29 - 31	34	31 - 34	46	38 - 46
Fri 27/01/2023	03:00	15	32	32 - 32	30	30 - 31	33	33 - 34	40	37 - 40
Fri 27/01/2023	03:15	15	33	32 - 33	31	31 - 32	34	34 - 35	42	38 - 42
Fri 27/01/2023	03:30	15	33	33 - 33	31	31 - 31	34	34 - 35	42	38 - 42
Fri 27/01/2023	03:45	15	60	33 - 65	31	31 - 32	35	33 - 45	85	44 - 85
Fri 27/01/2023	04:00	15	34	32 - 36	31	31 - 32	36	33 - 40	47	35 - 47
Fri 27/01/2023	04:15	15	65	32 - 70	31	31 - 32	35	33 - 51	93	38 - 93
Fri 27/01/2023	04:30	15	32	32 - 32	31	31 - 31	33	33 - 34	39	37 - 39
Fri 27/01/2023	04:45	15	60	32 - 64	30	30 - 31	36	33 - 45	85	39 - 85
Fri 27/01/2023	05:00	15	54	32 - 59	31	30 - 32	36	34 - 40	81	36 - 81
Fri 27/01/2023	05:15	15	39	34 - 43	33	32 - 34	40	36 - 47	56	40 - 56
Fri 27/01/2023	05:30	15	62	36 - 66	34	33 - 34	40	37 - 48	86	42 - 86
Fri 27/01/2023	05:45	15	62	38 - 66	35	35 - 36	43	40 - 47	86	44 - 86
Fri 27/01/2023	06:00	15	36	35 - 37	32	31 - 33	38	37 - 39	44	42 - 44
Fri 27/01/2023	06:15	15	59	39 - 63	32	31 - 34	42	41 - 43	85	50 - 85
Fri 27/01/2023	06:30	15	39	38 - 40	36	33 - 38	41	39 - 42	53	46 - 53
Fri 27/01/2023	06:45	15	56	39 - 61	37	36 - 38	44	41 - 46	82	44 - 82
Fri 27/01/2023	07:00	60	60	42 - 65	42	39 - 46	54	45 - 58	86	54 - 86
Fri 27/01/2023	08:00	60	60	46 - 65	43	42 - 45	52	47 - 57	85	59 - 85
Fri 27/01/2023	09:00	60	57	45 - 66	40	38 - 43	49	47 - 60	85	55 - 85
Fri 27/01/2023	10:00	60	59	42 - 68	38	37 - 41	48	44 - 56	85	54 - 85
Fri 27/01/2023	11:00	60	61	43 - 66	38	36 - 39	51	44 - 56	86	57 - 86
Fri 27/01/2023	12:00	60	59	41 - 66	37	35 - 39	47	43 - 61	88	54 - 88
Fri 27/01/2023	13:00	60	62	39 - 66	36	34 - 41	50	41 - 54	86	55 - 86
Fri 27/01/2023	14:00	60	59	40 - 66	36	34 - 38	48	42 - 55	86	54 - 86
Fri 27/01/2023	15:00	60	62	42 - 68	37	36 - 39	51	45 - 59	87	54 - 87

Fri 27/01/2023	16:00	60	58	43 - 66	37	35 - 42	52	45 - 60	86	60 - 86
Fri 27/01/2023	17:00	60	60	40 - 66	38	37 - 41	46	41 - 53	86	45 - 86
Fri 27/01/2023	18:00	60	62	42 - 68	40	39 - 43	46	44 - 50	90	49 - 90
Fri 27/01/2023	19:00	60	57	43 - 63	42	40 - 42	45	44 - 48	84	49 - 84
Fri 27/01/2023	20:00	60	60	42 - 68	40	39 - 41	44	43 - 47	86	48 - 86
Fri 27/01/2023	21:00	60	60	40 - 68	38	37 - 39	43	42 - 56	85	46 - 85
Fri 27/01/2023	22:00	60	56	37 - 64	36	34 - 38	42	39 - 45	85	45 - 85
Fri 27/01/2023	23:00	15	38	36 - 39	34	33 - 36	41	39 - 42	53	44 - 53
Fri 27/01/2023	23:15	15	54	38 - 59	33	33 - 34	41	40 - 41	78	48 - 78
Fri 27/01/2023	23:30	15	52	36 - 57	33	33 - 35	40	39 - 40	78	44 - 78
Fri 27/01/2023	23:45	15	36	34 - 36	31	31 - 32	38	36 - 39	53	44 - 53
Fri 27/01/2023	00:00	15	36	36 - 36	32	31 - 32	39	38 - 39	47	43 - 47
Sat 28/01/2023	00:15	15	68	33 - 73	30	30 - 33	45	35 - 78	86	42 - 86
Sat 28/01/2023	00:30	15	34	34 - 35	30	28 - 32	37	37 - 37	47	41 - 47
Sat 28/01/2023	00:45	15	35	32 - 37	29	29 - 30	37	34 - 40	49	41 - 49
Sat 28/01/2023	01:00	15	52	33 - 57	29	28 - 30	37	34 - 38	79	41 - 79
Sat 28/01/2023	01:15	15	33	32 - 35	29	28 - 31	36	34 - 38	45	41 - 45
Sat 28/01/2023	01:30	15	33	32 - 34	28	28 - 29	36	34 - 37	48	45 - 48
Sat 28/01/2023	01:45	15	31	30 - 32	28	28 - 29	33	32 - 34	41	37 - 41
Sat 28/01/2023	02:00	15	32	32 - 32	29	29 - 30	34	34 - 34	41	37 - 41
Sat 28/01/2023	02:15	15	33	31 - 34	30	29 - 31	34	33 - 35	54	40 - 54
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Sat 28/01/2023	02:45	15	34	34 - 34	32	32 - 33	36	35 - 36	43	41 - 43
Sat 28/01/2023	03:00	15	34	33 - 34	32	32 - 32	35	35 - 36	43	40 - 43
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Sat 28/01/2023	03:45	15	33	32 - 33	30	30 - 31	34	33 - 35	43	40 - 43
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Sat 28/01/2023	04:45	15	33	33 - 33	31	31 - 32	34	33 - 34	43	38 - 43
Sat 28/01/2023	05:00	15	63	31 - 68	30	30 - 31	35	33 - 45	86	39 - 86
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Sat 28/01/2023	06:30	15	59	35 - 64	33	33 - 34	40	37 - 45	85	42 - 85
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Sat 28/01/2023	07:00	60	61	39 - 70	38	35 - 42	53	41 - 59	91	52 - 91
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Sat 28/01/2023	12:00	60	60	45 - 68	40	39 - 42	50	46 - 59	87	62 - 87
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Sat 28/01/2023	16:00	60	57	42 - 65	40	38 - 41	50	43 - 57	85	52 - 85
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Sat 28/01/2023	20:00	60	58	39 - 64	37	36 - 38	42	41 - 43	84	43 - 84
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Sun 29/01/2023	00:15	15	35	34 - 36	33	32 - 33	37	36 - 38	45	43 - 45
Sun 29/01/2023	00:30	15	35	33 - 37	31	31 - 32	37	34 - 40	52	41 - 52
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Sun 29/01/2023	01:00	15	34	33 - 35	31	31 - 32	36	34 - 37	46	42 - 46
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Sun 29/01/2023	02:00	15	34	33 - 35	31	31 - 32	36	34 - 38	45	41 - 45
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Sun 29/01/2023	02:45	15	35	34 - 36	33	32 - 33	36	35 - 38	45	37 - 45
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Sun 29/01/2023	04:00	15	35	35 - 35	34	34 - 34	36	36 - 37	45	41 - 45
Sun 29/01/2023	04:15	15	35	35 - 35	34	33 - 34	36	36 - 37	43	43 - 43
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Sun 29/01/2023	05:00	15	36	35 - 36	34	34 - 35	36	36 - 37	43	41 - 43
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Sun 29/01/2023	08:00	60	47	44 - 51	39	38 - 40	50	46 - 55	68	56 - 68
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Sun 29/01/2023	11:00	60	56	43 - 63	40	38 - 41	49	43 - 56	83	59 - 83
Sun 29/01/2023	12:00	60	60	44 - 67	41	40 - 42	49	44 - 58	88	62 - 88
Sun 29/01/2023	13:00	60	55	42 - 64	40	39 - 42	48	43 - 63	84	54 - 84
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Mon 30/01/2023	02:45	15	42	42 - 42	41	40 - 41	43	43 - 44	48	46 - 48
Mon 30/01/2023	03:00	15	42	42 - 42	41	41 - 42	43	42 - 43	48	44 - 48
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Mon 30/01/2023	05:15	15	53	52 - 53	47	47 - 48	56	55 - 57	62	61 - 62
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Mon 30/01/2023	05:45	15	61	48 - 66	45	45 - 46	54	51 - 58	85	58 - 85
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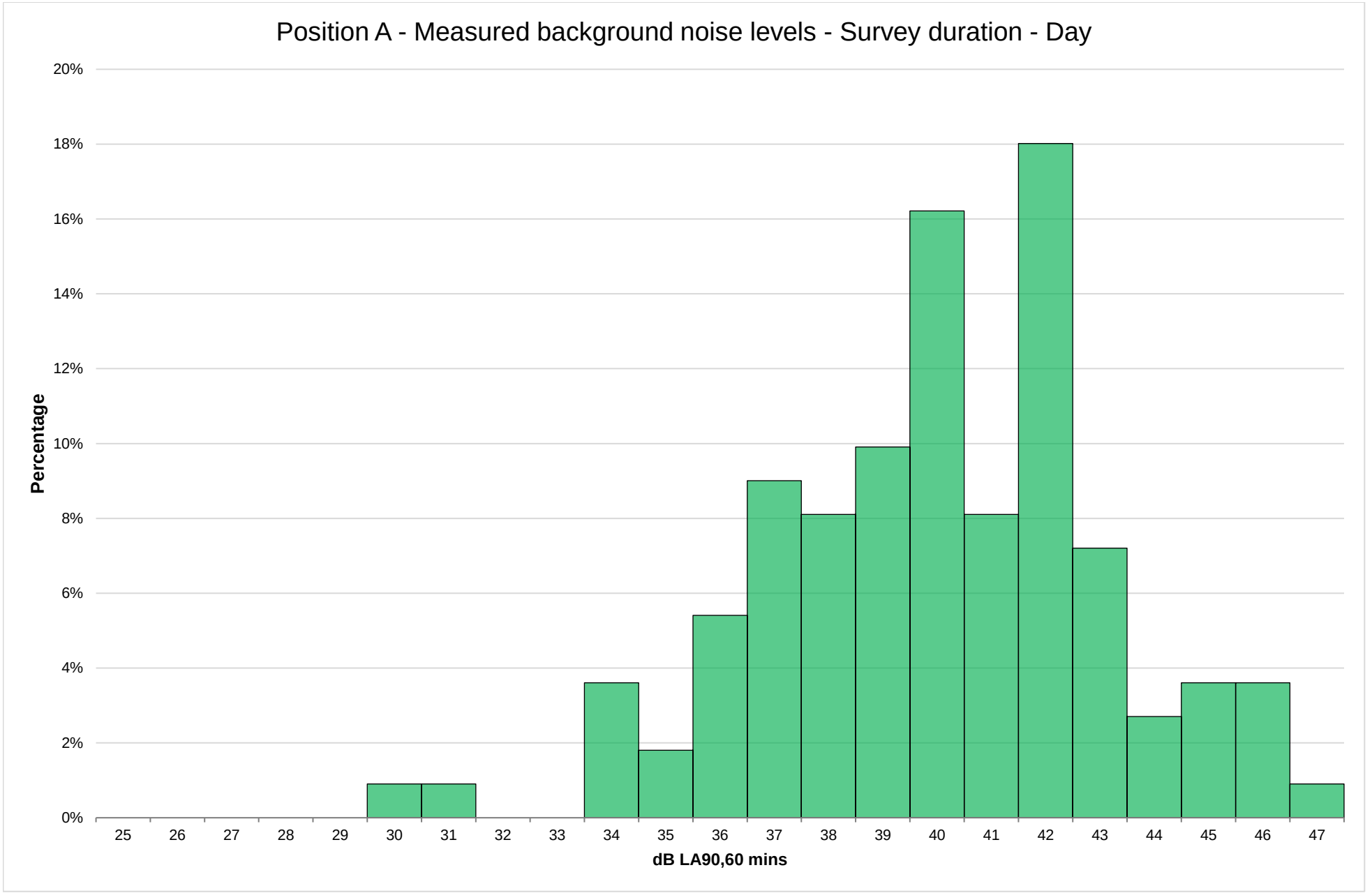
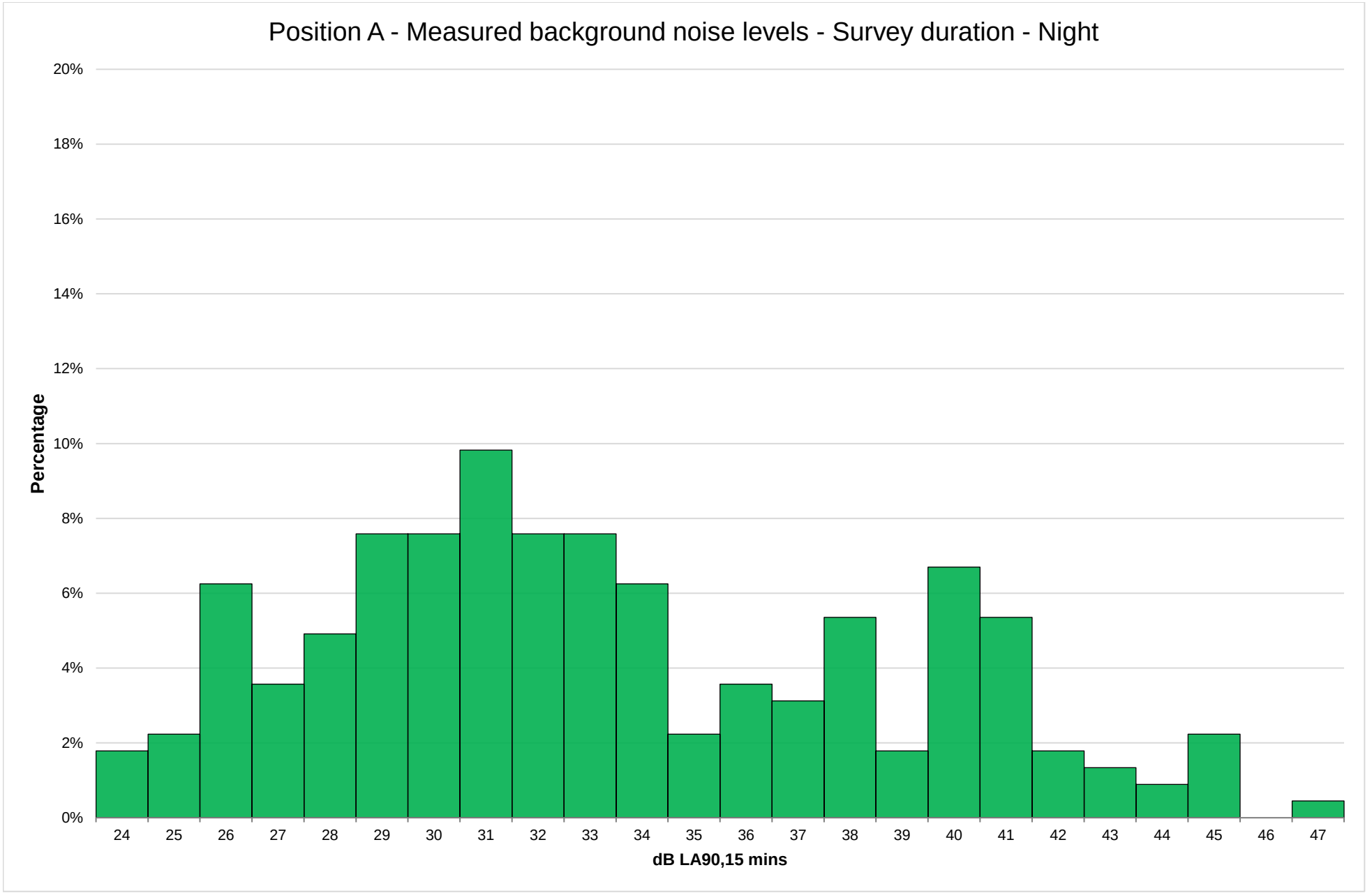
Mon 30/01/2023	06:15	15	62	47 - 65	44	44 - 45	51	49 - 51	85	54 - 85
Mon 30/01/2023	06:30	15	61	48 - 65	45	44 - 45	51	51 - 53	84	58 - 84
Mon 30/01/2023	06:45	15	57	46 - 61	44	44 - 44	49	47 - 50	78	52 - 78
Mon 30/01/2023	07:00	60	60	47 - 65	46	45 - 46	54	49 - 57	86	52 - 86
Mon 30/01/2023	08:00	60	61	47 - 67	46	45 - 47	51	48 - 54	88	52 - 88
Mon 30/01/2023	09:00	60	59	47 - 65	45	44 - 46	51	48 - 54	85	58 - 85
Mon 30/01/2023	10:00	60	60	47 - 65	43	43 - 45	52	48 - 57	85	56 - 85
Mon 30/01/2023	11:00	60	61	45 - 69	43	42 - 43	51	47 - 58	86	52 - 86

Time history graph of noise levels at Position A

Statistical analysis of typical noise levels at Position A



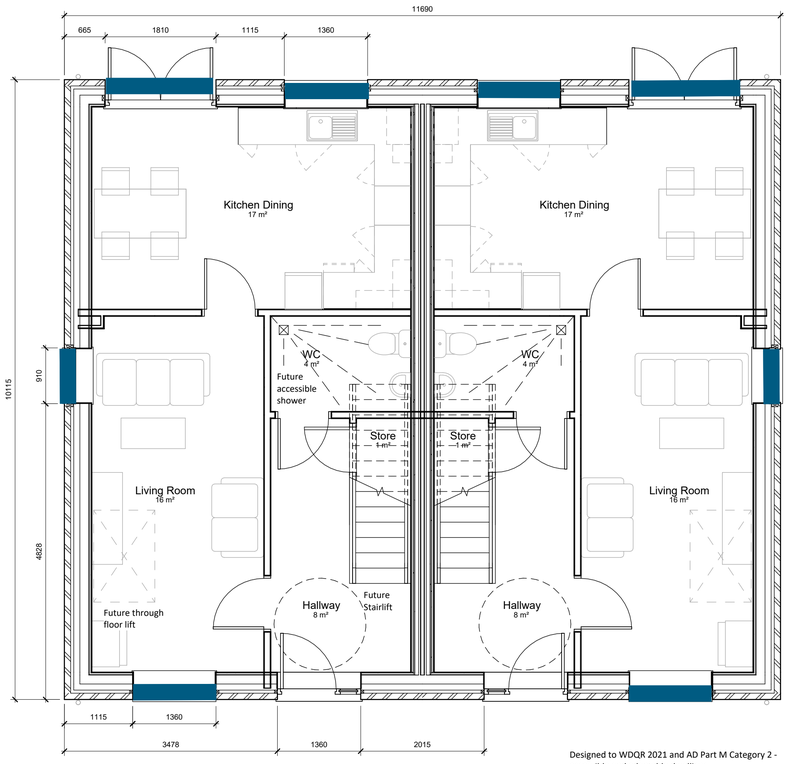
Statistical analysis of typical noise levels at Position A



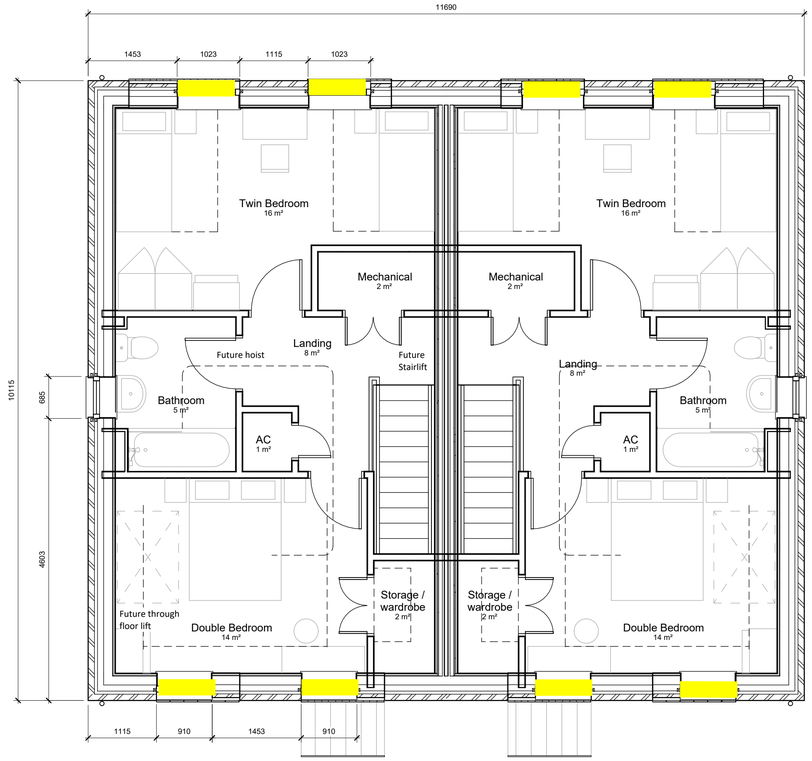
L_{ASMax} >82 dBA in any 1 hour								
Date	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00
Mon 23/01/2023	0	0	1	0	1	1	2	4
Tue 24/01/2023	1	0	0	0	1	1	2	4
Wed 25/01/2023	1	1	0	0	1	2	2	4
Thu 26/01/2023	1	0	1	0	1	2	2	2
Fri 27/01/2023	0	1	0	0	0	1	2	2
Sat 28/01/2023	0	0	0	0	0	0	0	0
Sun 29/01/2023	2	2	0	0	0	3	1	3

APPENDIX D Minimum sound insulation performance markups

2 Bed Semi Detached

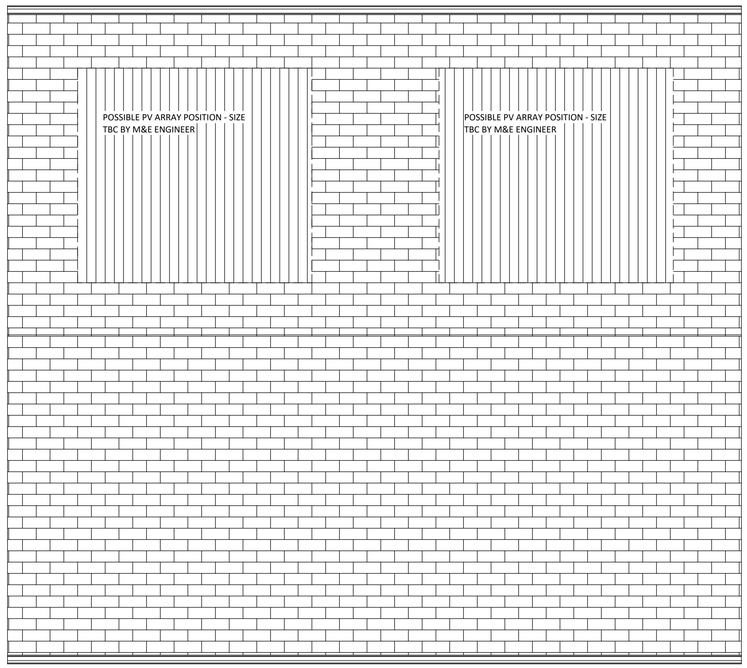


Proposed Ground Floor - GA
1 : 50



Designed to WDQR 2021 and AD Part M Category 2 - accessible and adaptable dwellings

Proposed First Floor - GA
1 : 50



Roof / Wall Plate
1 : 50

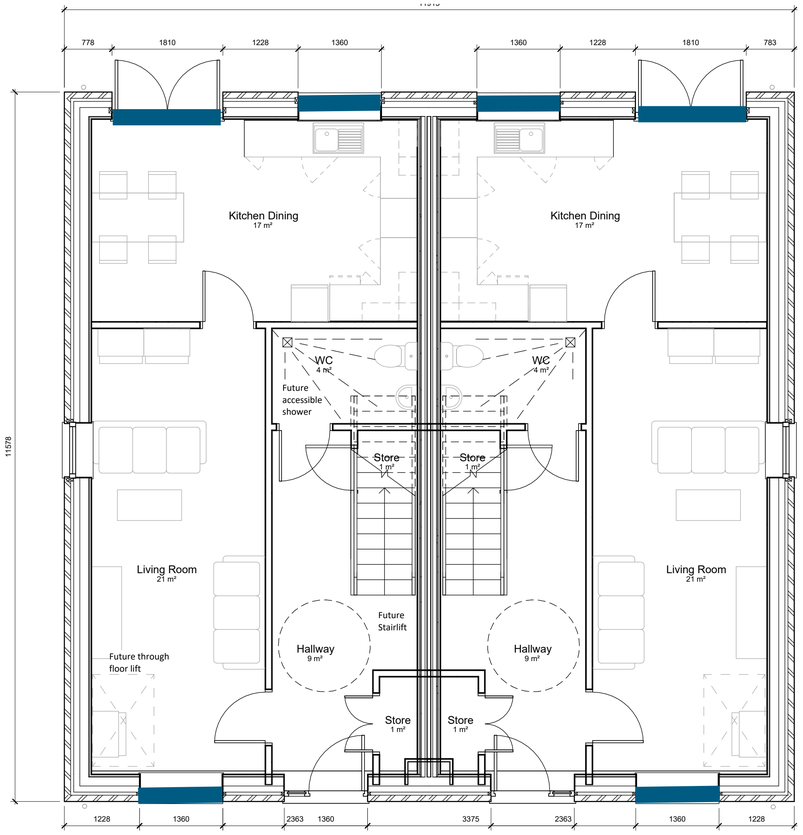
GL Hearn
member of WSP

GLAZING & VENTILATOR ACOUSTIC REQUIREMENTS FOR HABITABLE SPACES

A	Glazing:	≥ R_w+C_{tr} 25 dB
B	Glazing:	≥ R_w+C_{tr} 29 dB
C	Glazing:	≥ R_w+C_{tr} 34 dB

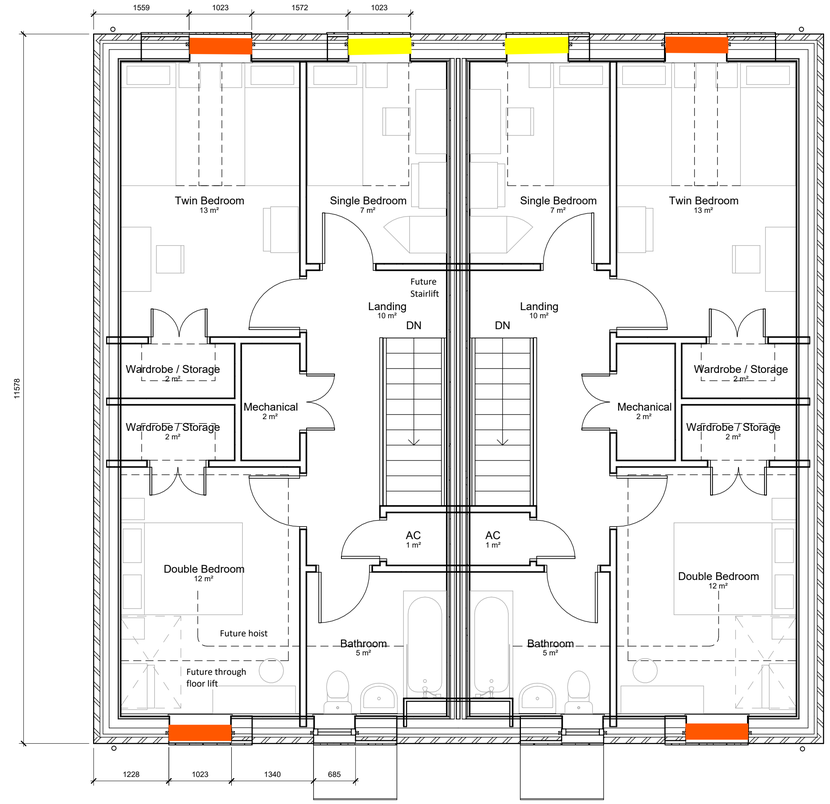
For non-habitable spaces (e.g. bathrooms), and all rooms on unmarked facades, standard thermal double glazing (R_w+C_{tr} 25 dB) is indicated to be sufficient

3 Bed Semi Detached

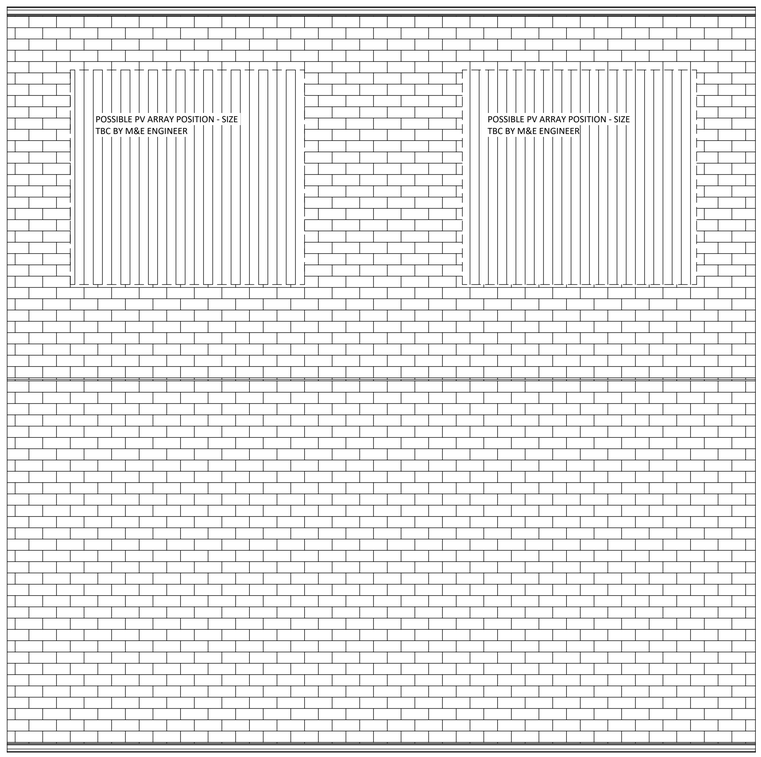


Designed to WDQR 2021 and AD Part M Category 2 - accessible and adaptable dwellings

Proposed Ground Floor - GA
1 : 50



Proposed First Floor - GA
1 : 50



Roof / Wall Plate
1 : 50

GL Hearn
member of WSP

GLAZING & VENTILATOR ACOUSTIC REQUIREMENTS FOR HABITABLE SPACES

A	Glazing:	≥ R_w+C_{tr} 25 dB
B	Glazing:	≥ R_w+C_{tr} 29 dB
C	Glazing:	≥ R_w+C_{tr} 34 dB

For non-habitable spaces (e.g. bathrooms), and all rooms on unmarked facades, standard thermal double glazing (R_w+C_{tr} 25 dB) is indicated to be sufficient

Apt Block 1- Ground & 1st Floor

Proposed Ground Floor - GA
1 : 50

Designed to WDQR 2021
Ground Floor designed to AD Part M Category 3 - Wheelchair user dwellings
First and Second Floor designed to AD Part M Category 2 - accessible and adaptable dwellings (no provision for hoists to bathrooms as the upper floor units cannot be wheelchair accessible)

Individual mechanical cupboards and meters for each unit located within the unit, with access to meters from corridor.

Equipment within and requirements for centralised plant spaces tbc by M&E Engineer and Fire Engineer.

GL Hearn
member of WSP

GLAZING & VENTILATOR ACOUSTIC REQUIREMENTS FOR HABITABLE SPACES

A	Glazing:	≥ R_w+C_{tr} 25 dB
B	Glazing:	≥ R_w+C_{tr} 29 dB
C	Glazing:	≥ R_w+C_{tr} 34 dB

For non-habitable spaces (e.g. bathrooms), and all rooms on unmarked facades, standard thermal double glazing (R_w+C_{tr} 25 dB) is indicated to be sufficient

Apt Block 1- 2nd Floor

Proposed Ground Floor - GA
1 : 50

Designed to WDQR 2021
Ground Floor designed to AD Part M Category 3 - Wheelchair user dwellings
First and Second Floor designed to AD Part M Category 2 - accessible and adaptable dwellings (no provision for hoists to bathrooms as the upper floor units cannot be wheelchair accessible)

Individual mechanical cupboards and meters for each unit located within the unit, with access to meters from corridor.

Equipment within and requirements for centralised plant spaces tbc by M&E Engineer and Fire Engineer.

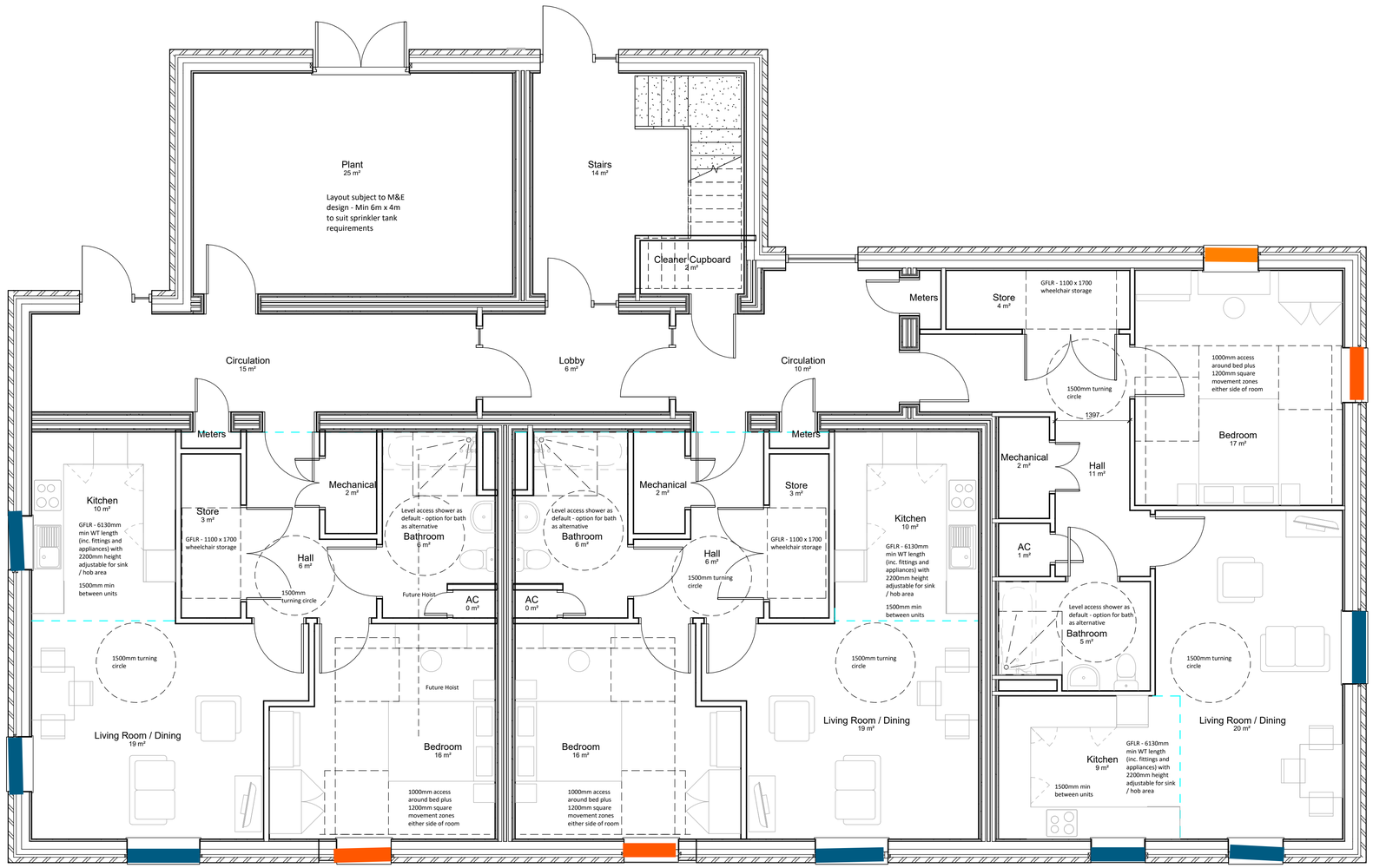
GL Hearn
member of WSP

GLAZING & VENTILATOR ACOUSTIC REQUIREMENTS FOR HABITABLE SPACES

A	Glazing:	≥ R_w+C_{tr} 25 dB
B	Glazing:	≥ R_w+C_{tr} 29 dB
C	Glazing:	≥ R_w+C_{tr} 34 dB

For non-habitable spaces (e.g. bathrooms), and all rooms on unmarked facades, standard thermal double glazing (R_w+C_{tr} 25 dB) is indicated to be sufficient

Apt Block 2 - Ground & 1st Floor



Proposed Ground Floor - GA

1 : 50

Designed to WDQR 2021

Ground Floor designed to AD Part M Category 3 - Wheelchair user dwellings
First and Second Floor designed to AD Part M Category 2 - accessible and adaptable dwellings (no provision for hoists to bathrooms as the upper floor units cannot be wheelchair accessible)

Individual mechanical cupboards and meters for each unit located within the unit, with access to meters from corridor.

Equipment within and requirements for centralised plant spaces tbc by M&E Engineer and Fire Engineer.

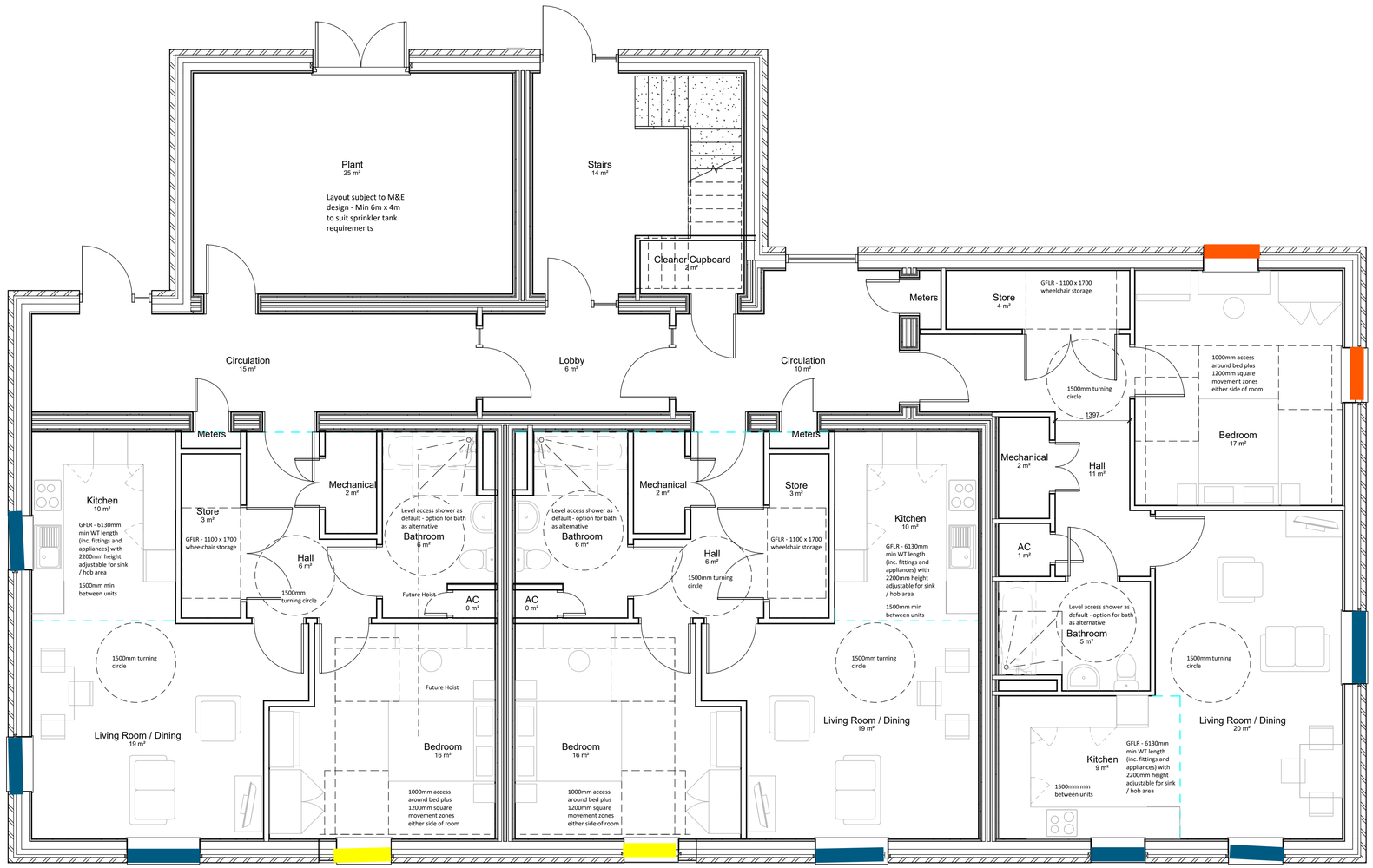
GL Hearn
member of WSP

GLAZING & VENTILATOR ACOUSTIC REQUIREMENTS FOR HABITABLE SPACES

A	Glazing:	≥ R_w+C_{tr} 25 dB
B	Glazing:	≥ R_w+C_{tr} 29 dB
C	Glazing:	≥ R_w+C_{tr} 34 dB

For non-habitable spaces (e.g. bathrooms), and all rooms on unmarked facades, standard thermal double glazing (R_w+C_{tr} 25 dB) is indicated to be sufficient

Apt Block 2 - 2nd Floor



Proposed Ground Floor - GA
1 : 50

Designed to WDQR 2021

Ground Floor designed to AD Part M Category 3 - Wheelchair user dwellings
First and Second Floor designed to AD Part M Category 2 - accessible and adaptable dwellings (no provision for hoists to bathrooms as the upper floor units cannot be wheelchair accessible)

Individual mechanical cupboards and meters for each unit located within the unit, with access to meters from corridor.

Equipment within and requirements for centralised plant spaces tbc by M&E Engineer and Fire Engineer.

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member of WSP

GLAZING & VENTILATOR ACOUSTIC REQUIREMENTS FOR HABITABLE SPACES

A	Glazing:	≥ R_w+C_{tr} 25 dB
B	Glazing:	≥ R_w+C_{tr} 29 dB
C	Glazing:	≥ R_w+C_{tr} 34 dB

For non-habitable spaces (e.g. bathrooms), and all rooms on unmarked facades, standard thermal double glazing (R_w+C_{tr} 25 dB) is indicated to be sufficient

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