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Report

Capitol Close, Dodworth, Barnsley
Environmental Noise Assessment of Industrial Site

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Appendices

1.0 Executive Summary

1.1 A noise assessment has been carried out on the Capitol Close site located off Whinby Road, Dodworth, Barnsley.

1.2 This report refers to the application (reference no: 2017/1002) for the erection of 15 no. industrial units in 8 blocks (Classes B1, B2 and B8) with associated car parking, and the associated Decision Notice granting planning permission. The assessment is intended to assist with the discharge of the following conditions:

Condition 7:

"Prior to the occupation of unit 6, full details of the proposed use and opening/operating hours shall be submitted to, and approved by, the Local Planning Authority. The approved details shall be adhered to throughout the life of that unit."

Reason: In the interests of the amenities of hotel guests and in accordance with Core Strategy Policy CSP 40.

Condition 20:

"Prior to the development being brought into use a scheme shall be submitted to and approved by the Local Planning Authority which shall specify the provisions to be made for the control of noise emanating from the site. Thereafter the development shall be carried out in strict accordance with the approved scheme."

Reason: In the interests of the amenities of local residents and in accordance with Core Strategy Policy CSP 40.

1.3 This report comments on off-site noise levels as a result of the granted development and advises on mitigation options, taking consideration of relevant planning policy and derivation of appropriate assessment criteria.

1.4 A review has been carried out of government policy and guidance to determine the appropriate assessment methodology. In this instance, the most appropriate standards are British Standard BS 4142: 2014, "Methods for rating and assessing industrial and commercial sound" and BS 8233: 2014 "Guidance on the sound insulation and noise reduction for buildings". These have been used to derive appropriate assessment criteria based on a worst-case scenario.

1.5 The two sources identified with the potential to produce an impact are:

- Noise from activities on site (assuming a busy 24 hour period, involving HGVs arriving departing, loading/unloading and forklift movements);
- Noise from external plant or equipment

1.6 SoundPLAN™ computer modelling has been undertaken to show the predicted levels at the nearest noise sensitive buildings with and without the site in operation; outputs are shown in Appendix A.

1.7 A Mitigation Scheme is advised and can be implemented in one of two ways:

Either:

- Operating hours of Unit 6 are restricted to daytime hours only (07:00-23:00). *(This is assuming no other units operate at night)*

Or

- Construction of a 4.0m screen along the eastern boundary of the Unit 6 yard. *(No restriction of operational hours to Unit 6 is required; assuming that no more than one HGV is loaded/unloaded in a 15 minute period in the night.*

1.8 Providing compliance with both the Mitigation Scheme and Noise Management Plan provided in the report, both Conditions 7 and 20 can be discharged.

2.0 Introduction

2.1 Sharps Redmore has been instructed by Stuart Willows of William Saunders on behalf of Carnell Management Services to undertake an environmental noise assessment of the planned industrial site in Dodworth, known as Capitol Close.

2.2 It is understood that permission was granted for the erection of B1, B2 and B3 units in the summer of 2017. The site is currently empty, situated among other industrial units and office blocks off Whinby Road. A stretch of the M1 motorway runs parallel with the site to the north approximately 80m from the site's northern boundary separated by earth bunding. A small rail-line runs approximately 100m south-east of the site boundary down a valley – this line tends to carry one or two trains per hour in the day and none were observed at night.

2.3 The nearest residential building is a bungalow sited around 100m south-west of the nearest new unit. The Ibis Hotel is approximately 130m from the nearest new building (Unit 6) and office blocks face the industrial site, forming part of the Capitol Close complex (around 15m south of the southern site boundary).

2.4 Typical site activities have been assessed based on data provided in the Transport Statement (dated June 2017). The information suggests that over a typical week day a total of 10 HGVs will enter, undergo a delivery and leave the yards. A busiest hour has been assessed in this report assuming the use of forklift trucks at every industrial block.

2.5 3D computer modelling has been undertaken via SoundPLAN^{TM} demonstrating the likely noise impact of the units (specifically yard activities) on nearby sensitive properties. Results are shown at Appendix A.

2.6 Plans showing the measurement position and site location are included in Appendix B and Appendix C includes a graph showing the 24 hour noise survey results.

2.7 Section 3 discusses the Government's Planning Policy, guidance and standards relevant to the case.

2.8 A noise survey has been undertaken at the site and the gathered data have been used in this assessment. The details of the survey methodology are in Section 4 and the results are discussed in Section 5.

3.0 Assessment Methodology and Criteria

National Policy

3.1 The National Planning Policy Framework (NPPF) sets out the Government's economic, environmental and social planning policies for England and "these policies articulate the Government's vision of sustainable development." In respect of noise, Paragraph 123 of the NPPF states the following:

"*Planning policies and decisions should aim to:*

- *avoid noise from giving rise to significant adverse impacts*[27] *on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts*[27] *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 business wanting to develop in continuance of their business should not have unreasonable restrictions put on them because changes in nearby land uses since they were established;*[28] *and*
- *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"*

3.2 It can be seen that the NPPF reinforces the March 2010 DEFRA publication, "Noise Policy Statement for England" (NPSE), which states three policy aims, as follows:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

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

3.3 Together, the first two aims require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:
"… all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur."

[27] See Explanatory note to the Noise Policy Statement for England (Department for the Environment, Food and Rural Affairs).

[28] Subject to the provisions of the Environmental Protection Act 1990 and other relevant law.

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

i) The effect may be determined by reference to guideline noise values. British Standard (BS) 8233:2014 and World Health Organisation (WHO) "*Guidelines for Community Noise"* contain such guidelines.

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

iii) Another method is described within BS 4142:2014 to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the newly revised standard is intended to assess are sound from industrial and manufacturing processes, sound from fixed plant installations, sound from loading and unloading of goods at industrial and/or commercial premises and the sound from mobile plant and vehicles, such as forklift, train or ship movements.

Guideline noise values

3.5 There are a number of guidance documents that contain recommended guideline noise values. These are discussed below.

3.6 British Standard 8233:2014 is principally intended to assist in the design of new dwellings; however, the Standard does state that it may be used in the assessment of noise from new sources being brought to existing dwellings.

3.7 The WHO advice is the most useful, comprehensive, and pertinent advice in this case, because it is not specific to the circumstances of the assessment. Instead, it provides guidance on acceptable limits in, for example, schools, dwellings and offices from noise occurring within the community.

3.8 The WHO guideline values are appropriate to what are termed "critical health effects". This means that the limits are at the lowest noise level that would be considered likely to result in any psychological or physiological effect. They are, as defined by NPSE, set at the Lowest Observed Adverse Effect Level (LOAEL), but do not define the level above which effects are significant (the SOAEL). Compliance with the LOAEL should, therefore, be seen as a robust aim.

3.9 The National Physical Laboratory document *"Health Effect based noise assessment methods; a review and feasibility study", (September 1998)* contains an "interpretation" of the WHO guidelines (then in draft form) for the DETR. The summary of this section of the NPL report states *"In essence, the WHO guidelines represent a consensus view of international expert opinion on the lowest threshold noise levels below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached"* (paragraph 5.4, therein).

3.10 The World Health Organisation/BS 8233 guideline noise values are summarised in the Table 3.1 below:

Table 3.1: WHO/BS 8233 guideline noise values

Document	Level	Guidance
World Health Organisation "Community Noise 1999"	L_{AeqT} = 55 dB	Serious annoyance, daytime and evening. (Continuous noise, outdoor living areas)
	L_{AeqT} = 50 dB	Moderate annoyance, daytime and evening. (Continuous noise, outdoor living areas).
	L_{AeqT} = 35 dB	Moderate annoyance, daytime and evening. (Continuous noise, dwellings, indoors)
	L_{AeqT} = 30 dB	Sleep disturbance, night-time (indoors)
	L_{Amax} = 60 dB	Sleep disturbance, windows open at night. (Noise peaks outside bedrooms, external level).
	L_{Amax} = 45 dB	Sleep disturbance at night (Noise peaks inside bedrooms, internal level)
BS 8233:2014 "Sound Insulation and noise reduction for buildings"	L_{AeqT} = 55 dB	Upper limit for external steady noise. (gardens and patios).
	L_{AeqT} = 50 dB	Desirable limit for external steady noise. (gardens and patios).
	$L_{Aeq\ 16\ hours}$ = 35 dB	Resting, living room day. (Internal – steady noise)
	$L_{Aeq\ 16\ hours}$ = 40 dB	Dining, dining room day. (Internal – steady noise)
	$L_{Aeq\ 16\ hour}$ = 35 dB	Sleeping, bedroom day (Internal – steady noise)
	$L_{Aeq\ 8\ hours}$ = 30 dB	Sleeping, bedroom night (Internal – steady noise)

3.11 For L_{AeqT} criteria the time base (T) given in the documents is 16 hours for daytime limits and 8 hours for night time limits.

Changes in noise level

3.12 Changes in noise levels of less than 3 dBA are not usually considered perceptible under normal conditions and changes of 10 dBA are equivalent to a doubling of loudness. This guidance has been accepted by inspectors, at inquiry, to encompass changes in noise levels in the index L_{AeqT}.

3.13 Table 3.2 below shows the response to changes in noise (known as a semantic scale); this table has been developed from general consensus opinion of acousticians.

Table 3.2: Change in noise level

Change in noise level L_{AeqT} dB	Response	Impact
<3	Imperceptible	None
3 – 5	Perceptible	Slight/moderate
6 – 10	Up to a doubling	Moderate/significant
11 – 15	More than a doubling	Substantial
>15	-	Severe

3.14 Where the existing ambient noise level is already above the criteria developed from the various guidance documents, it may be considered unreasonable to adopt such criteria. It would be reasonable, however, given the above statement, to consider criteria which do not exceed the existing noise climate.

British Standard 4142:2014

3.15 This British Standard enables the significance of sound impact to be determined in relation to industrial and commercial sources. The significance of sound impact is to be determined according to the following two stage process:

1) Assess background and residual noise levels; predict new noise levels, apply correction to predicted levels, as appropriate to arrive at a rating level and compare this rating level to the existing background level. Use this to make an initial estimate of impact; and
2) Consider this level difference in the context of the site.

3.16 Matters which the standard recommends are relevant in order to consider context are, as shown in Table 3.3 below:

Table 3.3: BS 4142 notes on context

Factor	BS 4142 commentary	Notes
Absolute level of sound	*For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.* *Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.* *Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and*	Guidance on appropriate or significant absolute levels such as L_{Aeq} values for day or night or L_{Amax} values for night time can be found in the World Health Organisation's "Guidelines for Community Noise" and in British Standard BS 8233: 2014 "Guidance on sound insulation and noise reduction for buildings". When existing levels are low, particularly at night, absolute levels will often provide a better assessment

Factor	BS 4142 commentary	Notes
	the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.	tool. At night, the L_{Amax} factor will often be the key parameter to assess potential sleep disturbance.
The character and level of the residual sound compared to the character and level of the specific sound.	*Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.*	Experience and judgement will generally provide an excellent guide to determine the extent to which a specific sound might stand out or be in keeping with the existing surroundings. Whilst a technical assessment of character is sometimes desirable, it is also possible to consider character without the need for technical comparisons.
Sensitivity of receptor	*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) facade insulation treatment;* *ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and* *iii) acoustic screening.*	If the existing noise sensitive premises (NSP) already have good quality windows (acoustically) and alternative means of ventilation or screening, then this needs to be considered. The intrinsic sensitivity of a particular use is also relevant. For example, whether the NSP is a school, office or dwelling is relevant.

3.17 Potentially noisy activities would comprise:

- Noise from unloading/loading;
- Noise from mechanical services plant
- Noise from lorry and forklift movements

3.18 The most appropriate methods of assessing the potential impact of noise from these operations is by reference to the methodology in BS 4142:2014.

4.0 Survey Details

4.1 Unattended and attended monitoring was undertaken over a 24 hour period between Tuesday and Wednesday, 27th – 28th March 2018. The measurement locations (shown in Figure B1 in Appendix A) were chosen to be representative of the nearest sensitive buildings to the Capitol Close development. Each noise meter was set to gather existing ambient, background and maximum noise levels. 24 hour unattended measurements were made at Position 1, 1m from the first floor level window of the Ibis Hotel. Spot measurements were then made at Positions 1 and 2 throughout the day and night, measured around typical working hours to minimise the effects of construction noise from a nearby development.

4.2 All measurements were made with Type 1 precision sound level meters (SLMs). The instrument used to carry out the long term noise survey was a Norsonic 118, with a microphone set at a height of 3m above ground level, 1m from a façade. Attended measurements were made with a 01 dB Fusion, set at a height of approximately 1.5m above ground, in free field locations.

4.3 The SLMs were set to measure the following "A" weighted parameters: $L_{Aeq,}$ L_{A10}, L_{A90} and L_{Amax}. The measurement sample period was typically 15 minutes. Immediately before and after the measurements were carried out, the SLMs were calibrated using an acoustic calibrator with no noticeable drift.

4.4 The weather during the survey period was suitable for noise monitoring, generally dry with a light spell of rain between the hours of 16:00 and 17:00 on Wednesday, 27th (this did not affect noise measurements to any significant degree).

4.5 Observations of the noise climate were made and can be found within the attended measurement details in Appendix C. Road traffic noise (mainly from the nearby M1 motorway) dominates the area, both day and night, other transport noise is present including intermittent rail noise to the south-east of the site.

4.6 A summary of the noise levels measured at the long term monitoring position are shown in Table 4.1 below.

Table 4.1: Summary of measurements taken at long term monitoring Position 1

Survey results summary (27-28/03/2019)				
$L_{Aeq, 16hr}$ day, dB	$L_{Aeq, 8hr}$ night, dB	Typical lowest daytime background level ($L_{A90, 1hour}$), dB	Typical lowest night-time background level ($L_{A90, 15min}$), dB	Typical night L_{Amax}, dB
61	55	50	39	64

The data is also shown graphically in in Table C1 Appendix C.

4.7 Measurements at Position 2 represent existing noise levels at the nearest residential dwelling. Due to constant construction noise being emitted from a site near the receptor, measurements were only made during hours outside of these operations. For this reason the background level estimated will likely be lower than is truly typical; this results in a robust assessment. A summary of the measurement results is shown in Table C2 in Appendix C.

4.8 Position 3 measurements (summarized in Table C2 in Appendix C) were made to inform background noise levels within the proposed site in order to set appropriate noise conditions on future plant and extraction units. The measured data was also used to calibrate and validate levels in the SoundPLAN^{TM} model to predict levels for the larger area.

5.0 Assessment

Derivation of LOAELs and SOAELs

5.1 Baseline noise measurements and SoundPLAN™ predictions inform the suitable LOAEL and SOAEL values for noise sensitive receptors in relation to the site; these include the 4 storey hotel to the south east, the 3 storey office block situated within the development area and the residential bungalow to the north-west.

5.2 Typical existing noise levels measured at Position 1 are representative of the nearest noise sensitive windows of the Ibis Hotel. As summarised in Table 4.1 above, daytime ambient noise levels here were 61 dB $L_{Aeq,\ 16hr}$ and 50 dB $L_{A90,\ 1hr}$ typical background. Based on this, a robust LOAEL for industrial site noise during the day would be the background level + 0 (50 dB) and as existing ambient levels are medium - high in the area the SOAEL should be set to 60 dB in accordance with the guidance in BS 4142:2014. The typical night-time ambient levels at the receptor were 55 dB $L_{Aeq,\ 15min}$ with the background occasionally dropping to around 39 dB $L_{A90,\ 15min}$ in the quietest hours. A LOAEL of 39 dB is set to achieve 0 dB above background with a SOAEL set at 49 dB.

5.3 The nearest noise sensitive receptor to the site is the existing 3 storey office building which forms part of Capitol Close. LOAEL and SOAEL values for this are derived from the British Standard BS 8233:2014 which advises an acceptable internal criteria to be between the range 35 – 45 dB ($L_{Aeq,T}$). As the office structure appears to be a closed façade it is therefore safe to assume windows will have a reduction of at least 30 dB (outside to inside). This is therefore considered in deriving the LOAEL and SOAEL for this receptor shown in Table 5.1 below.

5.4 Measurements at Position 2 represent existing noise levels at the nearest residential dwelling. Measured daytime background levels, corrected to the façade of the building were between 50 and 53 dB, L_{A90} with a typical lowest night-time background level of 42 dB, L_{A90}. The day-time LOAEL is set by both the existing background level and the BS 8233 guidance for external amenity space; which suggests a desirable ambient noise level of 50 dB, $L_{Aeq,T}$ (as explained in Table 3.1 above). The night-time LOAEL is based on levels incident on the dwelling's external façade to ensure acceptable internal noise levels; peak levels are also considered in the night assessment to reduce the likelihood of industrial L_{Amax} levels disturbing sleep.

5.5 The LOAEL and SOAEL values for these receptors are summarised in the following table:

Table 5.1: Summary of derived LOAELs and SOAELs

Receptor		Time Period	LOAEL	SOAEL
Hotel	External façade	Daytime (07:00 – 23:00)	50 dB	60 dB
	External façade	Night-time (23:00 – 07:00)	39 dB	49 dB
Offices	External façade	Typical working hours (09:00 – 17:00)	65 dB	75 dB
Residential bungalow	Amenity space	Daytime (07:00 – 23:00)	50 dB	60 dB
	External façade	Night-time (23:00 – 07:00)	42 dB	52 dB

Note: LOAEL and SOAEL levels are $L_{Aeq,T}$ levels.

Noise from Industrial Units

5.6 The proposed B1, B2 and B8 units vary in size but from data provided in the Transport Statement (dated June 2017) assume that some businesses will use HGVs, though many will not be large enough for this form of distribution. It is also estimated (in paragraph 4.19 of the Statement) that there would be 10 HGVs per weekday.

5.7 The design of the units imply that unloading and loading of HGVs would occur either by tail-lift or side loading (using forklifts or similar). As tail-lifting is more commonly used in the situation of retail, for the purposes of this assessment, the latter case is assumed.

5.8 The majority of noise at the site would therefore arise from external service yard activities, such as HGV and forklift movements and external loading/unloading occurring near the warehouses' openings (loading bays). An acoustic correction of 3 dB was applied to the industrial sources (as a result of forklift impulsivity).

5.9 Using the noise modelling programme SoundPLAN™ along with noise measurements; library data (based on measurements taken at similar sites over a period of years by Sharps Redmore) and the estimated vehicle numbers, noise levels were predicted at the sensitive buildings.
Noise map outputs are shown in Appendix A as the following Figures:

- A1: 3.0m – Daytime baseline levels, $L_{Aeq, 16hr}$
- A2: 3.0m – Daytime site noise, $L_{Aeq, 1hour}$,
- A3: 3.0m – Night-time site noise, $L_{Aeq, 15min}$,
- A4: 3.0m – Daytime site noise, $L_{Aeq, 1hour}$, with mitigation
- A5: 3.0m – Night-time site noise, $L_{Aeq, 15min}$, with mitigation
- A6: 8.0m – Night-time site noise, $L_{Aeq, 15min}$, with mitigation
- A7: 3.0m – Night-time site noise, L_{Amax}

The resulting values are shown in Table 5.2 below:

Table 5.2: Predicted noise levels at nearest receptors (without mitigation)

			Modelled Baseline			Site Yard Noise		
Sensitive building	Receptor	Floor	Day $L_{Aeq, T}$	Night $L_{Aeq, T}$	L_{Amax}	Day $L_{Aeq, T}$	Night $L_{Aeq, T}$	L_{Amax}
			dB			dB		
Offices	Facing north-east	GF	52	NA	NA	57	NA	NA
		F 1	53	NA	NA	57	NA	NA
		F 2	54	NA	NA	58	NA	NA
	Facing north-west	GF	52	NA	NA	58	NA	NA
		F 1	53	NA	NA	59	NA	NA
		F 2	54	NA	NA	60	NA	NA
Ibis Hotel	Facing north-west	GF	57	54	60	40	45	49
		F 1	59	55	64	43	48	52
		F2	61	57	66	44	48	52
		F3	63	59	67	44	49	53
Residential Bungalow	Facing north	GF	55	52	54	46	32	40
	Facing east	GF	54	52	53	42	36	48
	Garden	GF	54	NA	NA	45	NA	NA

5.10 Baseline noise levels were predicted over a 16 hour period (07:00-23:00) and 8 hours (23:00-07:00) for night. Site yard noise has been assessed based on BS 4142:2014, with the reference time interval, 'T' being:

- 1 hour during the day; and
- 15 minutes during the night

Results are taken for the likely busiest hour of the day and the busiest 15 minutes of the night. As stated above, it is predicted that 10 HGVs may enter the site on a given weekday. As a worst-case it was assumed that half of these HGVs would enter the site in the busiest hour and 2 HGVs might operate in the 15 minute period assessed at night.

5.11 Noise maps of the results above can be found in Appendix A; Figure A1 showing noise levels without the site operating (which is the baseline noise condition) with Figures A2 and A3 displaying predicted noise levels with just the site operating (day and night).

5.12 If only Unit 6 operates at night (as assumed in the calculations resulting in Table 5.2 above) the nearest residential dwelling off Higham lane would, in the potentially worst-case hour, be subject to levels of 46 dB, $L_{Aeq,T}$ in the day and 36 dB, $L_{Aeq,T}$ at night. This is below the LOAEL for both day and night so no additional mitigation is necessary. If a closer Unit (for example Unit 2C) also operated in this 15 minutes the level at the residential façade would be 44 dB $L_{Aeq,T}$. This is 2 dB above the LOAEL but 8 dB below the existing ambient (52, $L_{Aeq,T}$), an adverse impact is therefore unlikely. Additionally, L_{Amax} levels would be below 60 dB which complies with WHO guidance levels to reduce risk of sleep disturbance.

5.13 As stated above, the nearest sensitive property is the three storey office complex situated off Capitol Court, the closest façade being 30-40m from the closest (typical) service yard activities. By examining the results in Table 5.2, it is found that the highest predicted ambient noise level at a façade (caused by site activities in a given daytime hour) would be 60 dB, $L_{Aeq,T}$. This is below the Lowest Observable Adverse Effect Level (LOAEL) and therefore noise is unlikely to have any adverse effect on office users.

5.14 The Ibis Hotel rooms facing north-west would likely experience external levels of 44 dB, $L_{Aeq,T}$ in a worst-case hour of the day and 49 dB, $L_{Aeq,T}$ in the busiest 15 minutes of the night. Based on the criteria derived above in 5.3, daytime levels would be below the LOAEL for this period but would be equal to the SOAEL for night. Mitigation would therefore be needed to reduce the noise impact at night.

Mitigation

5.15 In order to achieve noise levels at the sensitive receptors which are below the SOAEL and as close as possible to the LOAEL at night, mitigation is required in this case.

5.16 The event which would present the largest contribution of noise at night is the loading and unloading of HGVs at the most south eastern warehouse (Unit 6). In order to mitigate this sound from the hotel façade a 4m solid screen set along the eastern boundary of the yard is proposed. Figure B2 and in Appendix B illustrates this scheme (screenshot taken from SoundPLAN™ 3D rendered model can be found in Appendix B; Figure B3).

5.17 This mitigation scheme would attenuate noise levels at the highest floor by approximately 4 dB, and as much as 9 dB at lower levels as shown in the two SoundPLAN™ noise maps (Figures A4 and A5 in Appendix A); a full breakdown of values are in Table C3 in Appendix C.

5.18 Table 5.3 below compares the predicted noise level from yard activity at the third floor hotel façade against LOAEL and SOAEL values shown above.

5.19 The assessment in Table 5.3 shows that, with the above mitigation scheme in place, noise levels at the receptor would be 6 dB within (below) the Lowest Observable Adverse Effect Level (LOAEL) for daytime and between LOAEL and SOAEL for night-time. As long as noise levels are below the SOAEL, operations are found to be reasonable; with the above mitigation scheme bringing levels down as close to the LOAEL as is practicable, 4 dB below the SOAEL. In reality the baseline background noise level would be higher at the third floor as it is exposed to additional road traffic noise, which would in-turn require a lower LOAEL/SOAEL.

Table 5.3: Approximate noise levels at 3rd floor hotel receptor from yard activities against LOAELs and SOEALs

	Baseline ambient noise level $L_{Aeq, T}$	Baseline background noise level $L_{A90, T}$	LOAEL	SOAEL	Predicted level at noise sensitive façade (with mitigation)	Assessment	Acceptable?
Daytime	61 dB	50 dB	50 dB	60 dB	44 dB	Below LOAEL	Yes
Night-time	55 dB	39 dB	39 dB	49 dB	45 dB	Between LOAEL and SOAEL and reduced as far as reasonably possible.	Yes

5.20 In conclusion, noise levels will be acceptable at the hotel receptor providing either:

- Operating hours of Unit 6 are restricted to daytime hours only (07:00-23:00).

Or

- A 4.0m solid screen is constructed along the eastern boundary of the Unit 6 yard.

Noise Management Plan

5.21 In order to calculate the predicted levels at receptors, the following conditions have been assumed:

- All loading/unloading would happen within loading area; and either:
  - Level loading bays are used in all dock spaces; or
  - Side-loading takes place using forklift trucks
- No tonal reversing alarms would be used on site during night-time hours;

- No refrigerated vehicles (if required, on board refrigeration units need to be switched off on entry road and during loading/unloading would be connected to an electric hook up);
- Vehicle engines would be switched off at all times other than for manoeuvring;
- No vehicle (or other) radios on in the yard; and
- Forklift trucks are either electric or gas powered; no diesel forklift trucks would be used at the site at any time unless it has a sound power level less than 95 dB, L_W.

5.22 These assumptions form part of a noise management plan, necessary for the site to function and not cause adverse noise impact to any noise sensitive receptor.

Noise from fixed plant and equipment

5.23 External plant should operate under the following condition:

> *"The noise rating level emitted by all fixed plant on the site shall not exceed 42 dB, L_{Ar} between 2300 and 0700 hours or 50 dB, L_{Ar} at any other time. These noise levels shall relate to a location one metre from the window to a habitable room of any nearby residential premises for night time or the centre of a garden area for the day time. The measurement and assessment shall be made according to BS 4142:2014."*

5.24 Given the distances, layout and screening involved these limit values would be readily achievable without the need for any additional mitigation schemes.

Conclusion

5.25 The industrial site has been assessed using BS 4142:2014 as the most appropriate method for rating and assessing industrial sound. Noise emanating from the site has been considered at all the nearby sensitive receptors. Unit 6 has been looked at in detail in relation to protecting the hotel receptor, as reasoned in Condition 7.

5.26 Based on the results obtained and levels predicted, providing compliance with both the Mitigation Scheme and Noise Management Plan above, both Condition 7 and 20 can be considered dischargeable.

APPENDIX A

SOUNDPLAN™ MODELS

Figure A1: SoundPLAN noise map output (at a height of 3.0m): $L_{Aeq,\ 16hr,\ (0700\text{-}2300)}$ baseline noise levels from existing road and rail noise sources (excluding all site activities)

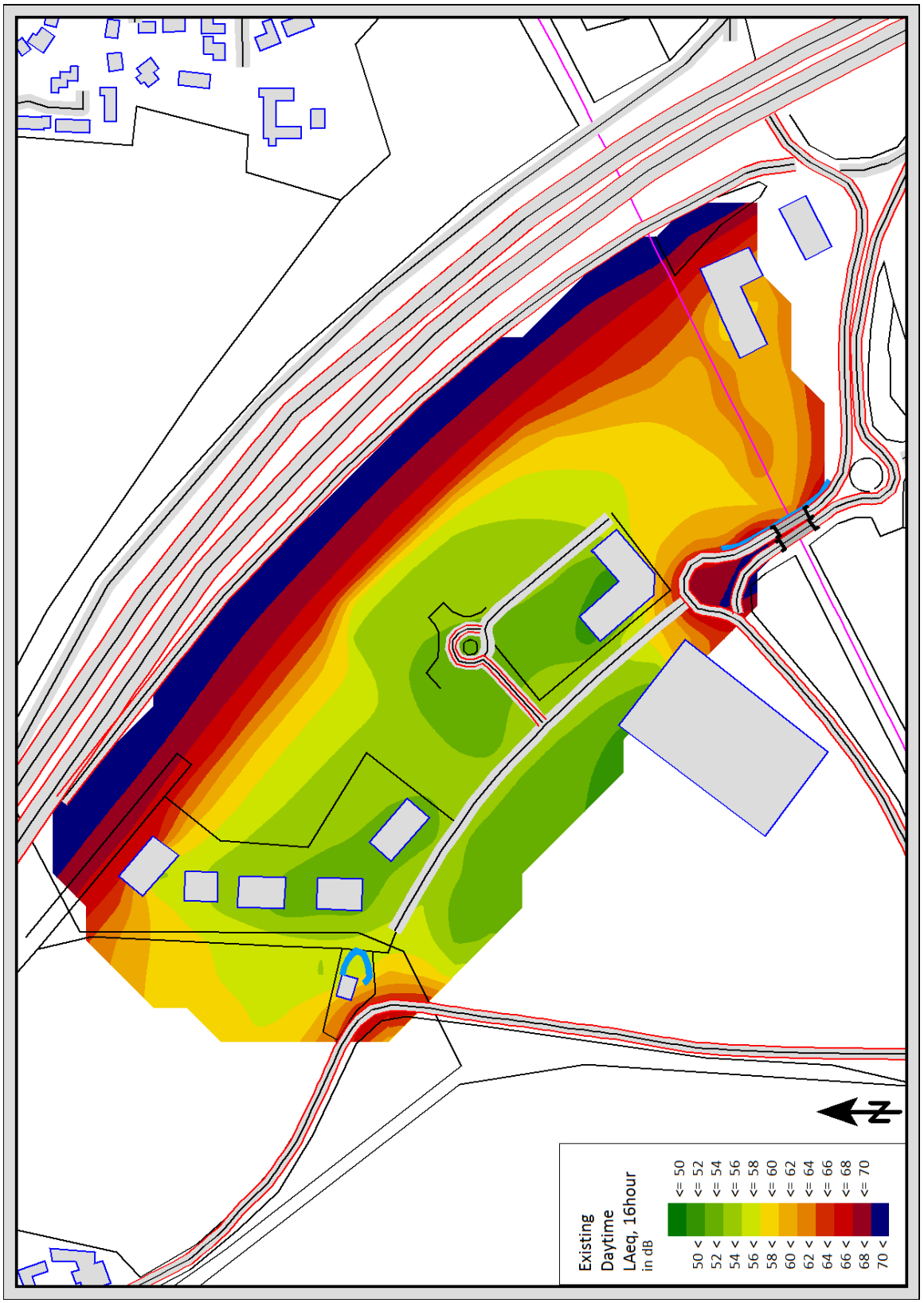


Figure A2: Daytime SoundPLAN noise map output (at a height of 3.0m): $L_{Aeq,\ 1hour}$ noise levels from site (excluding all other environmental noise sources)

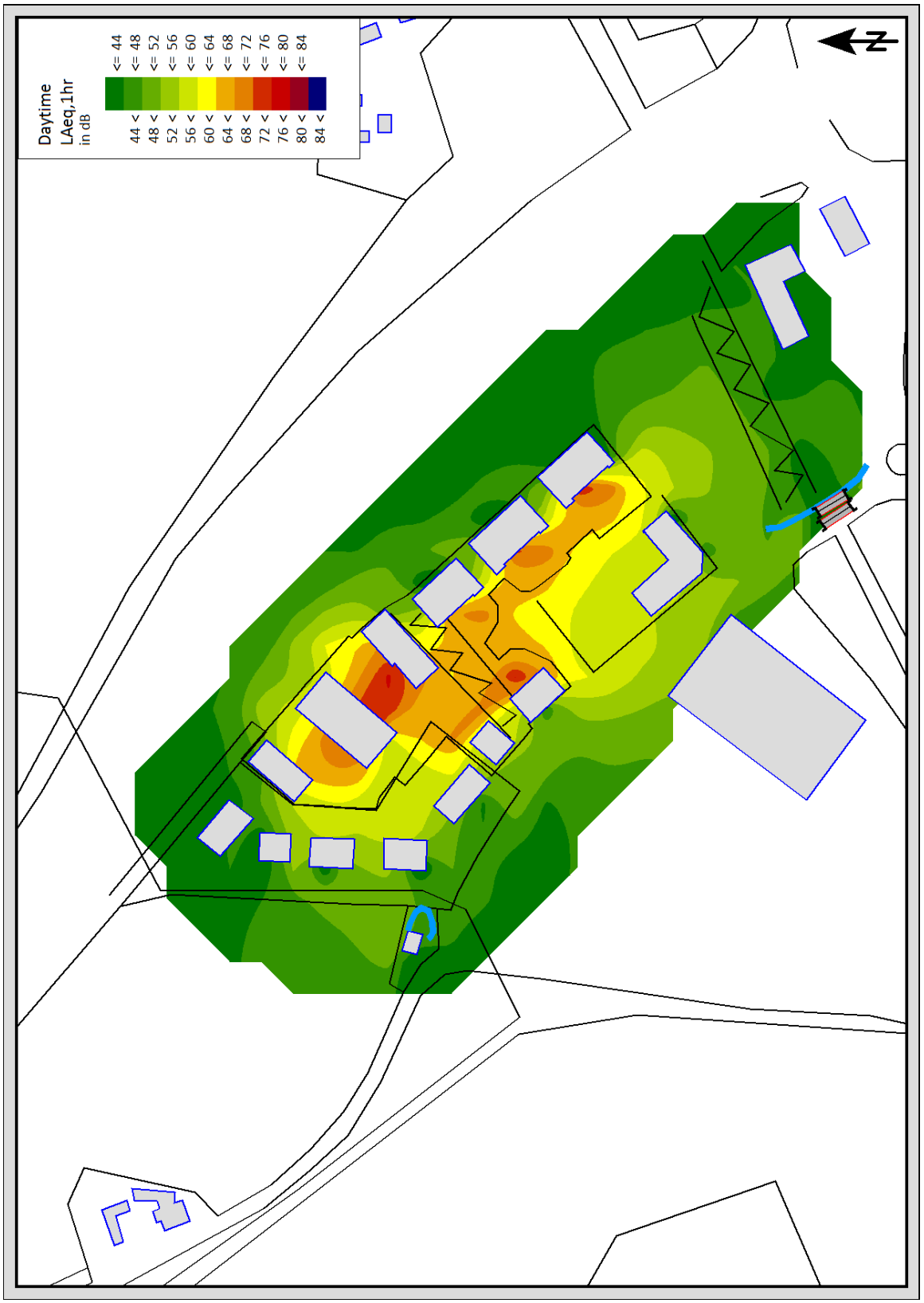


Figure A3: Night-time SoundPLAN noise map output (at a height of 3.0m): $L_{Aeq,\ 15min}$ noise levels from site (excluding all other environmental noise sources)

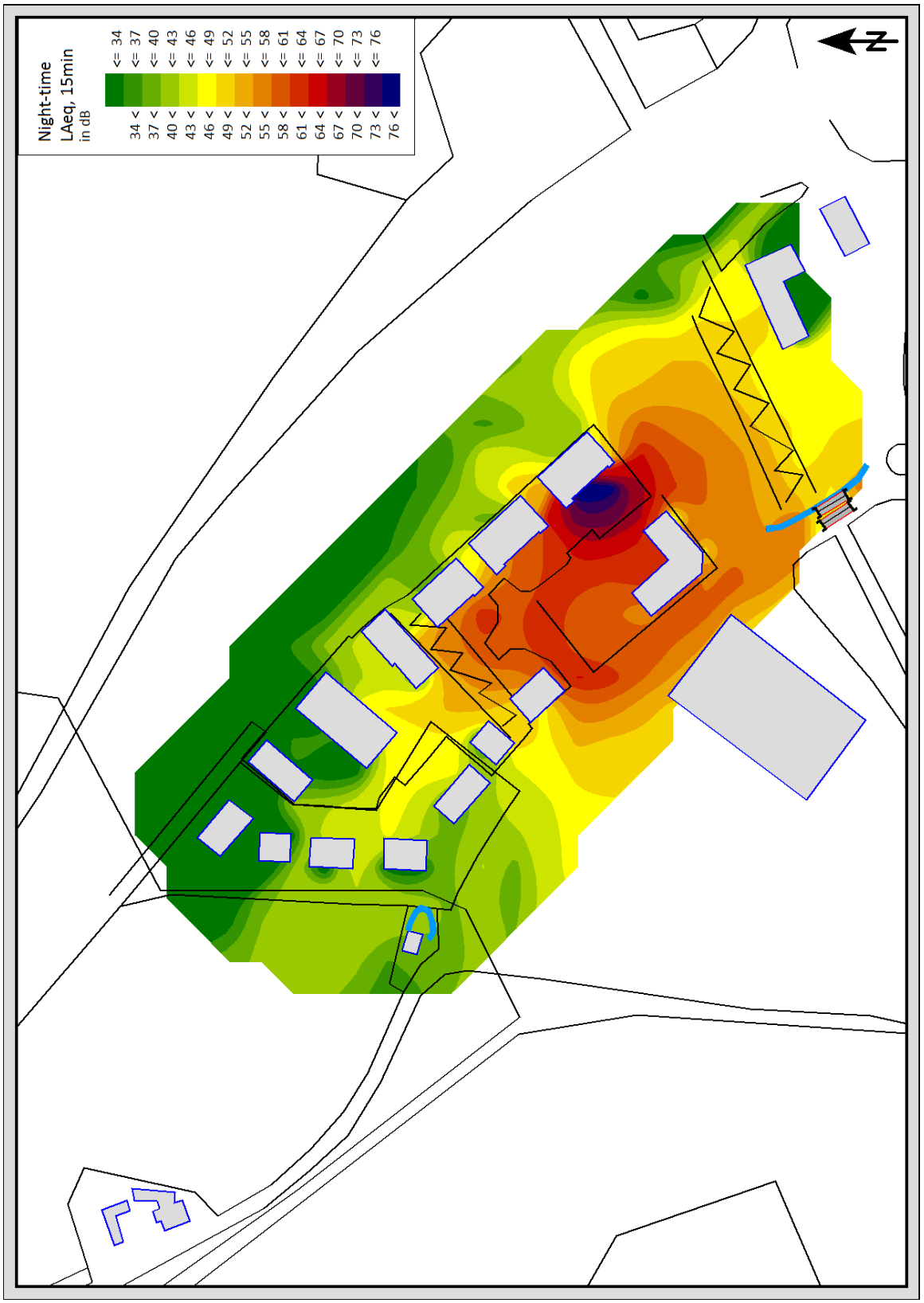


Figure A4: Daytime SoundPLAN noise map output (at a height of 3.0m): $L_{Aeq,\ 1hour}$ noise levels from site (excluding all other environmental noise sources) – with mitigation

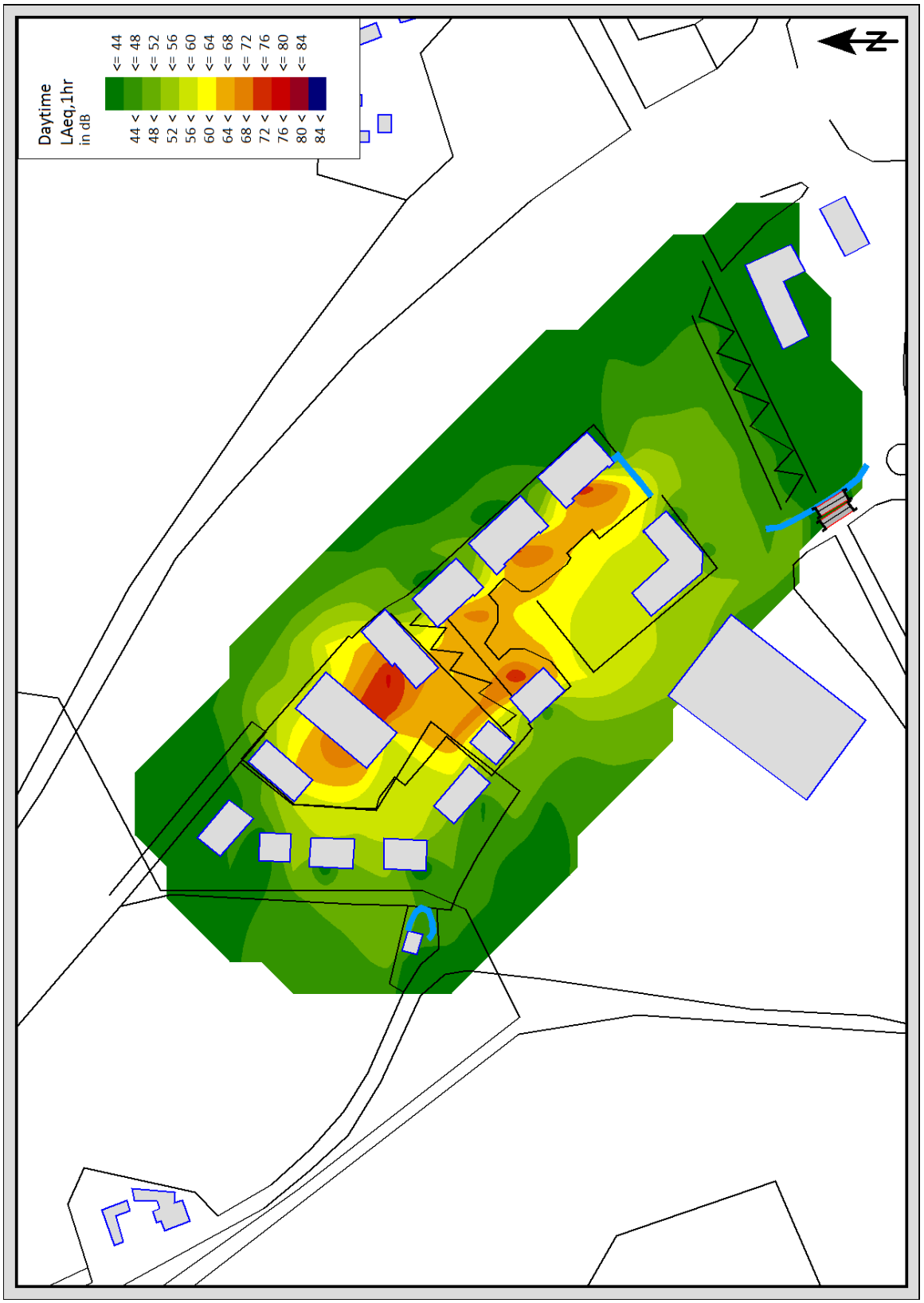


Figure A5: Night-time SoundPLAN noise map output (at a height of 3.0m): $L_{Aeq,\ 15min}$ noise levels from site (excluding all other environmental noise sources) – with mitigation

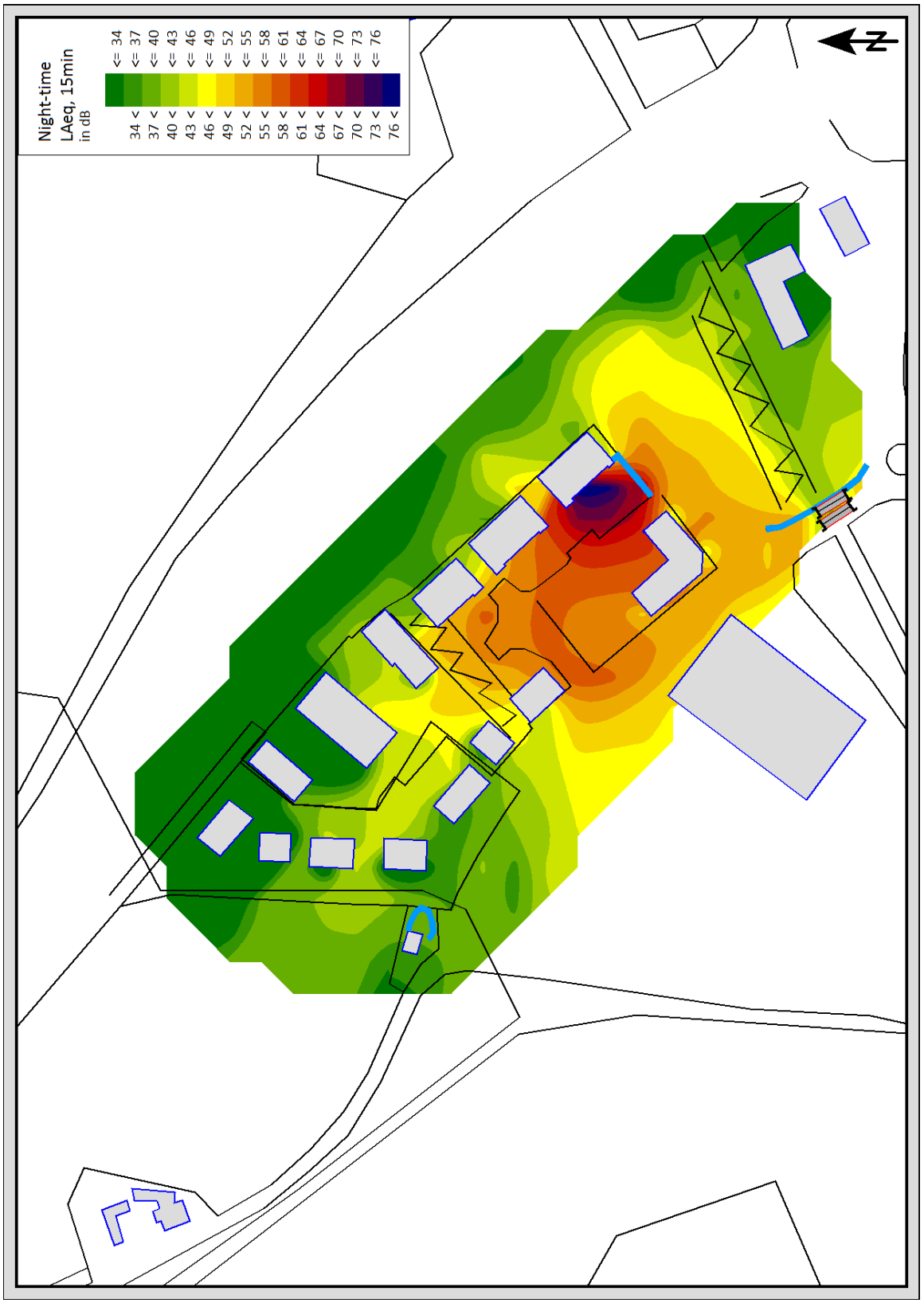


Figure A6: Night-time SoundPLAN noise map output (at a height of 8.0m): $L_{Aeq,\ 15min}$ noise levels from site (excluding all other environmental noise sources) – with mitigation

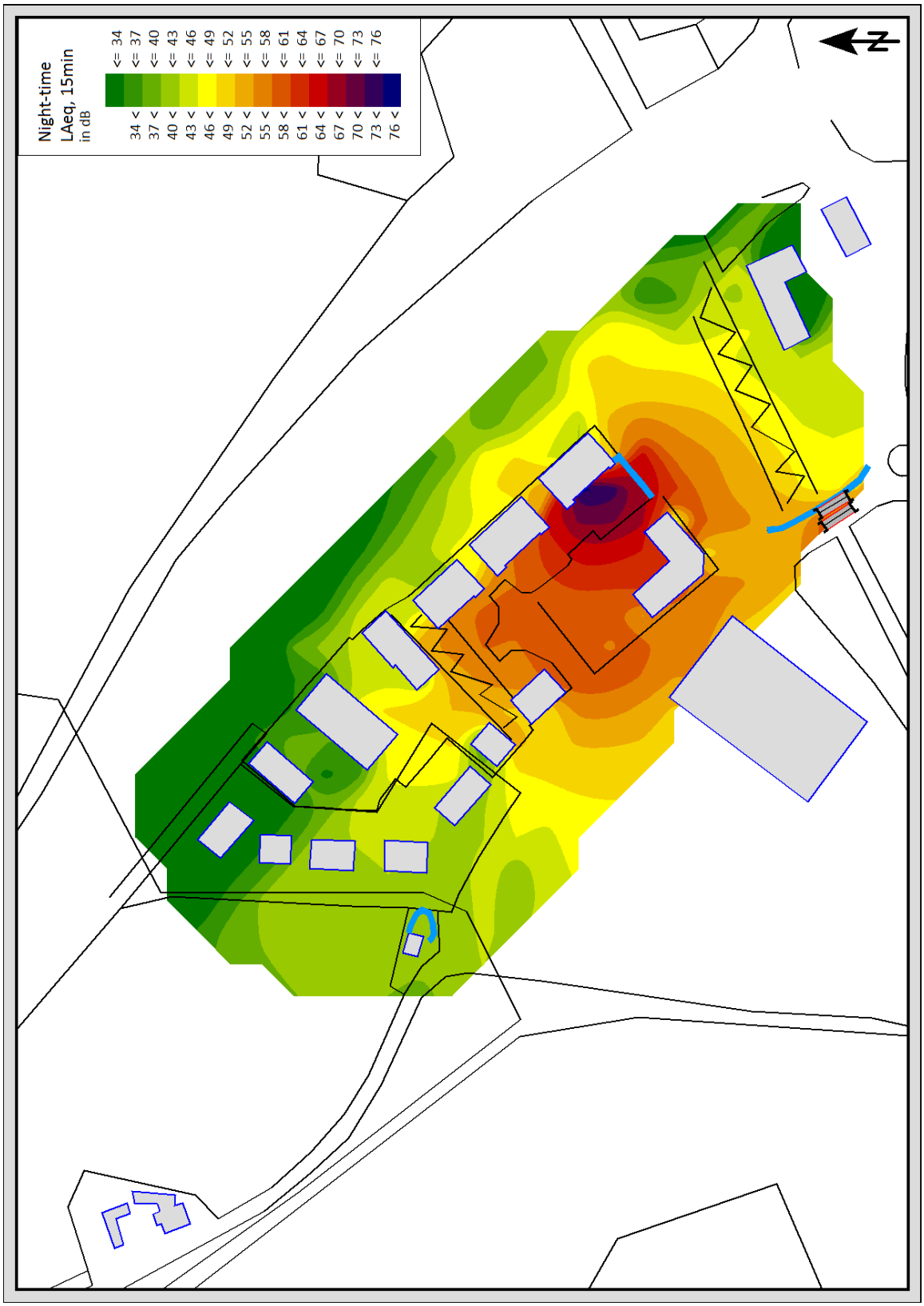
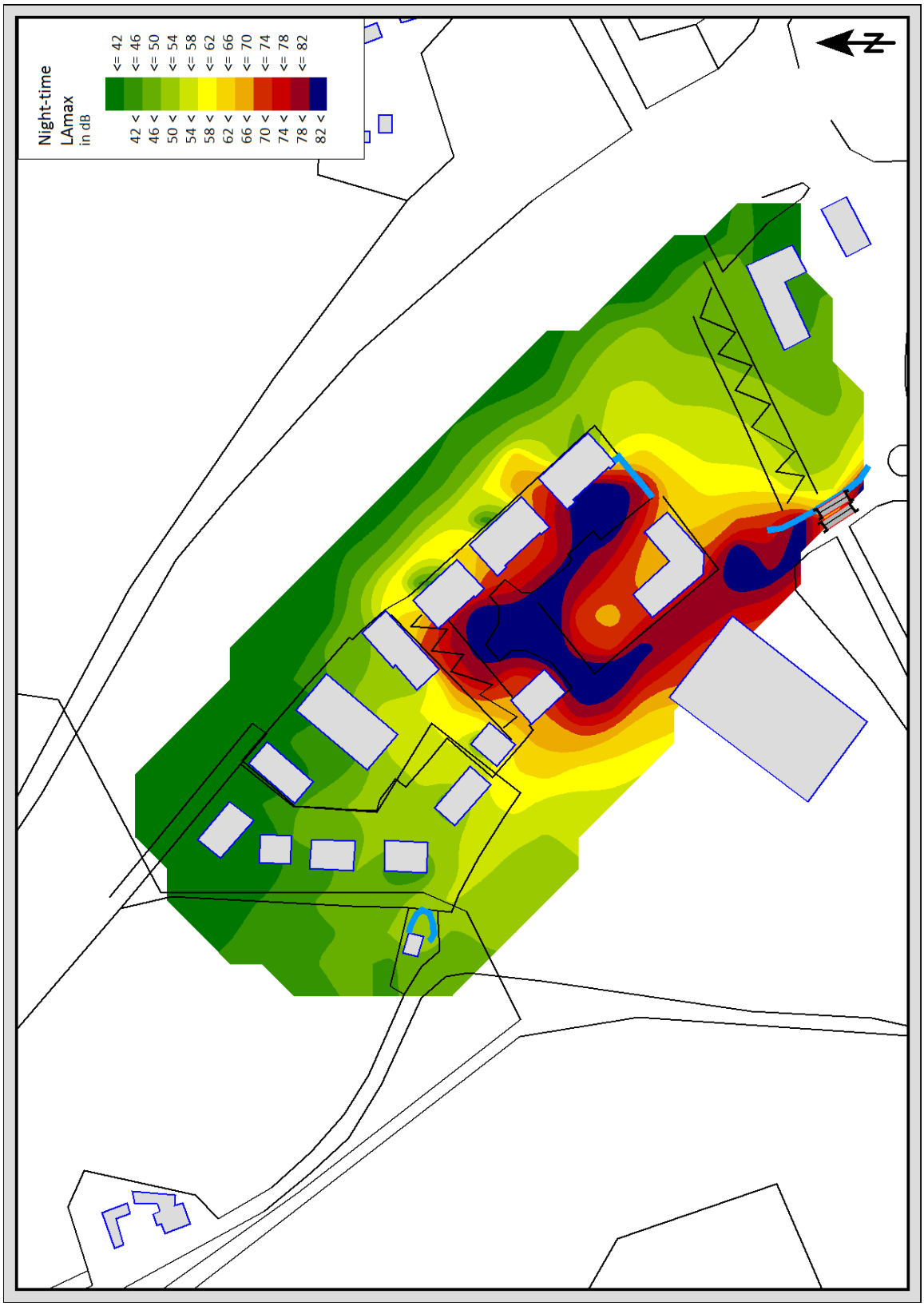


Figure A7: Night-time SoundPLAN noise map output (at a height of 3.0m): L_{Amax} noise levels from site (excluding all other environmental noise sources)



APPENDIX B

PLANS

Figure B1: Site map indicating site extent and noise survey measurement positions (27th – 28th March 2018)

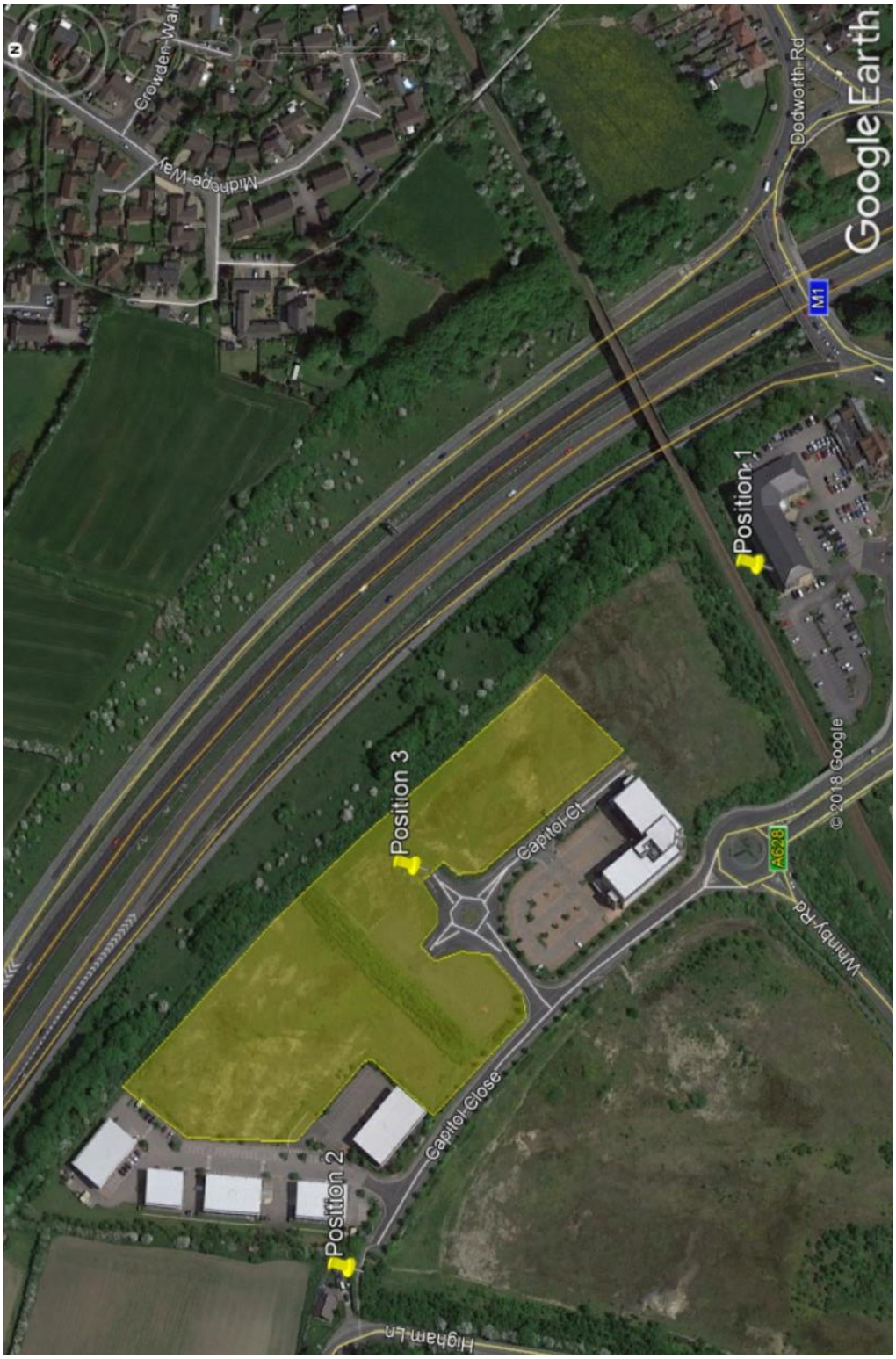


Figure B2: Proposed mitigation scheme (screen shown in green)

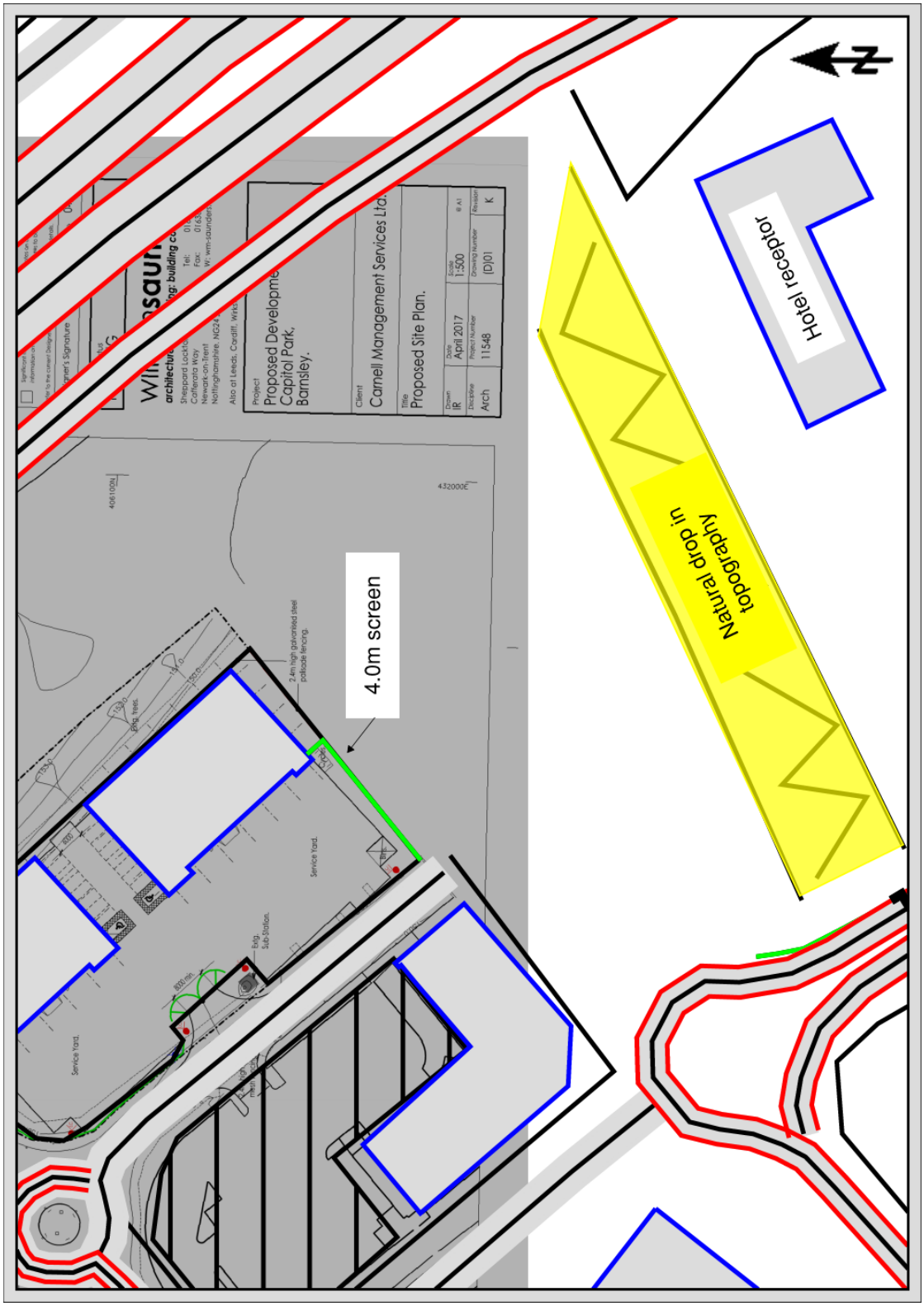
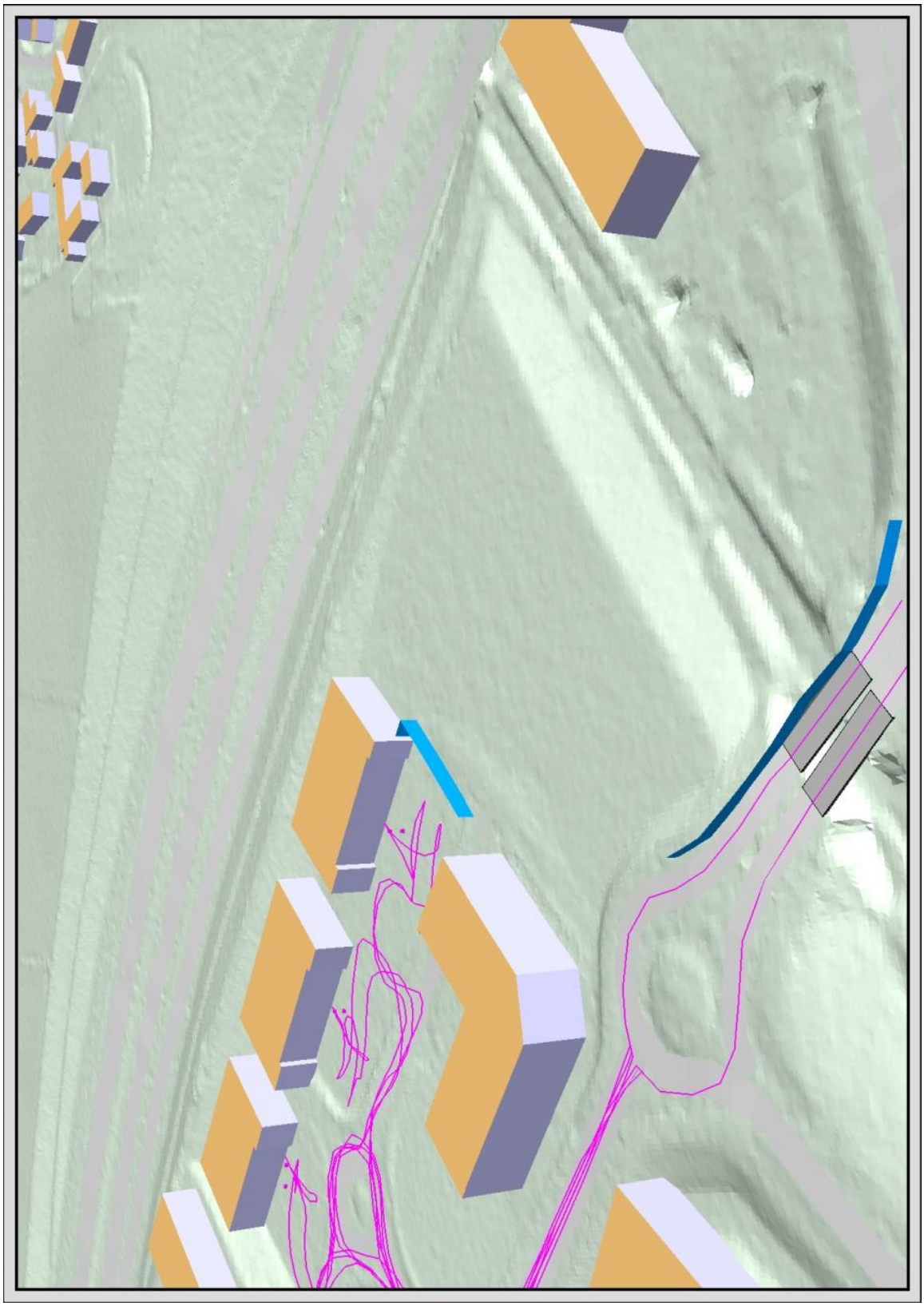


Figure B3: Proposed mitigation scheme (screen shown in blue) – 3D render



APPENDIX C

NOISE SURVEY RESULTS

Figure C1: Graph of survey results for Monitoring Location (27th – 28th March 2018)

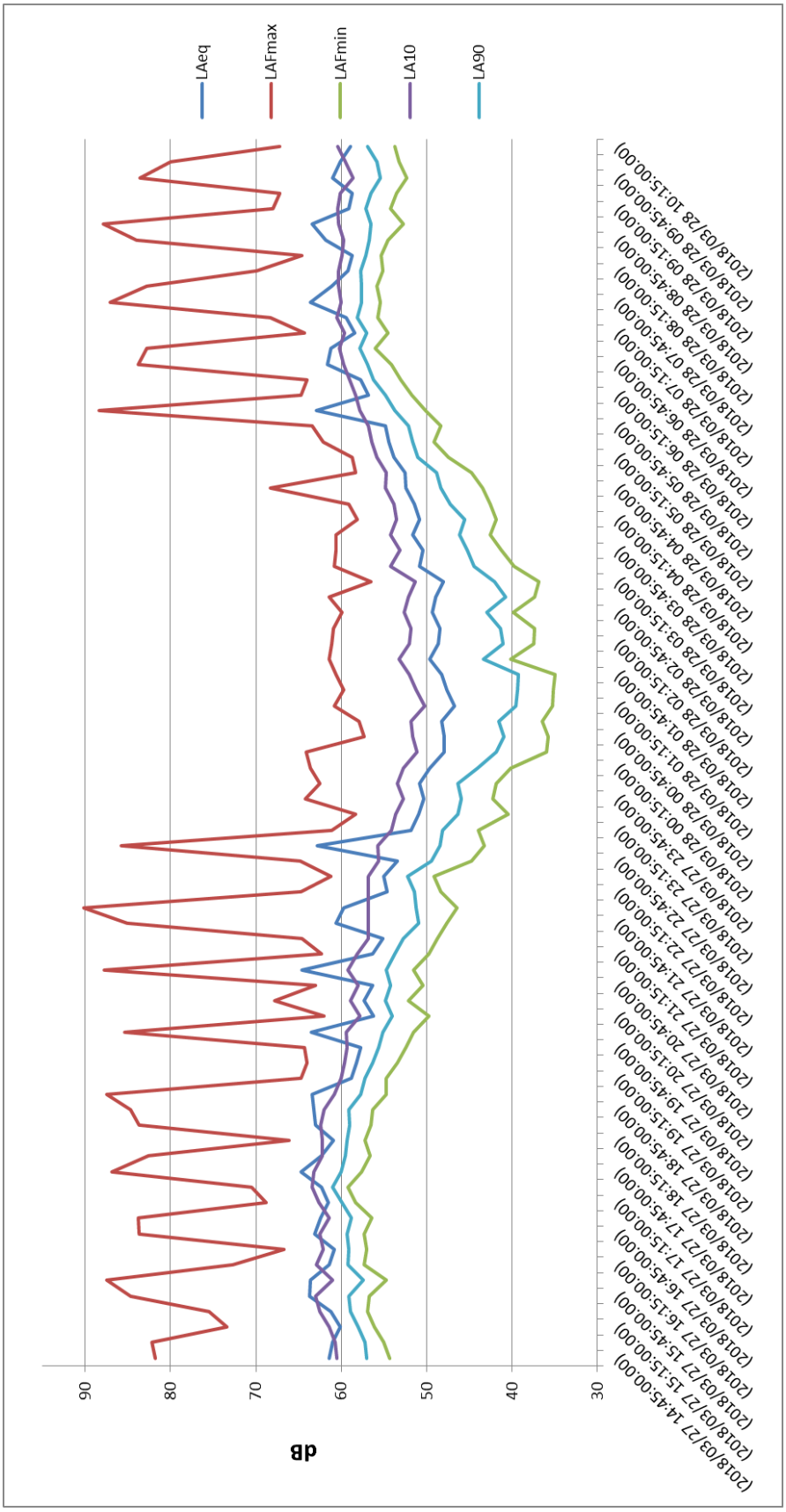


Figure C2: Table of survey results for monitoring Positions 2 and 3

Position	Time	L_{Aeq}	L_{Amin}	L_{Amax}	$\mathbf{L_{A90}}$	L_{A10}	Notes
		dB					
2	18:00	58	48	63	**50**	60	M1 traffic noise dominates soundfield along with intermittent traffic on Higham Lane. Birdsong also present among trees.
	19:30	56	47	63	**48**	59	
	19:45	56	45	68	**47**	61	
	22:45	51	45	58	**48**	53	
	03:29	41	39	47	**39**	41	
3	18:18	60	50	60	**54**	59	M1 traffic noise dominates soundfield (more than Position 2); no other obvious noise sources.
	20:05	54	50	58	**52**	55	
	22:26	53	47	60	**50**	55	
	03:29	47	40	57	**42**	50	

Figure C3: Table of predicted noise levels at receptors with the proposed mitigation scheme in place

With mitigation			Site Yard Noise		
Sensitive building	Building façade	Floor	Day $L_{Aeq, T}$	Night $L_{Aeq, T}$	L_{Amax}
			dB		
Offices	Facing north-east	GF	57	NA	NA
		F 1	57	NA	NA
		F 2	58	NA	NA
	Facing north-west	GF	58	NA	NA
		F 1	59	NA	NA
		F 2	60	NA	NA
Ibis Hotel	Facing north-west	GF	37	38	47
		F 1	40	39	48
		F2	43	44	49
		F3	44	45	49
Residential Bungalow	Facing north	GF	45	37	40
	Facing east	GF	42	36	48
	Garden	GF	45	NA	NA