njd

Environmental Associates

Noise Assessment

Somerford Buildings

January 2024

Mr William Harris

Noise Assessment

Somerford Buildings

Client: **Mr William Harris**

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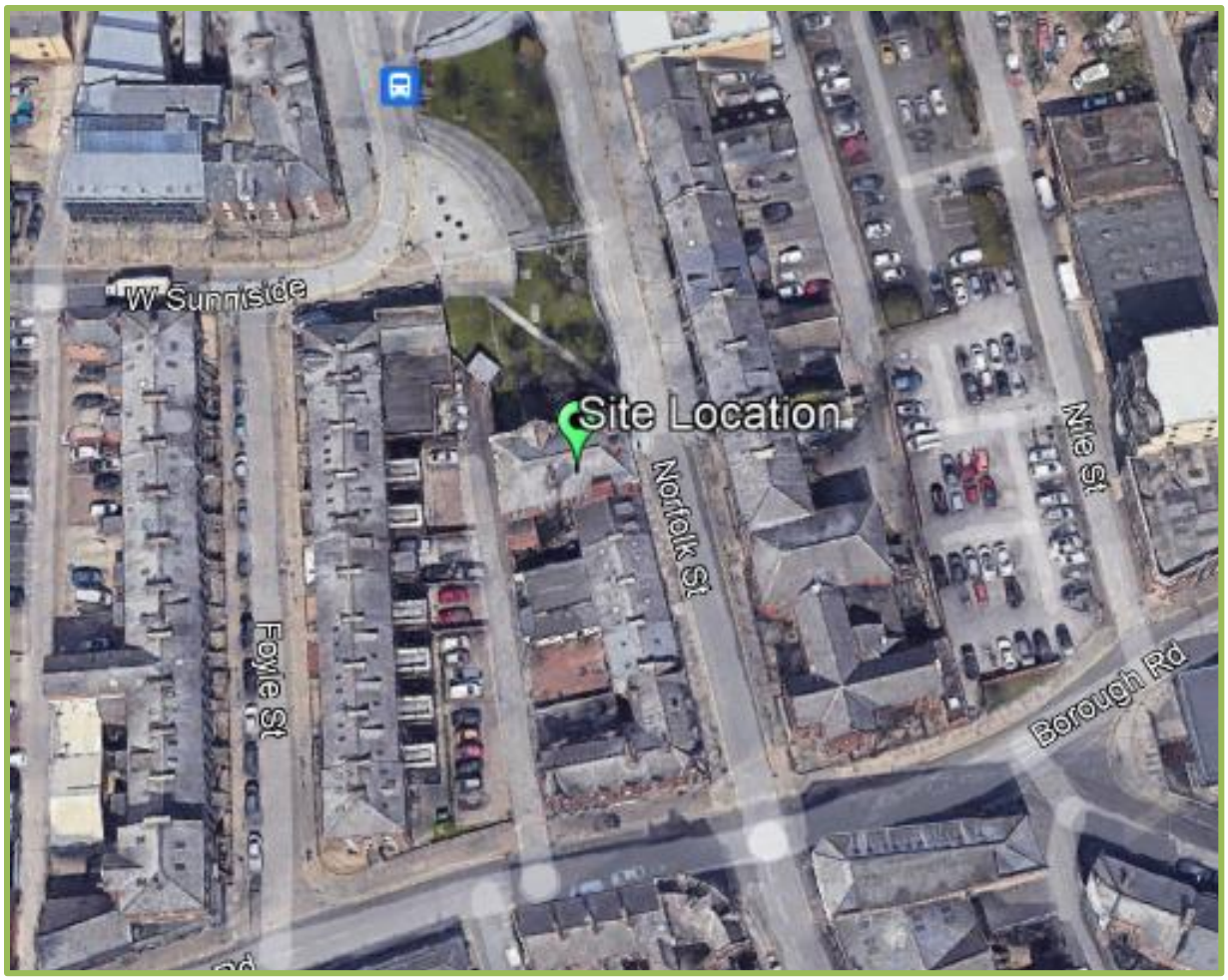
1 INTRODUCTION

1.1 Background

1.1.1 NJD Environmental Associates Ltd was instructed by Mr William Harris to undertake a noise assessment to seek prior approval for the change of use from existing offices to residential apartments at Somerford Buildings, Norfolk Street, Sunderland. The site location is provided below in Drawing 1.



Drawing 1: Site Location

1.1.2 A noise report has been prepared, with measurements taken of noise levels impacting the site, calculations performed using noise modelling software, and the results interpreted in accordance with the relevant standards.

2 ASSESSMENT METHODOLOGY

2.1 Local Authority Requirements

2.1.1 Correspondence was undertaken with Environmental Health at Sunderland City Council via email in December 2023. In the summary, the following was agreed:

- Baseline monitoring will be undertaken at 2no. locations with microphones protruding out of upper storey windows on both the eastern façade and northern / western façade.
- Based on the monitoring, noise levels from road traffic (namely Norfolk Street, Borough Road and West Sunniside) will be predicted across each elevation and each floor and assessed in accordance with the guidelines presented within BS8233:2014.
- The Manor Bar / Restaurant is located to the north of the site and has the potential to have building services plant to the rear, which if audible across the site, will be measured at source during the noise survey.
- There has been a recent planning permission (reference 22/00361/FUL) for a sui generis community space at the former Norfolk Hotel which is opposite the development and commercial noise sources associated with this will also be suitably addressed.
- Noise from these commercial / industrial sources will be assessed in accordance with BS4142:2014+A1:2019.
- Appropriate mitigation will be recommended, which given the nature of the development, will be limited to enhanced glazing and an alternative means of ventilation.

2.2 BS8233:2014 and WHO 1999 Guidance Levels

2.2.1 BS8233:2014 *'Guidance on sound insulation and noise reduction for buildings'* provides guidance for the control of noise in and around buildings. It applies to the design of new buildings, or refurbished buildings undergoing a change of use.

2.2.2 BS8233 refers to the World Health Organisation research and recommendations when defining acceptable and upper guidance noise levels within gardens during the day, and within habitable rooms in dwellings during the day and night-time periods as follows:

Table 1: Summary of BS8233 guidance noise levels			
Activity	**Location**	**0700 to 2300h**	**2300 to 0700h**
Resting	Living room	35dB LAeq,16h	-
Relaxing	Gardens	55dB LAeq,16h	-
Dining	Dining room	40dB LAeq,16h	-
Sleeping (Daytime resting)	Bedroom	35dB LAeq,16h	30dB LAeq,8h 45dB LAmax

2.2.3 The above levels have been adopted for the purpose of this assessment.

2.3 IEMA Guidelines for Environmental Noise Impact Assessment (2014)

2.3.1 Noise associated with patrons using the outdoor seating area of 'The Manor Bar' has been assessed with reference to the IEMA guidelines for environmental noise impact assessment.

2.3.2 The IEMA guidelines were introduced in 2014 and are intended to be applied to development of any scale, and include important principles for effective integration into the environmental impact assessment (EIA) process and other assessments.

2.3.3 The IEMA Guidelines for Environmental Noise Assessment address the key principles of noise impact assessment and are applicable to all development proposals where noise effects may occur. The guidelines set out key principles for noise impact assessment relevant to all types of projects, regardless of size.

2.3.4 The guidance provides advice with regards to the collection of baseline noise data, prediction of noise levels and how noise should be assessed. The guidance recognizes that the effect associated with a noise impact will be dependent on a number of factors including, but not limited to, the sensitivity of the receptor, frequency and duration of the noise source and time of day.

2.3.5 The Guidelines accept that a simple change in noise levels using a single noise indicator may fail to adequately reveal the actual noise impact of the proposal.

2.3.6 Absolute levels such as those set out in WHO Guidelines are also considered and the Guidelines suggest that a change in noise levels in an area where the existing levels are above WHO Guidelines should be considered as having more of an adverse effect than a change in noise levels in an area where existing levels are well below.

2.3.7 The Guidelines stop short of providing specific assessment criteria which developments should achieve, but instead suggests that the methodology adopted should be selected on a site-by-site basis regarding relevant national

and local standards. The Guidelines contain effect descriptors for changes in noise levels and for noise effect levels. These are summarised below:

Table 2: IEMA Impact from the Change in Sound Levels		
Long-term Impact Classification	**Short-term impact classification**	**Sound Level Change Plat**
Negligible	Negligible	> 0 dB and < 1 dB
	Minor	> 1 dB and < 3 dB
Minor	Moderate	> 3 dB and < 5 dB
Moderate	Major	> 5 dB and < 10 dB
Major		> 10 dB

2.4 BS4142:2014+A1:2019 Industrial and Commercial Sound Guidance

2.4.1 Where industrial or commercial noise is present or proposed and likely to impact a residential receptor, the guidance contained within BS 4142:2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound*' should be followed. The guidance enables the effects of such noise on people nearby to be assessed and the associated risks to be minimised.

2.4.2 The guidance provides a methodology for determining an initial estimate of significance through subtracting the measured background noise level from the rating level (the specific sound level of the source corrected for any distinctive acoustic characteristics).

2.4.3 Typically, the greater the difference, the greater the magnitude of the impact.

- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or 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.

2.4.4 The context, as defined within BS4142, relates to the following factors:

- The absolute level of sound.
- Character and level of the residual sound compared to the character and level of the specific sound.
- Acoustic design measures.

3 NOISE SURVEY

3.1 Introduction

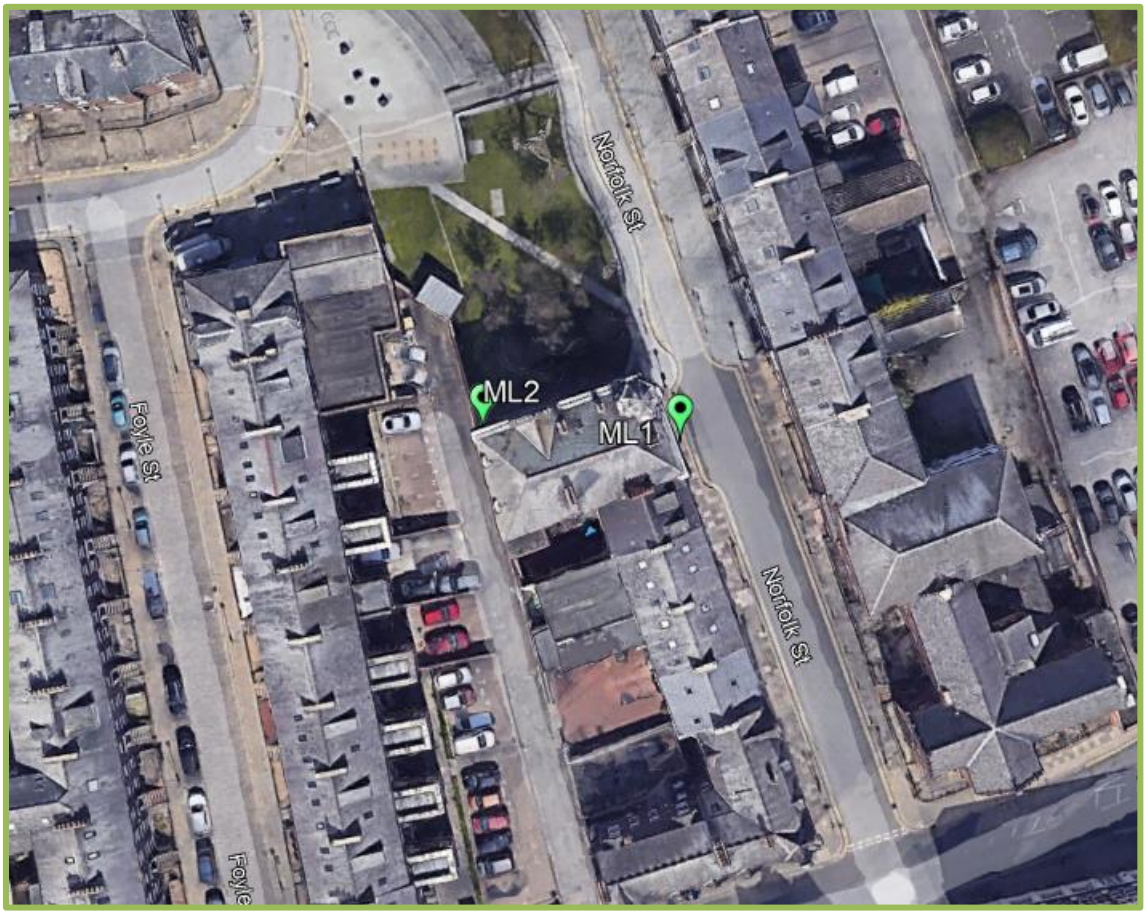
3.1.1 Between the 18th and 19th December 2023, noise measurements were taken in the vicinity of the development site, in order to quantify noise from surrounding sources.

3.1.2 Measurements were taken using Acoem Fusion sound level meters. The Class 1 instruments logged 1/3 octave levels throughout the measurements, in addition to audio recordings to aid subsequent analysis. The instruments were calibrated before and after the measurements to a reference level of 94dB, with no notable drift observed.

3.1.3 The sound level meters (SN: 14360 and 14924) and field calibrator (SN: 98108) both hold valid calibration certificates traceable to national standards, compliant with the requirements of BS7445. All calibration certificates can be made available upon request.

3.2 Monitoring Locations

3.2.1 Measurements were taken at the locations shown in Drawing 2 below.



Drawing 2: Noise monitoring locations

3.2.2 The monitoring locations were as follows:

- **ML1:** Microphone protruding approximately 1m from an open 2nd floor window on the eastern elevation, overlooking Norfolk Street and Saville Place / Borough Road.

  The measurement took place during the following dates and times:
  - 1125h on the 18th December, to 1205h on the 19th December 2023.

- **ML2:** Microphone protruding approximately 1m from an open 2nd floor window on the northern elevation, overlooking West Sunniside.

  The measurement took place during the following dates and times:
  - 1140h on the 18th December, to 1200h on the 19th December 2023.

3.2.3 During the deployment and collection of noise monitoring equipment, road traffic noise from Norfolk Street and Borough Road were found to be dominant across the site.

3.2.4 It was noted that 'The Manor Bar' is located to the north-west of the site. The seating area is located on the northern and western elevations of the bar, which

is screened away from the proposed development. Given the time of year, the outdoor area was not in use and therefore this has been assessed using surrogate data.

3.2.5 Following the site walkover, building services plant associated with The Manor Bar was noted. The plant was located on the south-eastern elevation of the bar, adjacent to the north-western corner of the proposed development. This is limited to an HVAC unit and kitchen extract as identified in Photograph 1 below.

Photograph 1: Identified Building Services Plant associated with 'The Manor Bar'

3.2.6 During the site walkover (undertaken during the daytime period) both items of plant were operational and audible when in close proximity.

3.2.7 Following a review of the monitoring data and corresponding sound files at ML2, there was identifiable noise from the building services plant audible at the elevation of the proposed development, during the night-time period (2300 – 0700) only.

3.2.8 No building services plant has been found to be audible during the daytime and the data identified during the night-time has been attributed to the HVAC unit rather than the kitchen extract, due to the kitchen extract not being operational

throughout the night-time. Therefore, only the HVAC has been assessed during the night-time.

3.2.9 Weather conditions throughout the survey were favourable; with no rainfall noted and windspeeds between 1 to 3ms^{-1} from variable directions.

Uncertainties

3.2.10 Noise measurements have been undertaken with high precision Class 1 instruments calibrated before and after the survey by an appropriately qualified and experienced technician.

3.2.11 The baseline data has been recorded over a 24-hour period during the week, when traffic movements and baseline noise levels are generally higher.

3.2.12 The noise models presented in this assessment calculate noise propagation to the methodologies contained within ISO 9613-2 Acoustic – Attenuation of sound during propagation outdoors. This gives a higher level of accuracy for the level of attenuation provided by intervening topography and barriers than the method provided by BS5228.

3.2.13 Whilst an element of uncertainty will inherently exist in any noise assessment due to the large number of potential variables, all reasonable steps have been taken to reduce this.

3.2.14 As such, the level of uncertainty should not be significant and the results and conclusions should be considered robust.

3.3 Existing Noise Levels

3.3.1 The noise levels from the identified monitoring locations are summarised in Tables 3 and 4 below.

Table 3: Summary of measured daytime noise levels (dBA)

Location	Daytime LAeq 0700 to 2300h	Daytime LA90 0700 to 2300h	Daytime LA10 0700 to 2300h	Daytime LAmax 0700 to 2300h
ML1	59	47	61	91
ML2	55	47	57	77

Table 4: Summary of measured night-time noise levels (dBA)				
Location	**Night-time LAeq 2300 to 0700h**	**Night-time LA90 2300 to 0700h**	**Night-time LA10 2300 to 0700h**	**Night-time LAmax 2300 to 0700h**
ML1	49	30	51	80
ML2	45	36	47	69

3.4 LAmax Analysis

3.4.1 WHO Guidelines for Community Noise (1999) suggests guideline values for internal noise exposure which take into consideration the identified health effects and are set, based on the lowest effect levels for general populations. The WHO (1999) recommends a guidance level of 45dB LAmax(f) within bedroom areas during the night-time, with the recommendation that;

'For intermittent noise, it is emphasized that it is necessary to take into account both the maximum sound pressure level and the number of noise events.'

3.4.2 World Health Organisation (WHO 2009), states in Section 3.4:

3.4.3 *'For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB LAmax more than 10 – 15 times per night.'*

3.4.4 The ProPG Noise further expands this point with reference to BS8233 Table 4, Note 4, stating:

'In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB LAmax,F more than 10 times a night.'

3.4.5 In light of the above, analysis has been conducted based on the LAmax events observed during the night-time period at ML1 and ML2. The analysis found that the 10th highest measured LAmax during the night-time period at ML1 and ML2 was 69dB and 61dB respectively. These levels have therefore been adopted for use in the noise modelling exercise, as detailed in the following Section.

4 CADNAA NOISE MODELS

4.1 Input Data

4.1.1 Topographic data of the site and surrounding land has been incorporated into the noise models, with buildings and roads positioned to reflect the proposed future conditions.

4.1.2 For the purpose of these calculations, the ground absorption has been set to G=0.5 (which represents a mixture of acoustically hard and soft ground around

the site), with buildings and roads also set to G=0, with two orders of reflection considered.

Existing Road Traffic

4.1.3 The models have been programmed to assess scenarios based on the daytime (0700 to 2300h) and night-time (2300 to 0700h) periods. The building evaluation function has been utilised to calculate noise levels at every floor on each elevation, based on the heights of windows from architect plans.

4.1.4 Point (LAmax(f)) and line (LAeq,T) sources have been set using the data presented in the Section 3.

The Manor Bar Outdoor Seating Area

4.1.5 Given that the outdoor seating area of The Manor Bar was unoccupied throughout the monitoring, patron noise associated with the use of the outdoor seating areas has been evaluated based on Hayne, M.J. *et al* (2011) *'Prediction of Noise from Small to Medium Sized Crowds'*, which provides example sound pressure levels ranging from 'whispering' to 'maximal shout' for human voices.

4.1.6 The data is summarised in Table 5 below:

Table 5: Summary of Sound Pressure Levels at 1m

Description	Speech Level (Lp dBA)
Whispering	36
Soft	42
Relaxed	48
Relaxed, normal	54
Normal, raised	60
Raised	66
Loud	72
Very loud	78
Shouting	84
Maximal Shout	90
Maximal shout (individual cases)	96

4.1.7 It is expected that the patrons will generally talk at somewhere between a 'relaxed' to a 'normal raised' voice for the majority of the time.

4.1.8 However, there will also inevitably be times where individuals may express 'raised' voices depending on the nature of the circumstances. Equally, there will also be periods of quiet, where individual patrons will not make any noticeable noise at all.

4.1.9 On balance it is felt that a robust assessment can be conducted on the basis that approximately 50% of the patrons will be talking at any one time, and that on average a 'normal raised' voice (60dBA at 1m) would be typical for the individual speaker.

4.1.10 The above factors have therefore been used within the models to calculate the operational noise impact of patrons using the outdoor seating area. The sources have been programmed as omnidirectional point sources positioned at the known seating areas.

Existing Building Services Plant

4.1.11 Examination of the sound level data and corresponding sound files at ML2 have identified that no building services plant is audible or distinguishable at the elevation of the development during the daytime period (0700 – 2300).

4.1.12 However, during the night-time period, the HVAC unit associated with The Manor Bar can be characterised. The monitoring has shown the HVAC unit switches on / off routinely throughout the night-time period (2300 – 0700) with a sound pressure level of 46 dBA at ML2 when operational, without accounting for on-time.

4.1.13 The sound power level has been determined based on the reference on-time. Analysis of the noise measurements showed that the HVAC unit operates approximately 50% of the time during the night-time and therefore the calculation has been performed as summarised below:

Table 6: Sound Power Calculation of Building Services Plant

Sound Pressure Level (dB Lp)	Directivity, Q	Distance from Source (m)	Sound Power Level (dB Lw)	On-time (min)	Reference Period (min)	Sound Power Corrected for On Time (dB Lw)
46	2	11.8	75	7.5	15	72

4.1.14 This has been represented in the model as a point source.

Nearby Proposed Redevelopment

4.1.15 Following correspondence with Sunderland City Council, it was outlined the report should consider any potential impacts in relation to noise associated with the proposed redevelopment of Norfolk Hotel, in to a Sui-generis Community Space, located to the east of Somerford Buildings.

4.1.16 Noise from the development is limited to proposed building services plant. Following a review of the submitted noise information and proposed site plans, the position of building services plant is not yet finalised. It is however considered likely to be located on the eastern side/ rear of the building (rather than the western side / front of the building facing Norfolk Street) which would be screened away from Somerford Buildings.

4.1.17 Furthermore, Condition 5 of the planning permission limits any building service plant to not exceed 36 dB during the night-time at the nearest sensitive receptors. Assuming a 15 dB attenuation through an open window, resultant noise levels from any plant associated with the development would be significantly below the internal guideline limit as presented within BS8233 of 30 dB within bedrooms during the night-time period.

4.1.18 It is therefore concluded that any noise from the redevelopment of Norfolk Hotel will not have any adverse impact on the proposed residential use at Somerford Buildings.

4.2 Noise Model Results

Road Traffic Noise

4.2.1 The results from each scenario assessed in all areas of the development at first floor level are shown in Figures 1 to 3.

4.2.2 Table 7 summarises the highest levels expected across the development during the respective day and night-time periods.

Table 7: Summary of highest modelled noise levels across the development			
PSR Location (Elevation)	**LAeq,16h**	**LAeq,8h**	**LAmax**
Ground Floor			
Eastern	61	50	71
Northern	56	45	65
Western	52	48	50
Southern	45	44	40
First Floor			
Eastern	61	51	71
Northern	56	45	65
Western	52	48	52
Southern	48	47	42
Second Floor			
Eastern	60	50	70
Northern	56	45	64
Western	52	48	53
Southern	48	47	47

4.2.3 The modelled levels have been used with reference to the required standards to determine appropriate mitigation, as discussed in the following Sections.

Outdoor Seating Area Noise and Building Services Plant

4.2.4 The results are shown in Figures 4 and 5 and summarised below in Table 8. The highest predicted noise level at proposed development façade at each floor has been used as part of this assessment.

Table 8: Summary of Predicted Noise levels (dBA)			
Noise Source	**Ground Floor**	**First Floor**	**Second Floor**
Outdoor Seating Area	32	32	32
External Plant	46	45	44

4.3 Noise Model Factors, Limitations and Uncertainties

4.3.1 The noise models presented in this assessment calculate noise propagation to the methodologies contained within ISO 9613-2 Acoustic – Attenuation of sound during propagation outdoors. This gives a higher level of accuracy for the level of attenuation provided by intervening topography and barriers than the method provided by BS5228.

4.3.2 All noise level predictions are based on simplified models of sound generation and propagation; however, some local conditions such as gusts of wind or bursts of turbulence in the air are too complex to be factored into the algorithms.

4.3.3 The noise models may therefore be subject to some minor uncertainties; however, it is noted that all predictions assume theoretical down-wind propagation from all sources to all receptors, and as such the models are more likely to over-predict noise levels compared to real-life conditions.

4.3.4 The primary factor that governs the validity of the models is the quality of the input data. As such, all practicable means have been explored to ensure that the data used in the models is as accurate as possible.

5 BS8233 ASSESSMENT OF NOISE LEVELS IN LIVING ROOMS AND BEDROOMS

5.1 Living Rooms and Bedrooms During the Daytime

5.1.1 During the daytime period, BS8233 recommends a guidance level of 35dB LAeq,16h inside living room and bedroom areas.

5.1.2 WHO (1999) indicates that with a window partially open for ventilation, approximately 15dB of attenuation from external noise sources should be achieved.

5.1.3 On this basis, living rooms or bedrooms located on the majority of elevations of the development will not achieve internal guidance levels without the provision of some form of acoustic ventilation and enhanced glazing.

5.2 Bedrooms During the Night-time

5.2.1 During the night-time period, BS8233 recommends a guidance level of 30dB LAeq,8h and 45dB LAmax inside bedroom areas.

5.2.2 As per the daytime requirements, bedrooms located on the majority of elevations of the development will not achieve the guidance levels with windows open.

5.2.3 Appropriate mitigation measures are discussed in Section 7.

6 ASSESSMENTS OF OUTDOOR SEATING AREA AND BUILDING SERVICES PLANT

6.1 Baseline and Background Noise Levels

6.1.1 To derive appropriate baseline and background noise levels at the ESRs considered, noise measurements taken from ML2 have been used.

6.1.2 In order to consider a worst case, the noise levels exclude the operation of the existing building services plant.

Table 9: Summary of Ambient and Background Noise Levels at ML2 (dB)		
Assessment Period	**LAeq**	**LA90**
2300 – 0700h	43	35

6.1.3 The selected levels are considered representative of those experienced at proposed development.

6.2 Outdoor Seating Area Noise Assessment

6.2.1 The modelled noise levels from patrons using the identified outdoor seating area are shown at Figure 4 and summarised in Table 10 below.

6.2.2 The predicted levels from this scenario have been compared to the measured baseline noise levels.

6.2.3 The data from Table 9 indicates that the baseline noise levels can be expected to be 43 dB LAeq,T during a night-time (23:00 -07:00).

6.2.4 Assuming the lower figure for the baseline noise level and the highest predicted noise level for operational noise, for the purpose of a robust assessment, the IEMA process has been conducted as follows:

Table 10: Summary of IEMA Assessment	
Description	**Proposed Development**
Measured Baseline (dB LAeq)	43
Operational Noise (i.e., Noise from outdoor seating area and car park) (dB LAeq)	32
With Development (i.e., Baseline and operational noise log addition) (dB LAeq)	43
Predicted Resultant Increase over Baseline Noise Level (dB LAeq)	0
IEMA Significance of Impact (short term)	Negligible
IEMA Significance of Impact (long term)	Negligible

6.3 Building Services Plant Noise Assessment

6.3.1 Table 11 below presents the findings of the BS4142 assessment for the existing building services plant during the night-time period.

Table 11: BS4142 Assessment		
Results	**Noise level (dB)**	**Commentary**
Specific sound level	46	Based on the calculated levels from Figure 5.
Acoustic feature correction	+3	There are no tonal or impulsive characteristics that would be perceptible at the proposed development and therefore no corrections are required. The monitoring showed a clear on/off pattern of the HVAC throughout the night-time and therefore it is clear that intermittency is present and a correction has been applied to account for this.
Rating level	49	Specific noise level corrected for acoustic features
Background sound level	35	Reference Table 9
Excess of rating over background sound level	+14	Rating level minus background level
Initial assessment of impact	**S/A**	Negligible (**N**); Low (**L**); Minor Adverse (**M/A**); Adverse (**A**); Significant Adverse (**S/A**)
Assessment of Context	The initial assessment indicates that noise associated with existing building services plant during the night-time may result in a significant adverse impact, depending on the context. The context is assessed below: The specific noise level is predicted to be up to 46 dB LAeq,T at the closest receptor during the night-time period. Assuming 15dB of attenuation for a partially open window (WHO 1999), internal noise levels would be marginally above the BS8233 internal guidance levels for bedrooms during the night-time.	
Conclusion	It is concluded that noise from the commercial source may be of a level that causes a change in behaviour or attitude to the receptor. Therefore, additional mitigation has been considered in the section below.	

7 MITIGATION MEASURES TO ACHIEVE INTERNAL GUIDANCE LEVELS

7.1.1 The receiving rooms subject to the highest potential impact are generally those with the greatest ratio of window area to room volume, in closest proximity to the dominant noise sources surrounding the development.

7.1.2 Table 7 above outlines the locations most exposed to noise ingress during both the daytime and night-time periods of each elevation.

7.1.3 The differences in resultant noises on each floor varies little between ground to second floor and therefore the highest noise level has been used to derive the mitigation across the whole elevation.

7.1.4 Based on the results from modelling, the levels of attenuation required to achieve the internal guidance levels for noise sensitive rooms of the development are summarised in Table 12 below.

Table 12: Highest attenuation requirements			
	LAeq,16h	**LAeq,8h**	**LAmax**
Eastern Elevation			
Level at façade of receptor (dBA)	61	51	71
Guidance level (dBA)	35	30	45
Level of attenuation required (dBA)	26	21	26
Northern Elevation			
Level at façade of receptor (dBA)	56	45	65
Guidance level (dBA)	35	30	45
Level of attenuation required (dBA)	21	No requirement*	20
Western Elevation			
Level at façade of receptor (dBA)	52	48	53
Guidance level (dBA)	35	30	45
Level of attenuation required (dBA)	17	18	No requirement*
Southern Elevation			
Level at façade of receptor (dBA)	48	47	47
Guidance level (dBA)	35	30	45
Level of attenuation required (dBA)	No requirement*	17	No requirement*

** Internal noise levels are met assuming 15 dB attenuation through an open window and therefore there is no requirement for additional attenuation.*

7.1.5 Tables 13 - 16 below summarises the calculations based on equations provided by BS8233 and BS EN12354-3 for performing detailed noise break-in for composite facades and individual façade elements such as ventilators. The equations are shown below.

$$L_2 = L_{1,in} - R + 10 \times Log\,(S/V) + 10 \times Log(T) + 11$$

$$L_2 = L_{1,in} - D_{n,e} - 10 \times Log\,(V) + 10 \times Log(T) + 21$$

7.1.6 The calculation uses dimensions of glazing and façade elements from the

apartments experiencing the highest noise impact in combination with the highest glazing to internal room volume ratio.

7.1.7 As part of the assessment, reference has been made to appropriate literature to provide an estimate of the typical noise attenuation that could be expected from existing and retained building elements.

7.1.8 With reference to Table E.2 of BS8233:1999, it could reasonably be expected that the walls of the dwellings will achieve sound insulation in the range of 45 to 50dB DnT,w.

7.1.9 Adopting the lower figure for the purpose of a robust assessment at this stage of the development, a glazing and ventilation scheme can be recommended across each elevation to help achieve internal guidance levels. The calculations are presented in Tables 13 - 16 below.

Table 13: Summary of calculated levels (Eastern Elevation)

	Total Area / No. Vents	**125Hz**	**250Hz**	**500 Hz**	**1kHz**	**2kHz**
Glazing; Rw + Ctr 33 dB (e.g 10/12/6mm or equivalent)	4.0m²	25	29	34	39	37
Acoustic Ventilation; Dnew + Ctr 37 dB (e.g Titon SFXSA V75/C75 5000EA or equivalent	2no.	38	35	32	40	46
Composite Façade Attenuation	29 dB					

Summary of Calculated Noise Levels

	Daytime (dB LAeq)	**Night-time (dB LAeq)**	**Night-time (dB LAmax)**
External Noise Level	61	51	71
Internal Noise Level	32	22	42

Table 14: Summary of calculated levels (Northern Elevation)						
	Total Area / No. Vents	**125Hz**	**250Hz**	**500 Hz**	**1kHz**	**2kHz**
Glazing; Rw + Ctr 27 dB (e.g 4/12/4mm or equivalent)	1.9m²	21	15	24	36	39
Acoustic Ventilation; Dnew + Ctr 37 dB (e.g Titon SFXSA V75/C75 5000EA or equivalent	2no.	38	35	32	40	46
Composite Façade Attenuation	25 dB					
Summary of Calculated Noise Levels						
	Daytime (dB LAeq)			**Night-time (dB LAmax)**		
External Noise Level	56			65		
Internal Noise Level	31			40		

Table 15: Summary of calculated levels (Western Elevation)						
	Total Area / No. Vents	**125Hz**	**250Hz**	**500 Hz**	**1kHz**	**2kHz**
Glazing; Rw + Ctr 27 dB (e.g 4/12/4mm or equivalent)	5.5m²	21	15	24	36	39
Acoustic Ventilation; Dnew + Ctr 34 dB (e.g Titon SFXSA V25/C25 2500EA or equivalent	4no.	38	38	34	32	42
Composite Façade Attenuation	22 dB					
Summary of Calculated Noise Levels						
	Daytime (dB LAeq)			**Night-time (dB LAeq)**		
External Noise Level	52			48		
Internal Noise Level	30			26		

Table 16: Summary of calculated levels (Southern Elevation)						
	Total Area / No. Vents	**125Hz**	**250Hz**	**500 Hz**	**1kHz**	**2kHz**
Glazing; Rw + Ctr 27 dB (e.g 4/12/4mm or equivalent)	4m²	21	15	24	36	39
Acoustic Ventilation; Dnew + Ctr 34 dB (e.g Titon SFXSA V25/C25 2500EA or equivalent	4no.	38	38	34	32	42
Composite Façade Attenuation	19 dB					
Summary of Calculated Noise Levels						
	Night-time (dB LAeq)					
External Noise Level	47					
Internal Noise Level	28					

7.1.10 The results from the tables above demonstrates that the recommended glazing and ventilation scheme can achieve the internal guidance levels based on the requirements for the worst-case living rooms and bedrooms.

7.1.11 Given there are areas which are screened away from noise sources (specifically on the southern elevation) there are areas on certain floors which have no specific glazing / ventilation requirement. The final glazing and ventilation scheme for each floor are presented illustratively in Figures 6 – 8.

7.2 Existing Building Services Plant Noise Mitigation.

7.2.1 As shown within Section 6 above, without additional mitigation at the proposed development there is potential adverse impacts which may arise from the adjacent building services plant associated with The Manor Bar.

7.2.2 The absolute noise levels as assessed above, and the mitigation derived from them, are inclusive of the specific noise levels from the building services plant.

7.2.3 Given the nature of the site and the absence of any external amenity spaces, the introduction of physical screening between the building and plant is not a viable mitigation option to reduce noise levels at the elevation of the building, nor is repositioning sensitive spaces within the building. Therefore, the only feasible mitigation measure would be to introduce façade mitigation.

7.2.4 BS4142:2014+A1:2019 states the following:

'Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors in consideration, including the following…

… The sensitivity of the 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:

i) Façade insulation treatment;

ii) Ventilation and/or cooling that will reduce the need to have windows open as to provide rapid or purge ventilation…'

7.2.5 Enhanced glazing (façade insulation treatment) and an alternative means of ventilation is being provided on all floors on both the northern and western elevations of the proposed development (which have direct line of sight to the plant) and therefore, in accordance with the guidance, will have less sensitivity when it comes to noise.

7.2.6 Therefore, with this mitigation implemented at the site, noise impact from the plant is considered to be reduced to a minimum and any impact should reside at or below the 'LOAEL' in accordance with the NPSE and PPG Noise.

8 ACOUSTIC DESIGN STATEMENT

8.1 Introduction

8.1.1 In accordance with the ProPG: Planning and Noise, an acoustic design statement has been prepared to supplement the noise assessment report.

8.1.2 The statement has been informed by the results presented in the previous sections of this report, and also based on the discussions, processes and limitations considered during the design of the development prior to submission of this prior approval.

8.2 Internal Guidance Levels

8.2.1 The ProPG recommends where it is not considered practical to achieve the internal noise level guidelines with windows open, justification should be provided to the LPA setting out the reasons for this.

8.2.2 To ensure that land is utilised in an efficient and economical way, increasing the stand-off from the surrounding transport links is not considered viable option.

8.2.3 There is no scope to introduce acoustic fencing towards the perimeter of the site.

8.2.4 The only other viable means for reducing internal noise levels to an acceptable standard would therefore be through either the reorientation of internal layouts (i.e., moving noise sensitive rooms away from the main noise sources) or through the use of an alternative means of ventilation.

8.2.5 Due to the proportion of apartments affected and limited space available, the reorientation of bedrooms is not considered a realistic, economical or proportionate solution.

8.2.6 It is therefore recommended that the most practical solution to achieve guidance levels is through the reliance on some form of acoustic ventilation in noise sensitive rooms.

8.2.7 Where limiting factors exist that make achieving internal guidance levels with windows open impractical, acoustic ventilation is considered a suitable solution that meets the good acoustic design test, as per Paragraph 2.33 to 2.34 of the ProPG, which states:

"It should be noted that the acoustic performance of the building envelope will be reduced in the event windows are opened for ventilation or cooling purposes, typically reducing the insulation to no more than 10 to 15 dB(A).

Most residents value the ability to open windows at will, for a variety of reasons, and LPAs should therefore normally request that designers principally aim, through the use of good acoustic design, to achieve the internal noise level guidelines in noise-sensitive rooms with windows open. Where internal noise levels are assessed with windows closed the justification for this should be included in the ADS.

Where the LPA accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment.

In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide "whole dwelling ventilation" in accordance with Building Regulations Approved Document F (e.g. trickle

ventilators) in the open position (see Supplementary Document 2). Furthermore, in this scenario the internal LAeq target noise levels should not generally be exceeded."

8.2.8 It is felt that in this circumstance, with due consideration to the factors set out above, achieving the guidance levels through use of an alternative means of ventilation is a suitable solution that meets the good acoustic design test.

9 ACOUSTIC DESIGN SUMMARY

9.1.1 Table 17 summarises the recommendations for glazing and ventilation across the different areas of the site.

Table 17: Glazing and ventilation requirements summary

Principle Elevation	Rooms	Glazing	Ventilation
Eastern	Bedrooms and Living rooms	Rw + Ctr 33 dB e.g., 10/12/6mm (or equivalent)	Dnew + Ctr 37 dB e.g., Titon SFXSA V75/C75 5000EA (or equivalent)
Northern		Rw + Ctr 27 dB e.g., 4/12/4mm (or equivalent)	Dnew + Ctr 37 dB e.g., Titon SFXSA V75/C75 5000EA (or equivalent)
Western		Rw + Ctr 27 dB e.g., 4/12/4mm (or equivalent)	Dnew + Ctr 34 dB e.g., Titon SFXSA V24/C25 2500EA (or equivalent)
Southern			

***Notes**: These recommendations apply to noise sensitive rooms (living rooms and bedrooms) with the applicable elevations shown on Figures 6 – 8. All unmarked facades have no specific requirement.*

It should be noted that the above mitigation strategy assumes a background ventilation system with intermittent extract fans only. If a continuous mechanical extract ventilation were to be installed, then the equivalent area of background ventilation can be reduced in accordance with Approved Document Part F. This may result in a reduced number / specification of vents required which in turn may result in a reduced specification requirement for the glazing for which it is sited. The final glazing and ventilation design should be reviewed by an acoustician.

10 OVERHEATING

10.1.1 Building Regulations Approved Document Part O was published on 15th June 2022. Section 3 states the following in relation to noise:

"In locations where external noise may be an issue (for example. Where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

Windows are likely to be closes during sleeping hours if noise within bedrooms exceeds the following limits.

a. 40 dB LAeq,T, averaged over 8 hours (between 11pm and 7am).

b. 55 dB LAFmax, more than 10 times a night (between 11pm and 7am).

Where in-situ noise measurements are used as evidence that these limits are not exceeded measurements should be taken in accordance with the Association of Noise Consultants' Measurement of Sound Level in Buildings with the overheating mitigation strategy in use."

10.1.2 Whilst the document relates to Building Regulations, it has been considered within this assessment at the planning stage as the most appropriate guidance to follow to identify which facades are likely to exceed the criteria outlined above. This is based on the measured and resulting modelled noise levels identified within this report.

10.1.3 Resultant noise levels are shown within the sections above. Based on these modelled noise levels, areas overlooking Norfolk Street are unlikely to be able to rely on openable windows for ventilation purposes and therefore a ventilation strategy has been designed accordingly above.

10.1.4 It should be noted that windows will be openable (i.e., not sealed) and residents have the choice to open windows if required, whilst accepting that the guideline internal noise levels are exceeded.

10.1.5 However, as the identified areas are unable to rely on openable windows to provide ventilation, an overheating assessment may be required to comply with Building Regulations, i.e., post planning.

11 CONCLUSION

11.1 Introduction

11.1.1 NJD Environmental Associates has undertaken a noise assessment seeking prior approval for the change of use from offices to new residential apartments at Somerford Buildings, Norfolk Street, Sunderland.

11.2 BS8233 and WHO Assessment

11.2.1 The BS8233:2014 assessment found that noise sensitive rooms in the majority of areas will require an enhanced double-glazing scheme coupled with an alternative means of acoustic ventilation to achieve the internal guidance noise levels.

11.2.2 Noise break-in calculations have demonstrated appropriate schemes of glazing and ventilation that can be adopted, with the details summarised in Table 17 and Figures 6 - 8.

11.2.3 Night-time noise levels identified that receptors overlooking Norfolk Street are likely to exceed the noise criteria outlined within Approved Document Part O and therefore are unable to rely on openable windows to mitigate overheating. An overheating assessment may therefore be required.

11.3 Outdoor Seating Area

11.3.1 An assessment of noise associated with the use of the outdoor seating area of The Manor Bar has been conducted with reference to IEMA guidelines.

11.3.2 The assessment found that noise from a worst-case scenario i.e., full occupation of the outdoor seating area is likely to result in an overall negligible impact in both the short and long-term, when assessed against the respective measured baseline noise levels.

11.4 BS4142 Assessment

11.4.1 The main industrial noise source found to impacting the site was building services plant (namely a HVAC unit and kitchen extract) associated with The Manor Bar to the west of the site.

11.4.2 The data log and audio files recorded were reviewed in order to determine and characterise the specific noise level.

11.4.3 In the absence of any mitigation, the plant is likely to be at a level which may result in an adverse impact. However additional mitigation is recommended in

the form of enhanced façade insulation as well as an alternative means of ventilation to allow the occupant to maintain ventilation requirements without the need to open windows. With this additional mitigation, the noise will likely at or below the LOAEL in accordance with the NPSE and PPG Noise.

11.4.4 It is concluded that subject to the recommended mitigation measures being implemented, noise should not be a prohibitive factor in the determination of this prior approval.

Environmental Associates

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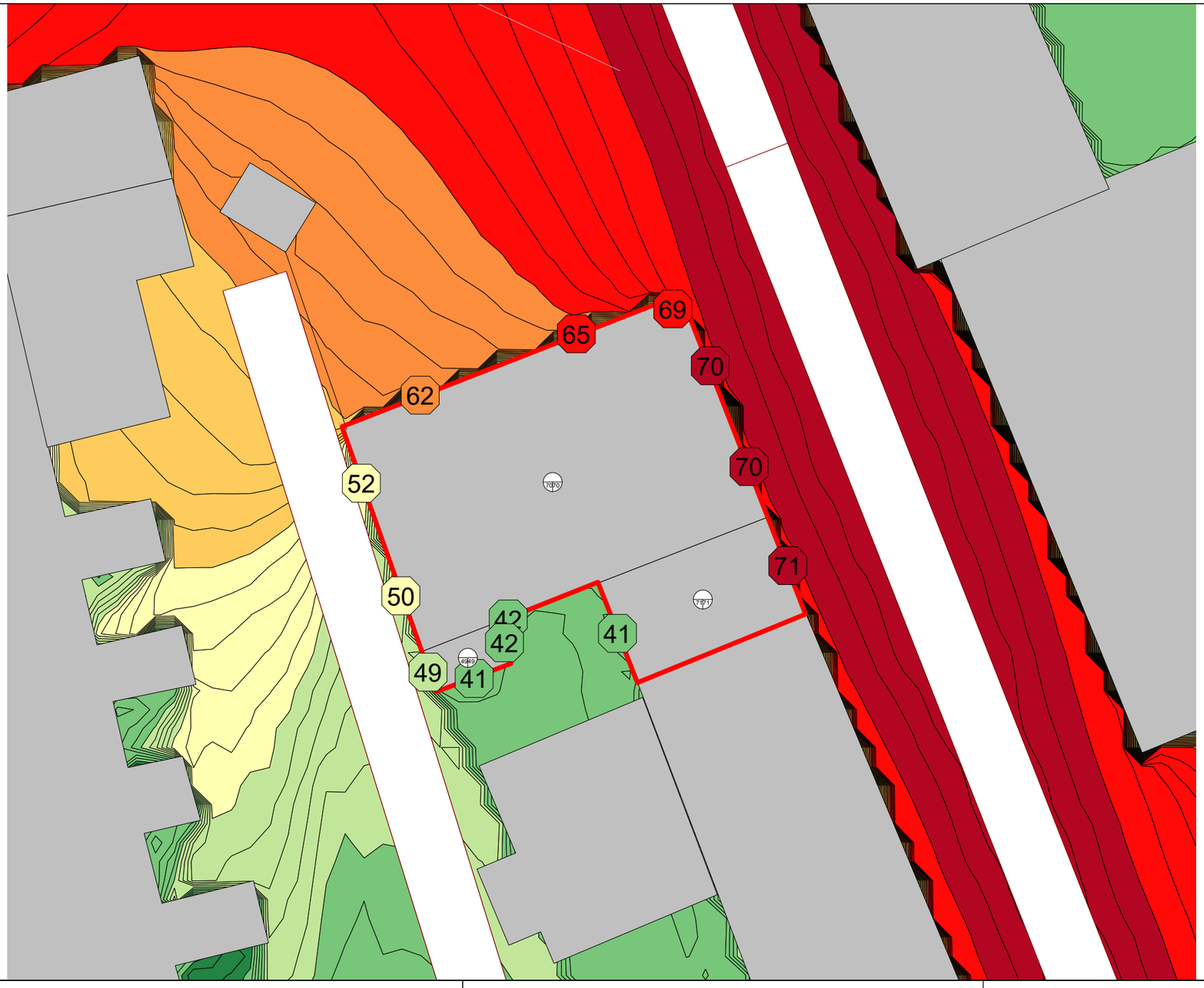
Company Registration No 10956987

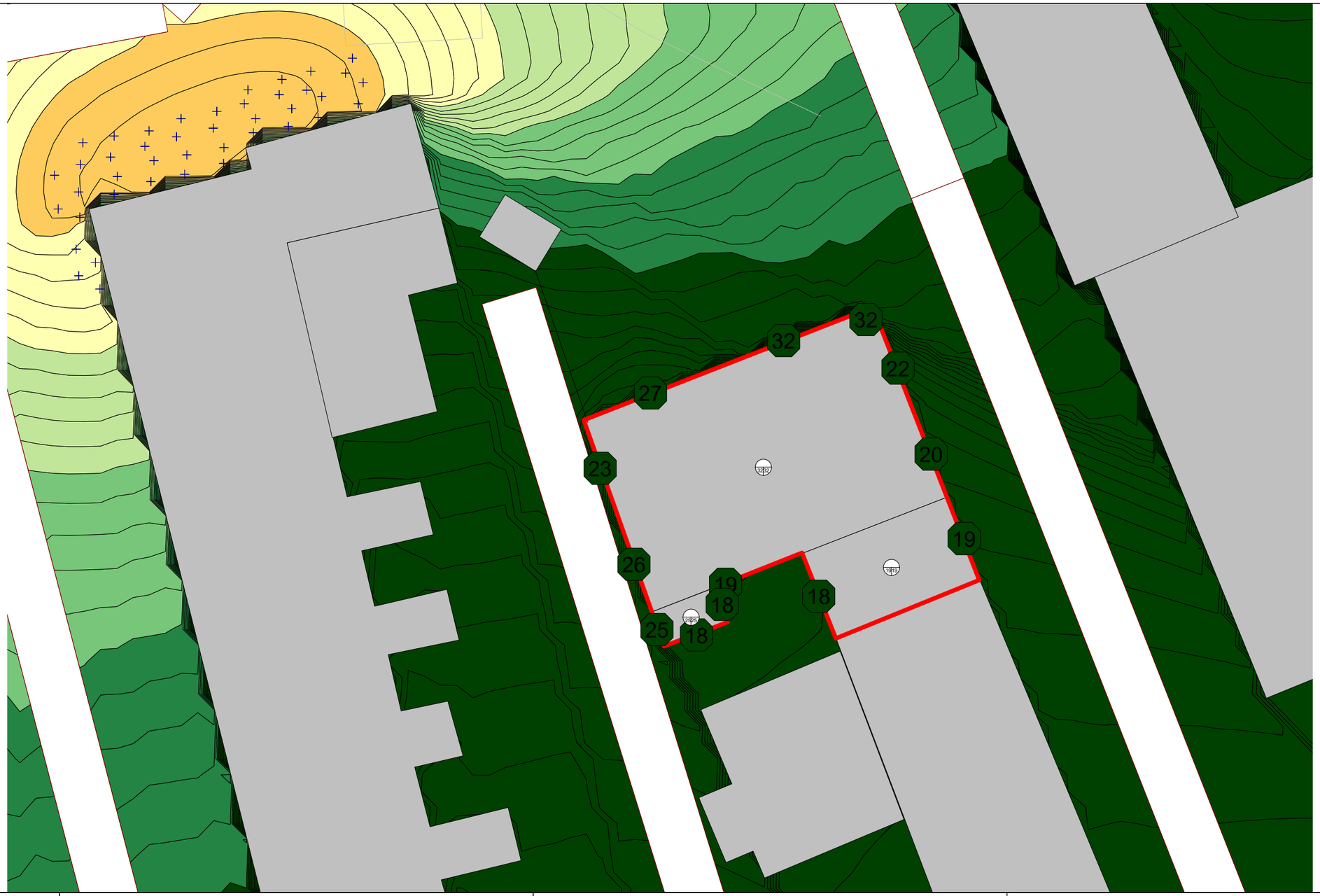
njd Environmental Associates

Client: Mr William Harris	Figure 1: Daytime LAeq,16hr (First Floor)	0 <= ... < 35 35 <= ... < 40 40 <= ... < 45 45 <= ... < 50 50 <= ... < 55 55 <= ... < 60 60 <= ... < 65 65 <= ... < 70 70 <= ... < 75 75 <= ... < 80 80 <= ...	N
Job Title: NJD23-0107 Somerford Buildings	Drawn By: Lewis Kelter		Date: Jan 2024

njd Environmental Associates	Client: Mr William Harris	Figure 2: Night-time LAeq,8hr (First Floor)	0 <= ... < 35 35 <= ... < 40 40 <= ... < 45 45 <= ... < 50 50 <= ... < 55 55 <= ... < 60 60 <= ... < 65 65 <= ... < 70 70 <= ... < 75 75 <= ... < 80 80 <= ...
	Job Title: NJD23-0107 Somerford Buildings	Drawn By: Lewis Kelter	Date: Jan 2024



njd Environmental Associates	Client: Mr William Harris	Figure 3: Night-time LAmax (First Floor)	0 <= ... < 35 35 <= ... < 40 40 <= ... < 45 45 <= ... < 50 50 <= ... < 55 55 <= ... < 60 60 <= ... < 65 65 <= ... < 70 70 <= ... < 75 75 <= ... < 80 80 <= ...
	Job Title: NJD23-0107 Somerford Buildings	Drawn By: Lewis Kelter	Date: Jan 2024



njd Environmental Associates

Client:
Mr William Harris

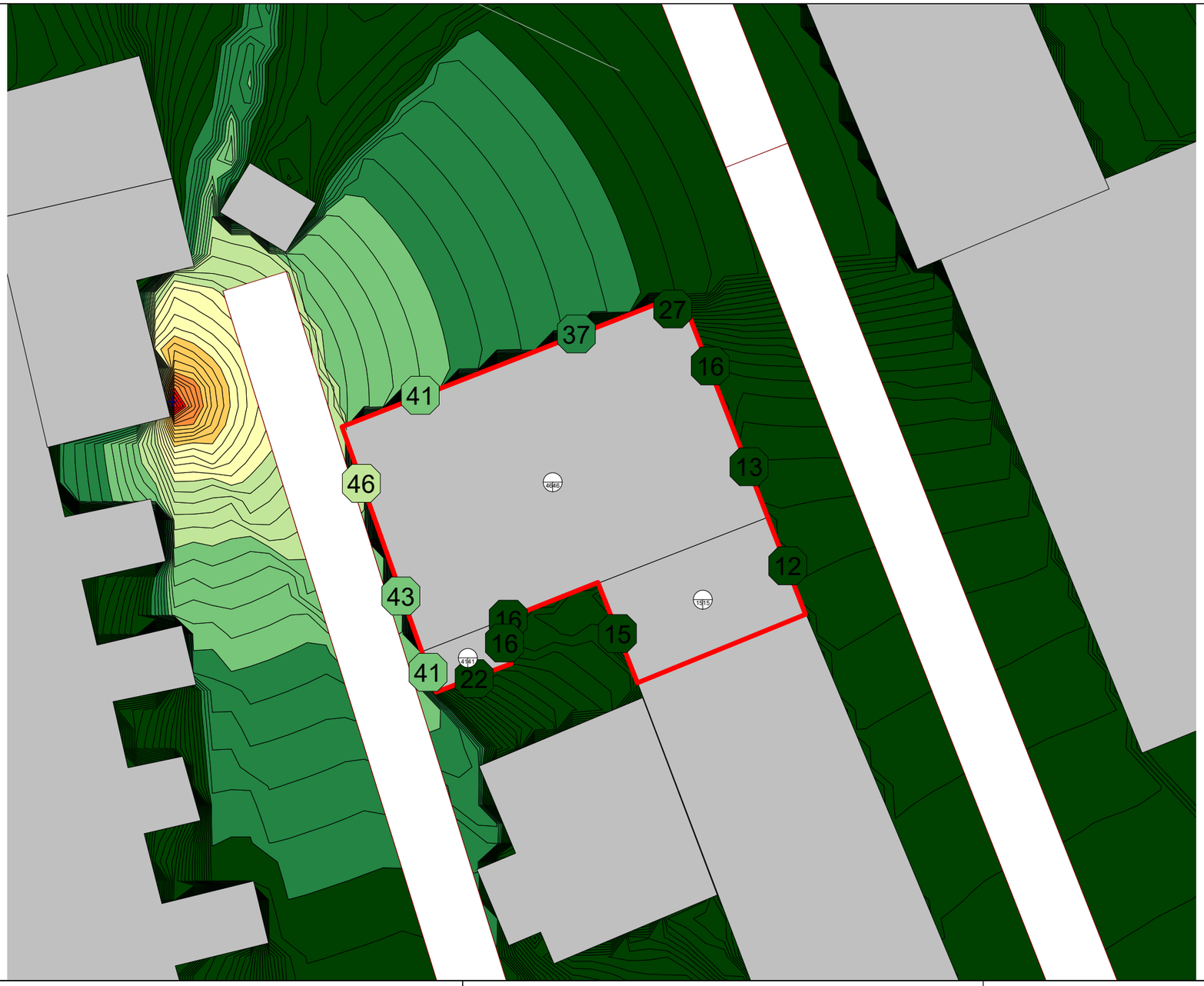
Figure 4:
Outdoor Seating Area Noise LAeq,T

- 0 <= ... < 35
- 35 <= ... < 40
- 40 <= ... < 45
- 45 <= ... < 50
- 50 <= ... < 55
- 55 <= ... < 60
- 60 <= ... < 65
- 65 <= ... < 70
- 70 <= ... < 75
- 75 <= ... < 80
- 80 <= ...

Job Title:
NJD23-0107
Somerford Buildings

Drawn By:
Lewis Kelter

Date:
Jan 2024



njd Environmental Associates

Client:
Mr William Harris

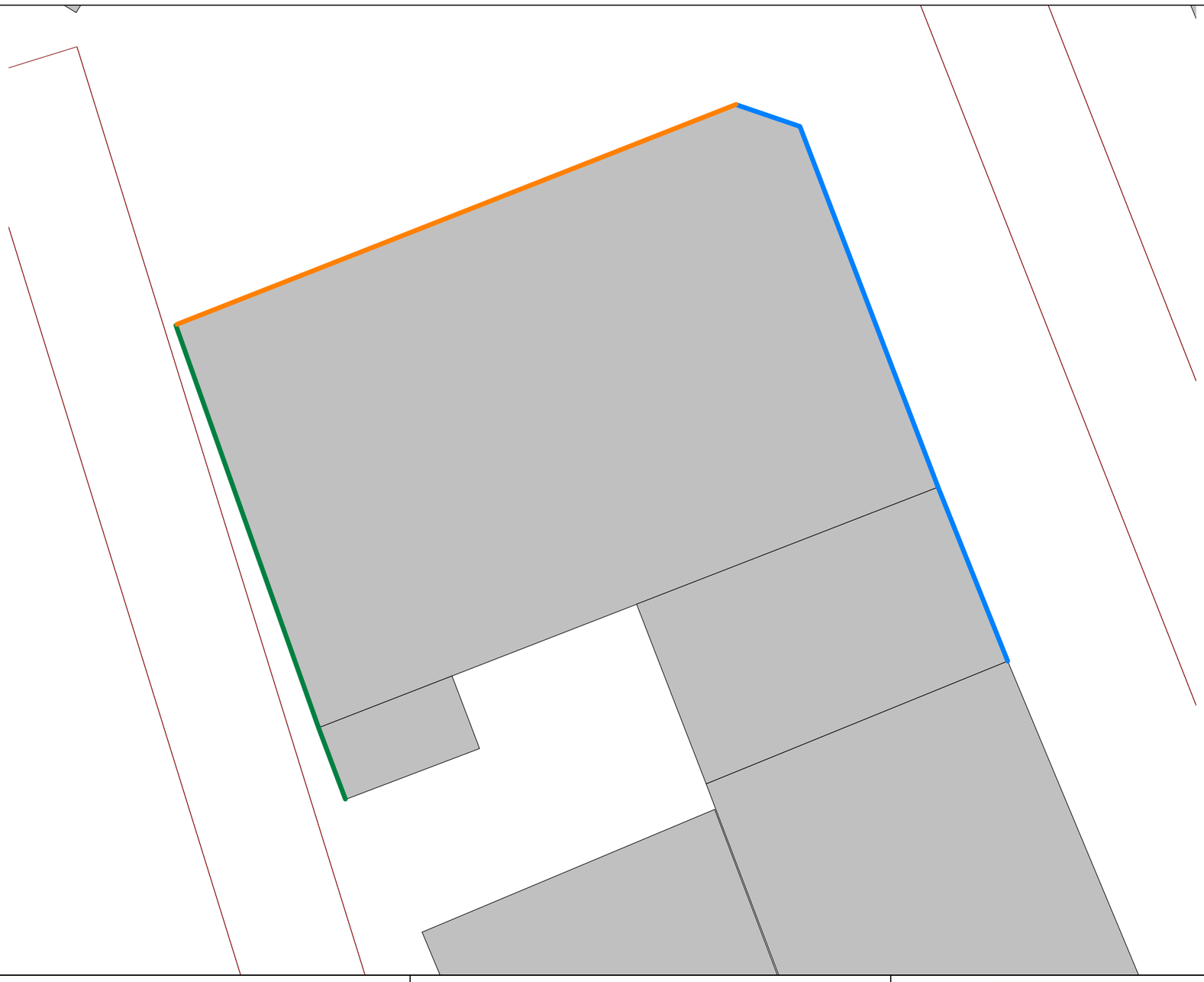
Figure 5:
Existing Building Services Plant
Night-time Specific Noise LAeq,15mins

0 <= ... < 35
35 <= ... < 40
40 <= ... < 45
45 <= ... < 50
50 <= ... < 55
55 <= ... < 60
60 <= ... < 65
65 <= ... < 70
70 <= ... < 75
75 <= ... < 80
80 <= ...

Job Title:
NJD23-0107
Somerford Buildings

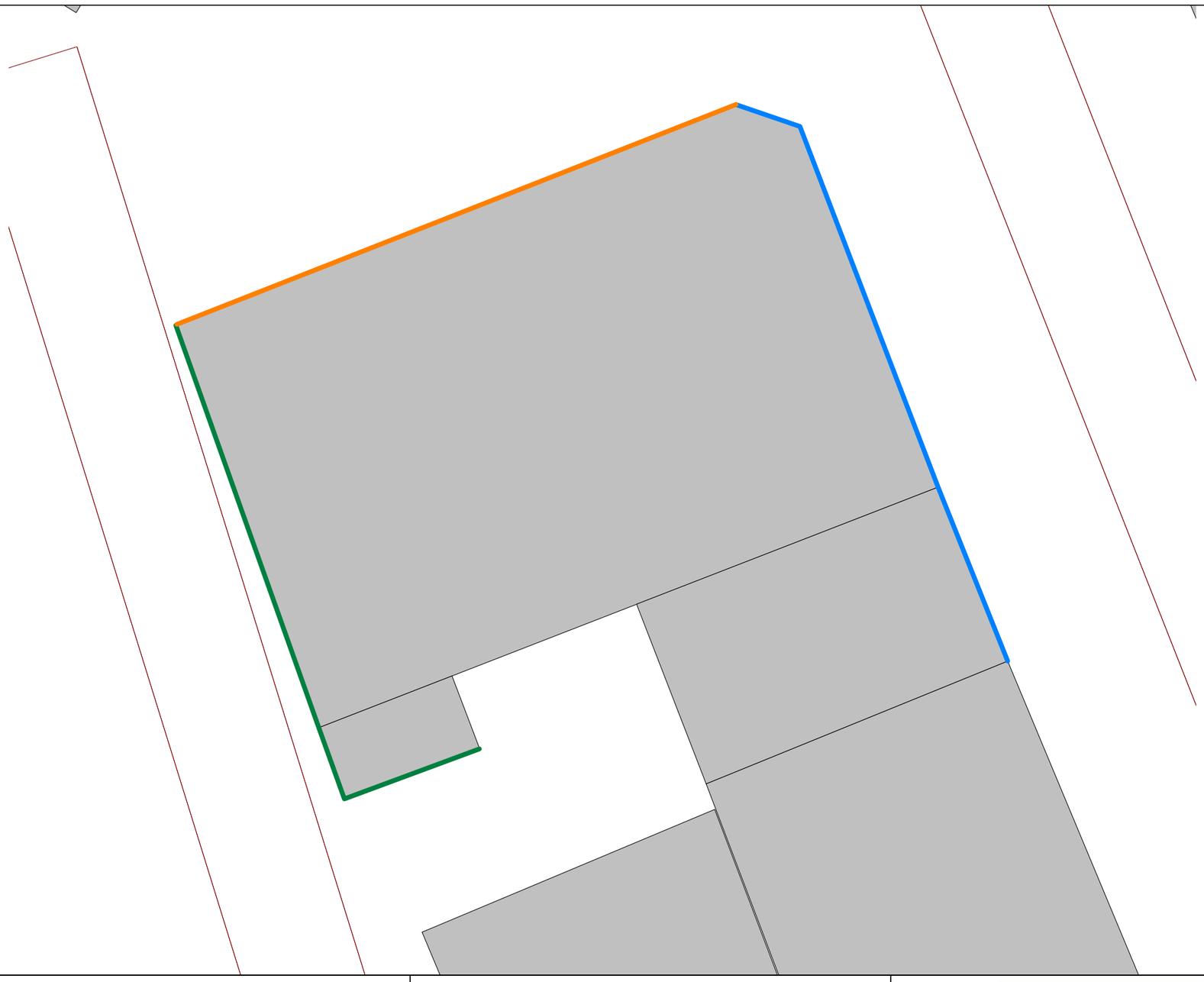
Drawn By:
Lewis Kelter

Date:
Jan 2024



njd Environmental Associates	Client: Mr William Harris	Figure 6: Glazing and Ventilation Strategy - Ground Floor	
	Job Title: NJD23-0107 Somerford Buildings	Drawn By: L Kelter	Date: Jan 2024

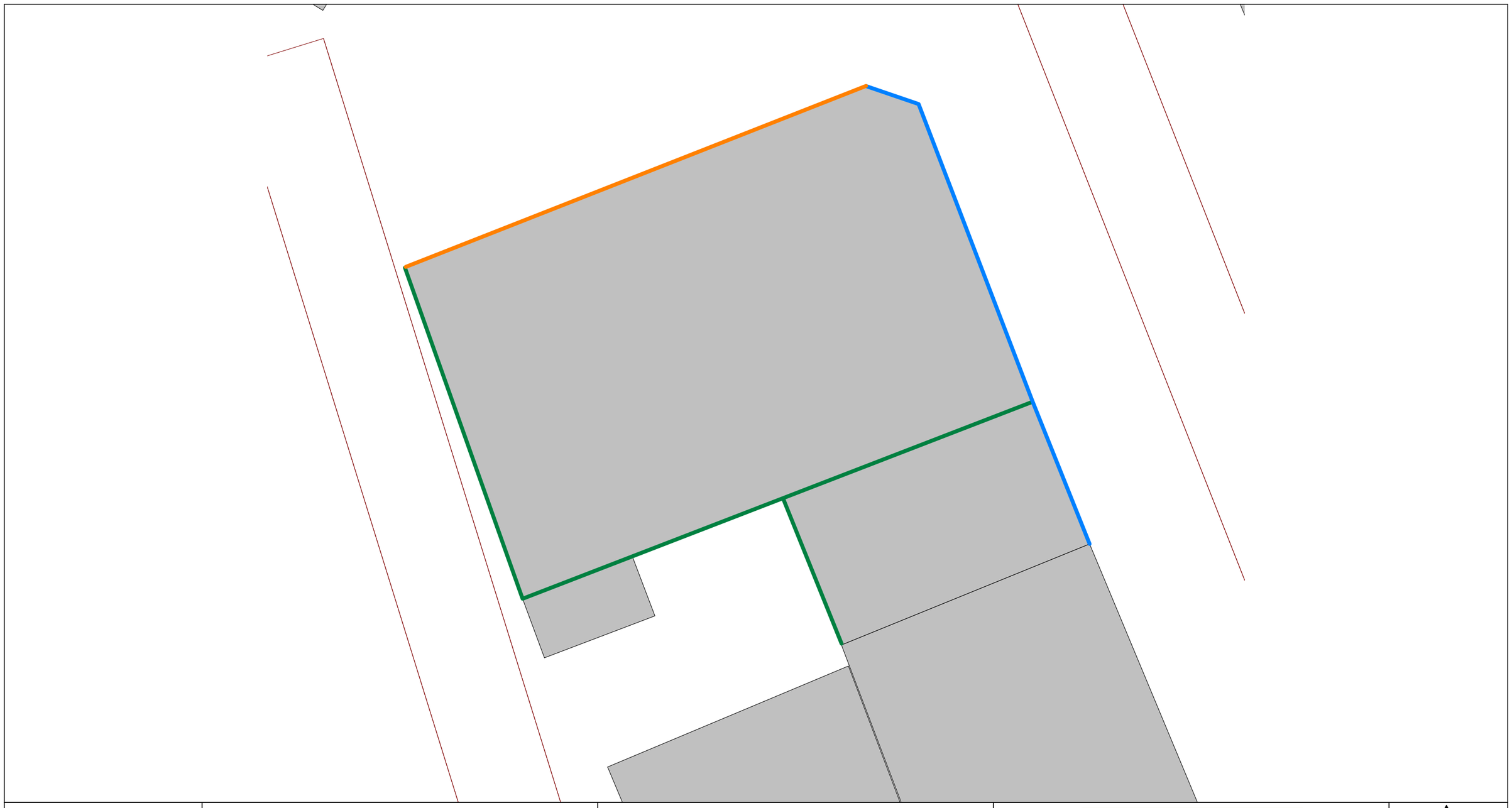
Key:	Living Room and Bedroom Mitigation:
	Rw + Ctr 33 dB (e.g., 10/12/6mm) glazing; Dnew + Ctr 37 dB (e.g., Titon SFXSA V75/C75) vents (or equivalent)
	Rw + Ctr 27 dB (e.g., 4/12/4mm) glazing; Dnew + Ctr 37 dB (e.g., Titon SFXSA V75/C75) vents (or equivalent)
	Rw + Ctr 27 dB (e.g., 4/12/4mm) glazing; Dnew + Ctr 34 dB (e.g., Titon SFXSA V25/C25) vents (or equivalent)
Unmarked facades have no specific requirements	



njd Environmental Associates

Client: Mr William Harris	Figure 7: Glazing and Ventilation Strategy - First Floor	
Job Title: NJD23-0107 Somerford Buildings	Drawn By: L Kelter	Date: Jan 2024

Key:	Living Room and Bedroom Mitigation:
	Rw + Ctr 33 dB (e.g., 10/12/6mm) glazing; Dnew + Ctr 37 dB (e.g., Titon SFXSA V75/C75) vents (or equivalent)
	Rw + Ctr 27 dB (e.g., 4/12/4mm) glazing; Dnew + Ctr 37 dB (e.g., Titon SFXSA V75/C75) vents (or equivalent)
	Rw + Ctr 27 dB (e.g., 4/12/4mm) glazing; Dnew + Ctr 34 dB (e.g., Titon SFXSA V25/C25) vents (or equivalent)
Unmarked facades have no specific requirements	



njd Environmental Associates	Client: Mr William Harris	Figure 8: Glazing and Ventilation Strategy - Second Floor	Key: / Living Room and Bedroom Mitigation: Rw + Ctr 33 dB (e.g., 10/12/6mm) glazing; Dnew + Ctr 37 dB (e.g., Titon SFXSA V75/C75) vents (or equivalent) Rw + Ctr 27 dB (e.g., 4/12/4mm) glazing; Dnew + Ctr 37 dB (e.g., Titon SFXSA V75/C75) vents (or equivalent) Rw + Ctr 27 dB (e.g., 4/12/4mm) glazing; Dnew + Ctr 34 dB (e.g., Titon SFXSA V25/C25) vents (or equivalent) Unmarked facades have no specific requirements
	Job Title: NJD23-0107 Somerford Buildings	Drawn By: L Kelter	Date: Jan 2024

Appendix 1: Noise Measurements

File	20231218_112635_000000_1.CMG					
Location	ML1					
Data type	Leq					
Weighting	A					
Unit	dB					
Start	18/12/2023 11:26:35					
End	19/12/2023 12:04:14					
Period	Day (Ld)					
Time slots	Day 07:00 23:00 Kd = 0 dBA					
	Ld dB	Leq dB	Lmin dB	Lmax dB	L90 dB	L10 dB
Level	58.8	58.8	35.9	91.0	47.3	60.8
Period	Night (Ln)					
Time slots	Night 23:00 07:00 Kn = 0 dBA					
	Ln dB	Leq dB	Lmin dB	Lmax dB	L90 dB	L10 dB
Level	48.8	48.8	26.3	79.9	30.2	50.9

File	20231218_114117_000000_1.CMG					
Location	ML2					
Data type	Leq					
Weighting	A					
Unit	dB					
Start	18/12/2023 11:41:17					
End	19/12/2023 12:00:15					
Period	Day (Ld)					
Time slots	Day 07:00 23:00 Kd = 0 dBA					
	Ld dB	Leq dB	Lmin dB	Lmax dB	L90 dB	L10 dB
Level	54.8	54.8	39.7	76.7	46.7	56.9
Period	Night (Ln)					
Time slots	Night 23:00 07:00 Kn = 0 dBA					
	Ln dB	Leq dB	Lmin dB	Lmax dB	L90 dB	L10 dB
Level	44.7	44.7	30.8	69.4	35.6	46.6

File	20231218_114117_000000_1.CMG
Location	ML2
Data type	Leq
Weighting	A
Start	18/12/2023 11:41:17
End	19/12/2023 12:00:15
Source	Leq specific dB
Plant	46.3

Periods	1m	Rank	Level
Start	18/12/2023 23:00	1st LAmax	79.9
End	19/12/2023 06:59	5th LAmax	73.1
Location	ML1	10th LAmax	68.6
Weighting	A	15th LAmax	66.2
Data type	Lmax		
Unit	dB		
Period start	Lmax		
18/12/2023 23:00	57.7		
18/12/2023 23:01	59.8		
18/12/2023 23:02	57.8		
18/12/2023 23:03	54.6		
18/12/2023 23:04	65.2		
18/12/2023 23:05	63.7		
18/12/2023 23:06	73.9		
18/12/2023 23:07	52.6		
18/12/2023 23:08	54.9		
18/12/2023 23:09	53.3		
18/12/2023 23:10	58.8		
18/12/2023 23:11	51.9		
18/12/2023 23:12	54.5		
18/12/2023 23:13	57.7		
18/12/2023 23:14	49.7		
18/12/2023 23:15	48.3		
18/12/2023 23:16	57.6		
18/12/2023 23:17	59.3		
18/12/2023 23:18	54.5		
18/12/2023 23:19	54.9		
18/12/2023 23:20	51.2		
18/12/2023 23:21	56.1		
18/12/2023 23:22	60.3		
18/12/2023 23:23	41.7		
18/12/2023 23:24	58.9		
18/12/2023 23:25	41.6		
18/12/2023 23:26	50.5		
18/12/2023 23:27	49.2		
18/12/2023 23:28	54.2		
18/12/2023 23:29	60.4		
18/12/2023 23:30	58.9		
18/12/2023 23:31	63.4		
18/12/2023 23:32	59.2		
18/12/2023 23:33	49.7		
18/12/2023 23:34	51.5		
18/12/2023 23:35	50.6		
18/12/2023 23:36	48.1		
18/12/2023 23:37	53.3		
18/12/2023 23:38	55.8		
18/12/2023 23:39	57.5		
18/12/2023 23:40	49.6		
18/12/2023 23:41	57.9		
18/12/2023 23:42	61.4		
18/12/2023 23:43	64.7		
18/12/2023 23:44	79.9		
18/12/2023 23:45	74.8		
18/12/2023 23:46	38.4		
18/12/2023 23:47	42.2		
18/12/2023 23:48	39.1		
18/12/2023 23:49	52.2		
18/12/2023 23:50	51.7		
18/12/2023 23:51	53.9		
18/12/2023 23:52	52.3		
18/12/2023 23:53	46.3		
18/12/2023 23:54	57.7		
18/12/2023 23:55	54.7		
18/12/2023 23:56	52.7		
18/12/2023 23:57	61.6		
18/12/2023 23:58	47.6		
18/12/2023 23:59	47.3		
19/12/2023 00:00	44.5		
19/12/2023 00:01	53.4		
19/12/2023 00:02	51.8		
19/12/2023 00:03	55.7		
19/12/2023 00:04	55.4		

Periods	1m	Rank	Level
Start	18/12/2023 23:00	1st LAmax	69.4
End	19/12/2023 06:59	5th LAmax	65.3
Location	ML2	10th LAmax	61.3
Weighting	A	15th LAmax	58.9
Data type	Lmax		
Unit	dB		
Period start	Lmax		
18/12/2023 23:00	45.3		
18/12/2023 23:01	48.4		
18/12/2023 23:02	57		
18/12/2023 23:03	46.1		
18/12/2023 23:04	49.3		
18/12/2023 23:05	48.1		
18/12/2023 23:06	68.8		
18/12/2023 23:07	43.8		
18/12/2023 23:08	42		
18/12/2023 23:09	42.4		
18/12/2023 23:10	45.5		
18/12/2023 23:11	42.9		
18/12/2023 23:12	46.1		
18/12/2023 23:13	45.3		
18/12/2023 23:14	49.1		
18/12/2023 23:15	47.7		
18/12/2023 23:16	47.3		
18/12/2023 23:17	47		
18/12/2023 23:18	48.1		
18/12/2023 23:19	47.6		
18/12/2023 23:20	43		
18/12/2023 23:21	45.3		
18/12/2023 23:22	43		
18/12/2023 23:23	44.9		
18/12/2023 23:24	48.7		
18/12/2023 23:25	44.4		
18/12/2023 23:26	45.8		
18/12/2023 23:27	43.4		
18/12/2023 23:28	43.8		
18/12/2023 23:29	47.6		
18/12/2023 23:30	49.6		
18/12/2023 23:31	50.4		
18/12/2023 23:32	48.2		
18/12/2023 23:33	52.5		
18/12/2023 23:34	47.4		
18/12/2023 23:35	44.4		
18/12/2023 23:36	45.9		
18/12/2023 23:37	44.1		
18/12/2023 23:38	45.3		
18/12/2023 23:39	45.4		
18/12/2023 23:40	46.2		
18/12/2023 23:41	48.2		
18/12/2023 23:42	48.1		
18/12/2023 23:43	54.4		
18/12/2023 23:44	62.4		
18/12/2023 23:45	53.5		
18/12/2023 23:46	42.8		
18/12/2023 23:47	46.9		
18/12/2023 23:48	43.2		
18/12/2023 23:49	46.9		
18/12/2023 23:50	47.9		
18/12/2023 23:51	48		
18/12/2023 23:52	43.2		
18/12/2023 23:53	45.5		
18/12/2023 23:54	47.8		
18/12/2023 23:55	60.3		
18/12/2023 23:56	51.4		
18/12/2023 23:57	48.2		
18/12/2023 23:58	47.4		
18/12/2023 23:59	47.8		
19/12/2023 00:00	46.7		
19/12/2023 00:01	58.3		
19/12/2023 00:02	52		
19/12/2023 00:03	50.3		
19/12/2023 00:04	51.8		

19/12/2023 00:05	59.8
19/12/2023 00:06	65.3
19/12/2023 00:07	51.3
19/12/2023 00:08	46
19/12/2023 00:09	50.6
19/12/2023 00:10	51.1
19/12/2023 00:11	73.9
19/12/2023 00:12	57.2
19/12/2023 00:13	68.6
19/12/2023 00:14	51.4
19/12/2023 00:15	58.2
19/12/2023 00:16	40
19/12/2023 00:17	55.9
19/12/2023 00:18	42.7
19/12/2023 00:19	70
19/12/2023 00:20	65.8
19/12/2023 00:21	54.8
19/12/2023 00:22	63.5
19/12/2023 00:23	62.2
19/12/2023 00:24	57.1
19/12/2023 00:25	55.8
19/12/2023 00:26	56.6
19/12/2023 00:27	59.6
19/12/2023 00:28	40.2
19/12/2023 00:29	34.6
19/12/2023 00:30	35.1
19/12/2023 00:31	62
19/12/2023 00:32	51.5
19/12/2023 00:33	56.8
19/12/2023 00:34	56.5
19/12/2023 00:35	45.3
19/12/2023 00:36	58.4
19/12/2023 00:37	51
19/12/2023 00:38	54
19/12/2023 00:39	55.7
19/12/2023 00:40	53.2
19/12/2023 00:41	56.4
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19/12/2023 04:50	47.2
19/12/2023 04:51	46
19/12/2023 04:52	49.8
19/12/2023 04:53	48.5
19/12/2023 04:54	56.4
19/12/2023 04:55	56.9
19/12/2023 04:56	54.7
19/12/2023 04:57	56.4
19/12/2023 04:58	52.1
19/12/2023 04:59	40.9
19/12/2023 05:00	57.6
19/12/2023 05:01	43.8
19/12/2023 05:02	50.9
19/12/2023 05:03	58.5
19/12/2023 05:04	57.8
19/12/2023 05:05	56.2
19/12/2023 05:06	54.2
19/12/2023 05:07	45.3
19/12/2023 05:08	55.5

19/12/2023 05:09	43.5
19/12/2023 05:10	54.2
19/12/2023 05:11	57.7
19/12/2023 05:12	57.1
19/12/2023 05:13	44.1
19/12/2023 05:14	62
19/12/2023 05:15	55.3
19/12/2023 05:16	40.5
19/12/2023 05:17	51.7
19/12/2023 05:18	55.3
19/12/2023 05:19	42.4
19/12/2023 05:20	44.8
19/12/2023 05:21	62.5
19/12/2023 05:22	47.3
19/12/2023 05:23	66.3
19/12/2023 05:24	59.8
19/12/2023 05:25	48.8
19/12/2023 05:26	58.2
19/12/2023 05:27	40
19/12/2023 05:28	41.3
19/12/2023 05:29	39.3
19/12/2023 05:30	51.3
19/12/2023 05:31	40.7
19/12/2023 05:32	39.7
19/12/2023 05:33	46.8
19/12/2023 05:34	67.5
19/12/2023 05:35	60.6
19/12/2023 05:36	42.9
19/12/2023 05:37	60.8
19/12/2023 05:38	62.3
19/12/2023 05:39	43.2
19/12/2023 05:40	41.4
19/12/2023 05:41	39.5
19/12/2023 05:42	46.1
19/12/2023 05:43	58.1
19/12/2023 05:44	48
19/12/2023 05:45	54.1
19/12/2023 05:46	53.6
19/12/2023 05:47	59.8
19/12/2023 05:48	55
19/12/2023 05:49	58.8
19/12/2023 05:50	52.4
19/12/2023 05:51	47.7
19/12/2023 05:52	48.2
19/12/2023 05:53	60.9
19/12/2023 05:54	69.3
19/12/2023 05:55	57.1
19/12/2023 05:56	56.4
19/12/2023 05:57	42.7
19/12/2023 05:58	48.9
19/12/2023 05:59	50.3
19/12/2023 06:00	59
19/12/2023 06:01	59.2
19/12/2023 06:02	55.5
19/12/2023 06:03	59.3
19/12/2023 06:04	59.8
19/12/2023 06:05	40.4
19/12/2023 06:06	59
19/12/2023 06:07	59.7
19/12/2023 06:08	59.7
19/12/2023 06:09	48.6
19/12/2023 06:10	59.6
19/12/2023 06:11	50.2
19/12/2023 06:12	57.9
19/12/2023 06:13	59.4
19/12/2023 06:14	62.2
19/12/2023 06:15	59.5
19/12/2023 06:16	53.7
19/12/2023 06:17	55.4
19/12/2023 06:18	40.8
19/12/2023 06:19	42
19/12/2023 06:20	73
19/12/2023 06:21	59.8
19/12/2023 06:22	41.6
19/12/2023 06:23	62.6
19/12/2023 06:24	59.2

19/12/2023 05:09	57.3
19/12/2023 05:10	45.3
19/12/2023 05:11	54.7
19/12/2023 05:12	53.6
19/12/2023 05:13	48.6
19/12/2023 05:14	48.8
19/12/2023 05:15	49.1
19/12/2023 05:16	49.2
19/12/2023 05:17	47.4
19/12/2023 05:18	53.7
19/12/2023 05:19	43.7
19/12/2023 05:20	41.9
19/12/2023 05:21	45.7
19/12/2023 05:22	43.8
19/12/2023 05:23	50.8
19/12/2023 05:24	46.8
19/12/2023 05:25	51.1
19/12/2023 05:26	49.4
19/12/2023 05:27	42.2
19/12/2023 05:28	42.4
19/12/2023 05:29	44.7
19/12/2023 05:30	50.7
19/12/2023 05:31	45.5
19/12/2023 05:32	44.1
19/12/2023 05:33	47.3
19/12/2023 05:34	65.3
19/12/2023 05:35	52
19/12/2023 05:36	45.6
19/12/2023 05:37	51.1
19/12/2023 05:38	45.7
19/12/2023 05:39	47.7
19/12/2023 05:40	47.4
19/12/2023 05:41	47.4
19/12/2023 05:42	47
19/12/2023 05:43	48.1
19/12/2023 05:44	48.3
19/12/2023 05:45	47.5
19/12/2023 05:46	51.5
19/12/2023 05:47	47.6
19/12/2023 05:48	47.7
19/12/2023 05:49	53.5
19/12/2023 05:50	47.2
19/12/2023 05:51	46.4
19/12/2023 05:52	48.2
19/12/2023 05:53	47.6
19/12/2023 05:54	47.9
19/12/2023 05:55	46.7
19/12/2023 05:56	52.4
19/12/2023 05:57	48.1
19/12/2023 05:58	48.3
19/12/2023 05:59	47.2
19/12/2023 06:00	52.9
19/12/2023 06:01	47.8
19/12/2023 06:02	46.9
19/12/2023 06:03	47.8
19/12/2023 06:04	50.3
19/12/2023 06:05	47.8
19/12/2023 06:06	48.8
19/12/2023 06:07	48.3
19/12/2023 06:08	48.6
19/12/2023 06:09	55.8
19/12/2023 06:10	53.1
19/12/2023 06:11	46.5
19/12/2023 06:12	46.2
19/12/2023 06:13	48
19/12/2023 06:14	48
19/12/2023 06:15	48.7
19/12/2023 06:16	46.2
19/12/2023 06:17	46.7
19/12/2023 06:18	46
19/12/2023 06:19	46.9
19/12/2023 06:20	57
19/12/2023 06:21	47.1
19/12/2023 06:22	45.7
19/12/2023 06:23	50.4
19/12/2023 06:24	48.7

19/12/2023 06:25	54.3
19/12/2023 06:26	58.8
19/12/2023 06:27	60.1
19/12/2023 06:28	65.8
19/12/2023 06:29	61.8
19/12/2023 06:30	61.2
19/12/2023 06:31	62.7
19/12/2023 06:32	60.9
19/12/2023 06:33	55.1
19/12/2023 06:34	61
19/12/2023 06:35	56.2
19/12/2023 06:36	49.7
19/12/2023 06:37	60.6
19/12/2023 06:38	62.5
19/12/2023 06:39	61.2
19/12/2023 06:40	63.7
19/12/2023 06:41	57.6
19/12/2023 06:42	57.9
19/12/2023 06:43	58.5
19/12/2023 06:44	60.4
19/12/2023 06:45	57.4
19/12/2023 06:46	58.6
19/12/2023 06:47	66.5
19/12/2023 06:48	58
19/12/2023 06:49	60
19/12/2023 06:50	61.7
19/12/2023 06:51	61.4
19/12/2023 06:52	57.8
19/12/2023 06:53	59.5
19/12/2023 06:54	46.2
19/12/2023 06:55	56.6
19/12/2023 06:56	51.2
19/12/2023 06:57	60.7
19/12/2023 06:58	61.2
19/12/2023 06:59	61.2
Overall	79.9

19/12/2023 06:25	53.4
19/12/2023 06:26	46.9
19/12/2023 06:27	50.8
19/12/2023 06:28	54
19/12/2023 06:29	49.1
19/12/2023 06:30	48.9
19/12/2023 06:31	49.6
19/12/2023 06:32	52
19/12/2023 06:33	58.7
19/12/2023 06:34	48.2
19/12/2023 06:35	48.4
19/12/2023 06:36	47.6
19/12/2023 06:37	47.8
19/12/2023 06:38	48.8
19/12/2023 06:39	51.7
19/12/2023 06:40	51.1
19/12/2023 06:41	49
19/12/2023 06:42	46.5
19/12/2023 06:43	57.3
19/12/2023 06:44	49.8
19/12/2023 06:45	47.9
19/12/2023 06:46	48.3
19/12/2023 06:47	52.2
19/12/2023 06:48	61
19/12/2023 06:49	48.9
19/12/2023 06:50	50.2
19/12/2023 06:51	49.1
19/12/2023 06:52	49.4
19/12/2023 06:53	49.6
19/12/2023 06:54	51.2
19/12/2023 06:55	54.3
19/12/2023 06:56	49.4
19/12/2023 06:57	50.1
19/12/2023 06:58	50.5
19/12/2023 06:59	50.1
Overall	69.4