

Occupation Lane, Woodville, Derbyshire, DE11 8ES

Noise Assessment

A112309

Harworth Group PLC

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Prepared on behalf of WYG Environment Planning Transport Limited.

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1.0 Introduction

This Noise Assessment has been prepared by WYG on behalf of the Harworth Group PLC to inform an outline planning application for a proposed development to include:

- Up to 300 new homes, to include a mix of house types;
- A local centre comprising approximately 1.5ha;
- Approximately 4.4ha of employment land;
- Vehicular and pedestrian access from the Woodville Regeneration Route (to be delivered by others), as well as from Moira Road to the east; and
- New areas of public open space and landscaping.

A description of the existing noise environment in and around the site is provided. A Noise survey has been undertaken and the results used to verify predictions of the effects of noise. The noise levels across the site have been predicted at proposed receptors using CADNA noise modelling software, which incorporates ISO 9613 and CRTN methodologies and calculations.

A list of acoustic terminology and abbreviations used in this report is provided in Appendix A and a set of location plans and noise contour plots relevant to the assessment are presented in Appendix B. Report Conditions are presented in Appendix D.

1.1 Legislative Context (England)

This report is intended to provide information relevant to the local planning authority and their consultees in support of a planning application for the above proposed development. Policy guidance with respect to noise is found in the National Planning Policy Framework (NPPF), published in February 2019. With regard to noise and planning, NPPF contains the following statement at paragraph 170:

"170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans*

A further 2 short statements are presented at paragraph 180, which state:

"180. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) *"mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life*
- b) *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

Furthermore, paragraphs 182 and 183 state:

"182. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

183. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."

Planning Practice Guidance (PPG): Noise provides further guidance with regard to the assessment of noise within the context of Planning Policy. The overall aim of this guidance, tying in with the principles of the NPPF and the Explanatory Note of the Noise Policy Statement for England (NPSE), is to, *'identify whether the overall effect of noise exposure is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.'*

A summary of the effects of noise exposure associated with both noise generating developments and noise sensitive developments is presented within the PPG and repeated as follows:

Table 1.1 Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No Specific Measures Required
Noticeable and intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect (NOEL)	No Specific Measures Required
Lowest Observed Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows	Observed Adverse Effect	Mitigate and reduce to a minimum

	for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.		
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Observed Adverse Effect	Prevent

The NPPF, NSPE and PPG:Noise do not, however, present absolute noise level criteria which define SOAEL, LOAEL and NOEL which is applicable to all sources of noise in all situations. Therefore, within the context of the Proposed Development, national planning policy and appropriate guidance documents, including the 'BS 8233 – Guidance on sound Insulation and Noise Reduction for Buildings'(2014), Section 2.0 presents the noise level criteria used as a basis of this assessment.

The PPG: Noise also states that neither the NPSE nor the NPPF (which reflects the Noise Policy Statement) expects noise to be considered in isolation, separately from the economic, social and other environmental dimensions of the proposed development.

2.0 Assessment Criteria

2.1 LOAEL and SOAEL Assessment Criteria

In order to enable the assessment of the proposed development in terms of LOAEL and SOAEL, Table 2.1 presents equivalent noise levels and associated actions with the target noise level criteria identified.

Table 2.1 Noise Level Criteria and Actions

Effect Level	Assessment	Noise Level Criteria	Action / Justification
Lowest Observed Adverse Effect Level (LOAEL)	Proposed Residential Receptors	Internal noise levels achieve (with windows open): <i>Bedrooms (night-time) – 30 dBL_{Aeq,8hours} / 45 dBL_{Amax} (up to 15 times per night)</i> <i>Living Rooms (daytime) – 35 dBL_{Aeq,16hours}</i>	None Within BS8233 / WHO Criteria
	Proposed Employment Use: Absolute Noise Levels	Private external Amenity Space (daytime) – 50 dBL _{Aeq,16hours}	
	Proposed Employment Use (Deliveries): Comparison with background noise levels	Difference between source noise rating levels and existing background levels of zero to 5 dB	Action: None Justification: + 5 dB above background is considered an indication of where adverse noise impacts may occur.
Significant Observed Adverse Effect Level (SOAEL)	Proposed Residential Receptors	Internal noise levels achieve (with windows closed): Bedrooms (night-time) – 30 dB L _{Aeq,8hours} / 45 dB L _{Amax} (up to 15 times per night) Living Rooms (daytime) – 35 dB L _{Aeq,16hours} Depending on context, external noise levels exceed:	Action: Mitigate to achieve (with windows closed): Bedrooms – 30 dBL _{Aeq,8hours} / 45 dBL _{Amax} Living Rooms – 35 dBL _{Aeq,16hours} <i>Depending on context, external Amenity Space – 55 dBL_{Aeq,16hours}</i>
	Proposed Employment Use: Absolute Noise Levels	Private external Amenity Space (daytime) – 55 dBL _{Aeq,16hours}	
	Proposed Employment Use (Deliveries): Comparison with background noise levels	Difference between source noise rating levels and existing background levels greater than 10 dB	Action: Mitigate as far as practicable: Justification: Depending on context, a difference of +10dB to be an indication of a significant adverse impact.

Noise levels at the site are dominated by a mix of transportation and industrial / commercial noise sources. However, the noise climate at the site will change once the Woodville Regeneration Route has been constructed with road traffic noise becoming more prevalent in the part of the site designated for residential use than compared to the current environment. Therefore, the absolute noise level criteria stated in BS 8233 (2014) 'Guidance on sound insulation and noise reduction for buildings' has been used as a basis for the

assessment of noise on proposed residential receptors. With regard to the assessment of proposed employment use at existing receptors, the assessment has been undertaken with reference to the guidance provided within BS 4142 (2014) 'Methods for rating and assessing industrial and commercial sound'.

3.0 Assessment Methodology

3.1 Noise Modelling Methodology

Three-dimensional noise modelling has been undertaken based on the monitoring data to predict L_{Aeq} and L_{Amax} noise levels at a large number of locations both horizontally and vertically. CADNA noise modelling software has been used which is based on the Department of Transport Calculation of Road Traffic Noise (CRTN) and ISO 9613 noise propagation methodology.

The modelling software calculates noise levels based on the emission parameters and spatial settings that are entered. Input data, assumptions and model settings as given in the table below have been used.

Table 3.1 Modelling Parameters Sources and Assumptions

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels	Ordnance Survey Curtins	OS 2m Lidar Proposed Ground Levels on Site and Link Road Alignment
Building heights	WYGE Observations	8 m height other than for relevant nearby industrial buildings which have been estimated
Barrier heights	WYGE Observations	3m barrier Proposed barriers shown in SK07
Receptor positions	WYGE	Height of 1.5 m for ground floor, 4 m for first floor receptors. Garden receptors, 1.5m above ground level. 1.5 m height for day model grid and monitoring locations for validation. 4m height for night model grid.
Absorbent Ground	CADNA	Frequency dependant ground absorption has been applied based on values specified in VDI 2714/16 clause 6.3.
Site Layout	Pegasus	Illustrative Masterplan P16-1422_004

It is acknowledged that a number of these assumptions will affect the overall noise levels presented in this report. However, it should be noted that certain assumptions made, as identified above, are worst case.

3.2 Model Input Data

3.2.1 Proposed Employment / Local Centre Units Noise Sources

At this outline stage, the assessment is based on external activities within services yard (delivery events) representing a reasonable worst-case scenario in terms of noise generation from proposed employment uses and the local centre.

Noise from vehicle movements associated with the proposed development, including both residential and non-residential uses, have been included with the noise assessment undertaken by AECOM which was submitted as part of the approved planning application for the Woodville Regeneration Route. Therefore, no further consideration of the impact of road traffic noise and vehicle movements has been undertaken with regard to existing receptors.

HGV Delivery Noise Data

Noise of a delivery event has been known to vary from site to site by as much as 22 dB L_{Aeq} at 5 m distance even with the same vehicle type. Similarly, individual events using the same vehicle and at the same site have been recorded to vary by as much as 14 dB.

As such, the following worst-case calculations have been based on measurements of refrigerated lorries delivering consumables. All measurements were undertaken in free-field conditions. In addition to noise from the unloading process, the levels used in the assessment include noise from the vehicle pulling up to the unloading bay, manoeuvring into position and then pulling away once unloading/loading is complete, together with other sources such as trolleys and reversing beepers. The calculations are based on a one event per hour at each unit as outlined on the illustrative masterplan. Given the likely type of proposed use and cumulative assessment of deliveries occurring simultaneously, it is considered reasonable to use an hourly time period for both daytime and night-time periods. Events are modelled as a point source.

Delivery Vehicle Docking and Unloading

- *Daytime $L_{Aeq,1hr}$ Noise Level*

5 minutes at L_p 75 dB at 3 m distance (vehicle arriving and manoeuvring)
 38 minutes at L_p 70 dB at 3 m distance (vehicle unloading)
 2 minutes at L_p 72 dB at 3 m distance (vehicle leaving)
 15 minutes of quiet (associated with documentation and waiting with engine off)

$$\begin{aligned}
 L_{Aeq(60 \text{ mins})} &= 10\log(1/60)(5\text{mins} \times 10^{0.1 \times 75\text{dB}} + 38\text{mins} \times 10^{0.1 \times 70\text{dB}} + 2\text{mins} \times 10^{0.1 \times 72\text{dB}}) \\
 &= 69.8 \text{ dB at 3 m distance } [L_{WA} = 87.3 \text{ dB}]
 \end{aligned}$$

- *Night-time $L_{Aeq,15mins}$ Noise Level*

5 minutes at L_p 75 dB at 3 m distance (vehicle arriving and manoeuvring)

$$\begin{aligned}
 &10 \text{ minutes at } L_p \text{ 70 dB at 3 m distance (vehicle unloading)} \\
 L_{Aeq(15 \text{ mins})} &= 10\log(1/15 \text{ mins})(5\text{mins} \times 10^{0.1 \times 75 \text{ dB}} + 10\text{mins} \times 10^{0.1 \times 70 \text{ dB}}) \\
 &= 72.4 \text{ dB at 3 m distance } [L_{WA} = 89.9 \text{ dB}]
 \end{aligned}$$

- *L_{Amax} Noise levels*

L_{Amax} used is as 85.4dB at 3 m distance

Delivery Vehicle Arriving/Exiting along service yard access road

The following calculations have been used to represent this as a line source in the model.

- *L_{Aeq,1hr} Noise Level*

1 x 10 seconds L_p = 69.3 dB at 3 m distance (vehicle arriving and leaving)

$$\begin{aligned}
 L_{Aeq(60 \text{ mins})} &= 10\log(1/60)(10 \text{ sec} \times 10^{0.1 \times 69.3 \text{ dB}} + 10 \text{ sec} \times 10^{0.1 \times 69.3 \text{ dB}}) \\
 &= 46.7 \text{ dB at 3 m distance}
 \end{aligned}$$

- *Night-time L_{Aeq,(15mins)} Noise Level (Per HGV)*

1 x 10 seconds L_p = 69.3 dB at 3 m distance (vehicle arriving or leaving)

$$\begin{aligned}
 L_{Aeq(15 \text{ mins})} &= 10\log(1/15 \text{ mins})(10 \text{ sec} \times 10^{0.1 \times 69.3 \text{ dB}}) \\
 &= 49.8 \text{ dB at 3 m distance}
 \end{aligned}$$

Building Services Plant (BSP) Noise Data

As the proposed plant design and end users are not confirmed at this stage a detailed plant noise assessment cannot be undertaken. Therefore, point sources have been defined in the model to represent potential plant associated with the Development. The maximum sound pressure levels of the point sources at 3 and 10 metres were estimated in the model as a conditional maximum level that the noise levels at nearby receptors were predicted to meet the required criteria of a noise rating level of equal to the background noise level at sensitive existing residential receptor locations.

3.2.2 Existing Noise Sources

Noise from transport and adjacent commercial/ industrial sources have been assessed based on on-site observations and a review of audio recordings collected at the long term measurement positions.

The noise sources considered with a brief discussion regarding the proposed assessment approach are outlined below with further details regarding the noise survey and observations made on site presented in Section 4.0.

For the purpose of assessing site suitability for residential development all proposed and existing noise sources have been considered cumulatively.

North Eastern Site Boundary

Activities within the delivery yard, primarily HGV movement, manoeuvring and idling, were identified to occur from around 05:00 at Food Search Worldwide. LT1 was positioned on the north eastern site boundary with proposed residential areas 70m or greater away from the service yard. Therefore, to account for the noise impact at proposed residential locations, noise modelling has been undertaken based on the HGV delivery and parking / idling event $L_{Aeq,1hour}$ and L_{Amax} source noise levels presented in Section 3.2.1. With regard to HGV's parking / idling along the site boundary a source noise level of 62.3 dB $L_{Aeq,1hour}$ (per event) has been used based on source data from the WYG database. $L_{Aeq,1hour}$ source noise levels have been used to present a reasonable worst-case when undertaking a comparison with the 16-hour daytime and 8-hour night-time BS 8233 noise level criteria.

Noise modelling has been undertaken based on delivery events occurring in the yard of Food Search Worldwide as well as HGV's idling adjacent to the site boundary. Line sources have been used to represent incoming and outgoing HGV movement. The location of where sources have been considered are shown on SK02b and include sources in the service yard of Kenyon Warehousing.

Based on the above, the noise model has been verified against the highest measured $L_{Aeq,1hour}$ at LT1.

Table 3.2 Daytime Modelled vs. Monitored Results $L_{Aeq,T}$

Monitoring Position	Monitored L_{Aeq} (dB)	Modelled L_{Aeq} (dB)	Difference between modelled and measured noise level (dB)
LT1	56.7	57.8	1.1

All values are sound pressure levels in dB re: 2×10^{-5} Pa

The verification points show that the modelling noise level is greater than the highest measured noise level. Therefore, the models are considered to represent at reasonable worst-case. It should also be noted that birdsong influenced the noise measurements at LT1 and, therefore, it is considered that the modelled noise levels present an over-estimate of the noise contribution of these units at the site.

Northern Boundary

Based on site observations and a review of audio recordings over the course of the noise survey, operations at a waste management company (ECO Skips) immediately adjacent to the northern boundary of the site were identified to occur during the daytime period. No noise was audible from this premises during the evening or night.

Observations were made during the survey which identified the principle source of noise from ECO skips site being vehicle movement, the movement and processing or aggregates / waste to the north of LT6. Noise

modelling verification has been undertaken based on the following source noise levels which have been included within the noise model as point sources:

- 74 dB $L_{Aeq,1hour}$ @ 10m (Sound Power Level: 102 dB(A)): Sourced from the WYG database, representative of a shredder operating with 50% on-time correction.
- 72 dB L_{Amax} @10m (Sound power level: 100 dB(A)): Sourced from Table BS5228-1:2009+A1:2014, representative of skip drive-by L_{Amax} noise levels with a 25% on-time correction.

Table 3.3 Daytime Modelled vs. Monitored Results $L_{Aeq,T}$

Monitoring Position	Monitored L_{Aeq} (dB)	Modelled L_{Aeq} (dB)	Difference between modelled and measured noise level (dB)
LT6	58.9	59.0	0.1
ST6	55.9	57.9	2.0

All values are sound pressure levels in dB re: 2×10^{-5} Pa

The verification points show that the modelling noise level is equivalent to or greater than the highest measured noise level. Therefore, the models are considered to represent at reasonable worst-case.

Whilst operations were occurring adjacent to boundary of the proposed residential area, it is understood that following completion of the Woodville Regeneration Route, the part of the ECO Skips site to the east of the proposed road will be sterilised with the land obtained under a compulsory purchase order associated with the proposals. However, at the time of writing, formal confirmation is not available and, therefore, noise from within this area has been included in the noise model to present a worst-case.

During the attended site visits no activities were observed to be occurring in the area directly to the northern of the proposed residential area / to the east of the Woodville Regeneration Route. Additionally, following a review of the measured noise data noise levels were typically below 55 dB $L_{Aeq,1hour}$ at LT5 with infrequent periods where, following a review of audio recordings, higher noise levels occurred due to vehicle movements within close proximity to the monitoring location. Therefore, point sources have been assigned in the noise model in the part of the Eco Skips site to the east of the Woodville Regeneration Route to represent a precautionary approach. The same noise source levels as included in the area to the west of the proposed road have been assigned (i.e. 100 dB L_{WA} and 102 dB L_{WA}).

In addition, a row of stacked containers is present along the ECO Skips southern boundary adjacent to the site which provides a barrier between operations within ECO Skips and the site. This barrier has been included within the noise model verification but to present a worst-case assessment, given that the barrier configuration or presence of the barrier will change following the construction of the Woodville Regeneration Route, the barrier has not been included within the noise models used to base the assessment on proposed receptors.

No significant sources of noise were evident during the night-time period. However, to present a worst-case assessment, the same source noise levels ($L_{Aeq,1hour}$) have been assessed during both daytime and night-time periods.

South Western Site Boundary

IG Elements is located to the south west of the site and based on observations made during the noise survey noise from forklift activities including the racking of materials and HGV movements were the dominant sources of noise from this premises. Noise breakout from music within the factory was also audible. The main noise sources that were audible at the site occurred during the daytime with a low level of noise audible externally during the night-time with operations occurring within the building.

Noise modelling verification has been undertaken based on the following source noise levels which have been included within the noise model as point sources:

- Internal reverberant noise level 75 dB $L_{Aeq,1hour}$: Noise breakout based on typical internal noise levels from a manufacturing premises from the WYG database. Two vertical areas sources have been included to represent open roller shutter doors on the eastern façade of the IG elements facility.
- 70.5 dB $L_{Aeq,1hour}$ @ 3m (Sound Power Level: 87 dB(A)): Representative of a forklift loading based on a noise measurement from within the WYG database of 76 dB $L_{Aeq,15secs}$. 25% on-time correction has been applied. Two sources point sources have been assigned in the noise models within the external yard.
- HGV movement as a line source. 20 events per hour based on 46.7 dB at 3 m as stated in Section 3.2.1.

Table 3.3 Modelled vs. Monitored Results $L_{Aeq,T}$

Monitoring Position	Monitored L_{Aeq} (dB)	Modelled L_{Aeq} (dB)	Difference between modelled and measured noise level (dB)
LT2	53.5	56.4	2.9
ST2	54.2	53.6	-0.6
ST2a	50.3	52.0	1.7

All values are sound pressure levels in dB re: 2×10^{-5} Pa

The verification points show that the modelling noise level is equivalent to or greater than the highest measured noise level. Therefore, the models are considered to represent at reasonable worst-case. To present a worst-case assessment, the same source noise levels ($L_{Aeq,1hour}$) have been assessed during both daytime and night-time periods. Peak noise levels during the night-time period have been assessed based on the L_{Amax} delivery source noise levels presented in 3.2.1.

Transport Noise Verification

With regards to transport noise, 18hr AAWT traffic flows for the 2015 base year (provided by AECOM) have been included within the noise model for existing roads around the site and surrounding area. In accordance with CRTN, A -2dB correction has then been applied to each link to the convert $L_{A10, 18hr}$ values to the $L_{Aeq, 16hr}$ source noise levels used within the noise model. The results of the noise modelling has then been compared against the closest long-term and/or short-term measurement positions to Moira Road. The comparison between the monitoring and modelling results are shown in the tables below.

Table 3.5 Daytime Modelled vs. Monitored Results $L_{Aeq, 16hours}$

Monitoring Position	Monitored L_{Aeq} (dB)	Modelled L_{Aeq} (dB)	Difference between modelled and measured noise level (dB)
LT2	50.9	52.3	1.4
LT3	55.1	57.7	2.6
ST4	66.0	65.9	-0.1

All values are sound pressure levels in dB re: 2×10^{-5} Pa

Within the daytime noise model all verification points show a divergence between monitored and modelled results of no more than 3 dBA. The models are therefore considered to be suitably verified.

For the proposed scenario, the traffic source noise levels are based on the 2035 Do Something (With Development) future year traffic data provided by AECOM.

With regard to the night-time period, a correction of -4 dB has been applied to the daytime $L_{Aeq, 16hours}$ to generate the night-time $L_{Aeq, 8hours}$ for all roads. This is equivalent to the measured daytime and night-time noise level during a weekday at LT3 as shown in Table 4.3.

3.2.3 Sensitive Receptors

Due to the outline nature of the proposed development, façade and garden receptor locations have been selected due to their geographical position in relation to both existing and proposed noise sources. This presents a worst-case assessment and indicates how noise levels vary throughout the site based on the indicative proposals. Their locations are detailed on SK02a (facades) and SK02b (gardens) in Appendix B. Existing residential receptor locations are presented on SK02c.

Table 3.6 Existing Receptor Locations

Ref.	Description	Height (m)
ER1	72 Main Street	1.5/4.0
ER2	44 Arliston Drive	1.5/4.0
ER3	25 to 39 Occupation Lane	1.5/4.0
ER4	21 Occupation Lane	1.5/4.0

3.3 Tranquillity Rating

An assessment of the existing tranquillity level of the site has been based on the mapping data published by Campaign to Protect Rural England (CPRE). This uses a colour coded system and a 500m assessment grid for the whole of England, and a tranquillity rating of between 1 and 10 is assigned (1 being least tranquil and 10 being most). By reference to these maps the development is assessed as falling into Zones 3 and 4.

4.0 Noise Survey

4.1 Noise Survey Methodology

A monitoring survey was undertaken to characterise baseline ambient noise levels currently experienced on the site and to establish the relative local background and traffic noise levels. Equipment used during the survey included:

Norsonic 140	Building Acoustics Analyser	s/n	1402989
Norsonic 1251	Sound Calibrator	s/n	31043
Rion NL-32	Environmental Noise Analyser (WYG12)	s/n	213442
Rion NL-52	Environmental Noise Analyser (WYG13)	s/n	1221575
Rion NL-52	Environmental Noise Analyser (WYG15)	s/n	620858
Rion NL-52	Environmental Noise Analyser (WYG17)	s/n	1043466
Rion NL-52	Environmental Noise Analyser (WYG19)	s/n	253701
Rion NL-52	Environmental Noise Analyser (WYG20)	s/n	253702
Rion NL-52+X	Environmental Noise Analyser (WYG2)	s/n	342867
Rion NL-52	Environmental Noise Analyser	s/n	264488
Rion NC-74	Sound Calibrator	s/n	35046823

The measurement equipment was checked against the appropriate calibrator at the beginning and end of the measurements, in accordance with recommended practice, the following drift was observed: LT1 +0.1dB, LT2 +0.1dB, LT4 -0.3dB, LT5 +0.4dB, LT6 +0.1dB, with no drift observed for LT3 or the short-term measurements. The accuracy of the calibrators can be traced to National Physical Laboratory Standards, calibration certificates for which are available on request.

A baseline monitoring survey was undertaken at sixteen locations (as specified in the following table and shown in SK01 of Appendix B) from Friday 22nd February 2019 to Thursday 28th February 2019. Attended short term measurements were undertaken at nine locations during the day, evening and night-time periods with one extra location measured during the day period. Six additional locations were measured unattended over a 144-hour period. The raw data collected from the long-term monitoring is available upon request.

Measurements were taken in general accordance with BS 7445-1:2003 *The Description and Measurement of Environmental Noise: Guide to quantities and procedures*. Weather conditions during the survey period were observed as being dry with scattered showers. Anemometer readings confirmed that wind speeds were less than 5 ms⁻¹ at all times during the attended survey, with a predominant south-westerly wind direction.

Table 4.1 Noise Monitoring Locations

Ref	Description
LT1	Northeast of the site, adjacent to Foodsearch Worldwide boundary
LT2	Southern part of site, east of service yard boundary of IG Elements

Ref	Description
LT3	Southeast corner of site by Occupation Lane/ Moira Road – Approximately 16m from Occupation Lane
LT4	North-eastern site boundary
LT5	On northern boundary of site
LT6	On northern boundary of site opposite to green shed in scrap yard
ST1	East of 62 Main Street, Albert Village
ST2	South-western corner of the site
ST2a	South-western corner of the site
ST3	North of 15 Occupation Lane
ST4	Junction of Chapel Street and Moira Road approximately 5m from Moira Road
ST5	Southwest corner of the site
ST6	Northern boundary of site, opposite to green shed at ECO Skips
ST7	Northern boundary of site
ST8	Northeast corner of site southwest of Kenyon Warehousing
ST9a	South of Foodsearch Worldwide service yard
ST10	North-western corner of the site

4.2 Noise Survey Results

The dominant noise sources found in the area include road traffic noise on Main Street, Occupation Lane and Moira Road with industrial and commercial noise sources also audible. Such sources included: to the south west of the site, forklift unloading noise and HGV's manoeuvring in the service yard and warehouse breakout noise from IG Elements; the principle source of noise from ECO Skips site adjacent to the northern boundary being vehicle movement, the movement and processing or aggregates / waste to the north of LT6 with infrequent vehicle movements to the north of LT5; and vehicle movements at the warehouses to the north east of the site. A hammer drill was also audible adjacent to LT4, however, this was considered to be a temporary feature and no representative of typical operations and thus not included in the assessment. During the later evening and night, noise levels were observed to be lower at the site and a distant drone of plant to the north of the site was audible in the absence of traffic noise.

Ambient and background noise levels are usually described using the L_{Aeq} index (a form of energy average) and the L_{A90} index (i.e. the level exceeded for 90% of the measurement period) respectively. Road traffic noise is generally described using the L_{A10} index (i.e. the level exceeded for 10% of the measurement period).

Table 4.2 Meteorological Conditions during the Survey

Survey Location	Date & Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
Day ST1	28/02/2019 10:28	5	0-1	W	8	Road traffic noise on Main Street dominant. Distant industry just audible when no traffic present.
Day ST2	27/02/2019 13:47	6	1-2	N	1	Industrial noises including power washer, reversing

Survey Location	Date & Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
						beeps, clangs and bangs from site to south west.
Day ST2	27/02/2019 14:03	6	1-2	N	1	Forklifts moving cargo on and off HGVs. Movement of HGVs. Other Industrial noises such as clangs and bangs, workers chatting.
Day ST2a	28/02/2019 11:43	8	0-2	W	8	Forklifts movements, reverse warning signals and lifting in service yard. Breakout including spraying sound music, odd bangs and machinery. HGV movement.
Day ST3	27/02/2019 16:10	8	1-2	N	1	Traffic noise and occasional distant industrial noise.
Day ST3	28/02/2019 11:06	6	0-1	W	8	Road traffic noise on Occupation Lane, Hepworth Road and roundabout dominant.
Day ST4	28/02/2019 09:50	5	0-1	W	8	Road traffic noise on B5004 Moira Road dominant. Occasional vehicle pass on Chapel Street. Distant plant hums and industrial bangs audible to the west.
ST5	27/02/2019 15:48	8	1-2	N	1	Lorries moving in and out. Emptying sediment and aggregates into piles. Mobile plant moving around site
Day ST6	28/02/2019 12:57	10	0-1	W	7	Skip trucks passing in ECO Skips and shredding and engine revs from green shed in yard.
Day ST6	27/02/2019 15:22	8	1-2	N	1	Vehicles moving in Eco Skip Hire yard. Sporadic bangs and clangs.
Day ST7	27/02/2019 15:02	8	1-2	N	1	Vertical Hammer/drill on tickover. Every so often drill gets adjusted to a slightly different location. Noise from excavator near drill.
Day ST7	28/02/2019 13:32	10	1-2	W	7	Engine noise and shredding audible from ECO Skips
Day ST8	28/02/2019 14:05	10	1-3	W	7	Engine noise and shredding audible from ECO Skips with occasional bangs from adjacent yards. Slight hum from adjacent warehouse.
Day ST8	27/02/2019 14:43	8	1-2	N	1	Drill operating in unite east of Food Worldwide. Clanging from near ST7 location.
Day ST9	27/02/2019 14:24	6	1-2	N	1	Road traffic along A514. Frequent bangs and clangs Engine noise and from ECO Skips with occasional clangs and bangs.
Day ST9a	28/02/2019 14:45	10	1-2	W	6	Occasional low-level noise audible from service yard to the north. HGV pass and manoeuvre to the northeast in service yard.
Day ST10	28/02/2019 12:21	10	1-2	W	7	HGV being loaded by forklift ~200m away in plastics company yard to southwest. Distant plant noise from

Survey Location	Date & Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
						chimney to the north. Vehicle movements including skip trucks passing to the northeast in scrap yard plus bangs from green shed in ECO Skips.
Evening ST1	27/02/2019 20:44	4.0	0-1	S	1	Traffic along Main Street. Distant plant noise.
Evening ST2	27/02/2019 22:22	4.0	0-1	S	1	Traffic along Moira Road. Distant plant noise.
Evening ST3	27/02/2019 21:50	4.0	0-1	S	1	Traffic along Moira Road. Distant plant noise.
Evening ST4	27/02/2019 21:14	4.0	0-1	S	1	Traffic along Moira Road.
Evening ST6	25/02/2019 22:10	6.0	0-1	SW	1	Road Traffic along Swadlincote Road, Moira Road and Occupation Lane. Intermittent overhead aircraft. Distant plant noise.
Evening ST7	25/02/2019 21:51	6.0	0-1	SW	1	Road Traffic along Swadlincote Road, Moira Road and Occupation Lane. Intermittent overhead aircraft. Distant plant noise.
Evening ST8	25/02/2019 21:31	6.0	0-1	SW	1	Road Traffic along Swadlincote Road, Moira Road and Occupation Lane. Intermittent overhead aircraft. Distant plant noise.
Evening ST9a	25/02/2019 21:09	6.0	0-1	SW	1	Road Traffic along Swadlincote Road, Moira Road and Occupation Lane. Intermittent Plane passes.
Evening ST10	25/02/2019 22:35	6.0	0-1	SW	1	Road Traffic along Swadlincote Road, Moira Road and Occupation Lane. Intermittent Plane passes. Distant plant noise.
Night ST1	28/02/2019 00:10	4.0	0-1	S	1	Traffic along Main Street. Distant plant noise.
Night ST2	27/02/2019 23:00	4.0	0-1	S	1	Traffic along Moira Road. Distant plant noise.
Night ST3	27/02/2019 23:28	4.0	0-1	S	1	Traffic along Moira Road. Distant plant noise.
Night ST4	27/02/2019 23:48	4.0	0-1	S	1	Traffic along Moira Road. Distant plant noise.
Night ST6	25/02/2019 23:27	4.0	0-1	SW	1	Road Traffic along Swadlincote Road, Moira Road and Occupation Lane. Intermittent Plane passes.
Night ST7	25/02/2019 23:44	4.0	0-1	SW	1	Road Traffic along Swadlincote Road, Moira Road and Occupation Lane. Intermittent Plane passes.
Night ST8	26/02/2019 00:03	4.0	0-1	SW	1	Road Traffic along Swadlincote Road, Moira Road and Occupation Lane. Intermittent Plane passes.
Night ST9a	26/02/2019 00:23	4.0	0-1	SW	1	Road Traffic along Swadlincote Road, Moira Road and Occupation Lane. Intermittent Plane passes.
Night ST10	25/02/2019 23:05	4.0	0-1	SW	1	Road Traffic along Swadlincote Road, Moira Road and Occupation Lane.

Survey Location	Date & Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
						Intermittent Plane passes. Distant plant noise.

The results of the statistical measurements and frequency measurements conducted during the survey are summarised in the following table. All values are sound pressure levels in dB (re: 2×10^{-5} Pa). For the long-term (LT) locations, the presented $L_{Aeq,T}$ and $L_{A10,T}$ are average noise levels whilst the L_{A90} is the modal noise level of each 5 minute measurement over the stated survey period.

Table 4.3 Results of Baseline Noise Monitoring Survey (Average Levels)

Period	Duration (T)	Monitoring Date and Times	Location	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
Weekday Daytime 07:00 - 23:00	63 Hours	22/02/2019 – 28/02/2019 07:00 - 23:00	LT1	52.1	86.9	35.5	48.7	46
Weekday Night-time 23:00 – 07:00	32 Hours	22/02/2019 – 28/02/2019 23:00 - 07:00		50.7	79.8	27.3	43.4	34
Weekend Daytime 07:00 - 23:00	32 Hours	22/02/2019 – 28/02/2019 07:00 - 23:00		50.5	87.3	32.0	45.6	44
Weekend Night-time 23:00 – 07:00	16 Hours	22/02/2019 – 28/02/2019 23:00 - 07:00		47.9	72.9	25.8	40.6	35
Weekday Daytime 07:00 - 23:00	63 Hours	22/02/2019 – 28/02/2019 07:00 - 23:00	LT2	50.9	87.1	34.2	51.8	46
Weekday Night-time 23:00 – 07:00	32 Hours	22/02/2019 – 28/02/2019 23:00 - 07:00		46.9	82.8	25.0	46.0	31
Weekend Daytime 07:00 - 23:00	32 Hours	22/02/2019 – 28/02/2019 07:00 - 23:00		48.9	80.7	27.9	49.8	44
Weekend Night-time 23:00 – 07:00	16 Hours	22/02/2019 – 28/02/2019 23:00 - 07:00		43.8	78.3	25.4	44.5	32
Weekday Daytime 07:00 - 23:00	63 Hours	22/02/2019 – 28/02/2019 07:00 - 23:00	LT3	55.1	87.4	28.7	58.6	44
Weekday Night-time 23:00 – 07:00	32 Hours	22/02/2019 – 28/02/2019 23:00 - 07:00		50.9	79.4	22.1	48.6	29
Weekend Daytime 07:00 - 23:00	32 Hours	22/02/2019 – 28/02/2019 07:00 - 23:00		54.4	78.9	26.1	58.2	40
Weekend Night-time 23:00 – 07:00	16 Hours	22/02/2019 – 28/02/2019 23:00 - 07:00		48.5	76.8	23.3	48.7	32
Weekday Daytime 07:00 - 23:00	63 Hours	22/02/2019 – 28/02/2019 07:00 - 23:00	LT4	50.2	79.9	32.3	48.9	42
Weekday Night-time 23:00 – 07:00	32 Hours	22/02/2019 – 28/02/2019 23:00 - 07:00		53.2	88.2	22.4	43.0	32
Weekend Daytime 07:00 - 23:00	32 Hours	22/02/2019 – 28/02/2019 07:00 - 23:00		48.4	79.3	26.8	46.0	40
Weekend Night-time 23:00 – 07:00	16 Hours	22/02/2019 – 28/02/2019 23:00 - 07:00		46.4	80.2	20.5	41.8	32

Period	Duration (T)	Monitoring Date and Times	Location	L _{Aeq,T} (dB)	L _{Amax,T} (dB)	L _{Amin,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
Weekday Daytime 07:00 - 23:00	63 Hours	22/02/2019 – 28/02/2019 07:00 - 23:00	LT5	58.8	94.0	34.0	50.6	44
Weekday Night-time 23:00 – 07:00	32 Hours	22/02/2019 – 28/02/2019 23:00 - 07:00		46.7	74.4	23.5	42.6	31
Weekend Daytime 07:00 - 23:00	32 Hours	22/02/2019 – 28/02/2019 07:00 - 23:00		47.3	79.6	28.2	47.4	42
Weekend Night-time 23:00 – 07:00	16 Hours	22/02/2019 – 28/02/2019 23:00 - 07:00		44.8	75.6	22.2	42.3	35
Weekday Daytime 07:00 - 23:00	63 Hours	22/02/2019 – 28/02/2019 07:00 - 23:00	LT6	52.8	84.6	33.6	51.6	42
Weekday Night-time 23:00 – 07:00	32 Hours	22/02/2019 – 28/02/2019 23:00 - 07:00		44.7	76.4	24.2	43.1	31
Weekend Daytime 07:00 - 23:00	32 Hours	22/02/2019 – 28/02/2019 07:00 - 23:00		49.8	80.5	30.2	48.8	46
Weekend Night-time 23:00 – 07:00	16 Hours	22/02/2019 – 28/02/2019 23:00 - 07:00		42.4	77.7	24.3	42.3	35
Daytime 07:00 - 19:00	30 Mins	28/02/2019 10:28	ST1	71.0	83.4	47.8	75.3	55.4
	15 Mins	27/02/2019 13:46	ST2	50.6	80.3	42.2	50.8	44.1
	15 Mins	27/02/2019 14:02	ST2	54.2	82.6	43.3	54.3	45.3
	30 Mins	28/02/2019 11:43	ST2a	50.3	66.7	43.4	52.2	47.0
	15 Mins	27/02/2019 11:06	ST3	48.4	63.3	40.4	50.8	44.6
	30 Mins	28/02/2019 11:06	ST3	50.5	72.8	39.1	52.1	44.4
	30 Mins	28/02/2019 09:50	ST4	66.0	84.3	45.9	70.5	49.1
	15 Mins	27/02/2019 15:48	ST5	59.2	66.0	53.9	60.9	57.1
	15 Mins	27/02/2019 15:21	ST6	54.9	70.1	41.7	58.6	44.6
	30 Mins	28/02/2019 12:57	ST6	55.9	71.6	40.4	59.4	43.6
	1 Hour	29/02/2019 10:51	ST6	52.2	72.6	40.0	54.2	46.4
	15 Mins	27/02/2019 15:02	ST7	60.8	71.2	42.2	65.4	47.0
	30 Mins	28/02/2019 13:32	ST7	50.1	65.2	42.6	52.5	46.2
	15 Mins	27/02/2019 14:43	ST8	57.0	72.8	42.0	58.9	45.3
	30 Mins	28/02/2019 14:05	ST8	47.8	71.3	42.3	49.2	45.3
	1 Hour	28/02/2019 11:59	ST8	45.9	62.4	39.5	47.2	42.9
	15 Mins	27/02/2019 14:24	ST9	44.0	65.0	38.6	45.5	40.4
	30 Mins	28/02/2019 14:45	ST9a	46.0	68.6	41.2	47.5	43.7
	1 Hour	28/02/2019 13:07	ST9	46.0	63.5	40.2	47.3	43.1
	30 Mins	28/02/2019 12:21	ST10	46.2	65.8	40.9	47.6	44.0
Evening 19:00 - 23:00	15 Mins	27/02/2019 20:44	ST1	68.8	84.1	44.7	73.5	52.1
	15 Mins	27/02/2019 22:22	ST2	46.8	58.0	38.7	49.3	41.4
	15 Mins	27/02/2019 21:50	ST3	49.1	70.0	36.7	52.8	39.4
	15 Mins	27/02/2019 21:14	ST4	66.5	87.4	41.7	67.7	44.7
	15 Mins	25/02/2019 22:10	ST6	43.7	62.5	36.9	45.0	40.8
	15 Mins	25/02/2019 21:51	ST7	45.6	64.4	36.4	46.9	41.3
	15 Mins	25/02/2019 21:31	ST8	41.7	52.8	35.4	42.8	38.7
	15 Mins	25/02/2019 21:09	ST9a	43.0	56.2	35.9	44.2	39.8

Period	Duration (T)	Monitoring Date and Times	Location	L _{Aeq,T} (dB)	L _{Amax,T} (dB)	L _{Amin,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
	15 Mins	25/02/2019 22:35	ST10	44.9	69.9	39.1	46.7	41.8
Night-time 23:00 - 07:00	15 Mins	28/02/2019 00:10	ST1	59.5	83.3	25.1	56.2	28.5
	15 Mins	27/02/2019 23:00	ST2	44.2	60.0	36.5	47.1	39.9
	15 Mins	27/02/2019 23:48	ST3	48.0	73.2	26.0	46.3	28.7
	15 Mins	27/02/2019 23:28	ST4	57.3	84.3	35.2	54.9	38.1
	15 Mins	25/02/2019 23:27	ST6	41.8	58.9	32.2	43.6	36.7
	15 Mins	25/02/2019 23:44	ST7	40.9	54.8	30.1	42.2	35.7
	15 Mins	26/02/2019 00:03	ST8	38.8	61.5	30.6	41.1	34.2
	15 Mins	26/02/2019 00:23	ST9a	47.0	64.7	29.3	48.6	39.5
	15 Mins	25/02/2019 23:05	ST10	42.6	56.5	35.0	43.5	38.9

All values are sound pressure levels in dB re: 2x 10⁻⁵ Pa

5.0 Assessment of Key Effects

Section 5.1 presents an assessment of the potential noise impact associated with the proposed employment uses at existing receptors. A daytime contour plot is presented in SK05.

Section 5.2 provides an assessment of the site suitability for residential end-use. Source noise levels associated with the proposed employment uses have been included within the assessment to quantify the potential for noise impact at the proposed receptors in the context of existing and proposed noise sources. An inherent design feature of the masterplanning process at this stage in relation to noise is proposed dwellings positioned along the northern boundary of the site should front onto the north with gardens to the rear. This feature is also recommended where practicable along the western boundary of the residential area of the site facing the Woodville Regeneration Route. Section 5.1 also considers building services plant with regard to proposed receptors as well as existing receptors.

5.1 Assessment of Proposed Employment Uses

5.1.1 Building Services Plant BS 4142 Noise Assessment

This assessment compares the predicted average noise levels from potential building service plant (BSP), with the measured background noise L_{A90} at the surrounding existing and proposed residential receptors.

As details relating to proposed BSP are currently unknown, noise from a series of predictions were made by defining different sound power levels (assuming hemi-spherical propagation) at the point sources. When the sound pressure levels are set as shown in Table 5.1 (which is considered to be achievable), the rating levels at all the representative receptors are predicted to meet the background levels during the period when the plant would be operational, as shown in Table 5.2.

Consideration has also been given to proposed residential receptors based on a design limit of 40 dB $L_{Aeq,1hour}$ (between 07:00 – 23:00) and 35 dB $L_{Aeq,1hour}$ (between 23:00 – 07:00). This will result in there being a negligible contribution from BSP. At the detailed design stage, given that the noise environment at the proposed site will change following the construction of the Woodville Regeneration Route, if it is identified that this criteria is over onerous, then further assessments in accordance with the guidance within BS 4142:2014+A1:2019 could be undertaken to determine whether the design limits could vary. Further justification could also be provided with regard to the night-time design limits as the reference background noise levels are very low.

Table 5.1 BSP Noise Emissions as Modelled

BSP Location	Noise Emission - Sound Pressure Level	
	Daytime	Night-time
Roof mounted on each proposed employment unit	62.9dBA at 3m or 52.4dBA at 10m	56.9.5dBA at 3m or 46.4dBA at 10m

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

Table 5.2 presents the difference between the background noise level and noise rating level associated with the proposed plant. To present a worst-case scenario and take into account any assessment uncertainty, in accordance with BS 4142 a +4 dB correction has been added to determine the rating level at the receptor.

Table 5.2 BS4142 Assessment for Proposed Plant

Reference	Existing Measured Background L_{A90}		Rating level from plant ($L_{A,Tr}$)		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
ER1	52	29	21	15	-31	-14
ER2	44	29	26	22	-18	-6
ER3	44	29	34	28	-11	-1
ER4	44	29	29	24	-15	-5

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

All calculations used to derive the above table (including averaging of background noise levels and predicted source noise levels) have been undertaken to 1 decimal place to avoid perpetuation of rounding errors. However, in accordance with BS4142 Para 8.6, the levels are expressed as integers (with 0.5 dB being rounded up). This may mean that the arithmetic in the above table may appear to be up to 1 dB incorrect due to this rounding.

At all receptors noise levels are predicted to be equivalent to or below the background noise level and thus below the LOAEL based on worst case assumptions that all plant would be operating simultaneously.

5.1.2 Delivery Noise Assessment

The assessment presented in Table 5. compares existing typical background noise levels (L_{A90}) with predicted delivery noise at the nearest residential dwellings at existing receptors (ER). During the daytime predicted noise levels are below background noise levels whilst during the night-time both background and predicted noise levels are very low. Therefore, a BS4142 character correction has not been applied.

Table 5.3 BS 4142 Assessment (Deliveries Only – Manoeuvring / loading / unloading)

Ref	Measured Average Pre-installation Background L_{A90}		Predicted noise level from deliveries ($L_{A,Tr}$)		BS 4142 Score	
	Day time	Night-time	Daytime	Night-time	Day time	Night-time
ER1	52	29	29	27	-24	-2
ER2	44	29	34	30	-10	1
ER3	40	29	41	34	1	5
ER4	40	29	39	33	-1	4

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

The assessment above shows that noise rating levels are predicted to be below background noise levels during the daytime all nearby existing sensitive receptor locations. Therefore, the results of the BS 4142 daytime assessment of on-site operational noise sources are below the LOAEL.

The night-time assessment shows that noise rating levels are predicted to be greater than the background noise levels by up to 5 dB which is equivalent to or below the LOAEL. As noted, the reference existing background noise levels are very low during the night-time and further context with regard to absolute noise level criteria is given below.

Internal L_{Aeq} and L_{Amax} noise levels, internal ambient noise levels, at nearby sensitive receptors from deliveries / services to the Development (on the basis of worst case assumptions) have been assessed both with windows open, where a reduction from a partially open window of 15 dBA has been used, and with windows closed where an assumption of single glazing with a sound reduction of 30 dBA has been used.

Table 5.4 Daytime Noise Intrusion Levels $L_{Aeq,1hour}$ (Deliveries Only)

Location	External L_{Aeq} Noise Level at 1 metre from façade	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria (Internal L_{Aeq} dB)
ER1	29.8	14.8	0.0	35
ER2	31.0	16.0	1.0	35
ER3	34.3	19.3	4.3	35
ER4	32.8	17.8	2.8	35

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

Table 5.5 Night Noise Intrusion Levels $L_{Aeq,15mins}$ (Deliveries Only)

Location	External L_{Aeq} Noise Level at 1 metre from façade	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria (Internal L_{Aeq} dB)
ER1	29.1	14.1	0.0	30
ER2	31.1	16.1	1.1	30
ER3	34.1	19.1	4.1	30
ER4	32.2	17.2	2.2	30

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

Table 5.6 Night Noise Intrusion Levels L_{Amax} (Deliveries Only)

Location	External L_{Aeq} Noise Level at 1 metre from façade	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria (Internal L_{Aeq} dB)
ER1	41.9	26.9	11.9	45
ER2	43.9	28.9	13.9	45
ER3	46.7	31.7	16.7	45
ER4	44.9	29.9	14.9	45

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

The BS 8233 noise intrusion assessment indicates that internal L_{Aeq} and L_{Amax} noise levels during the daytime and night-time from deliveries are predicted to meet the target noise intrusion criteria at all existing receptors with windows open.

The predicted internal noise levels at existing receptors will fall below LOAEL during the daytime and night-time periods at all receptors.

5.2 Assessment of Key Effects Residential Development

5.2.1 Noise Intrusion Assessment

Internal noise levels at the proposed development, based on the existing ambient noise climate and contributions from the proposed employment units, have been assessed both with windows open, where a reduction from a partially open window of 15 dBA has been used, and with windows closed where an assumption of standard double glazing (4mm / 16mm / 4mm) with a sound reduction of 25 dB $R_{w+C_{tr}}$ has been used. The predicted noise levels at the assessed receptors locations (as presented in SK02a) are presented in Table 5.7 and Table 5.8 below. The daytime and night-time L_{Aeq} noise contour plots are presented in SK03 and SK04. The location where localised 1.8m barrier have been included within the noise models are presented in SK06. By addressing the L_{Aeq} in bedrooms, the required glazing and ventilation specification will be sufficient to address the majority of peak (L_{Amax}) noise levels from road traffic noise. An assessment of night-time L_{Amax} noise levels, including maximum noise levels from indicative deliveries events associated with the proposed employment units as well as nearby existing commercial industrial / commercial use as outlined in Section 3.2.2, are presented in

Table 5.9.

Table 5.7 Daytime Noise Intrusion Levels $L_{Aeq,16hr}$

Ref	External $L_{Aeq,16hr}$ Daytime	Internal $L_{Aeq,16hr}$ Daytime (Windows Open)	Internal $L_{Aeq,16hr}$ Daytime (Windows Closed)	BS 8233 Target Criteria L_{Aeq}
R1	45.0	30.0	20.0	35
R2	58.2	43.2	33.2	35
R3	59.3	44.3	34.3	35
R4	61.6	46.6	36.6	35
R5	59.7	44.7	34.7	35
R6	57.3	42.3	32.3	35
R7	59.6	44.6	34.6	35
R8	59.5	44.5	34.5	35
R9	58.9	43.9	33.9	35
R10	55.7	40.7	30.7	35
R11	44.2	29.2	19.2	35
R12	45.1	30.1	20.1	35

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

Table 5.8 Night-time Noise Intrusion Levels $L_{Aeq,8hr}$

Ref	External $L_{Aeq,8hr}$ Night-time	Internal $L_{Aeq,8hr}$ Night-time (Windows Open)	Internal $L_{Aeq,8hr}$ Night-time (Windows Closed)	BS 8233 Target Criteria L_{Aeq}
R1	44.4	29.4	19.4	30
R2	60.8	45.8	35.8	30
R3	61.3	46.3	36.3	30
R4	60.0	45.0	35.0	30
R5	58.2	43.2	33.2	30
R6	55.4	40.4	30.4	30
R7	58.0	43.0	33.0	30
R8	57.8	42.8	32.8	30
R9	56.9	41.9	31.9	30
R10	53.9	38.9	28.9	30
R11	44.3	29.3	19.3	30
R12	45.3	30.3	20.3	30

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

Table 5.9 details the results of the modelled L_{Amax} scenario from nearby existing and proposed industrial / commercial premises at the most affected receptor locations.

Table 5.9 Night-time Noise Intrusion Levels L_{Amax}

Ref	External L_{Amax} Night-time	Internal L_{Amax} Night-time (Windows Open)	Internal L_{Amax} Night-time (Windows Closed)	Target Criteria L_{Amax}
R1	47.9	32.9	22.9	45
R2	48.1	33.1	23.1	45
R3	47.1	32.1	22.1	45
R4	49.4	34.4	24.4	45
R5	58.7	43.7	33.7	45
R6	50.9	35.9	25.9	45
R7	57.2	42.2	32.2	45
R8	59.0	44.0	34.0	45
R9	53.7	38.7	28.7	45
R10	52.5	37.5	27.5	45
R11	48.5	33.5	23.5	45
R12	50.8	35.8	25.8	45

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

Glazing

As shown in the tables above, with windows closed, standard double glazing will generally result in the target criteria being met throughout the site. An uplift in glazing specification may be required for habitable rooms on facades facing the Woodville Regeneration Route. The exact specification will be dependent on the type of glazing and ventilation configuration as well as the position of the dwellings. However as an example, a glazing specification of 4mm/16mm/6mm provides a noise reduction of 28 dB $R_w + C_{tr}$ which, based on the assessment presented in Tables 5.7 to 5.9, would result in the internal noise level criteria being met where an enhanced specification is predicted with regard to road traffic noise. The assessment also indicates that an enhanced specification is required for bedrooms on facades facing the northern boundary of the site with ECO Skips. As identified previously no significant sources of noise occurred during the night in this area and, due to compulsory purchase orders, the part of the ECO skips site closest to the proposed residential receptors may not be present in the future. However, based on the assessment undertaken, to present a reasonable worst-case, a glazing specification of 10mm/16mm/6mm provides a noise reduction of 31 dB $R_w + C_{tr}$ which would result in the BS 8233 criteria being met.

Ventilation

With windows open, internal noise levels within habitable rooms in some areas of the development site, particularly the western part of the site, are predicted to be greater than the target criteria. Therefore, a scheme of ventilation will be required for such areas to enable acceptable rates of ventilation when windows are closed. This can be provided in several ways from acoustic trickle vents (which should to have a comparable acoustic performance as the glazing), other passive ventilation systems or mechanical ventilations systems. Locations where such measures are required would be identified as part of a reserved matter application when a detailed site layout is available.

5.2.2 External Amenity Assessment

Predicted noise levels at the worst-case identified receptor locations (as identified in SK02b) are presented in the table below. The assessment includes 1.8m barriers (close boarded fences) around indicative garden boundaries as shown in SK06 with regard to gardens which would not be afforded screening to the Woodville Regeneration Route by the buildings. During the detailed design, depending on the distance and orientation towards Moira Road, localised barriers around proposed gardens may also be required. It should also be noted that all assessed industrial / commercial sources have been assessed as $L_{Aeq,1hour}$ source noise levels to present a stringent assessment.

Table 5.10 External Private Amenity Noise Levels $L_{Aeq,16hr}$

Location	External L_{Aeq}	Target Criteria L_{Aeq}
G1	52.3	55

Location	External L_{Aeq}	Target Criteria L_{Aeq}
G2	54.4	55
G3	52.5	55
G4	45.8	55
G5	46.3	55
G6	50.5	55
G7	45.2	55
G8	44.2	55
G9	44.8	55
G10	47.4	55
G11	49.4	55
G12	54.2	55

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

Noise levels in external areas throughout the development site are predicted to be within the target criteria of 55 dB $L_{Aeq,16hours}$ providing the final design incorporates garden fences surround gardens at the extremities of the site. Any barriers will be required to have no air gaps and be of solid construction with a minimum mass of 10 kg/m².

5.3 Tranquillity Assessment

An assessment of the existing tranquillity level of the site has been based on the mapping data published by Campaign to Protect Rural England (CPRE). This uses a colour coded system and a 500m assessment grid for the whole of England, and a tranquillity rating of between 1 and 10 is assigned (1 being least tranquil and 10 being most). By reference to these maps the development is assessed as falling into Zones 3 and 4 and of low to medium tranquillity value. There are two public rights of way traversing the site and the proposed development retaining the connectivity through the site and there will be a negligible effect on local access to areas of greater tranquillity.

6.0 Conclusions

This report presents the findings of a noise assessment to inform an outline planning application for a proposed development of up to 300 residential dwellings along with the provision of up to 1.5ha of land for a local centre and 4.4ha of land for B1 employment use on land at Woodville, Swadlincote. The assessment has been assessed against the test points within the NPPF with the findings outlined below. Reference has been given to relevant guidance documents, including the Planning Practice Guidance: Noise, BS 8233 and BS 4142 with the assessment demonstrating the suitability of the site for residential and employment development.

NPPF 170 (e) and 180 (a)

Through the use of appropriate mitigation, which is summarised below, it is considered that the proposed development will avoid noise giving rise to significant adverse impacts on health and the quality of life. An outline glazing and ventilation strategy has been established for proposed residential receptors demonstrating that BS 8233 internal noise level criteria can be achieved. Based on indicative positioning of dwellings within, it has been demonstrated that noise levels in private external amenity space are predicted to be below 55 dB $L_{Aeq,16hours}$ with screening by either proposed dwellings or barriers around gardens (close boarded fences) likely to be required including along the northern boundary of the site.

An assessment has been undertaken with regard to noise from the proposed non-residential uses including deliveries. The assessment has been undertaken with regard to potential and reasonable worst-case assumptions and establishes that with suitable considerations within the design, significant noise effects are not predicted. As details of proposed building services plant are not available at this stage, design noise limits at existing and proposed receptors have been set.

NPPF 180 (b), 182 and 183

Based on the assessments undertaken it is not considered that any existing businesses wanting to develop would be restricted by the proposals. An assessment of the existing tranquillity level of the site was undertaken and identified that the site is not highly prized for its tranquillity and recreational value in terms of noise. Connectivity through the site will be retained and, therefore, the proposed development is considered to have a negligible effect on local access to any areas of tranquillity.

Planning Practice Guidance: Noise

The noise mitigation measures recommended within this report are considered sufficient to reduce the effects of identified sources of noise, both existing and proposed, to prevent the adopted thresholds (within the context of BS 8233 and BS 4142) for Significant Observed Adverse Effect Level (SOAEL) being exceeded for existing and future residents.

Appendices

Appendix A – Acoustic Terminology and Abbreviations

Acoustic Terminology

- dB** Sound levels from any source can be measured in frequency bands in order to provide detailed information about the spectral content of the noise, i.e. whether it is high-pitched, low-pitched, or with no distinct tonal character. These measurements are usually undertaken in octave or third octave frequency bands. If these values are summed logarithmically, a single dB figure is obtained. This is usually not very helpful as it simply describes the total amount of acoustic energy measured and does not take any account of the ear's ability to hear certain frequencies more readily than others.
- dB(A)** Instead, the dBA figure is used, as this is found to relate better to the loudness of the sound heard. The dBA figure is obtained by subtracting an appropriate correction, which represents the variation in the ear's ability to hear different frequencies, from the individual octave or third octave band values, before summing them logarithmically. As a result the single dBA value provides a good representation of how loud a sound is.
- L_{Aeq}** Since almost all sounds vary or fluctuate with time it is helpful, instead of having an instantaneous value to describe the noise event, to have an average of the total acoustic energy experienced over its duration. The L_{Aeq, 07:00 – 23:00} for example, describes the equivalent continuous noise level over the 12 hour period between 7 am and 11 pm. During this time period the L_{pA} at any particular time is likely to have been either greater or lower than the L_{Aeq, 07:00 – 23:00}.
- L_{Amin}** The L_{Amin} is the quietest instantaneous noise level. This is usually the quietest 125 milliseconds measured during any given period of time.
- L_{Amax}** The L_{Amax} is the loudest instantaneous noise level. This is usually the loudest 125 milliseconds measured during any given period of time.
- L_n** Another method of describing, with a single value, a noise level which varies over a given time period is, instead of considering the average amount of acoustic energy, to consider the length of time for which a particular noise level is exceeded. If a level of x dBA is exceeded for say 6 minutes within one hour, then that level can be described as being exceeded for 10% of the total measurement period. This is denoted as the L_{A10, 1 hr} = x dB.
- The L_{A10} index is often used in the description of road traffic noise, whilst the L_{A90}, the noise level exceeded for 90% of the measurement period, is the usual descriptor for underlying background noise. L_{A1} and L_{Amax} are common descriptors of construction noise.
- R_w** The *weighted sound reduction index* determined using the above *measurement* procedure, but weighted in accordance with the procedures set down in BS EN ISO 717-1. Partitioning and building board manufacturers commonly use this index to describe the inherent sound insulation performance of their products.

Abbreviations

CADNA – Computer Aided Noise Abatement

DMRB – Design Manual for Roads and Bridges

HGV – Heavy Goods Vehicle

PPG24 – Planning Policy Guidance

PRoW – Public Rights of Way

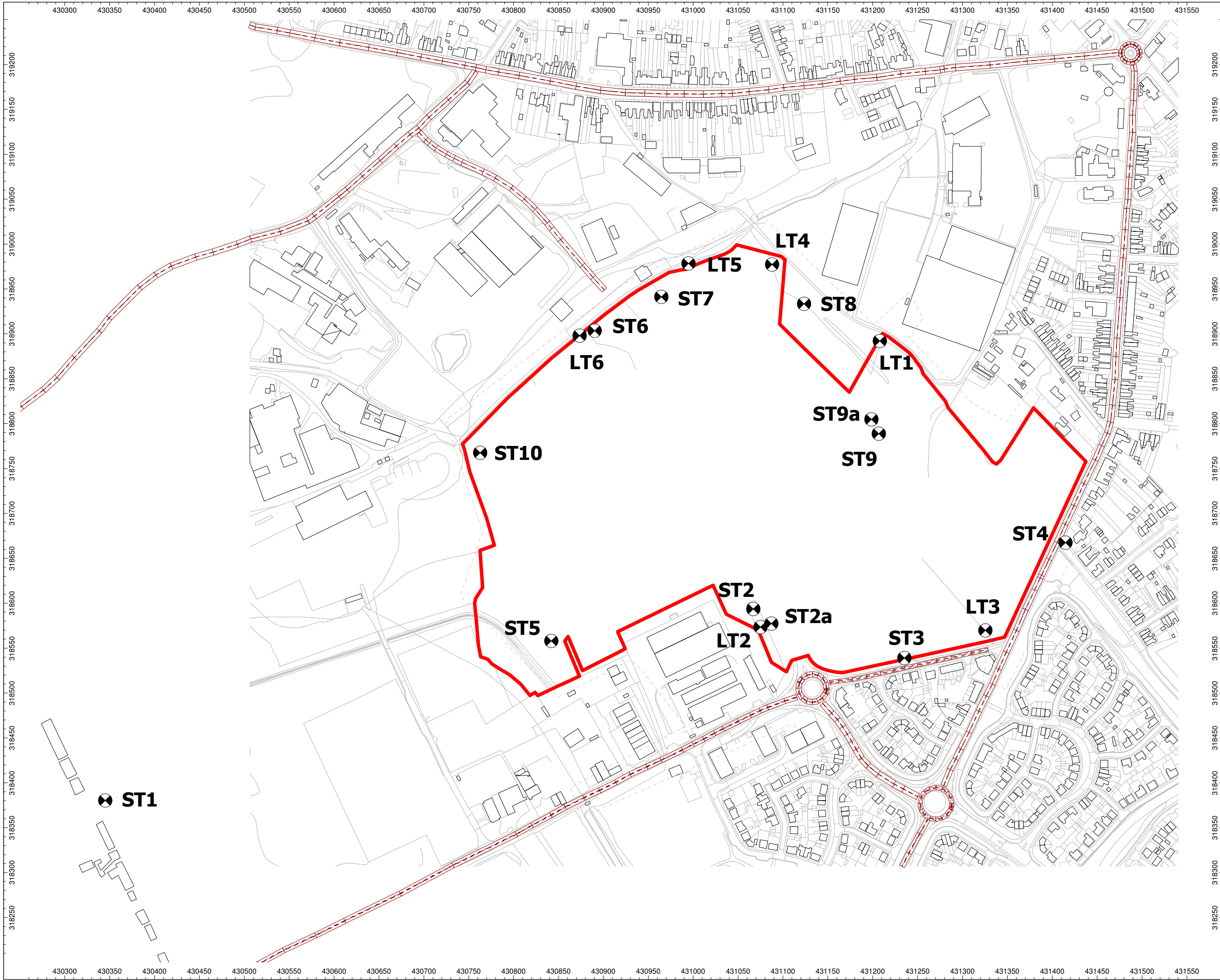
UDP – Unitary Development Plan

UKAS – United Kingdom Accreditation Service

WYGE – WYG Environment

Appendix B – Sketches

- SK01 Noise Monitoring Location Plan
- SK02a Proposed Receptor Location Plan (Facades)
- SK02b Proposed Receptor Location Plan (Gardens)
- SK02c Existing Receptor Location Plan
- SK03 Noise Contour Plot Proposed Daytime $L_{Aeq,16hr}$
- SK04 Noise Contour Plot Proposed Night-time $L_{Aeq,8hr}$
- SK05 Noise Contour Plot Proposed Employment Units $L_{Aeq, 1hr}$
- SK06 Barrier Location Plan



Client:
Harworth Group

Project:
Woodville

Project Number:
A111309

Drawing Title / Scenario:
**Noise Monitoring
Location Plan**

Drawing Number:
SK01

Key:

Monitoring
Locations:

Site Boundary:

Scale : Not to scale



Client:
Harworth Group

Project:
Woodville

Project Number:
A112309

Drawing Title / Scenario:
Receptor Location
Plan (Facades)

Drawing Number:
SK02a

Key:
Receptor
Locations:

Site Boundary:

Noise Source:

Vehicle Movements:

Scale : Not to scale

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Drawing Title / Scenario:
Receptor Location
Plan (Gardens)

Drawing Number:
SK02b

Key:

Receptor
Locations:



Site Boundary:



Noise Source:



Vehicle Movements:



Scale : Not to scale

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Drawing Title / Scenario:
Existing Receptor
Location Plan

Drawing Number:
SK02c

Key:

Receptor
Locations:



Site Boundary:



Noise Source:



Proposed Vehicle
Movements:



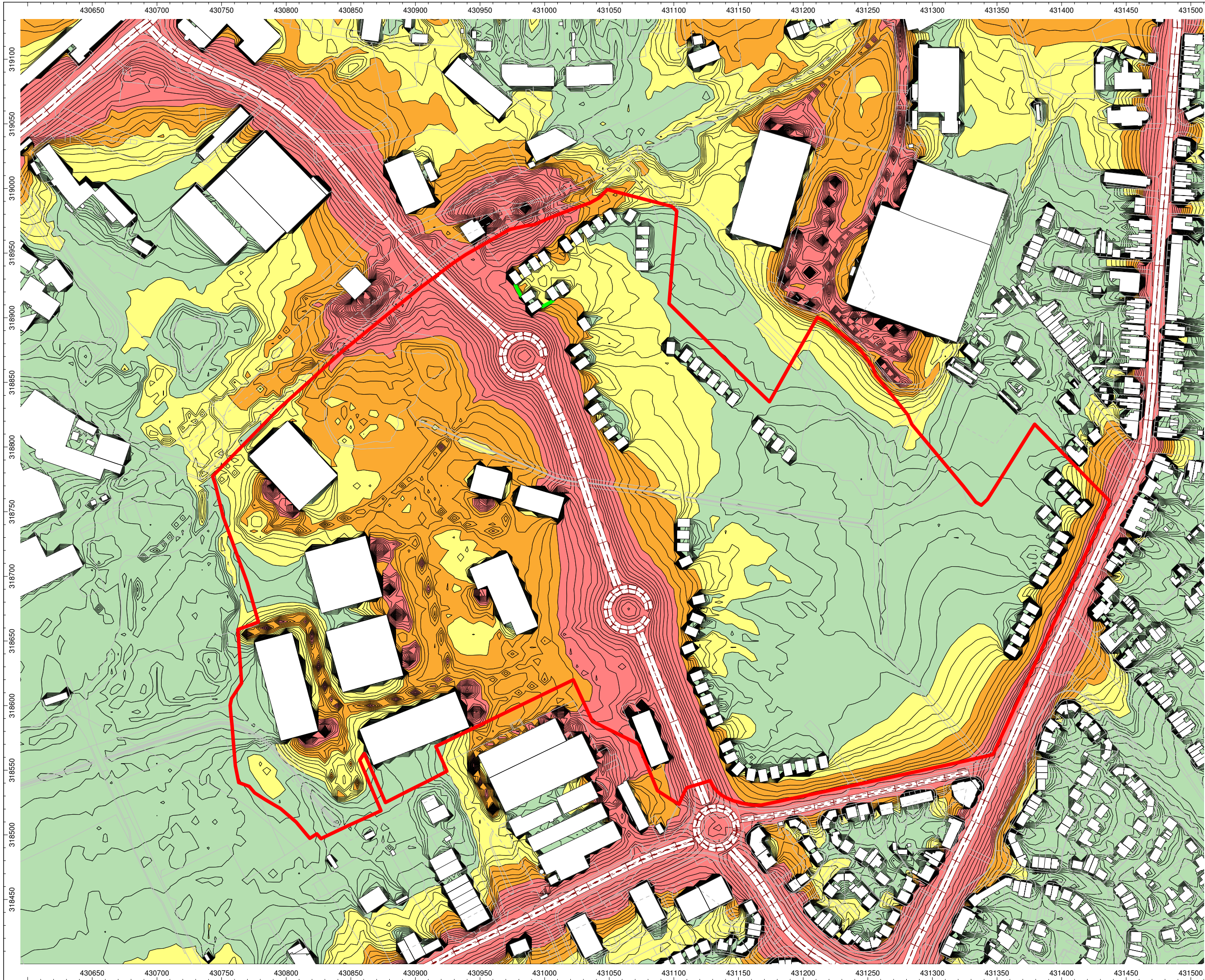
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Project:
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Project Number:
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Drawing Title / Scenario:
Daytime LAeq,16hour
Noise Contour Plot

Drawing Number:
SK03

Key:

Site Boundary: —

- 0.0 - 50.0 dB
- 50.0 - 55.0 dB
- 55.0 - 60.0 dB
- >60.0 dB

Contour plot for indicative
purposes only.

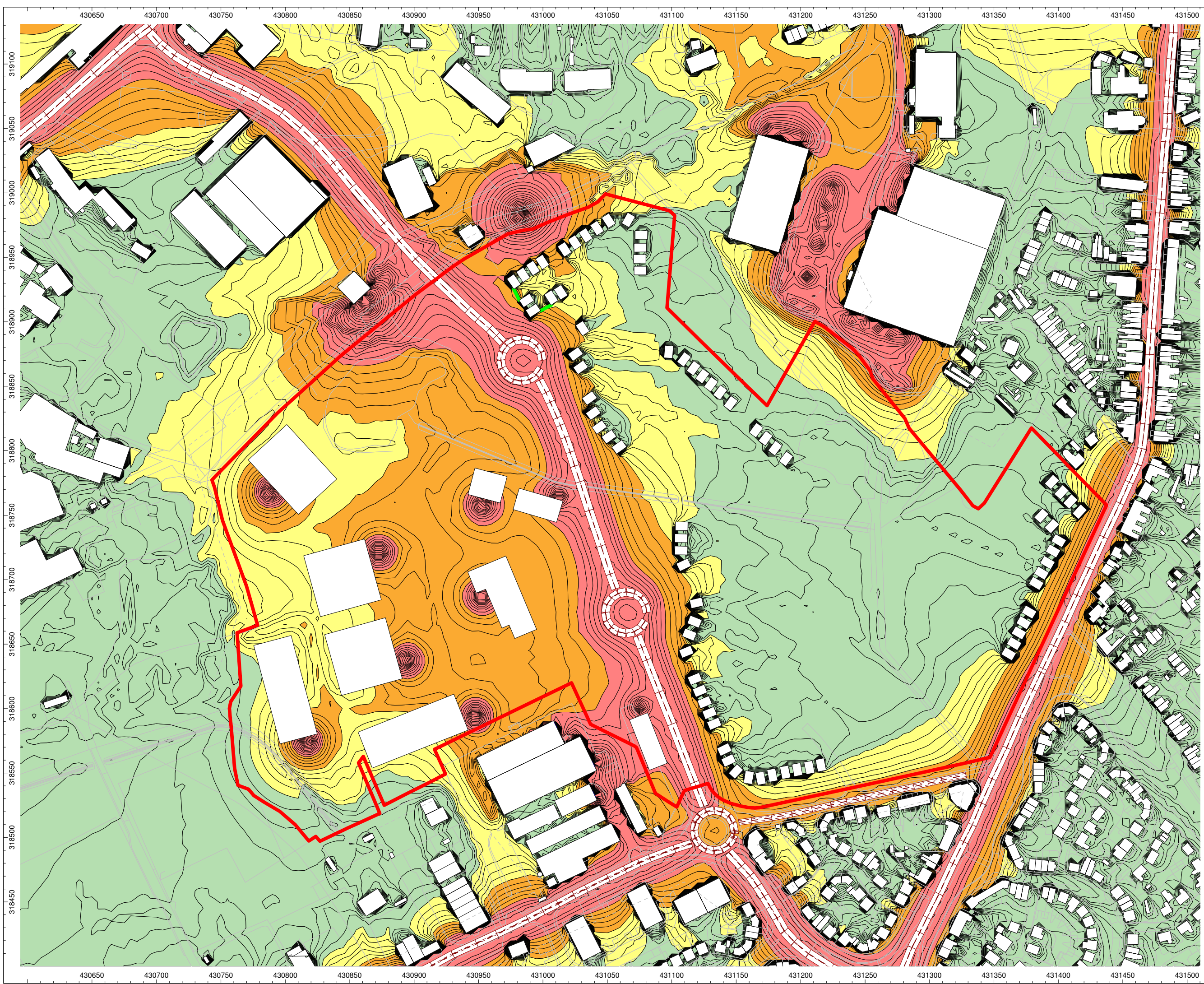
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Project:
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Project Number:
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Drawing Title / Scenario:
Night-time LAeq,8hour
Noise Contour Plot

Drawing Number:
SK04

Key:

Site Boundary: —

0.0 - 50.0 dB
50.0 - 55.0 dB
55.0 - 60.0 dB
>60.0 dB

Contour plot for indicative
purposes only.

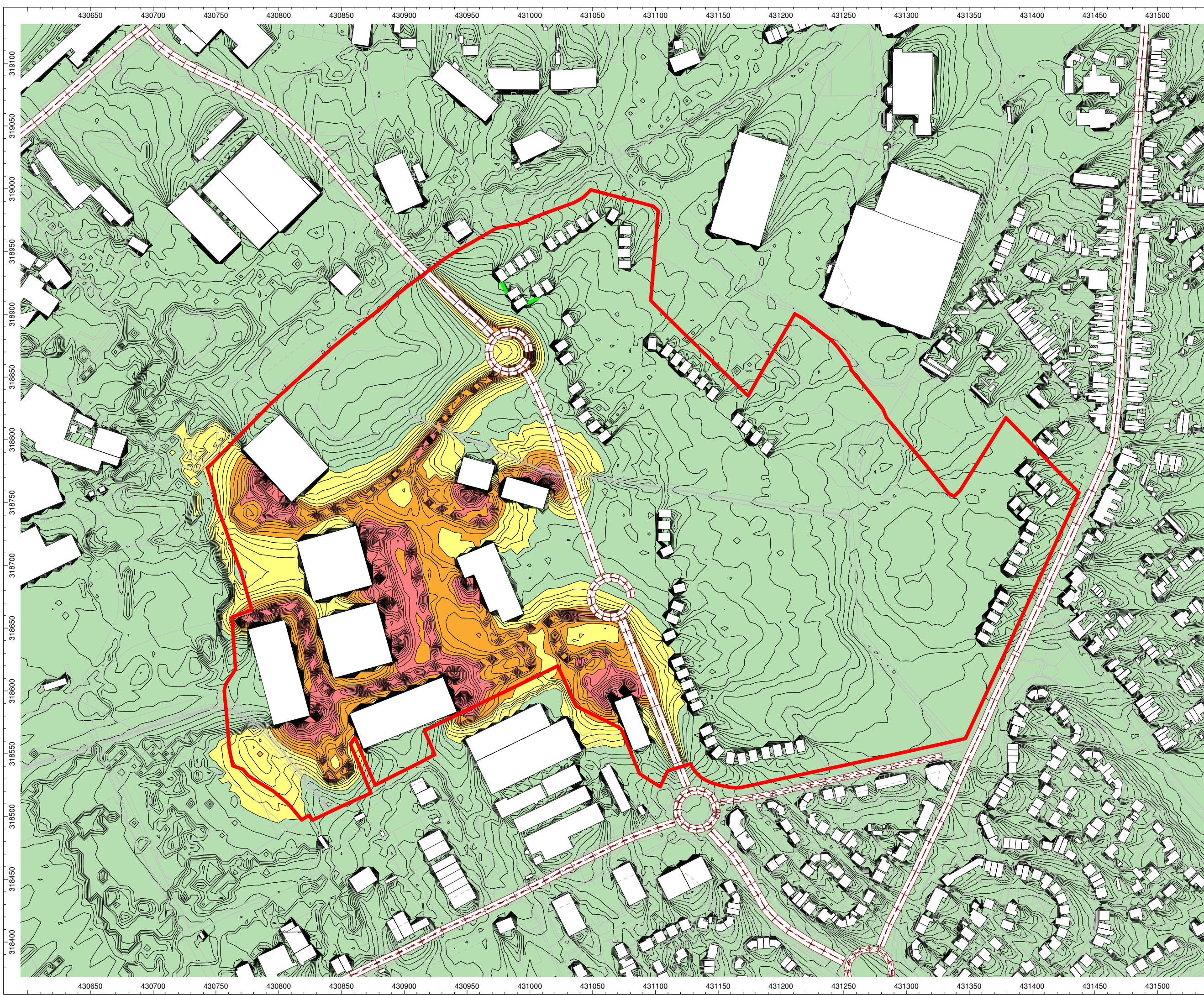
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Client:
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Project:
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Project Number:
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Drawing Title / Scenario:
Proposed Employment
Units LAeq,1hour
Noise Contour Plot

Drawing Number:
SK05

Key:

Site Boundary: —

- 0.0 - 45.0 dB
- 45.0 - 50.0 dB
- 50.0 - 55.0 dB
- >55.0 dB

Contour plot for indicative
purposes only.

Scale : Not to scale

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Client:
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Project:
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Project Number:
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Drawing Title / Scenario:
Barrier
Location Plan

Drawing Number:
SK06

Key:

Site Boundary: 

1.8m barrier: 

Barriers to be of solid
construction with no gaps
and a minimum mass of
10kg/m2

Scale : Not to scale

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Appendix C – Background Noise Level Graphs

Figure C.1 LT1 Daytime L_{A90} Analysis

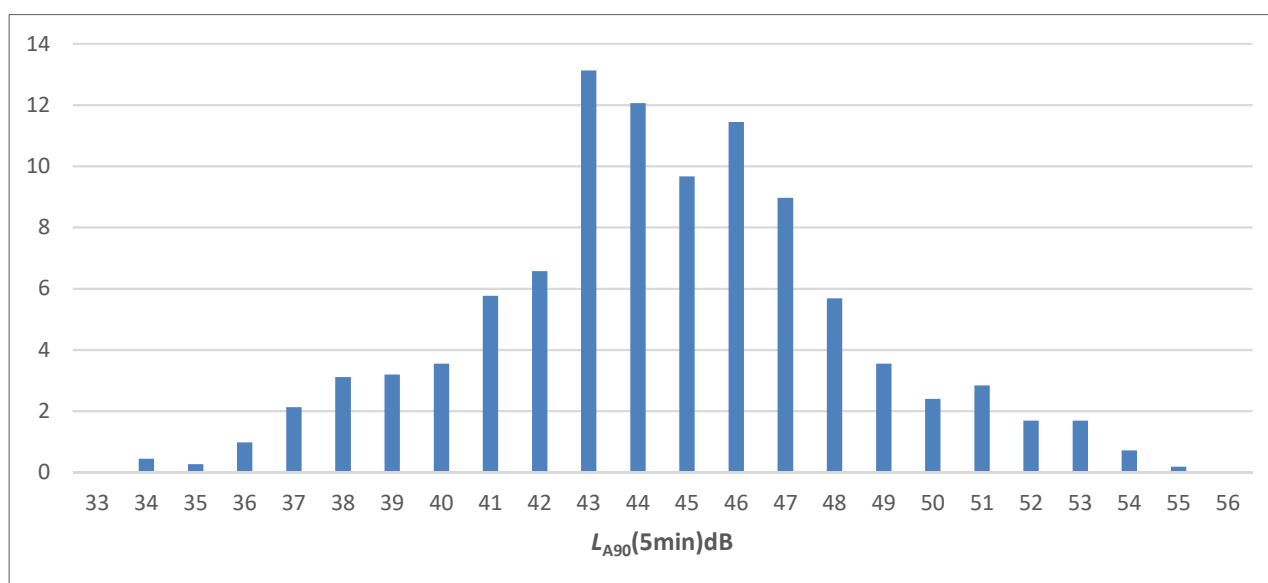


Figure C.2 LT1 Night-time LA90 Analysis

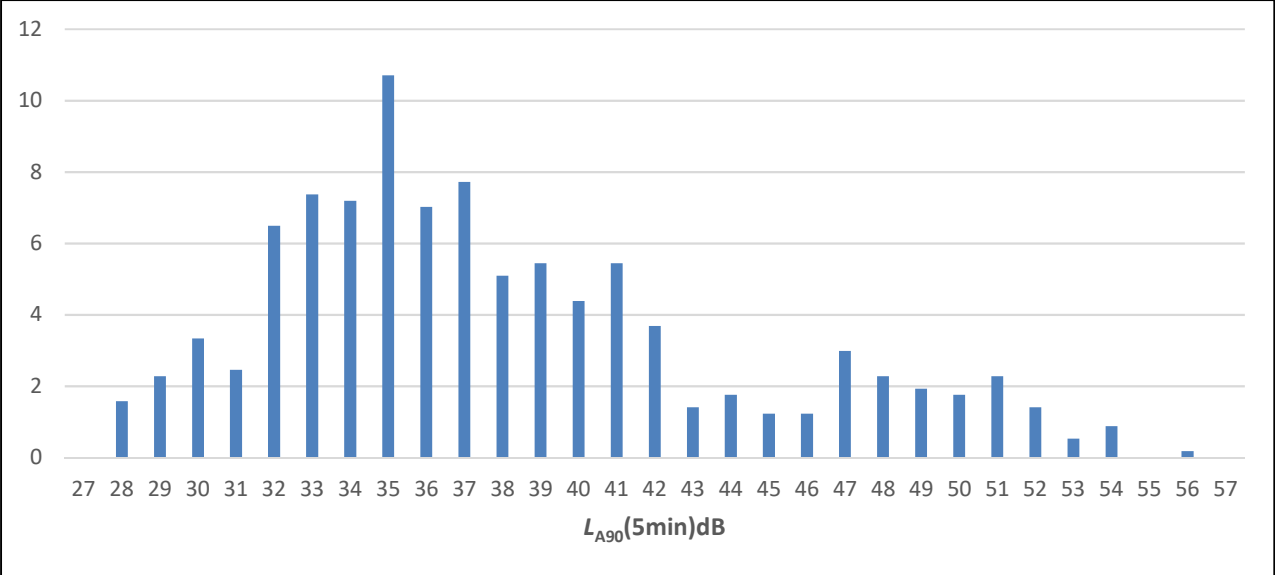


Figure C.3 LT2 Daytime LA90 Analysis

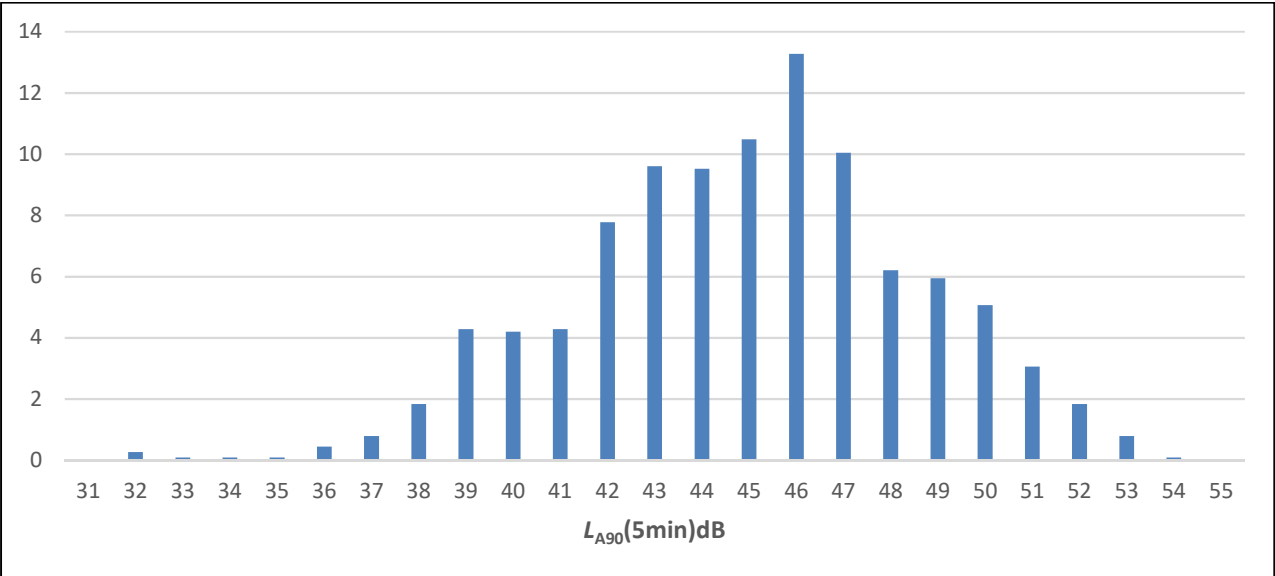


Figure C.4 LT2 Night-time LA90 Analysis

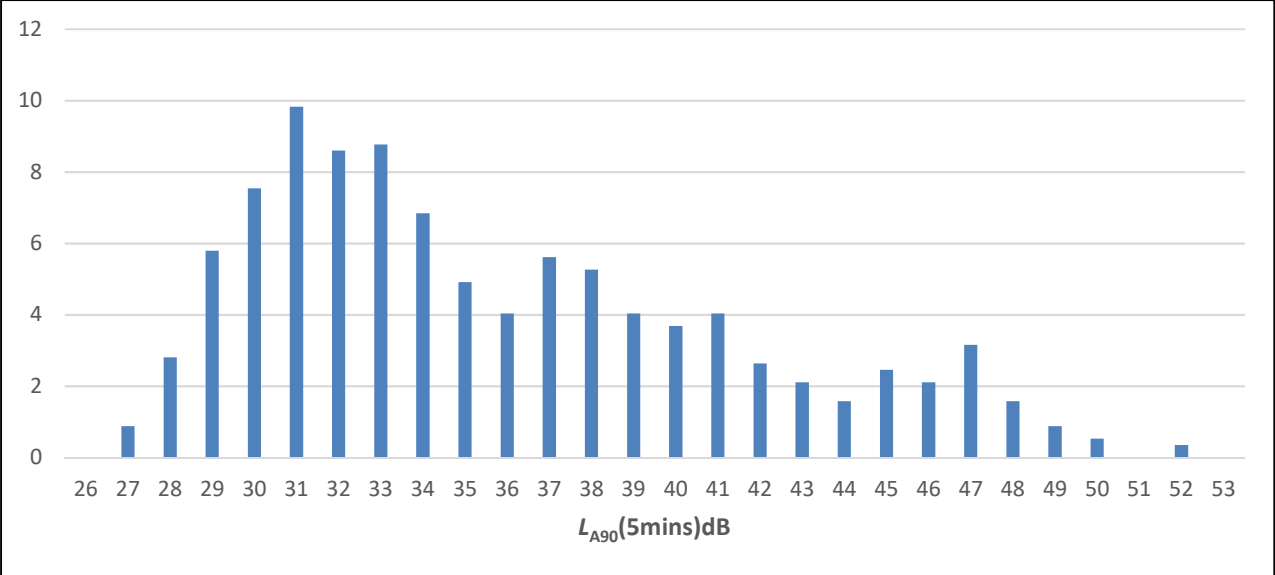


Figure C.5 LT3 Daytime LA90 Analysis

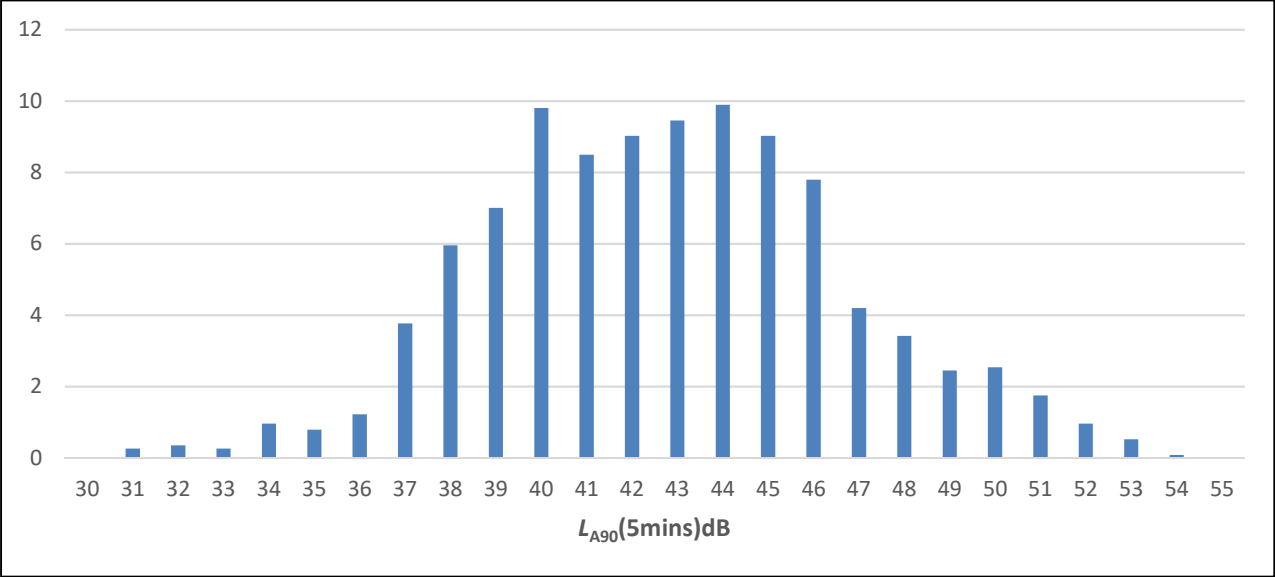


Figure C.6 LT3 Night-time L_{A90} Analysis

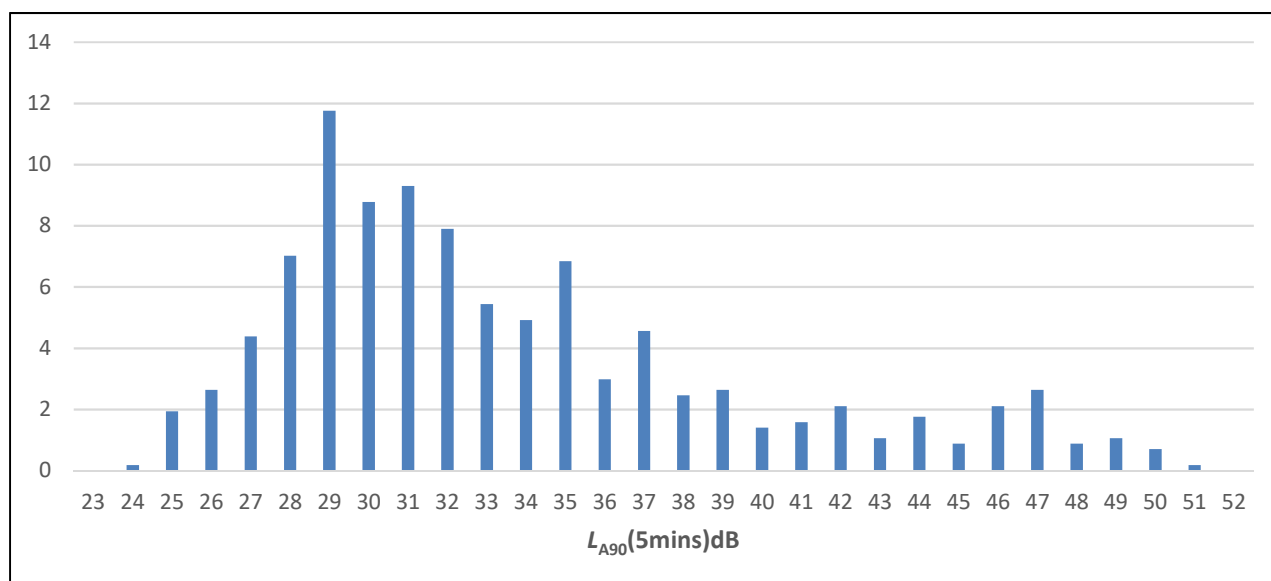


Figure C.7 LT4 Daytime L_{A90} Analysis

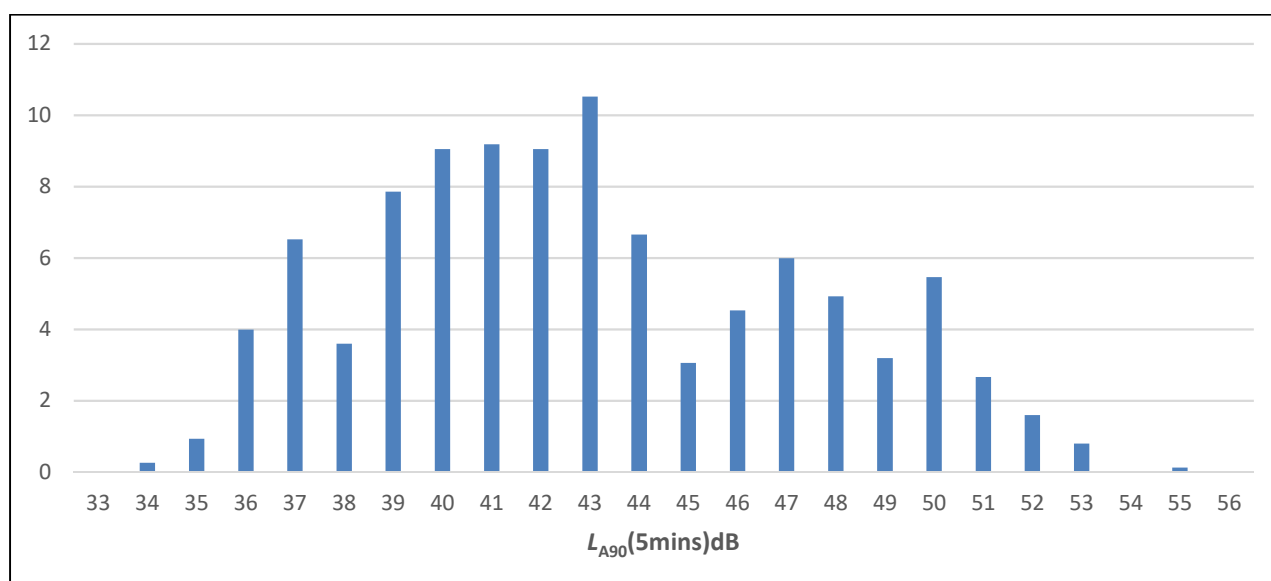
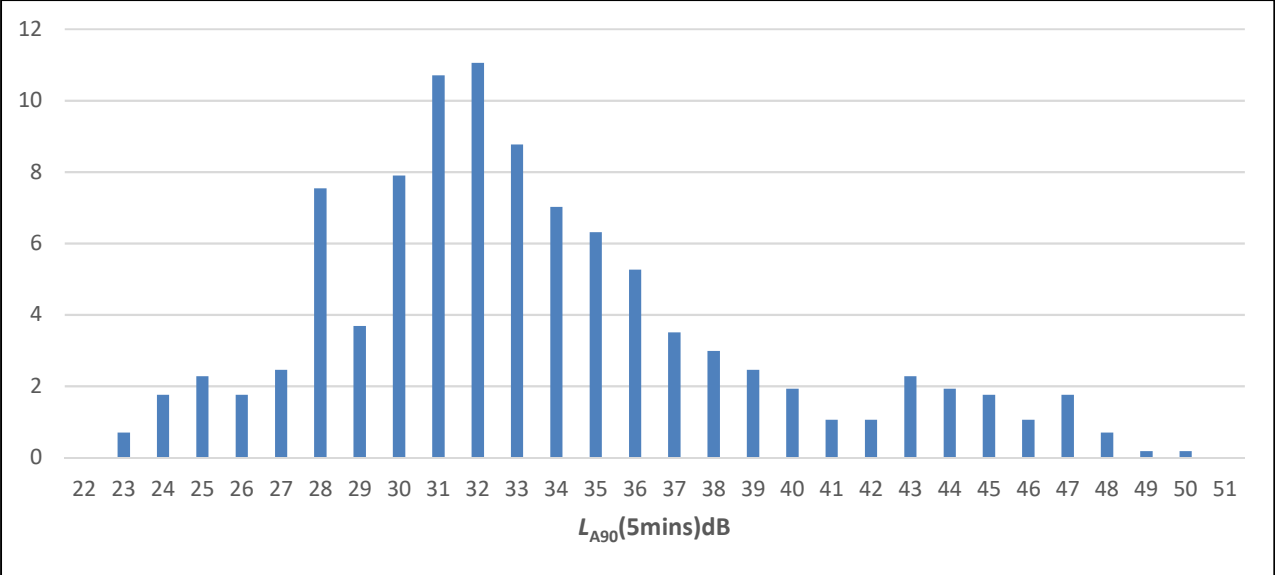


Figure C.8 LT4 Night-time L_{A90} Analysis



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