sharps acoustics

Big Yellow, Alpha House, 24-27 Regis Road, Kentish Town

Assessment of noise impact from proposed self-storage facility and flexible office space

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Appendices

1.0 Introduction

1.1 Sharps Acoustics LLP (SAL) has been commissioned by .Big Yellow Self Storage Company Limited to provide an assessment of potential noise impacts from the use of the site at Alpha House, 24-27 Regis Road, NW5 3EQ for the following development:

> *'Redevelopment of the site and the construction of a self-storage facility (Use Class B8) and flexible office space (Use Class E(g)(i)), together with vehicle and cycle parking and landscaping.'*

1.2 This report provides details of relevant policy and guidance of this assessment, details of baseline survey work carried out and details of the assessment, recommended noise mitigation and conclusions.

1.3 The report also contains details of a BREEAM assessment for credits for Pol05 and Hea06 in Section 5.0.

2.0 Assessment Methodology and Criteria

National Planning Policy Framework (NPPF) (2021)

2.1 Government planning policy in relation to noise is contained in the National Planning Policy Framework (NPPF). The relevant paragraph from this (paragraph 185) states:

> *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> *a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
>
> *b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason …"*

2.2 The requirement to avoid significant impacts and to mitigate and reduce to a minimum other adverse effects was originally recommended in the Noise Policy Statement for England (NPSE).

Noise Policy Statement for England (NPSE)

2.3 The 2010 DEFRA publication *'Noise Policy Statement for England'* (NPSE) sets out policy advice applicable to the assessment and management of noise, including environmental noise. The NPSE states three policy aims, which are:

- *"avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life."*

2.4 All three of these aims are to be considered in the context of Government policy on sustainable development.

2.5 The first two aims require that no significant adverse impact should occur and, where noise falls between the lowest observable adverse effect level (LOAEL) and the significant observed adverse effect level (SOAEL), then according to the NPSE:

> *"… all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur."*

2.6 The NPSE notes that, *"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times".*

2.7 The NPSE describes the Government's "guiding principles of sustainable development", listing the following as underpinning their sustainable development strategy:

- ensuring a strong, healthy and just society;
- using sound science responsibly;
- living within environmental limits;
- achieving a sustainable economy; and
- promoting good governance.

2.8 Thus, noise should not be considered in isolation; the economic and social benefit of a proposed development should be considered alongside the potential adverse effects from noise.

Planning Practice Guidance on Noise (PPG: Noise)

2.9 The Government first published their Planning Practice Guidance on noise (PPG) in March 2014, with the most recent version issued in July 2021. The PPG provides guidance on the interpretation and implementation of planning policy, as contained in the NPPF and the NPSE.

2.10 The use of the lowest observed adverse effect level (LOAEL) and significant observed adverse effect level (SOAEL) for the assessment of noise impacts is reinforced in the PPG, which seeks to define human perception at these effect levels.

2.11 The PPG describes the LOAEL as the level at which *"noise can be heard and causes small changes in behaviour, attitude or other physiological response"* and it is *"present and intrusive"*. Below this level, the PPG describes the NOAEL, or No Observed Adverse Effect Level, which it notes *"can be heard but does not cause any change in behaviour, attitude or other physiological response"* as the noise is *"present but not intrusive"*. The NOAEL is not included in the NPSE and is introduced in the PPG. Below the NOAEL, the PPG describes the NOEL, or No Observed Effect Level, where noise is *"not present"* and has *"no effect"*.

2.12 The PPG describes the LOAEL as the:

> *"… boundary above which the noise starts to cause small changes in behaviour and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise)."*

2.13 Significant observable adverse effects, i.e. those occurring at or above the SOAEL, are described as *"present and disruptive"* and the PPG states that above the SOAEL:

> *"… the noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is predicted to be above this level the planning process should be used to avoid this effect occurring, for example through the choice of sites at the plan-making stage, or by use of appropriate mitigation such as by altering the design and layout. While such decisions must be made taking account of the economic and social benefit of the activity causing or affected by the noise, it is undesirable for such exposure to be caused."*

Local Planning Policy

2.14 Relevant local planning policy is contained in London Borough of Camden's (LBC) Local Plan 2017. Policy A1 of that plan, titled, "Managing the impact of development" states:

> *The Council will seek to protect the quality of life of occupiers and neighbours. We will grant permission for development unless this causes unacceptable harm to amenity.*
>
> *We will … seek to ensure that the amenity of communities, occupiers and neighbours is protected … require mitigation measures where necessary …*
>
> *The factors we will consider include … noise and vibration levels"*

2.15 Additionally, Policy A4, "Noise and vibration" states:

> *"The Council will seek to ensure that noise and vibration is controlled and managed.*
>
> *Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:*
>
> *a) development likely to generate unacceptable noise and vibration impacts; or*
>
> *b) development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.*
>
> *We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise*

the impact on local amenity from deliveries and from the demolition and construction phases of development."

2.16 The "thresholds" referred to in Policy A3, which are found in Appendix 3 of the Local Plan are described in that appendix as "design criterion" [sic]. The Table containing these criteria is reproduced below:

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

Discussion of local plan policy "thresholds / design criteria"

2.17 All noise and planning policy and relevant guidance directs assessors to set levels for LOAEL and SOAEL which are relevant to the circumstances being considered. The NPSE specifically states that it is not possible to set fixed thresholds to represent a significant adverse effect (see 2.6 above).

2.18 The relevant British Standard (BS4142 - discussed in greater detail below) requires that the level at which a noise could be considered to have a significant effect is considered in context.

2.19 PPG- Noise recommends, in relation to local planning policies, that:

"Plans may include specific standards to apply to various forms of proposed development and locations in their area. Care should be taken, however, to avoid these being applied as rigid thresholds, as specific circumstances may justify some variation being allowed."

2.20 The Local Plan Policy states that assessments *"should have regard to"* the levels in Appendix 3. It does not direct that they should be rigidly adhered to.

2.21 For the reasons given in 2.17 to 2.20 above, it is SAL's view that the levels in Appendix 3 should not be rigidly imposed as thresholds and that, where there is disagreement between the relevant British Standard and the design criteria in Appendix 3, the assessment of noise according to the relevant standard would provide a more reliable assessment of true outcome. Reliance on this standard (BS4142) will, in any event, ensure that the local plan policy that there would not be *"unacceptable noise".*

Derivation of suitable assessment methodology and criteria

2.22 It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, as follows:

- The effect may be determined by reference to guideline noise values. British Standard (BS) 8233:2014 and a number of published documents from the World Health Organisation (WHO) (such as "*Guidelines for Community Noise"*) contain such guidelines.

- Alternatively, the impact may be determined by considering the change in noise level that would result from the proposal, in an appropriate noise index for the characteristic of the noise in question. There are various criteria linking change in noise level to effect. This is the method that is suited to, for example, the assessment of noise from road traffic because it is capable of displaying impact to all properties adjacent to a road link irrespective of their distance from the road.

- Another method is described within BS 4142, the current version of which is BS 4142:2014+A1:2019, 'Methods for rating and assessing industrial and commercial sound', to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the standard is intended to assess are sounds from industrial and manufacturing processes, sound from fixed plant installations, sound from loading and unloading of goods at industrial and/or commercial premises and the sound from mobile plant and vehicles, such as forklift, train or ship movements.

2.23 In order to assess noise from the proposed redevelopment of the site for E(g) and B8 uses, the approach set out in BS4142 is most appropriate, as the noise sources present would be similar to those listed within the scope of that standard. Paragraphs 2.24 to 2.30 below explain the key features of this standard in more detail.

British Standard BS 4142: 2014 + A1:2019

2.24 British Standard (BS) 4142: 2014+A1: 2019 *'Methods for rating and assessing industrial and commercial sound'* (BS4142) describes a method for rating and assessing sound of an industrial or commercial nature, which includes, in Section 1.1 of the standard:

> *"sound from industrial and manufacturing processes;*
>
> *sound from fixed installations which comprise mechanical and electrical plant and equipment;*
>
> *sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and*
>
> *sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site."*

2.25 The industrial or commercial sound is assessed outside an existing or proposed dwelling or premises used for residential purposes. BS4142 does not consider internal spaces in terms of its numerical assessment.

2.26 The procedure contained in BS4142 begins by quantifying the "specific sound level", which is the measured or predicted level of sound from the source in question over a one-hour period for the daytime or a 15-minute period for the night-time. Daytime and night-time are not defined in BS4142, but the standard notes that they are typically taken to be 0700 to 2300 hours for daytime, and 2300 to 0700 hours for night-time.

2.27 BS4142 sets out a number of methods of determining the specific sound level including, for situations where the specific sound source does not yet exist, the ability to estimate it, stating, at Section 7.3.6:

> *"Determine the specific sound level by calculation alone if measurement is not practicable, for example if the source is not yet in operation. In such cases, report the method of calculation in detail and give the reason for using it."*

2.28 The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for potentially tonal, impulsive or intermittent elements. The standard sets out subjective and objective methods for determining the presence of tones or impulsive elements but notes that the objective methods should be used where the subjective method is not sufficient. For situations where the specific sound source does not yet exist, the objective methods cannot be used.

2.29 The assessment outcome results from a comparison of the rating level with the background sound level (which is determined by the assessment of typical background noise levels by survey). The standard states, in Section 11:

> *"a) Typically, the greater this difference, the greater the magnitude of the impact.*
>
> *b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
>
> *c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
>
> *d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*
>
> *NOTE 2 Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*

2.30 Finally, BS4142 requires that the level difference is considered in the context in which it is found. Contextual considerations include:

- Absolute level of sound. If the existing level is particularly high or low, then this can affect the significance of a particular difference (assessed as described in 2.21 above).

- The character and level of the residual sound compared to the character and level of the specific sound.

- Sensitivity of receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions such as:

    - facade insulation treatment;

    - ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and

    - acoustic screening.

3.0 Noise Survey

3.1 An environmental noise survey was carried out between 1200 hours on 10th March 2022 and 1115 hours on 16th March 2022. Measurements were taken continuously over day and night periods. The microphone used was fitted with an integrated wet weather kit and wind-shield in a free field location in the location shown in Figure A1 in Appendix A at a height of approximately 3 metres above ground level.

3.2 All measurements were made in 15 minute periods using a Norsonic 140 sound level meter (a Type 1 sound level meter) which was field checked for calibration before and after the measurements. No significant drift was noted.

3.3 Meteorological conditions were generally suitable for the measurement of environmental noise.

3.4 For information purposes it can be noted:

- Measurements of sound level were all made with the A-weighting, which is a filter applied to the sound level meter to simulate the frequency response of the human ear, which is more sensitive to high frequency sound than low.

- L_{Aeq} is the equivalent continuous noise level which is a method of averaging the varying noise level over the time period into a single figure value. The L_{Aeq} has the same sound energy as the fluctuating level over that period. The L_{Aeq} is also known as the "ambient level" and in BS4142 the L_{Aeq} in the absence of the proposed development sound is known as the "residual level".

- L_{Amax} is the highest level within the measurement period.

- L_{A90} is the noise level exceeded for 90% of the time and is referred to as the background noise level.

3.5 Survey results are shown graphically in Figure B1 in Appendix B and summarised in Table 3.1 below.

Table 3.1: Summary of noise survey results

Period	Measured Parameter (T=16hour for day and 8 hours for night)		
	$L_{Aeq,T}$, dB	Typical / representative L_{A90} dB	L_{Amax}, dB
Day 0700-2300 hours	60	48	-
Night 2300-0700 hours	53	43	88
Part night (0500 to 0700 hours)	56	45	83

4.0 Assessment

Predicted Specific Levels from Site Operations

4.1 Noise sources to be considered from site activities are vehicle movements, movement of goods, doors, voices and any other noise sources resulting from the use, including servicing. Figures A2 to A5 in Appendix A show the proposed site layout.

4.2 Noise will occur from customers using the Big Yellow forecourt. In 2007, surveys of noise levels and activities at eight Big Yellow stores was undertaken to establish the frequency of occurrence of different activities and their noise levels at a reference distance. Recently, in March 2022, a comprehensive two week long study was undertaken at the Big Yellow site in Fulham to update this data in the light of shifting patterns of use over the previous 14 years. The results of this survey work have been reported in a stand alone report, the body of which is attached as Appendix C. (Note: two of the appendices of the forecourt noise study report (Appendices B and C) are extremely long (86 pages of data) and have therefore been omitted from Appendix C of this report. This additional data can be made available on request. The findings of the Fulham forecourt noise study are summarised below.

4.3 Noise from the Big Yellow forecourt will be generated from two main sources:

- Vehicles arriving and leaving site, manoeuvring and parking; and
- Loading and unloading activities.

4.4 Generally Big Yellow self-storage facilities are staffed continuously between 08:00 and 18:00 hours and the majority of custom occurs during that period. However, some customers may wish to access the site outside of these hours, and this is permitted between 05:00 and 23:00 hours. A small percentage of customers currently make use of these extended hours.

4.5 Activities associated with a self-storage site such as this can be grouped into four categories for the purposes of a noise assessment:

- Cars /motorbikes / small vans: enquiries (no goods) or light loads only (carried by hand)
- Cars /motorbikes / small vans: with heavier loads using trolley

- Larger vehicles with no goods or light loads only (carried by hand)
- Larger vehicles with heavier / more bulky loads

4.6 The proportion of the total number of each of these activities at a store each day and the single event levels from each activity at reference distance 10m has been found to be as shown in Table 4.1 below.

Table 4.1: Sound source data for Big Yellow forecourt areas

Event category	Percentage of total	L_{AE}, dB
Cars /motorbikes / small vans: enquiries (no goods) or light loads only	43%	71
Cars /motorbikes / small vans: with heavier loads using trolley	22%	80
Larger vehicles with no goods or light loads only	16%	73
Larger vehicles with heavier / more bulky loads	19%	83

4.7 The highest L_{Amax} level which occurs from any activity at a reference distance of 10m was found to be 85dB, L_{Amax}.

4.8 Based on an estimate of the total numbers of vehicles likely to use the site provided by Rappor, the there would be 69 vehicles using the site per day. If it is assumed that all of the noise from these vehicle movements and loading / unloading were to take place in the busy 10 hour period between 0800 and 1800 hours (which would slightly over estimate the hourly level, as some of the activity takes place outside of this period, the 10-hourly noise from this site at a distance of 10 metres from the sources can be predicted using the relationship:

$$L_{Aeq,\,T} = L_{AE} + 10 \log N - 10 \log t$$

Where:

'T' is the time period of interest, in this case the busiest 10 hours of the day;

't' is the number of seconds in time T: in 10 hours this would be 36000s;

'N' is the number of events to occur in time T, and

'L_{AE}' is the single event level (at 10 metres): the amount of noise caused by an event, compressed into one second.

4.9 The resultant daytime ambient noise levels, $L_{Aeq,10hour}$ from each activity type during the busiest period of the day at 10 metres are shown in Table 4.2 below.

Table 4.2 Predicted noise levels from different activities on site at 10m

Vehicle Type	Noise level at 10 metres from the source, dB		
	L_{AE}	N	$L_{Aeq, 10hour}$
Cars /motorbikes / small vans: enquiries (no goods) or light loads only	71	30	40
Cars /motorbikes / small vans: with heavier loads using trolley	80	15	46
Larger vehicles with no goods or light loads only	73	11	38
Larger vehicles with heavier / more bulky loads	83	13	49

4.10 Using the data described in Table 4.2 above, adding this together and correcting for distance, noise levels at the nearest noise sensitive premises which are approximately 30m from the loading bays would be 42dB, $L_{Aeq,10h}$. The noise level during a single hour within this period would be the same: 42dB, $L_{Aeq,1h}$, assuming no reduction in level between source and receptor due to screening. This is the specific level, according to BS4142 terminology.

4.11 At night, the busiest 15 minutes should be considered, according to BS4142. It is assumed, for the purposes of a robust assessment, that in the busiest 15 minutes at night (between 0500 and 0700 hours) there could be a large vehicle with heavier goods loading throughout that period. This would result in an overall noise level of 41dB, $L_{Aeq,15min}$ and 75dB, L_{Amax}.

Rating Level

4.12 To convert these specific levels to rating levels, a character penalty may be added, where applicable. Character corrections (also known as penalties) may be added if the specific sound has distinctive characteristics which might increase the significance of impact over that expected from a sound with the same level but an anonymous character or which is masked by the residual sounds present.

4.13 To do this, the assessor must consider subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which any acoustically distinguishing characteristics might attract attention. Corrections can be added where there is tonality, impulsivity or intermittency present or, if none of these occur but the sound contains some other characteristic which is distinctive against the residual acoustic environment.

4.14 In this case, comparing levels in Table 3.1 and the predicted levels in 4.10 and 4.11 above, the highest specific levels predicted at any nearby residential receptor would be well below the residual (ambient) and background levels during both the day and the part of the night when the site would potentially be used (0500 to 0700 hours). It is likely that any acoustic features would be effectively masked by the

residual sounds in the area for the whole time that the site may be active. The character of the residual sound is mainly local road traffic noise.

4.15 In this instance, it would not be appropriate to add a character correction to the specific level to arrive at a rating level; the rating level would therefore be the same as the specific level.

Differences Between Rating and Background Levels

4.16 The predicted differences between rating and background levels for those receptors adjacent to the site which are predicted to experience the highest levels of specific sounds would therefore be as shown in Table 4.3 below.

Table 4.3: Predicted rating levels, background levels and level differences

Period	Rating level, L_{Ar}, dB	Background level, L_{A90}, dB	Difference between rating and background level, dB
Day (0700 to 2300 hours)	42	48	-6
Night (0500-0700)	42	45	-3

4.17 All rating levels would be below the existing background levels and this indicates that there would be a low impact, dependent upon context.

Context

4.18 As discussed in 2.30 above, in general, 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); a difference of around +5dB is likely to be an indication of an adverse impact and a level difference of +10dB indicates a significant adverse impact. However, these values depend on the context in which they occur. Context must be considered, as set out in guidance in Clause 11 of BS4142.

4.19 The site and surroundings currently experience a mixture of road traffic, commercial, industrial and other sounds. The ambient (residual) levels are neither particularly high nor particularly low, so this has a neutral contextual effect when considering the difference between rating level and background level.

4.20 The predicted rating noise levels at all noise sensitive receptors would be below typical background noise levels at all times when the site may be in use (during busy periods) and this is indicative of a noise which would not result in an adverse effect, when considered in context.

4.21 When considered against the Council's design criteria / thresholds, the predicted levels would be at the lower end of the range of "between LOAEL and SOAEL". As discussed in Section 2 above, the assessment using BS4142 should take precedence where there is a difference between local authority criteria and that standard, as the standard allows a detailed and reliable assessment, which takes account of the context in which the noise occurs; is a nationally adopted and routinely applied "industry standard"; and

has been authored and peer reviewed by a team of experts whereas the local authority thresholds do not and are not.

4.22 It is therefore concluded that the noise from the site would be below the LOAEL at all times and that no specific measures are required to control noise in this instance.

Noise from mechanical services / plant noise

4.23 The exact nature and location of any plant, and its associated noise characteristics are yet to be determined, so it would be appropriate to impose a planning condition to control noise output from the plant. Accordingly, the following condition is recommended:

> *"The rating level of noise emitted by all fixed plant on the site shall not exceed 48dB at the boundary with any noise sensitive premises between 07:00 and 23:00 and 43dB between 23:00 and 07:00 hours. The measurement and assessment shall be made according to BS 4142:2014+A1."*

4.24 Based on knowledge of mechanical services plant associated with similar sites and the distances and screening at this site the noise levels required by such a condition should be achievable.

4.25 Note that, if the BREEAM credit is sought for Pol05, as discussed below, the target levels would be 5dB below those prescribed in 4.23 above.

Conclusions

4.26 The predicted levels from site operations would result in no adverse effects and therefore would be below the LOAEL at all times. No further noise mitigation measures are required and there would be, by definition, no observed adverse noise effects resulting from the proposed operations at the site.

4.27 Mechanical services and any other external plant can be controlled by condition to ensure that there are no adverse noise effects from its operation.

5.0 BREEAM Assessment

Pol 05 compliance

5.1 According to the BREEAM technical manual for non-domestic buildings (UK) 2018:1, one credit can be awarded where either of the following two criteria apply:

1 There are no noise-sensitive areas within the assessed building or within 800 m radius of the assessed site.

OR

2 Where there are noise-sensitive areas within the assessed building or noise-sensitive areas within 800 m radius of the assessed site, a noise impact assessment compliant with BS 4142:2014 is commissioned. Noise levels must be measured or determined for:

2.a Existing background noise levels:

2.a.i at the nearest or most exposed noise-sensitive development to the proposed assessed site

2.a.ii including existing plant on a building, where the assessed development is an extension to the building

2.b Noise rating level from the assessed building.

3 The noise impact assessment must be carried out by a suitably qualified acoustic consultant.

4 The noise level from the assessed building, as measured in the locality of the nearest or most exposed noise sensitive development, must be at least 5dB lower than the background noise throughout the day and night.

5 If the noise sources from the assessed building are greater than the levels described in criterion 4, measures have been installed to attenuate the noise at its source to a level where it will comply with the criterion.

Pol05 Assessment

5.2 There are noise sensitive premises within 800 metres: the nearest residential properties are situated on the southern side of Regis Road.

5.3 The guidance in the BREEAM technical manual suggests that, when assessing compliance at the design stage, "compliance can be demonstrated through the use of acousticians' calculations or by scale model investigations."

5.4 Since there are dwellings near to the closest point (approximately 20 metres) at which mechanical services might theoretically be sited, the second approach has been taken and since plant has not yet been selected, compliance has been considered by calculation.

5.5 To achieve the BREEAM credit, all plant from the development would need to be 5dB below the background noise level at the nearest noise sensitive premises at all times. The typical day time background level (as discussed in Section 3.0 above) was 48dB, L_{A90} and at night it was 43dB, L_{A90}.

5.6 The credits can therefore be awarded if noise from all plant meets the following criteria at the closest noise sensitive receptors:

Day 43dB

Night 38dB

5.7 Since plant and equipment to be used at the site is not yet known, it is necessary to calculate a limit level for the plant at the site boundary and then to ensure compliance with this when selecting the units to be used. In order to do this, we can assume a worst case that all plant is placed one metre from the building façade closest to the nearest noise sensitive premises and to calculate how much sound would be lost due to propagation over the 20 metres between the boundary and the receptors. The level required at the boundary from all plant and equipment operating together would therefore be:

Level at 1 metre (from the plant) = Level at 20 metres + 20 log (20/1) dB

= 38 + 26 = 64dB, night

= 43 + 26 = 69dB, day.

5.8 The proposals are likely to require a few small air conditioning condensers and perhaps one of two air handling units or similar noise producing plant items. The proposed plant may be screened to an extent by the buildings themselves or could, if required, be sited more remotely from the nearest dwellings. The realistic worst case aggregate levels from all plant likely to be installed at the site would be likely to be below the values which would need to be met in order to achieve the BREEAM target levels at the closest noise sensitive receptors.

5.9 It is therefore concluded that if sited in the worst possible location on site, the aggregate level of all plant to be operated on site would need to be below 64dB at 1m during the night and below 69dB at 1m during the day. The likelihood of the plant installed exceeding these levels is low and since there is scope to site the mechanical services away from the worst case location and to take advantage of screening by buildings if required, no further assessment is needed prior to operation.

Hea 05 compliance

5.10 BREEAM 2018 New Construction Section Hea 05 'Acoustic Performance' provides guidance and criteria for assessing the acoustic performance of industrial-type developments (including storage facilities). Based on this guidance, the following design criteria have been identified in this instance.

First Credit- Sound Insulation

5.11 The BREEAM 2018 New Construction manual states the following for internal sound insulation between rooms:

"The sound insulation between rooms and other occupied areas complies with the performance criteria given in Section 7 of BS 8233:2014. Alternatively, propose performance standard based on demonstrable best practice."

5.12 BREEAM 2018 also refers to 'Educational spaces' where higher levels of sound insulation are required. In this case there are no rooms considered 'Educational spaces'.

Second Credit - Internal Noise Levels

5.13 The relevant guidance in the BREEAM 2018 New Construction manual states that for 'all room functions':

"Achieve indoor ambient noise levels that comply with the design ranges given section 7 of BS 8233:2014"

5.14 Table 6 within Section 7 of BS8233:2014 provides internal ambient noise level design range criteria for typical noise levels in non-domestic buildings.

Reverberation

5.15 The relevant guidance in the BREEAM 2018 New Construction manual states that, in terms of 'room acoustics', the design should "Achieve the requirements relating to sound absorption and reverberation times, where applicable, set out in Section 7 of BS 8233:2014". Section 7 of BS 8233:2014 indicates that this is only a critical consideration for rooms intended for speech (e.g. meeting rooms). In this case there are no rooms used for speech or which are otherwise acoustically critical in terms of room acoustics.

Commissioning Tests

5.16 The BREEAM 2018 manual states that the following is required for 'all room functions':

"A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the acoustic testing and measurement procedures outlined in the Methodology section of this BREEAM issue."

Competence

5.17 This assessment has been written by Clive Bentley, who is a Member of the Institute of Acoustics, a Member of the Chartered Institute of Environmental Health, a Member of the Institute of Environmental Science and is both a Chartered Environmentalist and a Chartered Scientist. He has been working in the field of Environmental Protection continuously since 1992 and has specialised in acoustics since 1995.

Indoor Ambient Noise Levels

5.18 The reception area and first floor office spaces are potentially sensitive to noise. To accurately assess the indoor ambient noise level one must consider both the noise levels incident upon the building façades and any mechanical ventilation serving those spaces.

Building envelope design

5.19 Criteria in BS8233:2014 most relevant to the offices gives a design range of between 35-45dB $L_{Aeq, T}$. The offices feature relatively large windows in close proximity to the noise survey location (shown in Figure A1 in Appendix A). From Table 3.1 above, daytime noise levels of 60dB $L_{Aeq, 16h}$ would be incident

on this façade and so the windows would need to achieve a sound insulation performance of between 15 and 25dB, R_W+C_{tr}. Any good quality double glazing is capable of achieving this performance comfortably. Specific acoustic requirements for the glazed elements are therefore not required providing any standard double glazed system or better is installed.

Mechanical ventilation

5.20 Mechanical ventilation is commonly designed to a Noise Rating (NR) limit in terms of acoustics. BS8233:2014 stipulates that an approximation to convert a dB(A) level into an NR level can be used, following this formula NR = dB(A) – 6. This method has been adopted to provide limiting NR levels in the previously discussed acoustically sensitive space so that mechanical ventilation and noise break-in combined does not exceed the recommend ambient noise levels in BS8233:2014.

5.21 Mechanical ventilation should be designed so that the following NR levels are not exceeded by the combined mechanical ventilation noise serving their associated rooms:

Reception - NR49

Office - NR34

5.22 At this stage in the design a detailed M&E design schedule has not yet been issued for this site, this NR limit should be provided to the appointed M&E consultant, evidence to show that these limits are met with the intended design should be issued as confirmation alongside this assessment.

Sound Insulation

5.23 BREEAM 2018 requires compliance with guidance criteria set out in Section 7 of BS8233 2014. For sound insulation, Table 3 - "On-Site Sound Insulation Matrix" can be used to identify the acoustic requirements based on the established activity noise of the source room, sensitivity of the receiving room and overriding privacy requirement.

5.24 It is assumed that the reception area would require a low level of privacy from the storage area. Within Big Yellow Self Storage warehouses, noise levels are generally low, so, following Table 3 of BS8233:2014 the relevant sound insulation performance requirements for partition walls between the storage units within the warehouse and the reception area would be 37 $D_{nT,w}$.

5.25 In relation to the proposed offices, a stringent privacy requirement within offices are unlikely in a development of this type, following Table 3 of BS8233:2014 the following acoustically relevant sound insulation performance requirements for partition walls between adjacent occupied spaces have been identified:

Office to Office or similar = 37 dB $D_{nT,w}$

Storage units/warehouse to Office = 42 $D_{nT,w}$

5.26 Currently, specific internal wall details are unknown. Once wall types have been agreed these should be reviewed and confirmed as compliant against the above criteria.

5.27 The above sound insulation performances are based on a good level of workmanship being maintained along all flanking paths and penetrations so that the overall in-situ wall achieves the above criteria.

Reverberation Time

5.28 There are no rooms used for speech or performance, including public speaking within this scheme. Previous versions of BREEAM Hea05 stipulated that in the absence of rooms used for speech or performance this credit could automatically be awarded. BREEAM 2018 New Construction no longer specifically references that this is still the case; logically however we SAL assumes that this is still acceptable. This will need to be confirmed by the BREEAM assessor.

BREEAM conclusions

5.29 Based on the above, credits can be awarded for Pol05 and Hea05, in this instance.

Appendix A: Plans

Figure A1: Aerial view showing noise monitoring location

Figure A2: Proposed site layout – ground floor

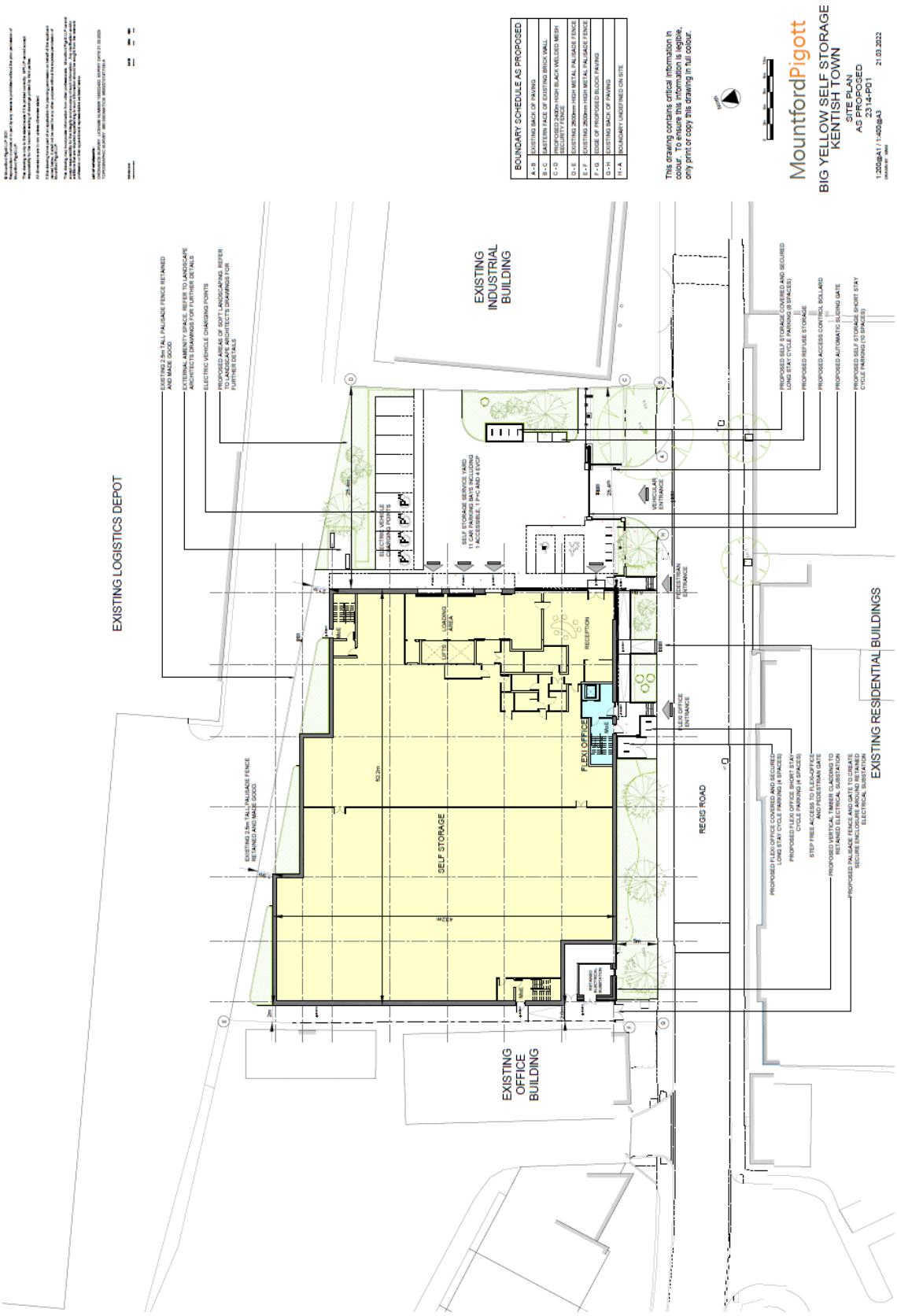


Figure A3: Proposed layout – first floor

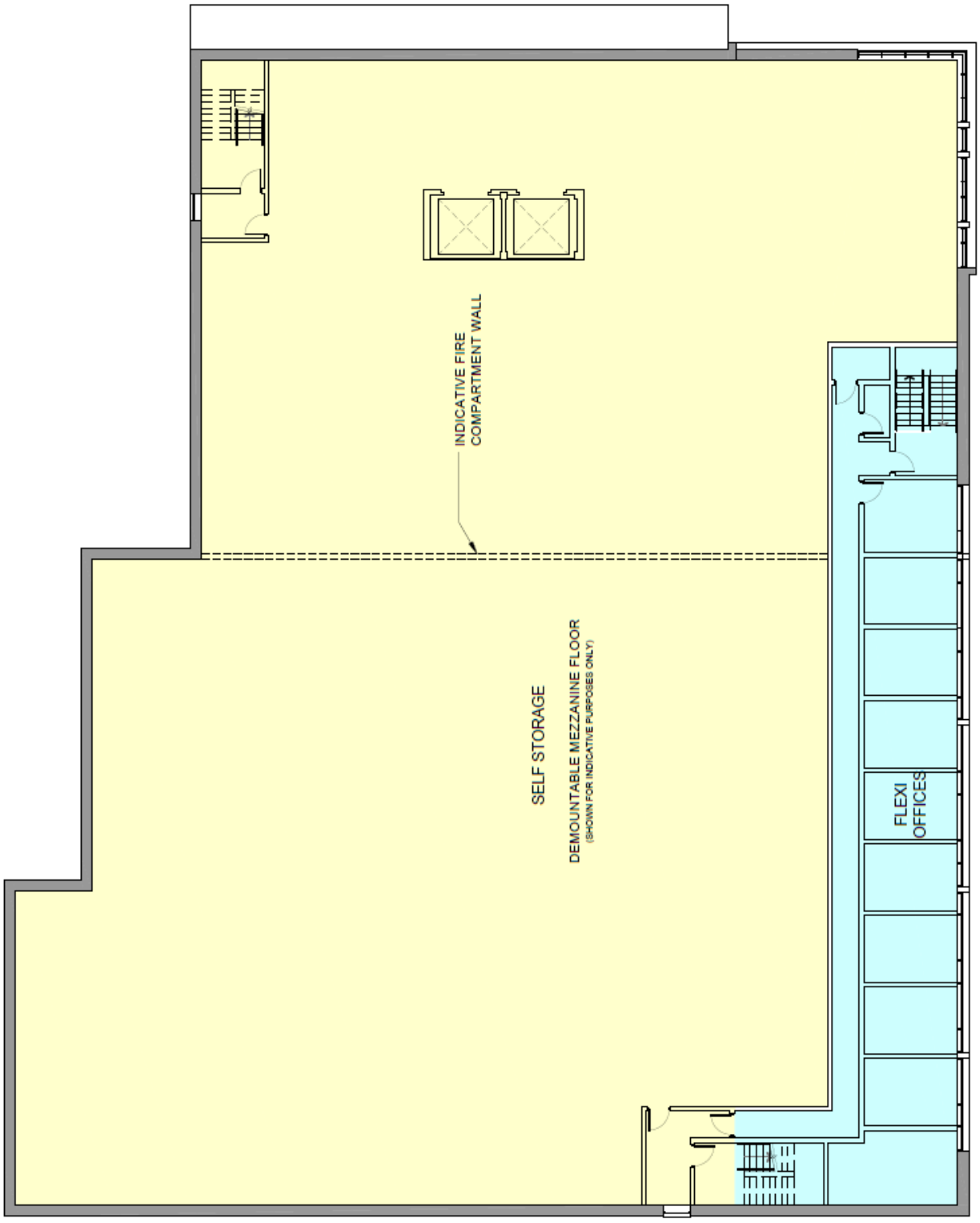


Figure A4: Proposed layout – second floor

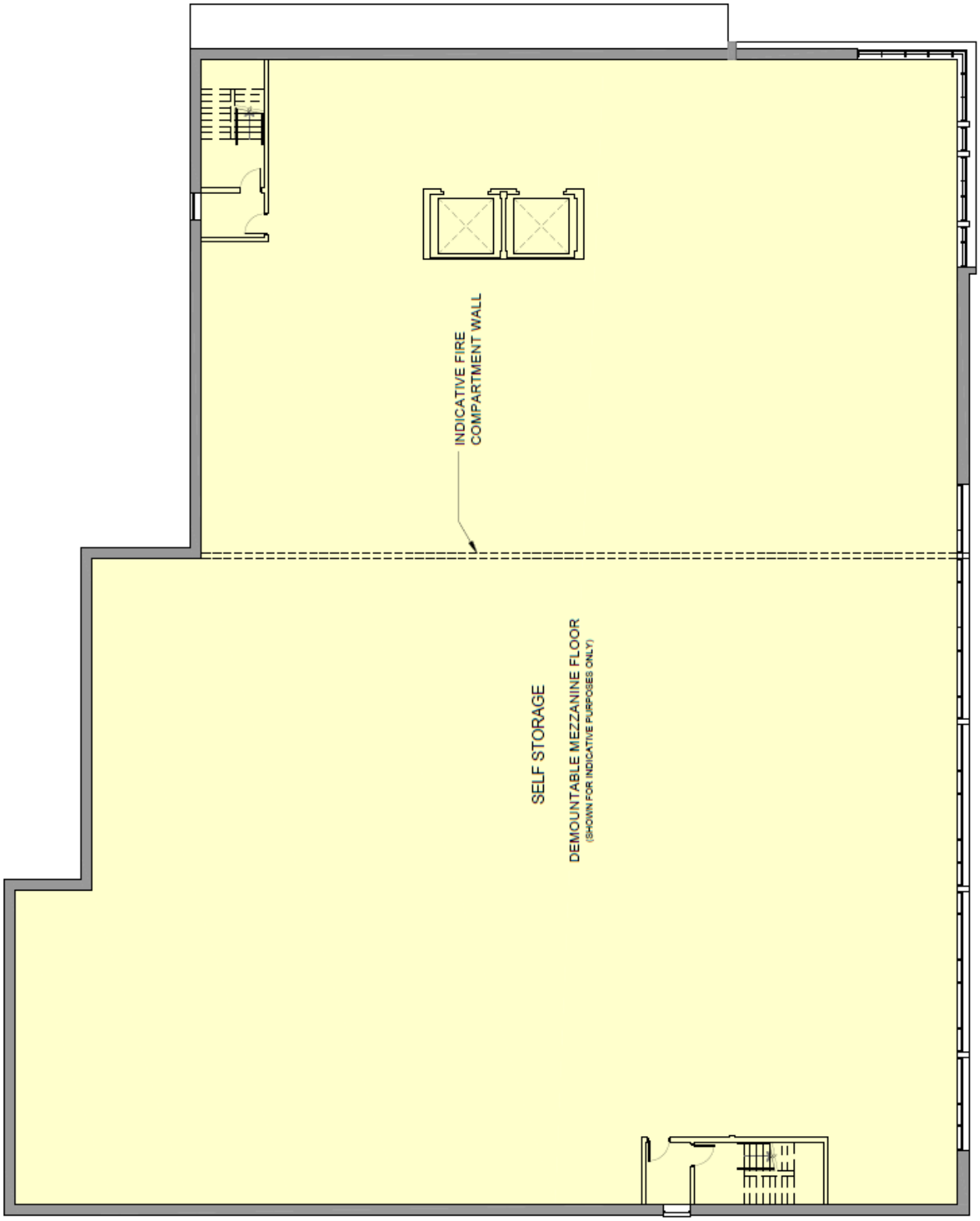
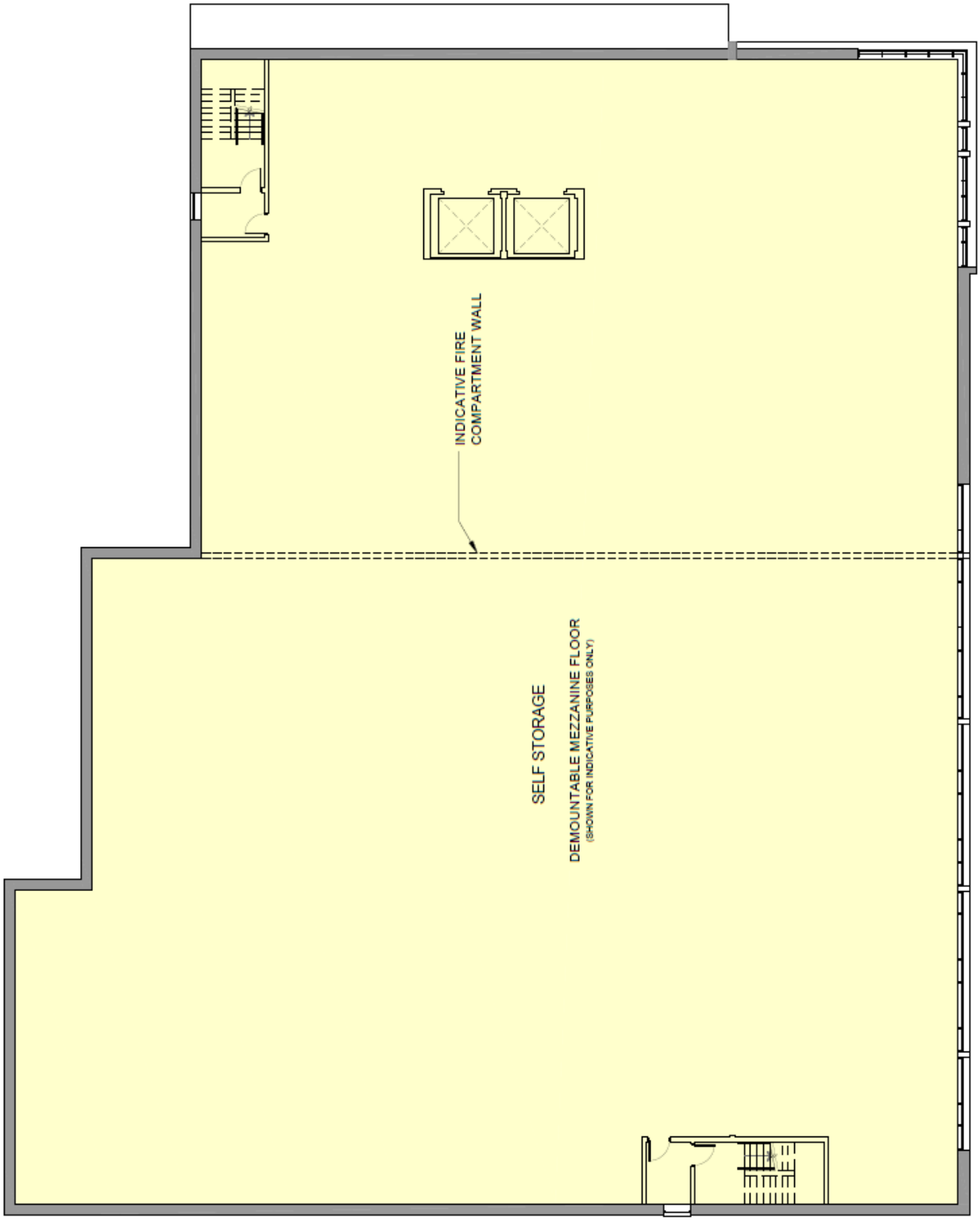
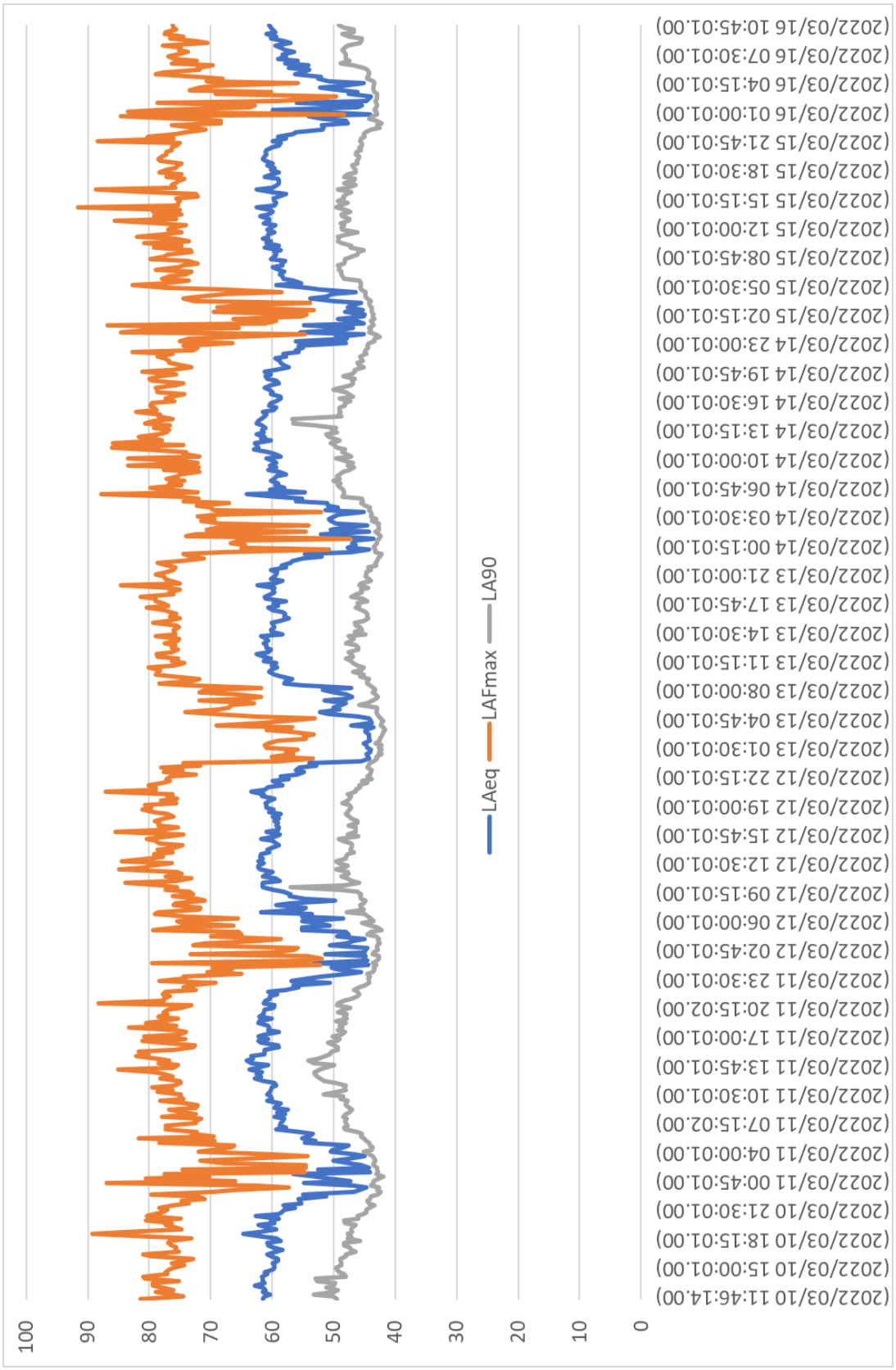


Figure A5: Proposed layout – third floor



Appendix B: Noise Survey Results

Figure B1: Noise survey results



Appendix C: Big Yellow forecourt noise study

sharps acoustics

Big Yellow, Fulham

Assessment of forecourt noise

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13th May 2022

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Appendices

1.0 Introduction

1.1 Sharps Acoustics LLP (SAL) has been commissioned by .Big Yellow Self Storage Company Limited to provide a detailed assessment of forecourt noise at the Big Yellow store at 71 Townmead Rd, London SW6 2ST (Fulham) to establish an up to date source of data for future noise assessments.

1.2 A similar survey was carried out previously in 2006 to determine the different types of activities present on the forecourt and the noise levels produced by each. However, since the patterns of use of Big Yellow's stores has changed to a degree due to the different way that businesses operate in 2022, where more goods are bought now online and there is a greater demand for commercial storage than there was in 2006, it was considered prudent to update the data. The Fulham store was chosen as it is the largest in the UK and therefore provides the largest data set when surveyed over a particular period. Operations at Fulham are also understood to be representative of the patterns of use at other, smaller stores. The results can therefore be scaled for other stores, based on their relative floor areas, compared with the Fulham store.

1.3 For a two week period in March 2022, both noise levels and activities were recorded (using two noise meters and two cameras). The two sets of data were then analysed and combined to provide an overview of noise levels from different activities, with other, offsite sound sources excluded from measurements.

1.4 This report provides details of the survey carried out, an analysis of the results and a summary of the noise levels by different types of noise event. It is intended that the findings from this study be used for future noise assessment reports at other stores, to explain how noise source assumptions and levels have been derived.

1.5 Section 2.0 provides details of the survey methodology. Section 3.0 presents survey results. Section 4.0 provides a summary of findings.

2.0 Survey Details

2.1 The noise and camera survey was carried out between 14th and 28th March 2022. Measurements and recordings were taken continuously over day and night periods. Microphones were fitted with integrated wet weather kits and wind-shields. Camera and noise measurement locations, were as shown in Figure A1 in Appendix A. The microphone at location 1 was at a height of approximately 1.5 metres above ground level, free field; the microphone at location 2 was at a height of approximately 2.1m above ground level at one metre from a facade.

2.2 All measurements were made continuously at 0.1 second resolution using 01dB Fusion sound level meters. These are Type 1 sound level meters and they were field checked for calibration before and after the measurements. No significant drift was noted. Audio recordings were made throughout.

2.3 Weather was generally good for measurements of environmental noise during the majority of the survey. However, there were some periods when heavy rain affected measured levels and these periods were excluded from subsequent analysis. This was particularly so at location 2, where, due to the close proximity of a drain pipe to the microphone, rain noise dominated at times.

2.4 For information purposes it can be noted:

- Measurements of sound level were all made with the A-weighting, which is a filter applied to the sound level meter to simulate the frequency response of the human ear, which is more sensitive to high frequency sound than low.

- L_{Aeq} is the equivalent continuous noise level which is a method of averaging the varying noise level over the time period into a single figure value. The L_{Aeq} has the same sound energy as the fluctuating level over that period.

- The L_{AE} is the single event level which is the total sound energy over the duration of an event, compressed into a one second period. Hence, if the measured level of a particular event was 60dB, L_{Aeq} and the event lasted 60 seconds, this would result in a L_{AE} of 60 + 10 x log(60) = 68dB.

- L_{Amax} is the highest level within the measurement period.

2.5 Cameras recorded activities continuously over the same period and so it was possible to analyse camera footage and noise level measurements together to determine levels for each activity. Audio recordings were also made throughout to enable noises from sources other than the Big Yellow forecourt (such as aircraft, noisy motorbikes passing the site, rain and activities on adjacent sites) to be excluded from results.

3.0 Survey Results

3.1 Noise survey results are shown graphically in Appendix B. Levels at each survey location were dependant on both forecourt activities and on other sources. In general, the noise level attributable to activities on the forecourt during the busier hours of the day were generally between 51 and 53dB, $L_{Aeq,1h}$ at both locations and the level from other sources during the same period was 55 to 58dB, $L_{Aeq,1h}$. The overall measured level each day was greatly influenced by the presence (or otherwise) of aircraft and, in particular, helicopters.

3.2 Events were divided up by vehicle type and activity type using the following categories:

1. Type of vehicle:
    a. Motorcycle
    b. Car or light van
    c. Large van (eg. Transit)
    d. Small lorry (eg. Luton)
    e. OGV
    f. Other (specify)

2. Type of activity of vehicle occupant(s)
    a. None – remains in vehicle or visits the store without any apparent goods
    b. Walk to store and back out, carrying a light goods / envelope, small boxes etc

c. Use trolley to take goods to or from store
d. Use forklift to take goods to or from store
e. Other – as specified.

3.3 The camera recordings were initially analysed by a third party, who produced a summary of each loading / unloading event on each day. This summary is presented in Appendix C.

3.4 Camera recordings and measured levels were analysed jointly to provide an estimate of noise levels from different vehicles and different types of events with ambient sounds from other sources excluded. Typical ranges of noise levels for each event type were as shown in Table 3.1 below.

Table 3.1: Measured event level ranges, normalised to 10m (free field)

Event	Event level, L_{AE}, dB			
	None	Light goods only	Use trolley / forklift	Other
Motorcycle	70	72	-	-
Car or light van	68-70	67-71	77-80	-
Large van (eg. Transit)	67-71	68-72	80-84	-
Small lorry (eg. Luton)	70-73	66-74	79-83	-
OGV	69-72	70-73	80-83	-
Misc (highest)	-	-	-	85
E-scooter / cycle	0	0	-	-

3.5 The highest L_{Amax} values at 10m were between 80 and 85dB (free field); these occurred during unloading of larger vehicles with heavier goods. The highest L_{Amax} values which occurred (at reference distance 10m) other than during loading or unloading of larger vehicles / heavier goods were generally between 74-79dB (free field).

3.6 Wherever possible, event types were combined to simplify the analysis process. For example, a small lorry and a large van with light goods produced very similar overall noise level and so were grouped together. It was found that, in noise terms, the following activities had noise levels which were sufficiently similar that they could be grouped together:

- Cars /motorbikes / small vans: enquiries (no goods) or light loads only
- Cars /motorbikes / small vans: with heavier loads using trolley
- Larger vehicles with no goods or light loads only
- Larger vehicles with heavier / more bulky loads
- Misc (a small handful of vehicles, such as a refuse truck)

- E-scooters / cycles.

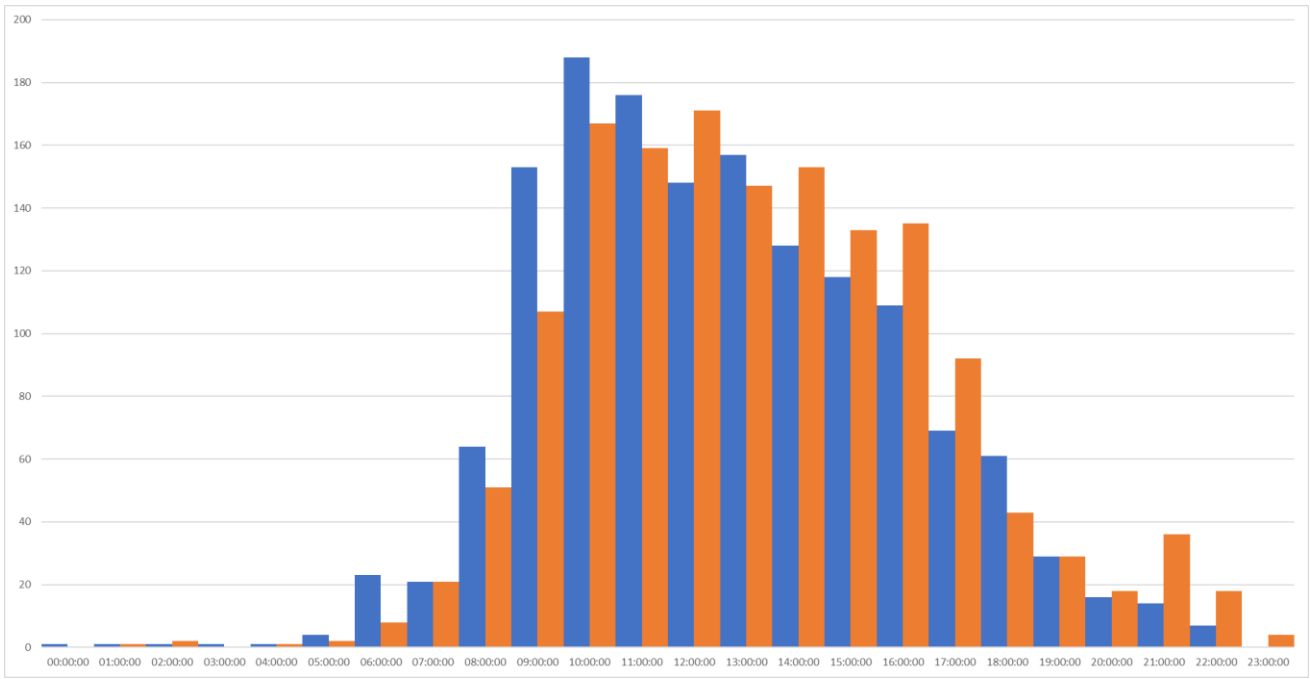
3.7 The total numbers of events in the two week period were as shown in Table 3.2 below.

Table 3.2: Total numbers of events in each category

Event category	Number of each	Percentage of total
Cars /motorbikes / small vans: enquiries (no goods) or light loads only	604	41.5%
Cars /motorbikes / small vans: with heavier loads using trolley	313	21.5%
Larger vehicles with no goods or light loads	219	15.1%
Larger vehicles with heavier / more bulky loads:	272	18.7%
Misc	5	0.3%
E-scooter / cycle	41	2.8%
Total events for two weeks	1454	100%

3.8 In addition to the number of vehicle movements and activities, the data provided information about the pattern of use across the day. The total numbers of vehicles arriving and leaving over a 24 hour period is summarised in Figure 3.1 below.

Figure 3.1: graph showing distribution of arrivals (blue) and departures (orange) over a 24 hour period



3.9 This shows that majority of activity on site took place between 0800 hours and 1800 hours.

4.0 Summary

4.1 The above information can be synthesised into a single table (for this site) which can be scaled (based on the proposed floor area of a new store, compared with the floor area at the Fulham store) to provide predicted free field noise levels from a given forecourt (at a nominal distance of 10m from the loading area).

4.2 Ignoring cycles and e-scooters and "misc" other vehicles, as their numbers are so low, so they have no effect on the predicted level means that there were only 1408 vehicles in the two week period that affected noise levels from the forecourt. Adjusting the percentages from Table 3.2 to take account of the removal of bicycles etc. and rounding the values gives the figures in Table 4.1 below:

Table 4.1: Sound source data for Big Yellow forecourt areas

Event category	Percentage of total	L_{AE}, dB
Cars /motorbikes / small vans: enquiries (no goods) or light loads only	43%	71
Cars /motorbikes / small vans: with heavier loads using trolley	22%	80
Larger vehicles with no goods or light loads only	16%	73
Larger vehicles with heavier / more bulky loads:	19%	83

4.3 Use of the values within this table would provide an estimate of the $L_{Aeq,T}$ at 10m from the loading bays, where time period, T, is a whole working day. Since the majority of activity on site takes place in the 10 hour period between 0800 and 1800 hours, to obtain a prediction of noise levels in one of these hours, one could reasonably compress a "working day" into 10 hours rather than 16 hours. This would result in a slightly higher predicted hourly noise level than would actually occur, but would result in a robust assessment for typical daytime operations.

Appendix A: Survey locations

Figure A1: Survey locations