HOARE LEA

CLV - Building A.
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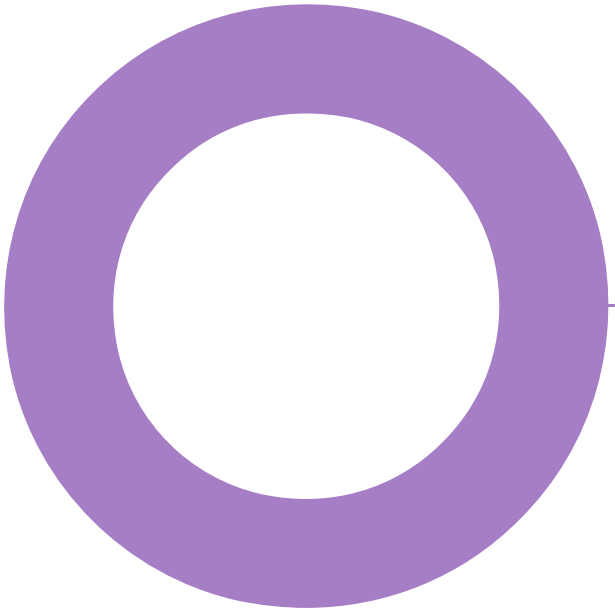
Stanley Sidings Limited.

ACOUSTICS
NOISE ASSESSMENT FOR PLANNING

REVISION 05 – 18.09.2018



Audit sheet.

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Contents.

Addendum following additional survey.

This report has been prepared as an addendum to the original planning report submitted in support of the Section 73 application (ref: 2018/1713/P) the Hawley Wharf Development.

The addendum has been prepared following a request for updated environmental sound survey information from London Borough of Camden (LBC). Updated survey results are provided in Appendix B, and summarised in the section below. Additionally, the building services plant strategy has developed since the initial application and this report provides an update on the status of design in relation to the noise impacts.

Environmental sound surveys.

Environmental sound surveys were undertaken between 24th August and 5th September 2018. Two sound monitoring locations were chosen, and are shown in Figure 1:

- Position 1: Roof level of Building A0 overlooking Chalk Farm Road. The intent of this monitoring location was to obtain a representative background and ambient sound level for existing residential receivers along Chalk Farm Road.
- Position 2: On a fourth-floor balcony of Building C1, overlooking the railway line. The intent of this monitoring location was to obtain a representative ambient sound level for the new residential development.

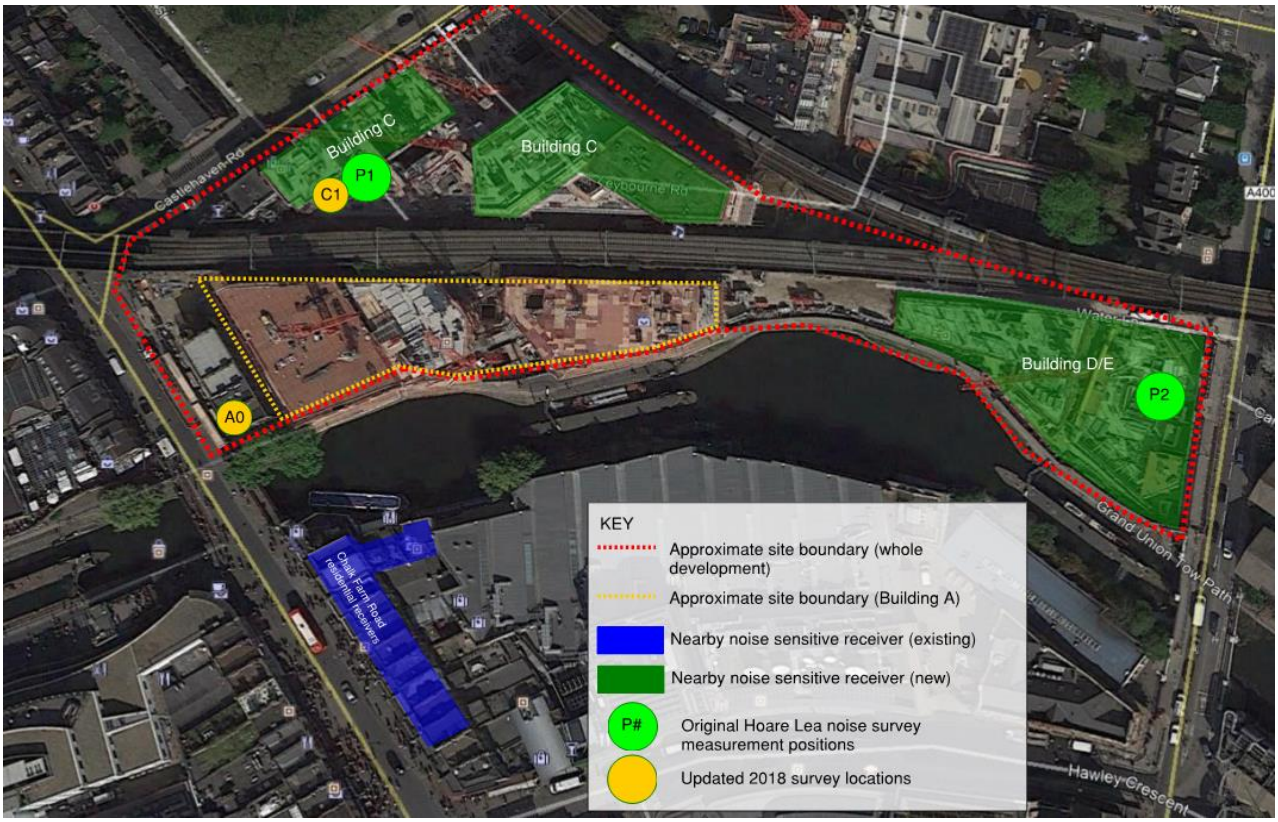

Figure 1 Updated sound monitoring locations

Summary of results.

Analysis of the measurement data has determined that there is negligible change in the background sound levels (L_{A90}) at existing receivers along Chalk Farm Road.

Ambient noise levels (L_{Aeq}) measured at the Chalk Farm Road monitor location are lower when compared to the original survey. The sound level meter was located at roof level and did not have a direct line of sight to the road, which would result in a reduction of the measured sound levels.

If the updated survey was undertaken directly overlooking the road (which is not practical due to the current site conditions), measured levels would be expected to be similar to those measured during the initial Environmental Impact Assessment undertaken by Waterman's (hereafter referred to as the 'Waterman's survey'), which are consistent with the level of sound expected of a busy major road with an unobstructed view.

Ambient sound levels measured at the balcony level of Building C1 are consistent with those measured during the design phase for the consented scheme. Note that analysis has focused on ambient levels during the evening period (19:00-23:00) where measured sound levels would not be contaminated with construction noise from within the site.

Full survey results are provided in Appendix C of this report, accompanied with a comparison of the initial data.

Implications of new results on previous assessment.

Plant noise emissions.

As discussed above, the newly measured background sound levels (L_{A90}) are consistent with the original survey data at the existing residential receivers. On this basis, the plant noise limits previously proposed are considered appropriate and in line with Condition 53 of the Outline Planning Permission for the scheme (ref: 2012/4628/P). These limits have been observed in further developing the plant design following the initial S73 submission.

Assessment of activity noise – existing residential receivers.

The initial assessment of activity noise from the food court at existing residential receivers concluded that the impact would constitute "No Observed Effect Level" (NOEL) in accordance with LBC policy.

Ambient sound levels along Chalk Farm Road are lower than those previously measured. This is considered to be attributable to the available monitoring locations which did not have a direct line of sight to the road; which would result in a reduction of measured sound level.

Based upon the newly measured ambient sound levels, the predicted levels of activity noise from the food court would be 8 dB lower than the level of ambient sound without activity. In terms of LBC policy, this would consistent a "Lowest Observed Adverse Effect Level" (LOAEL).

In practice, the residential receivers along Chalk Farm Road will have a direct line of sight to the road and would therefore be subject to higher sound levels than those measured. It is therefore anticipated that, in use, the effect would constitute a NOEL.

Assessment of activity noise – Building C

The previous assessment concluded that activity sound from the food court at Building C would constitute a LOAEL, and mitigation measures were set out to further limit the impact (primarily management policies).

The newly measured ambient sound levels at Building C are consistent with the original survey data, and therefore the assessed impact remains a LOAEL.

Update on plant strategy.

At the time of the original submission, the plant design was conceptual with no specific details of the fans known. Since the submission was made, the design has been developed further.

The current design is based upon providing low noise in-line centrifugal fans. This approach was driven solely by the need to achieve the limiting sound levels in line with LBC policy. Allowance is made within the design for fans to be provided with sound attenuators to intake and exhaust ductwork, with an acoustic jacket to reduce sound breakout from the casing, and anti-vibration mounts of all equipment.

A summary of the assessment is provided in Appendix D which concludes that, following the installation of sound attenuators, the proposed plant noise emission limits could be achieved with the current design.

Executive summary.

There are proposals for minor material amendments to the consented scheme for Building A of the Hawley Wharf development.

The proposals include a redistribution of approved A3/A5 floorspace within the building which will require additional building services plant to be installed.

Various baseline noise surveys have been undertaken around the site. Results from the surveys are presented and used to determine noise emission limits in line with London Borough of Camden (LBC) policy.

At this stage, the design of the building services plant is conceptual, with information on the location and number of items known, but without specific details on the equipment available. It is, however, reasonable to expect that appropriate noise levels can be achieved providing relatively conventional noise control measures are incorporated.

An assessment of activity sound from the proposed food market has demonstrated that noise levels will be below the existing ambient noise levels without food market activity. It is also important to recognise the context in which the noise is occurring. Chalk Farm Road is a particularly busy 'lively' part of Camden Town, and the type of noise will be in keeping with the acoustic character of the area. It is therefore considered that this will limit any noise impact.

On the basis of the assessments, noise from the development can be controlled by appropriate noise mitigation measures. Therefore, noise would not be expected to pose an obstacle in the granting of planning permission.

1. Introduction.

There are proposals for minor material amendments to Building A of the Hawley Wharf development. The proposals include redistribution of Class A3 and A5 uses within Building A. As part of these plans, a number of additional extract fans will be introduced.

A baseline noise survey was undertaken as part of the original design development for the scheme. Results from the noise survey have been used to set noise emissions limits for new building services plant. A plant noise assessment is presented to demonstrate in principle that the noise limits can be achieved.

In addition, there are proposals to change the provision at level one to utilise more Class A3/A5 units and to provide a food market type offering. Consideration has been given to the potential for changes in operational / entertainment noise due to the food market.

Recognising that the report is technical in nature, a glossary of acoustic terms is provided in Appendix A.

1.1 Description of site and surroundings.

The site is located in a mixed-use area along Camden High Street. There are residential buildings to the north and south of the site. New residential buildings are being developed as part of the development (Buildings C, and D/E). An aerial view of the site is shown in Figure 2, showing nearby noise sensitive facades as well as measurement positions used in the noise survey.

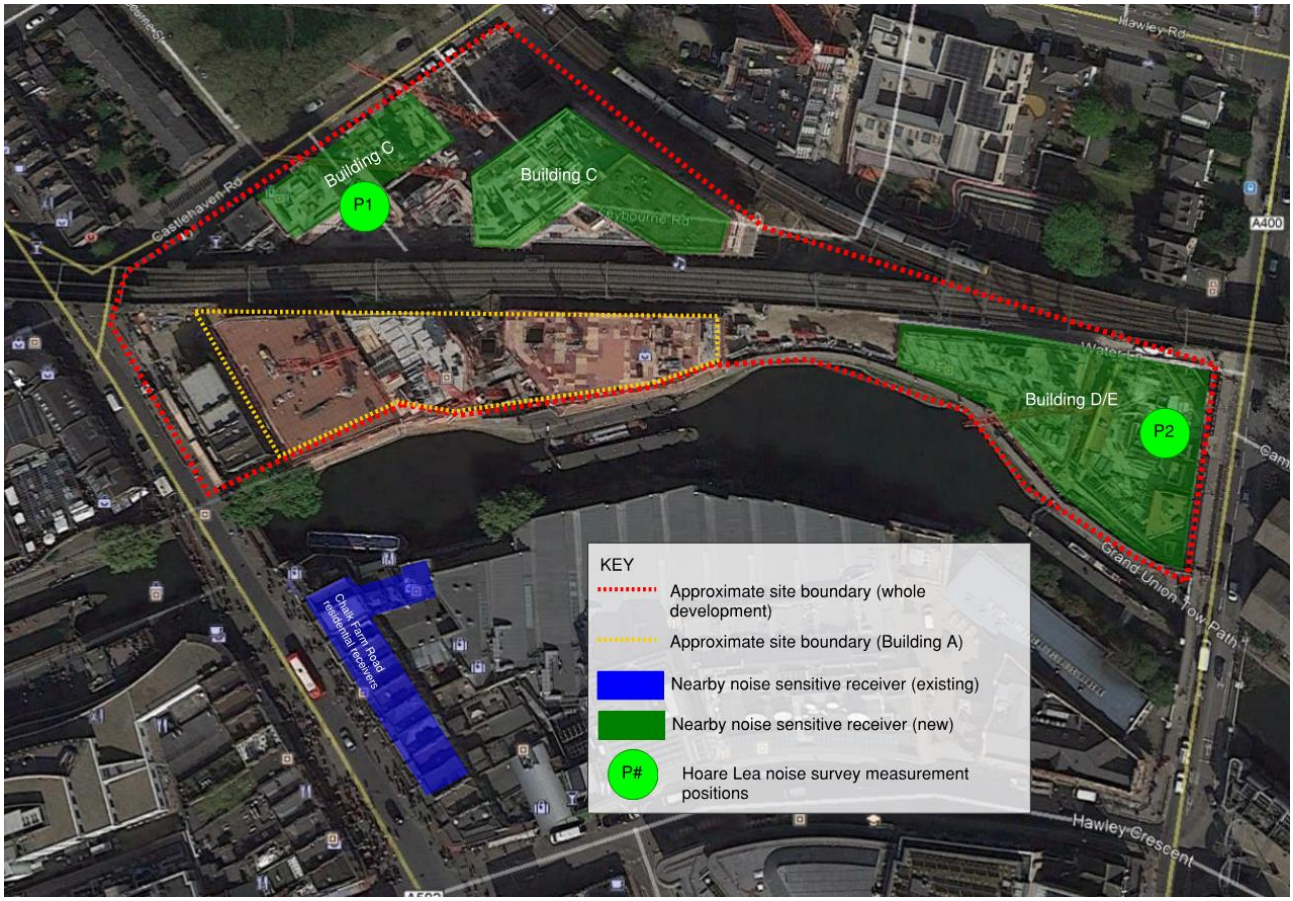

Figure 2 Aerial view of site. Source: Google Earth

1.2 Local noise environment.

The local noise environment is largely dominated by noise from road traffic vehicles, as well as pedestrian activity along Chalk Farm Road. There are also contributions from train movements on elevated railway lines crossing the site.

2. Acoustic design standards.

Well established guidance on noise management and related design is available from a variety of references, including:

- London Borough of Camden Local Plan policy
- National Planning Policy Framework (NPPF)
- National Planning Policy Guidance (NPPG)
- British Standard 4142: 2014 "Methods for rating and assessing industrial and commercial sound"
- British Standard 8233: 2014 "Guidance on sound insulation and noise reduction for buildings"

2.1 London Borough of Camden requirements.

2.1.1 Plant noise emissions

Planning permission was granted by London Borough of Camden (LBC) in January 2013 under application reference 2012/4628/P. Condition 53 of the decision notice requires that noise emissions are controlled. The condition reads:

"Noise levels at a point 1 metre external to sensitive facades shall be at least 5 dB(A) less than the existing background measurement (LA90) expressed in dB(A) when all plant / equipment (or any part of it) is in operation unless the plant / equipment hereby permitted will have a noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) and / or if there are distinct impulses (bangs, clicks, clatters, thumps), then the noise levels from that piece of plant / equipment at any sensitive façade shall be at least 10 dB(A) below the LA90 expressed in dB(A)".

It is noted that LBC's local policy was updated in 2017. LBC's noise policy is set out within Appendix 3 of the Local Plan 2017. The document explains that noise is considered in terms of various 'effect levels' which align with the National Planning Policy Framework (NPPF) and National Planning Policy Guidance (NPPG) documents:

- NOEL – No observed effect level
- LOAEL – Lowest observed adverse effect level
- SOAEL – Significant observed adverse effect level

Assessment is made relative to the following context descriptors:

- Green – where noise is considered to be acceptable
- Amber – where noise is observed to have an adverse effect level, but may be acceptable when assessed in the context of other merits of the development
- Red – where noise is observed to have a significant adverse effect

For new noise generating development, assessment should be made with reference to the methodology set out within BS 4142: 2014. The following thresholds are set:

- LOAEL (Green): Noise 'Rating level' to be 10 dB below the existing background. An additional criteria applies at night that no events exceed 57 dB L_{Amax}

- LOAEL to SOAEL (amber): Noise rating level to be between 9 dB below and 5 dB above background, or noise events between 57 dB and 88 dB L_{Amax} at night
- SOAEL (red): Noise rating level is greater than 5 dB above background, and / or events exceed 88 dB L_{Amax} at night

It is proposed that noise emissions from plant are assessed in line with the original planning condition attached to the development.

2.1.2 Entertainment noise

LBC sets out requirements for the assessment of 'entertainment noise' in Appendix 3 of the Local Plan 2017. This would apply to activity noise from within the food market. The following thresholds are provided:

- Daytime:
  - NOEL: The higher of 55 dB $L_{Aeq,5min}$ or 10 dB below existing $L_{Aeq,5min}$
  - LOAEL: 56-60 dB $L_{Aeq,5min}$ or 3-9 dB below the existing $L_{Aeq,5min}$ without entertainment noise
  - SOAEL: The higher of 61 dB $L_{Aeq,5min}$ or 2 dB below existing $L_{Aeq,5min}$
- Evening:
  - NOEL: The higher of 50 dB $L_{Aeq,5min}$ or 10 dB below existing $L_{Aeq,5min}$
  - LOAEL: 51-55 dB $L_{Aeq,5min}$ or 3-9 dB below the existing $L_{Aeq,5min}$ without entertainment noise
  - SOAEL: The higher of 56 dB $L_{Aeq,5min}$ or 2 dB below existing $L_{Aeq,5min}$
- Night:
  - LOAEL: The higher of 45 dB $L_{Aeq,5min}$ or 10 dB below existing $L_{Aeq,5min}$
  - LOAEL to SOAEL: 46-50 dB $L_{Aeq,5min}$ or 3-9 dB below the existing $L_{Aeq,5min}$ without entertainment noise
  - SOAEL: The higher of 51 dB $L_{Aeq,5min}$ or 2 dB below existing $L_{Aeq,5min}$

It is also important to consider the relevant sections of the National Planning Policy Framework (NPPF) relating to noise, which states that "planning policies and decisions should aim to;

- Avoid noise from giving rise to significant adverse effects on health and quality of life as a result of new development.
- Mitigate and reduce to a minimum other adverse effects on health and quality of life arising from noise from new development, including through the use of conditions.
- Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put upon them because of changes in nearby land uses since they were established.
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

NPPF also makes reference to the Noise Policy Statement for England (NPSfE) which stresses the need to place into context any general requirements that increases in ambient noise should be 'minimised'. In this regard the NPSfE states:

*"*Of course, taken in isolation and to a literal extreme, noise minimisation would mean no noise at all. In reality, although it has not always been stated, the aim has tended to be to minimise noise as far as is reasonably practical… the application of the NPSfE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular policy, development or other activity may not have been given adequate weight when assessing the noise implications *".*

3. Baseline noise survey.

Several noise surveys were undertaken around the site as part of the 2013 planning application (by Waterman's), and subsequent detailed design phase of the project (by Hoare Lea).

The table below presents a summary of the noise levels measured close to the noise sensitive receivers identified in Figure 2. Full results are presented in Appendix B.

Table 1 Typical baseline noise levels

Parameter	Period	Location		
		Chalk Farm Road (Waterman's data)	Building C (Hoare Lea data position P1)	Kentish Town Rd (Hoare Lea data position P2)
Average ambient noise level, dB $L_{Aeq,T}$	Day	72	63	66
	Night	65	62	63
Typical minimum background noise level, dB $L_{A90,T}$	Day	56	47	48
	Night	47	45	45

Note that the precise location of the noise monitor from the Waterman's report is not detailed within the Environmental Statement. The logger position is described as "Western site boundary with Chalk Farm Road, located on 1st floor terrace area (Area A)".

3.1 Plant noise emission limits

Noise emission limits for new plant have been derived in accordance with the original planning condition 53 and are presented below. Limits are given for daytime and night periods, relative to the background noise levels in Table 1 and are as follows:

- Daytime (07:00-23:00): 42 dB $L_{Aeq,T}$
- Night (23:00-07:00): 40 dB $L_{Aeq,T}$

The limits shall apply at the façade of the nearest existing noise sensitive buildings.

It is proposed that noise emissions are controlled to not exceed a level of 45 dB $L_{Aeq,T}$ at 1m from any new residential facades built as part of the development (i.e. Building C, and D/E). This aligns with the existing background noise levels. According to BS 4142: 2014 this would result in a low impact; depending on the context. Additionally, the proposed noise limit would be considered a 'LOAEL to SOAEL' within the context of LBC's updated planning policy. For new noise sensitive buildings within the scheme, occupants will not be familiar with the 'existing baseline' noise levels and therefore will not judge impact based upon relative change. On this basis, it is suggested that the impact would constitute a 'LOAEL' as per the guidance in BS 4142:2014.

4. Plant noise assessment.

Noise from the new plant will need to be controlled to achieve the noise emission limits identified above. The nearest existing residential buildings have been identified as flats above retail units on Chalk Farm Road; approximately 50m south of Building A plant. Consideration will also need to be given to residential units as part of the development; the closest of which is Building C approximately 20-25m north of the Building A plant at the closest point. Noise levels at Building D/E will be lower due to additional distance between the plant and noise sensitive receivers.

4.1 Overview of proposals.

The proposals are to provide the following items of additional plant:

- 11no. new kitchen extract fans, located at roof level
- 3no. new kitchen extract fans located internally, but discharging at roof level

4.2 Assessment.

At this stage, the design of the building services plant is conceptual, with information on the location and number of items known, but without specific fan details. It is therefore not possible to provide a detailed assessment at this stage.

It is, however, reasonable to expect that noise from the new fans could be controlled to achieve the noise limits set out above provided the following noise control measures are included within the design:

- Low noise equipment to be selected where possible. An initial calculation suggests that fans should achieve be selected with a limiting case breakout sound power level of 72 dB(A), free of tonal components
- If fans are selected with higher levels of case radiated noise, then an acoustic jacket could be incorporated around the fan; which could provide further reduction of approximately 8-10 dB
- Sound attenuators to fan intake and exhaust
- All fans to be installed on appropriate anti-vibration mounting

As the design is developed further, specific noise mitigation measures will be developed to achieve the noise limits. Noise attenuation measures will be selected relative to the sound power levels of the final fan selections. This can be controlled by a suitable planning condition attached to the decision notice.

5. Activity noise from level 01 of Building A.

As part of the proposals, the Class A3/A5 provision on Level 01 will be reconfigured compared to the consented scheme. The intent is that will provide a food market type offering.

The design incorporates an open 'shuttered' façade, which will provide a wind and rain screen when required, but will offer minimal sound reduction performance from outside to inside; as they are intended to remain open for the majority of the time. This was also the case for the consented scheme.

Consideration has been given to the potential for change in activity noise levels due to the food market.

5.1 Assessment to existing receivers on Chalk Farm Road.

An assessment has been undertaken of the likely levels of noise from the food market to the existing residential receivers along Chalk Farm Road. The market building will be open until 21:00hrs and therefore assessment is made with reference to daytime ambient noise levels only.

It is anticipated that noise levels within the food market would be in the order of 70-75 dB L_{Aeq}.

Taking into account losses for distance only (assuming plane source propagation, and no screening), noise levels are expected to be reduced to 50-55 dB L_{Aeq} at the residential receiver. This is more than 10 dB lower than the

daytime L_{Aeq} data provided by Waterman's in the original planning assessment at Chalk Farm Road. In terms of LBC's planning policy, this would result in a NOEL.

5.2 Assessment to Building C.

The assessment to Building C indicates that noise levels from the open food market are expected to be in the order of 55-60 dB $L_{Aeq,T;}$ This would be at least 3 dB lower than the existing ambient levels (typically 63 dB L_{Aeq}), which according to LBC policy would constitute a LOAEL. Noise levels at Building D/E will be lower due to increased distance from source to receiver, and this would help to further reduce impact at these receivers.

As well as the absolute level of noise, consideration is given to the context in which the noise occurs. This reflects the statements made in both NPPF and NPSfE guidance.

As with plant noise, it is not considered appropriate to assess with regard to existing levels of noise without contributions from entertainment as new residents will not be familiar with the existing baseline noise levels.

The façade for Building C has been developed to provide high levels of sound reduction due to the presence of noise from the railway. Additionally, ventilation systems have been designed such that occupants do not need to rely upon opening the windows for either background ventilation or control of overheating.

Based upon the façade specification, which incorporates 40 dB R_w glazing, the noise level inside a bedroom at night would be less than 30 dB(A) / NR 25; which aligns with guidance within BS 8233 and World Health Organisation Guidelines for internal noise levels within bedrooms.

Finally, it is also considered that the noise emanating from the food market is 'in keeping' with the acoustic character of the area, and this would help to limit the impact.

Taking into account the above context, it is considered that this reinforces the viewpoint that noise from the food market to Building C, D/E would constitute a LOAEL.

5.3 Mitigation measures

The assessment determined that noise from the food market is considered to constitute a "LOAEL". Should further reductions in noise be required, mitigation measures would fall within two categories; physical mitigation, and management measures.

Physical mitigation, such as acoustically absorbent finishes could be incorporated within the space to help 'soak up' activity sound at source. This could potentially reduce noise levels by 3-5 dB.

Management controls could be developed such as staff supervision of the area to keep noise levels to a minimum.

5.4 Conclusion

An assessment of noise from the proposed food market offering has concluded that noise would be below the existing ambient noise levels without activity noise. Taking into account the character of the area, the noise impact is considered to be a LOAEL. This reflects the requirements of the NPPF that noise should be minimised to avoid significant adverse effect.

As such, noise from the food market should not be considered an obstacle in the granting of planning permission.

6. Summary

There are proposals for minor material amendments to the consented scheme for Building A of the Hawley Wharf development.

The proposals include redistribution of the food based provision within the building which will require additional building services plant to be installed.

Various baseline noise surveys have been undertaken around the site. Results from the surveys are presented and used to determine noise emission limits in line with London Borough of Camden (LBC) policy.

At this stage, the design of the building services plant is conceptual, with information on the location and number of items known, but without specific details on the equipment available. It is, however, reasonable to expect that appropriate noise levels can be achieved providing relatively conventional noise control measures are incorporated within the design.

An assessment of noise from the proposed food market has demonstrated that noise levels will be below the existing ambient noise levels without entertainment. It is also important to recognise the context in which the noise is occurring. Chalk Farm Road is a particularly busy 'lively' part of Camden Town, and the type of noise will be in keeping with the acoustic character of the area. It is therefore considered that this will help to limit any noise impact.

On the basis of the assessments, noise from the development can be controlled by appropriate noise mitigation measures. Therefore, noise would not be expected to pose an obstacle in the granting of planning permission.

Appendix A – Glossary of Terms

Decibel (dB)

The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithms are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

Octave and Third Octave Bands

The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of a noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example two adjacent octave bands are 250 Hz and 500 Hz. Third octave bands provide a fine resolution by dividing each octave band into three bands.

A-Weighting

The 'A' weighting is a correction term applied to the frequency range in order to mimic the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies. An 'A' weighted value would be written as dB (A).

Equivalent Continuous Sound Level Leq,

The L_{eq}, is a parameter defined as the equivalent continuous sound pressure level. Over a defined time period 'T', it is the sound pressure level equivalent to the acoustic energy of the fluctuating sound signal. The $L_{eq,T}$ can be seen to be an "average" sound pressure level over a given time period (although it is not an arithmetic average). Typically the $L_{eq,T}$ will be an 'A' weighted noise level in dB(A). It is commonly used to describe all types of environmental noise sources.

Background Noise Level L90

The $L_{90,T}$ is a parameter defined as the sound pressure level exceeded for 90% of the measurement period 'T'. It is a statistical parameter and cannot be directly combined to other acoustic parameters. It is generally used to describe the prevailing background noise level or underlying noise level.

Appendix B – Noise survey results

For details of the Waterman's survey refer to the original planning report.

Results from the long term noise monitoring undertaken as part of the detailed design for the consented scheme are shown overleaf.

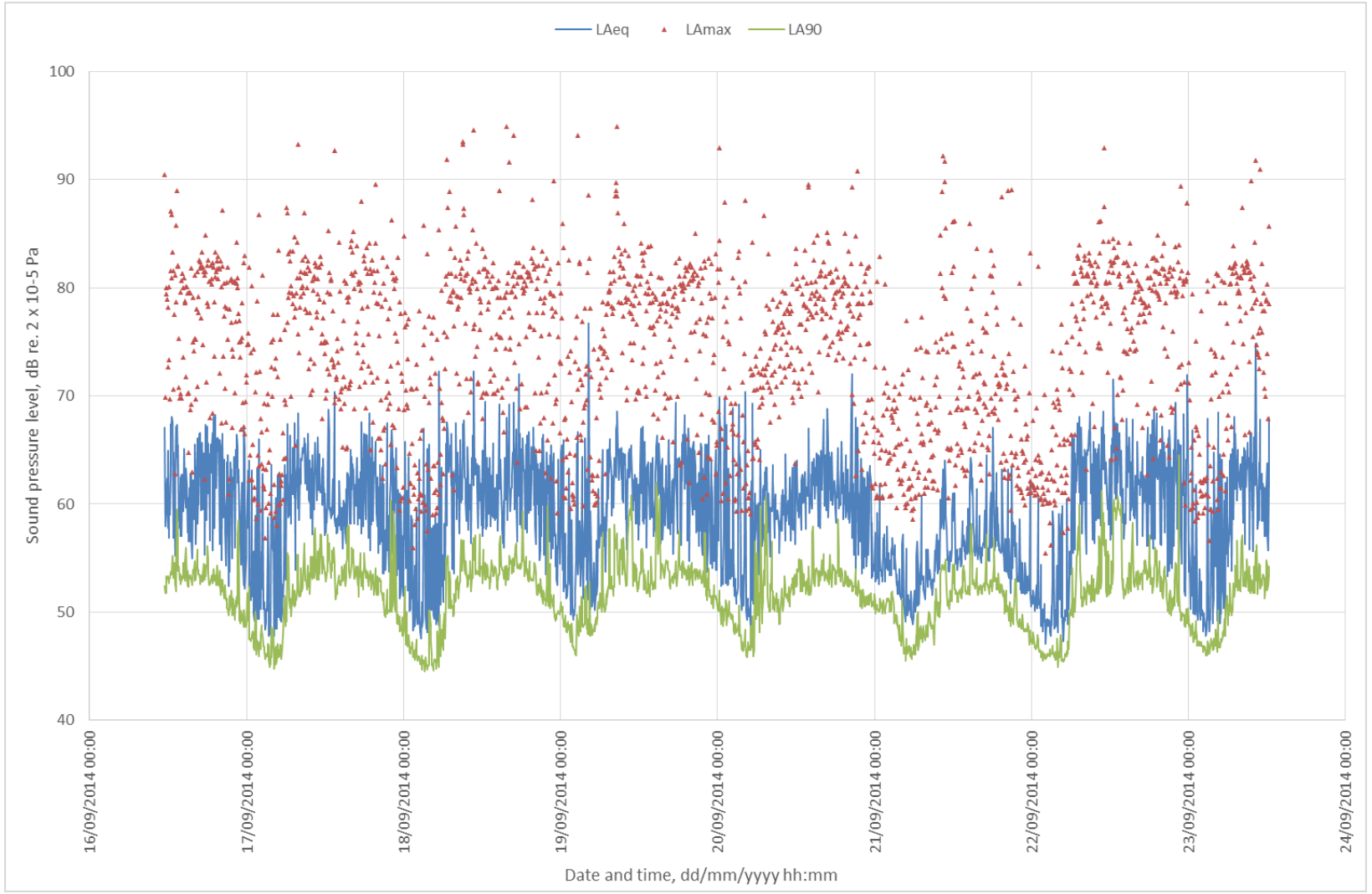

Figure 3 Logger position P1

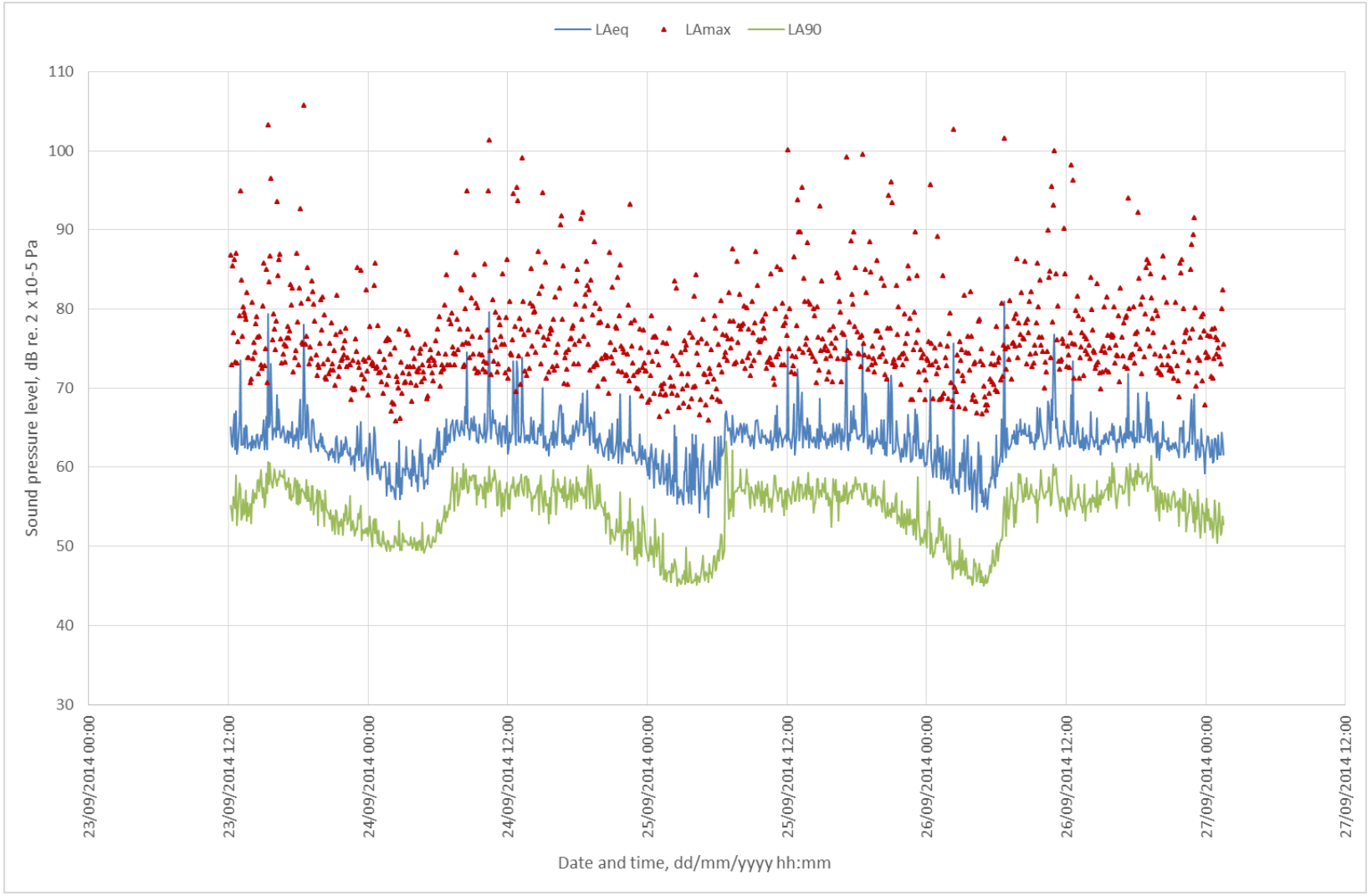

Figure 4 Logger position P2

Appendix C – Updated noise survey.

Equipment used during survey.

Building A0 Roof:

- Sound level meter: Rion NL-31, serial no: 00630481
- Pre-amplifier: Rion UC-53A, serial no: 305115
- Microphone: Rion NH-21, serial no: 09098
- Calibrator: Rion NC-74, serial no: 34172704

Building C balcony:

- Sound level meter: Rion NL-52, serial no: 00331820
- Pre-amp: Rion UC-59, serial no: 04886
- Microphone: Rion NH-25, serial no: 21771
- Calibrator: Rion NC-74, serial no: 34172704

All equipment held a valid calibration certificate (details available on request) at the time of the survey. Equipment was checked for sensitivity before and after the survey and no drift was observed.

Meteorological conditions.

Weather conditions were dry with light wind and minimal cloud cover.

Results.

Graphs showing the monitoring results are provided overleaf.

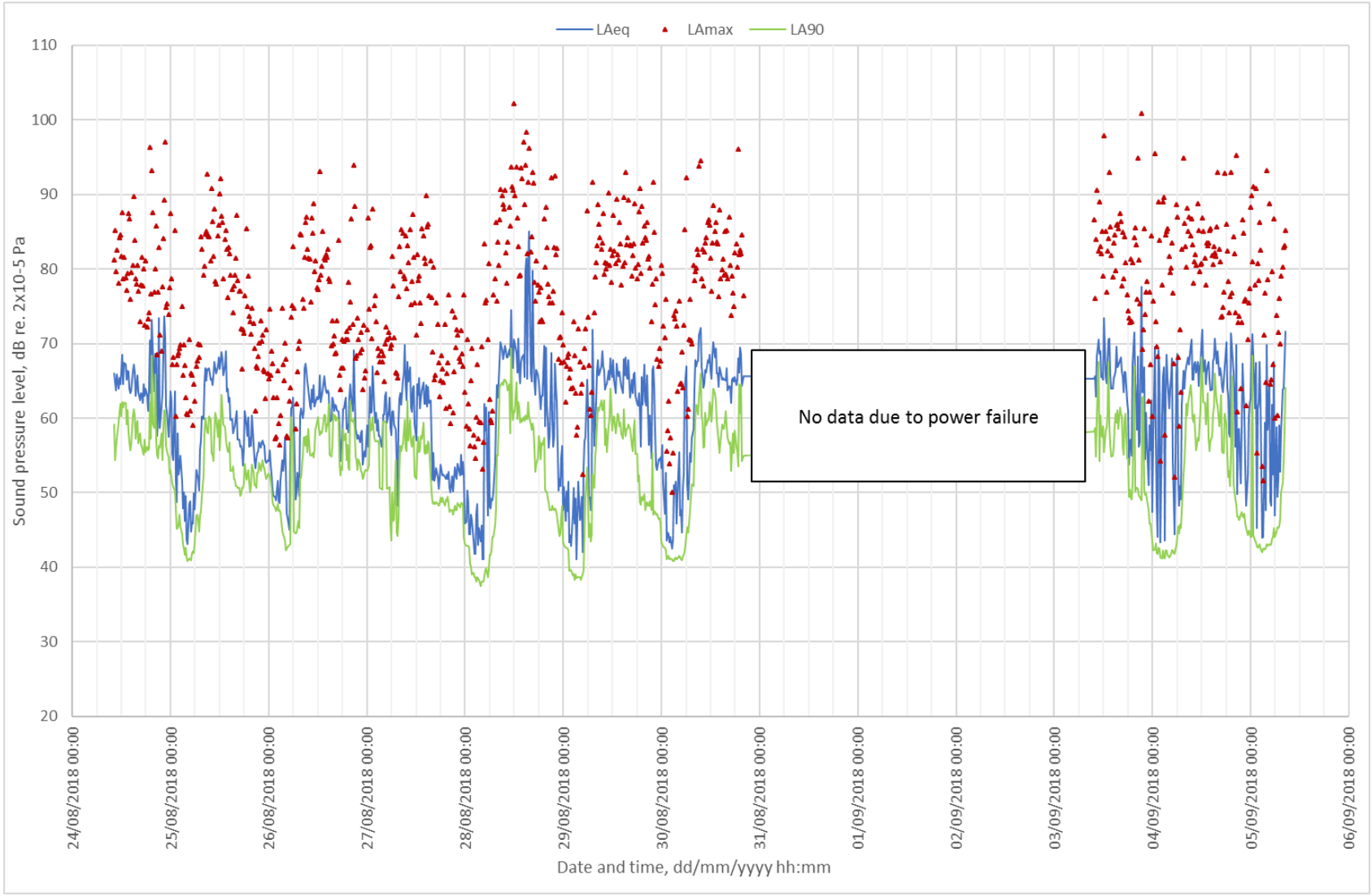

Figure 5 Revised survey data - Building C1 balcony

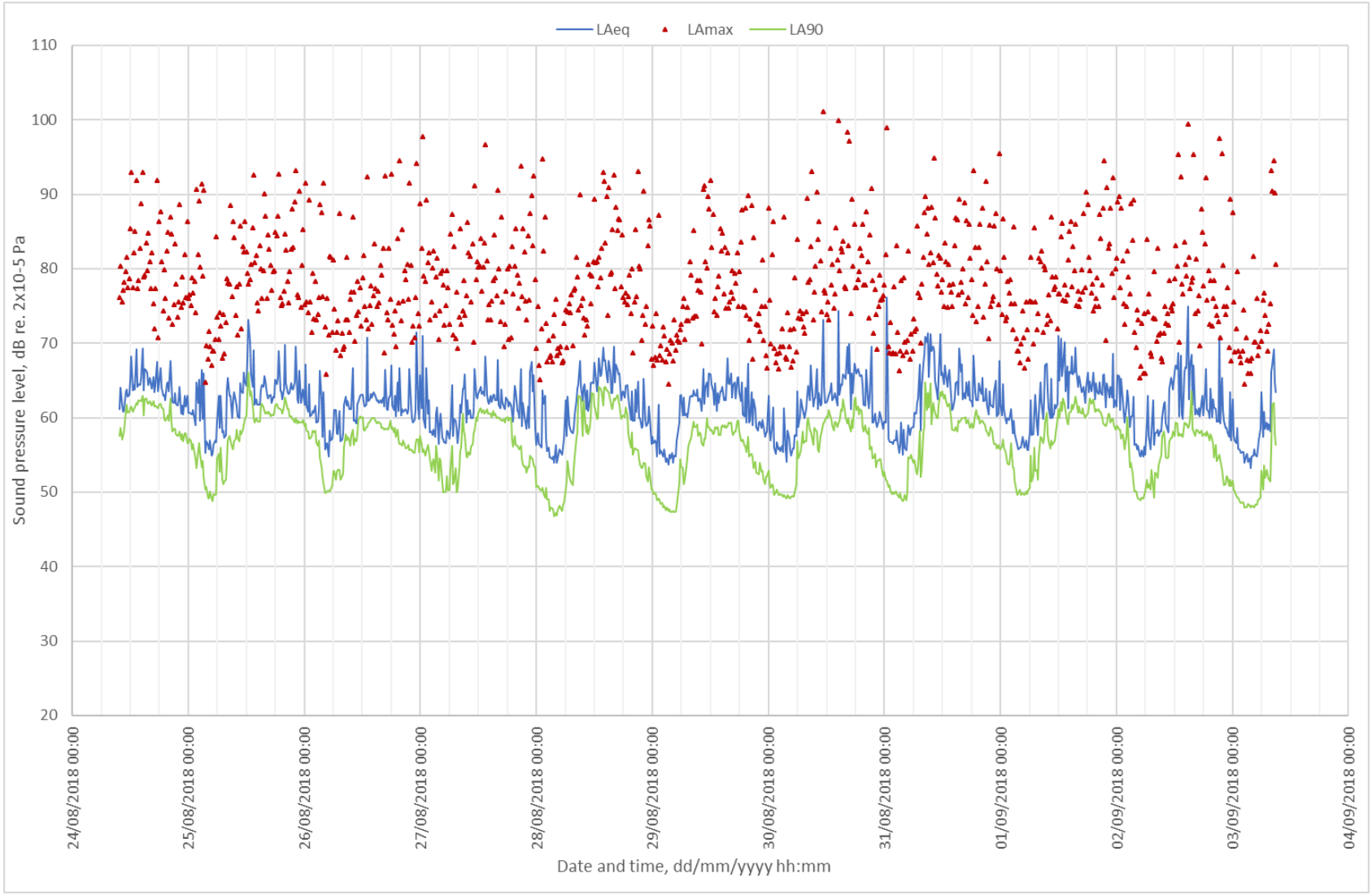

Figure 6 Revised survey data - Building A0 roof

Analysis.

Comparison has been made of the relevant survey information at each location:

Period	Typical minimum background sound levels at existing residential receivers on Chalk Farm Road		Ambient sound levels at existing residential receivers on Chalk Farm Road		Ambient sound levels at new residential receivers at Building C1	
	Waterman's Survey data	New 2018 survey data (from A0 roof logger)**	Waterman's Survey data	New 2018 survey data (from A0 roof logger)	Hoare Lea survey position P1	New 2018 survey data (from C1 balcony logger)
Daytime (07:00-19:00)	56 dB L_{A90}	56 dB L_{A90}	72 dB L_{Aeq}	65 dB L_{Aeq}*	63 dB L_{Aeq}	67 dB L_{Aeq}*
Evening (19:00-23:00)				63 dB L_{Aeq}	62 dB L_{Aeq}	64 dB L_{Aeq}
Night (23:00-07:00)	47 dB L_{A90}	48 dB L_{A90}	65 dB L_{Aeq}	61 dB L_{Aeq}	60 dB L_{Aeq}	56 dB L_{Aeq}

* Data excluded from analysis as there was ongoing construction activity on the development site which would affect the results.

** Typical minimum based upon highest 90% of measured LA90 values

Appendix D – Updated plant noise assessment.

The following presents an updated plant noise assessment to demonstrate compliance with the plant noise emission limits set out within this report. Assessment is based upon sound power level data provided by the fan manufacturer. The current proposals are for 11no. externally located kitchen extract fans at roof level, plus an additional three extract fans located internally but with an external discharge duct. Note that external plant will be running during daytime hours only (07:00-23:00) and assessment is made relative to daytime plant noise emission limits.

Noise sensitive receiver locations.

Reference was made to two assessment locations, which are shown in the figure below;

- Existing residential receivers along Chalk Farm Road
- Future residential receivers as part of the Camden Lock Village (CLV) development (specifically building C)

Figure 7 Aerial view of site showing assessment locations. Image source: Google Maps

Assessment to existing residential properties on Chalk Farm Road.

Calculations assume point source propagation between the source and receiver. Allowance is made for 'screening' losses, which are attributable to a break in the line of sight between source and receiver provided by the building edge.

Attenuator requirements have been derived based upon achieving a limit 3dB lower than the overall noise emissions limits such that, when added to the case breakout noise, the overall sound limit is achieved.

Table 2 Summary of calculation of casing breakout sound to existing residential receivers

Calculation step	Fan reference													
	Ext. 01	Ext. 02	Ext. 03	Ext. 04	Ext. 05	Ext. 06	Ext. 07	Ext. 08	Ext. 09	Ext. 10	Ext. 11	Int. 01	Int. 02	Int. 03
Sound power level, dB Lw	70	70	70	70	70	70	70	70	70	70	70	N/A	N/A	N/A
Distance to noise sensitive receiver, m	50	50	50	50	50	55	75	80	85	85	95			
Distance attenuation, dB	-42	-42	-42	-42	-42	-43	-46	-46	-47	-47	-48			
Screening losses, dB	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8			
Sound pressure level at 1m from noise sensitive receiver, dB	20	20	20	20	20	19	16	16	15	15	14			
Cumulative sound pressure level at 1m from noise sensitive receiver, dB	29 dB $L_{Aeq,T}$													

Table 3 Summary of calculation of casing breakout sound

Calculation step	Fan reference													
	Ext. 01	Ext. 02	Ext. 03	Ext. 04	Ext. 05	Ext. 06	Ext. 07	Ext. 08	Ext. 09	Ext. 10	Ext. 11	Int.01	Int.02	Int.03
Sound power level, dB Lw	87	87	87	87	87	87	87	87	87	87	87	89	89	89
Distance to noise sensitive receiver, m	50	50	50	50	50	55	75	80	85	85	95	55	55	75
Distance attenuation, dB	-42	-42	-42	-42	-42	-43	-46	-46	-47	-47	-48	-43	-43	-46
Screening losses, dB	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5

Calculation step	Fan reference													
	Ext. 01	Ext. 02	Ext. 03	Ext. 04	Ext. 05	Ext. 06	Ext. 07	Ext. 08	Ext. 09	Ext. 10	Ext. 11	Int.01	Int.02	Int.03
Directivity correction, dB (based upon SRL directivity calculations)	8	8	8	7	7	7	5	5	5	5	5	5	5	5
Sound pressure level at 1m from noise sensitive receiver, dB	48	48	48	47	47	46	41	41	40	40	39	46	46	43
Cumulative sound pressure level at 1m from noise sensitive receiver, dB	56 dB $L_{Aeq,T}$													
Attenuation required, dB	17 dB*													

The initial assessment highlighted the need for sound attenuators to the exhaust ductwork. The above summary of attenuation requirements is based upon more detailed octave band calculations. Space allowance has been made within the design for attenuators capable of achieving the required insertion losses.

Table 4 confirms that, following mitigation measures, the overall plant noise limit would be achieved at the existing residential receivers.

Table 4 Cumulative sound pressure levels following mitigation

Calculation step	
Total case breakout sound pressure level at 1m from noise sensitive receiver, dB	29 dB $L_{Aeq,T}$
Total fan exhaust sound pressure level at 1m from noise sensitive receiver, dB	39 dB $L_{Aeq,T}$ following the installation of sound attenuators
Cumulative sound pressure level at 1m from noise sensitive receiver, dB	39 dB $L_{Aeq,T}$
Plant noise emissions limits, dB	42 dB $L_{Aeq,T}$
Assessment	Compliant, following the installation of sound attenuators.

Assessment to Building C.

Table 5 Summary of calculation of casing breakout sound to existing residential receivers

Calculation step	Fan reference													
	Ext. 01	Ext. 02	Ext. 03	Ext. 04	Ext. 05	Ext. 06	Ext. 07	Ext. 08	Ext. 09	Ext. 10	Ext. 11	Int. 01	Int. 02	Int. 03
Sound power level, dB Lw	70	70	70	70	70	70	70	70	70	70	70	N/A	N/A	N/A
Distance to noise sensitive receiver, m	25	25	25	30	30	35	65	70	75	80	85			
Distance attenuation, dB	-36	-36	-36	-38	-38	-39	-44	-45	-46	-46	-47			
Sound pressure level at 1m from noise sensitive receiver, dB	34	34	34	32	32	31	26	25	24	24	23			
Cumulative sound pressure level at 1m from noise sensitive receiver, dB	41 dB $L_{Aeq,T}$													

Table 6 Summary of calculation of casing breakout sound

Calculation step	Fan reference													
	Ext. 01	Ext. 02	Ext. 03	Ext. 04	Ext. 05	Ext. 06	Ext. 07	Ext. 08	Ext. 09	Ext. 10	Ext. 11	Int.01	Int.02	Int.03
Sound power level, dB Lw	87	87	87	87	87	87	87	87	87	87	87	89	89	89
Distance to noise sensitive receiver, m	50	50	50	50	50	55	75	80	85	85	95	55	55	75
Distance attenuation, dB	-42	-42	-42	-42	-42	-43	-46	-46	-47	-47	-48	-43	-43	-46
Screening losses, dB	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5
Directivity correction, dB (based upon SRL directivity calculations)	8	8	8	7	7	7	5	5	5	5	5	5	5	5
Attenuator insertion loss, dB (based upon assessment to existing resi)	-14*	-14*	-14*	-14*	-14*	-14*	-14*	-14*	-14*	-14*	-14*	-14*	-14*	-14*

Calculation step	Fan reference													
	Ext. 01	Ext. 02	Ext. 03	Ext. 04	Ext. 05	Ext. 06	Ext. 07	Ext. 08	Ext. 09	Ext. 10	Ext. 11	Int.01	Int.02	Int.03
Sound pressure level at 1m from noise sensitive receiver, dB	26	26	26	25	25	24	19	18	18	17	17	28	22	22
Cumulative sound pressure level at 1m from noise sensitive receiver, dB	36 dB $L_{Aeq,T}$													

*Note that difference in insertion loss presented is due to changes in the octave band assessment. The overall 'sound pressure level at 1m from noise sensitive receiver' is calculated based upon individual octave bands.

Table 7 confirms that, following mitigation measures, the overall plant noise limit would be achieved at Building C.

Table 7 Cumulative sound pressure levels following mitigation

Calculation step	
Total case breakout sound pressure level at 1m from noise sensitive receiver, dB	41 dB $L_{Aeq,T}$
Total fan exhaust sound pressure level at 1m from noise sensitive receiver, dB	36 dB $L_{Aeq,T}$ following the installation of sound attenuators
Cumulative sound pressure level at 1m from noise sensitive receiver, dB	42 dB $L_{Aeq,T}$
Plant noise emissions limits within development, dB	45 dB $L_{Aeq,T}$
Assessment	Compliant, following the installation of sound attenuators.

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