

**Soller Eight Ltd**

**Oxford Road, Manchester  
(Phase 2)**

**Noise Assessment**

**September 2020**

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## Document Control

Project: Oxford Road, Manchester  
Client: Soller Eight Ltd  
Job Number: A117616-1  
File Origin: O:\Acoustics Air Quality and Noise\Active Projects\A117616-1

Document Checking:

|              |                                                                               |                |
|--------------|-------------------------------------------------------------------------------|----------------|
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|--------------|---------------------------------------------------|----------------|

| Issue | Date                            | Status      |
|-------|---------------------------------|-------------|
| 1     | 25 <sup>th</sup> September 2020 | First Issue |
| 2     |                                 |             |
| 3     |                                 |             |
| 4     |                                 |             |

## Contents Page

|     |                                 |    |
|-----|---------------------------------|----|
| 1.0 | Introduction.....               | 3  |
| 2.0 | Assessment Criteria .....       | 6  |
| 3.0 | Assessment Methodology.....     | 7  |
| 4.0 | Noise Survey.....               | 11 |
| 5.0 | Assessment of Key Effects ..... | 14 |
| 6.0 | Conclusions .....               | 17 |

## Appendix Contents

Appendix A - Acoustic Terminology and Abbreviations

Appendix B – Sketches

Appendix C –Report Conditions

## 1.0 Introduction

### 1.1 Purpose of this Report

This report has been prepared in relation to the acoustic design requirements for the extension at 137 Oxford Road, Manchester. The development is an extension of two additional storeys to the existing development which is a mixed-use development comprising of a ground floor and mezzanine commercial and new residential units on the floors above.

Noise surveys have been undertaken and the results used to determine the noise exposure of future residential dwellings associated with the Development and to characterise the existing baseline at surrounding sensitive receptor locations. A description of the existing noise environment in and around the site is provided. The noise levels from the Development have been predicted at local representative receptors using CADNA noise modelling software which incorporates ISO 9613 methodologies and calculations.

A list of acoustic terminology and abbreviations used in this report is provided in Appendix B and a set of location plans, noise contour plots relevant to the assessment and sound insulation mark-ups are presented in Appendix C.

This report incorporates the same assessment methodology undertaken for the previous permitted application (Reference 126573/FO/2020) on the ground, first and second floors to ensure the sound insulation achieves the same requirements as those in the previous WYG assessment.

### 1.2 Legislative Context

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 NPPF, published on 19<sup>th</sup> 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, 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 NPPG Noise Exposure Hierarchy**

| Perception                                | Examples of Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Increasing Effect Level             | Action                           |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------|
| Not present                               | No Effect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | No Observed Effect                  | No Specific Measures Required    |
| Present and not intrusive                 | Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.                                                                                                                                                                                                                                                                   | No Observed Adverse Effect          | No Specific Measures Required    |
| Lowest Observed Adverse Effect Level      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                     |                                  |
| Present and intrusive                     | Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.                                          | Observed Adverse Effect             | Mitigate and reduce to a minimum |
| Significant Observed Adverse Effect Level |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                     |                                  |
| Present and disruptive                    | The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. 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                            |
| Present and very disruptive               | Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.                                                                                                                                                                                       | Unacceptable Adverse Effect         | Prevent                          |

The NPPF, NPSE and NPPG 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 'BS 4142: 2014 + A1:2019 *Methods for Rating and Assessing Industrial and Commercial Sound*' and '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 NPPG 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 National Planning Practice Guidance - 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. The noise level criteria detailed below have been derived from standards and design guidance:

BS 8233:2014 '*Guidance on sound insulation and noise reduction for buildings – Code of practice*'

BS 4142:2014 + A1:2019 '*Methods for rating and assessing industrial and commercial sound*'

**Table 2.1 Noise Level Criteria and Actions**

| Effect Level                                      | Noise Level Criteria                                                                                        | Action / Justification                                                                                                                         |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| No Observed Adverse Effect Level (NOAEL)          | BS4142 Score of zero or lower                                                                               | No Action Required<br>Score of zero or lower is an indication of the sound source having a low impact                                          |
|                                                   | Noise levels are below:<br><br>Bedrooms: 30 dB $L_{Aeq,8hours}$<br>Living Rooms: 35 dB $L_{Aeq,16hours}$    | Within BS8233 guideline criteria                                                                                                               |
| Lowest Observed Adverse Effect Level (LOAEL)      | BS4142 Score of + 5 dB or lower                                                                             | No Action Required<br>Difference of + 5 dB likely to be an indication of an adverse effect<br>BS4142 Score of plus 5 or lower                  |
|                                                   | Noise levels are below:<br><br>Bedrooms: 30 dB $L_{Aeq,8hours}$<br>Living Rooms: 35 dB $L_{Aeq,16hours}$    | Within BS8233 / WHO guideline criteria                                                                                                         |
| Significant Observed Adverse Effect Level (SOAEL) | BS4142 Score of around + 10 dB                                                                              | Difference of up to + 10 dB likely to be an indication of a significant adverse effect<br>Mitigate to achieve:<br>BS4142 Score of + 5 or lower |
|                                                   | Noise levels are exceeded:<br><br>Bedrooms: 30 dB $L_{Aeq,8hours}$<br>Living Rooms: 35 dB $L_{Aeq,16hours}$ | Mitigate and reduce to a achieve:<br><br>Bedrooms: 30 dB $L_{Aeq,8hours}$<br>Living Rooms: 35 dB $L_{Aeq,16hours}$                             |

## 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 number of locations both horizontally and vertically. CADNA noise modelling software has been used. This model is based on ISO 9613 noise propagation methodology and allows for detailed prediction of noise levels to be undertaken for large numbers of receptor points and different noise emission scenarios both horizontally and vertically.

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

**Table 3.1 Modelling Parameters Sources and Input Data**

| Parameter                          | Source                                | Details                                                                                                                  |
|------------------------------------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Horizontal distances – around site | Ordnance Survey                       | Ordnance Survey                                                                                                          |
| Ground levels – around site        | Ordnance Survey                       | Ordnance Survey                                                                                                          |
| Ground levels – other areas        | Site Observations and Ordnance Survey | OS 1:25,000 contours and OS 1:10,000 spot heights.                                                                       |
| Building heights – around site     | WYG Observations                      | 8 m height for two storey residential properties, and 4 m for Bungalows. 3m per storey for multi-storey developments.    |
| Barrier heights                    | WYG Observations                      | All existing barriers at 1.8 m with the exception of hedges and trees which are considered to offer no noise protection. |
| Proposed Plans                     | 21 <sup>st</sup> Architecture Ltd     | Project Ref: 296<br>Dated: June 2020                                                                                     |

It is acknowledged that a number of the values of parameters chosen will affect the overall noise levels presented in this report. However, it should be noted that the values used, as identified above, are worst case.

### 3.2 Model Input Data

#### Model Verification (Existing Ambient Noise Climate)

The model was verified by modelling the monitoring locations for the 'existing' scenario, including contributions from the surrounding road network. Worst-case daytime and night-time  $L_{Aeq}$  scenarios have been verified. The comparison between the monitoring and modelling results are shown in the tables below.

**Table 3.2 Modelled vs. Monitored Results  $L_{Aeq}$ ; daytime 07:00 – 23:00**

| Location | Monitored $L_{Aeq}$ | Modelled $L_{Aeq}$ | Difference between Monitored and Modelled Results |
|----------|---------------------|--------------------|---------------------------------------------------|
| LT1      | 61.1                | 58.5               | -2.6                                              |
| ST1      | 71.7                | 73.5               | 1.8                                               |
| ST2      | 63.9                | 63.8               | -0.1                                              |
| ST3      | 61.4                | 62.4               | 1.0                                               |

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

**Table 3.3 Modelled vs. Monitored Results  $L_{Aeq}$ ; night-time 23:00– 07:00**

| Location | Monitored $L_{Aeq}$ | Modelled $L_{Aeq}$ | Difference between Monitored and Modelled Results |
|----------|---------------------|--------------------|---------------------------------------------------|
| LT1      | 59.7                | 57.1               | -2.6                                              |
| ST1      | 64.9                | 67.3               | 2.4                                               |
| ST2      | 58.8                | 58.2               | -0.6                                              |
| ST3      | 57.3                | 58.5               | 1.2                                               |

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

**Table 3.4 Modelled vs. Monitored Results  $L_{Amax}$** 

| Location | Monitored $L_{Amax}$ | Modelled $L_{Amax}$ | Difference between Monitored and Modelled Results |
|----------|----------------------|---------------------|---------------------------------------------------|
| LT1      | 76.9                 | 75.8                | -1.1                                              |
| ST1      | 79.0                 | 79.1                | 0.1                                               |
| ST2      | 70.2                 | 69.9                | -0.3                                              |
| ST3      | 68.2                 | 70.1                | 1.9                                               |

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

After analysis of the long-term monitoring data, it was identified that the maximum noise levels were associated with the closing of shutter doors towards the rear of the development. As it was identified that this even occurred significantly less than 15 times per night-time period, a 95<sup>th</sup> percentile of the maximum measured noise levels were used. Following a review of sound files, the noise level used within the verification above is representative of passing emergency vehicle sirens.

The verification points show a divergence of less than +/- 3 dB between monitored and modelled results for all locations during all scenarios.

### Specific Noise Sources

Due to the ongoing restrictions associated with the COVID-19 pandemic, measurements of entertainment noise sources from the Bank nightclub in Woking (which is considered to be a similar source) have been used and verified to the monitoring to present a worst-case assessment. These noise sources have been included in the model as vertical area sources, representing the breakout from the entire façade of the venue

as well as those of nearby entertainment premises including The Footage, The Deaf Institute and The Flour and Flagon. Therefore, the noise levels are considered to represent a worst-case scenario; the noise level input data is detailed in Table 3.5 below.

**Table 3.5 Surrogate Measured Entertainment Noise**

| Description                         | Frequency (Hz) |      |      |      |      |      |      |      |      | Total L <sub>Aeq</sub><br>dB(A) at<br>1m |
|-------------------------------------|----------------|------|------|------|------|------|------|------|------|------------------------------------------|
|                                     | 31.5           | 63   | 125  | 250  | 500  | 1k   | 2k   | 4k   | 8k   |                                          |
| Music Breakout Noise from Nightclub | 70.0           | 79.6 | 75.4 | 72.1 | 74.5 | 70.2 | 65.8 | 58.6 | 47.2 | 82.9                                     |

### Building Services Plant Noise Level Data

Point sources have been used in the model to represent the worst-case breakout noise from the commercial heating and cooling units, which will replace the existing ones that are located to the rear of the development. The maximum sound pressure levels from the point sources at 1 metre and 3 metre were estimated in the model as a conditional maximum level that the noise levels at nearby receptors were predicted to meet the BS 4142 assessment criteria. Noise emission limits for the commercial cooling and heating units have been specified to ensure that plant noise rating levels are at least 10 dB below the existing daytime and night-time background noise level at all surrounding receptors.

The mechanical ventilation system within has yet to be finalised, however a typical product example has been used within the assessment. Other mechanical ventilation are expected to have similar noise levels associated with the units.

The manufacturer's data and associated sound pressure level data of plant are summarised within the table below. As worst case, it assumed that the speed is at 100%.

**Table 3.6 Mechanical Ventilation Noise Level Data**

| Item                                      | Octave Sound Power Level (dB) |        |        |        |       |       |       |       | Sound Pressure Level at 3m<br>dB(A) |
|-------------------------------------------|-------------------------------|--------|--------|--------|-------|-------|-------|-------|-------------------------------------|
|                                           | 63 Hz                         | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |                                     |
| Lo-Carbon Sentinel Kinetic B/BH (Supply)  | 70.3                          | 75.7   | 73.9   | 66.3   | 63.5  | 59.7  | 53.2  | 50.6  | 52.5                                |
| Lo-Carbon Sentinel Kinetic B/BH (Extract) | 66.6                          | 63.9   | 60.9   | 56.5   | 51.2  | 44.2  | 36.8  | 32.6  | 40.4                                |

### 3.3 Sensitive Receptors

#### Proposed Sensitive Receptors

Table 3.7 summarises the proposed receptor locations selected for the assessment of the Development; the locations of the receptors are shown on SK02a in Appendix B.

**Table 3.7 Receptor Locations (Noise Intrusion)**

| Ref. | Description     | Height (m) |
|------|-----------------|------------|
| R01  | Southern Façade | 18/22      |
| R02  | Eastern Façade  | 18/22      |

#### Existing Sensitive Receptors

Table 3.8 summarises the existing receptor locations selected for the plant assessment; the locations of the receptors are shown on SK02b in Appendix B.

**Table 3.8 Receptor Locations (Noise Intrusion)**

| Ref. | Description                       | Height (m) |
|------|-----------------------------------|------------|
| ER01 | 135b Oxford Road (Front)          | 8.0        |
| ER02 | 135b Oxford Road (Front)          | 8.0        |
| ER03 | First Floor, 124 Grosvenor Street | 8.0        |
| ER04 | 131 Grosvenor Street              | 4.0        |
| ER05 | 133a Grosvenor Street             | 4.0        |

## 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:

|            |                              |     |          |
|------------|------------------------------|-----|----------|
| Rion NL-52 | Environmental Noise Analyser | s/n | 253702   |
| 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, a drift of +0.1 dB was observed. 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 four locations (as specified in the following table and shown in SK01 of Appendix B) from Wednesday 4<sup>th</sup> December 2019 to Tuesday 10<sup>th</sup> December 2019. Attended short term measurements were undertaken at three locations during day, evening and night-time periods with two additional locations being measured unattended over a 141-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 and partly cloudy. Anemometer readings confirmed that wind speeds were less than 5 ms<sup>-1</sup> at all times during the survey, with a predominant easterly wind direction, during the survey.

**Table 4.1 Noise Monitoring Locations**

| Ref | Description                                                               |
|-----|---------------------------------------------------------------------------|
| LT1 | On roof of building on junction between Oxford Road and Grosvenor Street. |
| ST1 | On junction between Grosvenor Street and Sidney Street.                   |
| ST2 | On Grosvenor Street outside building opposite 'The Deaf Institute'.       |
| ST3 | On Oxford Road pavement outside 'Pizza Hut'.                              |

### 4.2 Noise Survey Results

The existing noise climate is characterised by the following sources found in the area: road traffic noise from Oxford Road and Grosvenor Street, including frequent buses picking up and dropping off passengers. Noise from the surrounding entertainment premises where audible during the long-term monitoring.

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                                        |
|-----------------|------------------|------------------|------------------|----------------|---------------------|--------------------------------------------------------------|
| Daytime ST1     | 10/12/2019 11:17 | 8.0              | 0-1              | NE             | 8                   | Road traffic noise from oxford road.                         |
| Daytime ST2     | 09/12/2019 16:27 | 6.0              | 0-1              | E              | 0                   | Road traffic noise from Grosvenor Street and Oxford Road.    |
| Daytime ST3     | 09/12/2019 16:11 | 6.0              | 0-1              | E              | 0                   | Road traffic noise from Grosvenor Street and Sidney Street.  |
| Evening ST1     | 09/12/2019 20:33 | 3.0              | 0-1              | E              | 6                   | Road traffic noise from oxford road.                         |
| Evening ST2     | 09/12/2019 20:17 | 3.0              | 0-1              | E              | 7                   | Road traffic noise from Grosvenor Street and Oxford Road.    |
| Evening ST3     | 09/12/2019 20:01 | 3.0              | 0-1              | E              | 7                   | Road traffic noise from Grosvenor Street and Sidney Street . |
| Night-time ST1  | 10/12/2019 00:04 | 3.0              | 0-1              | E              | 1                   | Road traffic noise from oxford road.                         |
| Night-time ST2  | 10/12/2019 00:19 | 3.0              | 0-1              | E              | 1                   | Road traffic noise from Grosvenor Street and Oxford Road.    |
| Night-time ST3  | 10/12/2019 00:34 | 3.0              | 0-1              | E              | 1                   | Road traffic noise from Grosvenor Street.                    |

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:  $2 \times 10^{-5}$  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    | 62 hours     | 04/12/2019 - 10/12/2019 07:00 - 23:00 | LT1      | 61.1             | 87.4              | 53.5              | 62.1             | 60.0             |
| Weekday Night-time 23:00 - 07:00 | 32 hours     | 04/12/2019 - 10/12/2019 23:00 - 07:00 |          | 57.8             | 88.3              | 45.3              | 58.7             | 55.0             |
| Weekend Daytime 07:00 - 23:00    | 32 Hours     | 06/12/2019 - 08/12/2019 07:00 - 23:00 |          | 59.7             | 79.9              | 51.2              | 60.9             | 58.0             |
| Weekend Night-time 23:00 - 07:00 | 16 hours     | 06/12/2019 - 08/12/2019 23:00 - 07:00 |          | 59.7             | 86.3              | 50.1              | 60.7             | 58.0             |
| Daytime                          | 15 Mins      | 10/12/2019 11:17                      | ST1      | 71.7             | 87.7              | 61.8              | 75.6             | 64.6             |

| Period                      | Duration (T) | Monitoring Date and Times | Location | L <sub>Aeq,T</sub> (dB) | L <sub>Amax,T</sub> (dB) | L <sub>Amin,T</sub> (dB) | L <sub>A10,T</sub> (dB) | L <sub>A90,T</sub> (dB) |
|-----------------------------|--------------|---------------------------|----------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|
| 07:00 - 19:00               | 15 Mins      | 09/12/2019 16:27          | ST2      | 63.9                    | 86.4                     | 54.2                     | 65.6                    | 56.5                    |
|                             | 15 Mins      | 09/12/2019 16:11          | ST3      | 61.4                    | 72.2                     | 54.5                     | 63.5                    | 58.3                    |
| Evening<br>19:00 - 23:00    | 15 Mins      | 09/12/2019 20:33          | ST1      | 66.5                    | 85.4                     | 52.3                     | 70.1                    | 57.0                    |
|                             | 15 Mins      | 09/12/2019 20:17          | ST2      | 61.9                    | 80.4                     | 51.9                     | 65.0                    | 54.9                    |
|                             | 15 Mins      | 09/12/2019 20:01          | ST3      | 60.2                    | 78.8                     | 53.3                     | 62.4                    | 56.8                    |
| Night-time<br>23:00 - 07:00 | 15 Mins      | 10/12/2019 00:04          | ST1      | 64.8                    | 79.0                     | 50.3                     | 68.2                    | 56.2                    |
|                             | 15 Mins      | 10/12/2019 00:19          | ST2      | 58.8                    | 70.2                     | 51.0                     | 61.82                   | 52.9                    |
|                             | 15 Mins      | 10/12/2019 00:34          | ST3      | 57.3                    | 68.2                     | 46.6                     | 60.9                    | 51.1                    |

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

## 5.0 Assessment of Key Effects

### 5.1 Noise Intrusion

Internal noise levels, at the proposed development, based on the existing ambient noise climate, have been assessed both with windows open, where a reduction from a partially open window of 10 dB has been used, and with windows closed where an assumption of a glazing with a sound reduction of  $R_w + C_{tr}$  39 dB has been used unless stated otherwise.

The results presented in Tables 5.1, 5.2 and 5.3 below show the predicted noise intrusion levels at properties across the site. The glazing and ventilation strategy has been designed to achieve WHO/BS 8233 internal  $L_{Aeq}$  daytime noise level criteria of 35 dB and internal night-time  $L_{Aeq}$  (30 dB) noise level criteria with windows closed within residential spaces.

**Table 5.1 Daytime Noise Intrusion Levels  $L_{Aeq,16\text{ hour}}$**

| Location               | External $L_{Aeq}$<br>at 1m from facade | Internal $L_{Aeq}$ with<br>windows open | Internal $L_{Aeq}$ with<br>windows closed | Criteria<br>Internal $L_{Aeq}$ |
|------------------------|-----------------------------------------|-----------------------------------------|-------------------------------------------|--------------------------------|
| <b>Southern Façade</b> |                                         |                                         |                                           |                                |
| R01 (Third Floor)      | 66.0                                    | 56.0                                    | 27.0                                      | 35                             |
| R01 (Fourth Floor)     | 65.3                                    | 55.3                                    | 26.3                                      | 35                             |
| <b>Eastern Façade</b>  |                                         |                                         |                                           |                                |
| R02 (Third Floor)      | 58.1                                    | 48.1                                    | 19.1                                      | 35                             |
| R02 (Fourth Floor)     | 57.8                                    | 47.8                                    | 18.8                                      | 35                             |

**Table 5.2 Night-time Noise Intrusion Levels  $L_{Aeq, 8\text{ hour}}$**

| Location               | External $L_{Aeq}$<br>at 1m from facade | Internal $L_{Aeq}$ with<br>windows open | Internal $L_{Aeq}$ with<br>windows closed | Criteria<br>Internal $L_{Aeq}$ |
|------------------------|-----------------------------------------|-----------------------------------------|-------------------------------------------|--------------------------------|
| <b>Southern Façade</b> |                                         |                                         |                                           |                                |
| R01 (First Floor)      | 68.7                                    | 58.7                                    | 29.7                                      | 30                             |
| R01 (Second Floor)     | 68.0                                    | 58.0                                    | 29.0                                      | 30                             |
| <b>Eastern Façade</b>  |                                         |                                         |                                           |                                |
| R02 (First Floor)      | 68.4                                    | 58.4                                    | 29.4                                      | 30                             |
| R02 (Second Floor)     | 67.7                                    | 57.7                                    | 28.7                                      | 30                             |

**Table 5.3 Night-time Noise Intrusion Levels  $L_{Amax}$**

| Location               | External $L_{Amax}$<br>at 1m from facade | Internal $L_{Amax}$ with<br>windows open | Internal $L_{Amax}$ with<br>windows closed | Criteria<br>Internal $L_{Amax}$ |
|------------------------|------------------------------------------|------------------------------------------|--------------------------------------------|---------------------------------|
| <b>Southern Façade</b> |                                          |                                          |                                            |                                 |
| R01 (First Floor)      | 71.2                                     | 61.2                                     | 32.2                                       | 45                              |
| R01 (Second Floor)     | 70.8                                     | 60.8                                     | 31.8                                       | 45                              |
| <b>Eastern Façade</b>  |                                          |                                          |                                            |                                 |
| R02 (First Floor)      | 73.2                                     | 63.2                                     | 34.2                                       | 45                              |
| R02 (Second Floor)     | 73.9                                     | 63.9                                     | 34.9                                       | 45                              |

Enhanced glazing achieving a minimum of  $R_w + C_{tr}$  39 dB will be provided to sensitive living and bedrooms on both southern and eastern façades of the building in order to achieve internal noise levels and meet the requirements of the planning condition and BS8233.

### Entertainment Noise

Potential noise from the Flour and Flagon and other entertainment premises around the development has been considered in detail with respect to the specifications of the glazing to achieve a suitable overall reduction at 63 and 125Hz. The octave band frequency based on entertainment noise for all modelled receptors for 63 and 125Hz at 1 metre from the façade are shown in Table 5.4. The glazing specification presented in Table 5.5 below provides the required reduction to achieve the criteria in relation to both traffic and entertainment noise.

**Table 5.4 Entertainment Noise Level at Modelled Receptors**

| Description        | Octave-band (Hz) Equivalent Sound Pressure Level, $L_{Aeq}$ (dB) |                                                |                                 |                                                |
|--------------------|------------------------------------------------------------------|------------------------------------------------|---------------------------------|------------------------------------------------|
|                    | 63Hz                                                             |                                                | 125Hz                           |                                                |
|                    | Predicted noise level at façade                                  | Example Glazing Reduction ( $R_w + C_{tr}$ 39) | Predicted noise level at façade | Example Glazing Reduction ( $R_w + C_{tr}$ 39) |
| R01 (First Floor)  | 40.6                                                             | 29                                             | 46.5                            | 28                                             |
| R01 (Second Floor) | 40.0                                                             | 29                                             | 45.8                            | 28                                             |
| R02 (First Floor)  | 42.1                                                             | 29                                             | 48.0                            | 28                                             |
| R02 (Second Floor) | 41.2                                                             | 29                                             | 47.1                            | 28                                             |

**Table 5.5 Example Glazing Specifications**

| Description                   | Octave-band (Hz) Equivalent Sound Pressure Level, $L_{Aeq}$ (dB) |     |     |     |      |      |      | $R_w + C_{tr}$ |
|-------------------------------|------------------------------------------------------------------|-----|-----|-----|------|------|------|----------------|
|                               | 63                                                               | 125 | 250 | 500 | 1000 | 2000 | 4000 |                |
| Saint Gobain Glass 8 (6) 8.4A | 29                                                               | 28  | 36  | 39  | 45   | 46   | 58   | <b>39</b>      |

All facades associated with the development will be provided with an alternative means of mechanical supply and extract ventilation with a sound reduction equal to, or greater than the glazing in order to achieve ventilation and internal ambient noise criteria. The example ventilation systems presented within this document are expected to result in noise breakout levels between 16.7 dB (20%) and 39.6 dB (100%) which are considered to be typical for a domestic unit. As such, although internal noise levels may be elevated during periods of maximum load, these conditions are only expected to be encountered during periods when pollutants (such as fumes from activities such as cooking or painting are created) and would typically operate at a much lower level to provide background ventilation.

## 5.2 Building Services Plant Noise

This assessment has been undertaken to establish the maximum external noise levels from the proposed development. The assessment compares the predicted worst-case breakout noise levels from potential plant with the typical measured average background noise  $L_{A90}$  at the closest existing residential receptors.

A series of predictions were made by defining different sound power levels at point sources. When the sound pressure levels are set as shown in Tables 5.6 (which are considered to be achievable), the noise levels at all the existing receptors are predicted to be at least 10 dB below existing background levels during the daytime and night-time.

**Table 5.6 Proposed Emission Limits for the commercial BSP as Modelled**

| BSP Description & Location | Noise Emission Limit - Sound Pressure Level (Each Unit) | Noise Emission Limit - Sound Pressure Level (Each Unit) |
|----------------------------|---------------------------------------------------------|---------------------------------------------------------|
|                            | Daytime                                                 | Night-time                                              |
| Roof Plant                 | 78.5 dB at 1m and 68.9 dB at 3m                         | 75.5 dB at 1m and 65.9 dB at 3m                         |

In accordance with section 9.2 of BS4142:2014 an overall +3 dB character correction has been applied to account for any intermittent characteristics of noise from the plant units which may be perceptible at the closest sensitive receptors. As the plant has the potential to operate 24/7, background  $L_{A90}$  noise levels measured over the entire daytime and night-time period have been used within the assessment.

Table 5.7 below takes in to account the chosen cooling and heating unit noise limits in Table 5.6 and the plant data from the mechanical ventilation supply and extract fans.

**Table 5.7 BS4142 Assessment for Proposed Plant**

| Ref | Existing Measured Background ( $L_{A90}$ ) |            | Specific Noise Level ( $L_{Aeq}$ ) |            | Rating level from operational noise |            | BS 4142 Score |            |
|-----|--------------------------------------------|------------|------------------------------------|------------|-------------------------------------|------------|---------------|------------|
|     | Daytime                                    | Night-time | Daytime                            | Night-time | Daytime                             | Night-time | Daytime       | Night-time |
| R01 | 58                                         | 55         | 38                                 | 35         | 41                                  | 38         | -17           | -17        |
| R02 | 58                                         | 55         | 48                                 | 45         | 51                                  | 48         | -7            | -7         |
| R03 | 58                                         | 51         | 37                                 | 36         | 40                                  | 39         | -18           | -12        |
| R04 | 57                                         | 53         | 42                                 | 42         | 45                                  | 45         | -12           | -8         |
| R05 | 57                                         | 53         | 41                                 | 40         | 44                                  | 43         | -13           | -10        |

The assessment above shows that worst-case plant noise rating levels are predicted to be at least 7 dB below the existing background noise levels at all nearby sensitive receptor locations during night-time, which is an indication of a low impact.

## 6.0 Conclusions

This report provides acoustic design advice for the planning application of two additional residential floors at 137 Oxford Road, Manchester.

In accordance with the requirements of BS8233 a glazing and ventilation strategy has been provided which achieves both ventilation and internal ambient noise level requirements of 35 dB  $L_{Aeq,16hours}$  (between 07:00 to 23:00) and of 30 dB  $L_{Aeq,8hours}$  (between 23:00 to 07:00) and 45 dB  $L_{Amax}$  in all residential bedroom/spaces of the Development. The assessment takes account of a potential event occurring the Flour and Flagon, along with the Deaf Institute and the Footage.

Sensitive rooms will feature enhanced glazing and an alternative means of ventilation. Glazing specifications used within this assessment are presented in Tables 5.5.

Furthermore, noise rating levels from the proposed plant are expected to be below existing background noise levels at nearby noise sensitive receptors.

Accordingly, the proposed plant is predicted to have a low impact at the closest sensitive receptors when assessed in accordance with BS8233 and BS4142. Therefore, the proposed plant is not expected to have a 'significant adverse impact' on health or quality of life.

# 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<sub>Aeq</sub>** 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<sub>Aeq, 07:00 – 23:00</sub> 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<sub>pA</sub> at any particular time is likely to have been either greater or lower than the L<sub>Aeq, 07:00 – 23:00</sub>.
- L<sub>Amin</sub>** The L<sub>Amin</sub> is the quietest instantaneous noise level. This is usually the quietest 125 milliseconds measured during any given period of time.
- L<sub>Amax</sub>** The L<sub>Amax</sub> is the loudest instantaneous noise level. This is usually the loudest 125 milliseconds measured during any given period of time.
- L<sub>n</sub>** 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<sub>A10, 1 hr</sub> = x dB.
- The L<sub>A10</sub> index is often used in the description of road traffic noise, whilst the L<sub>A90</sub>, the noise level exceeded for 90% of the measurement period, is the usual descriptor for underlying background noise. L<sub>A1</sub> and L<sub>Amax</sub> are common descriptors of construction noise.
- R<sub>w</sub>** 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

PPG – Planning Practice Guidance

UDP – Unitary Development Plan

UKAS – United Kingdom Accreditation Service

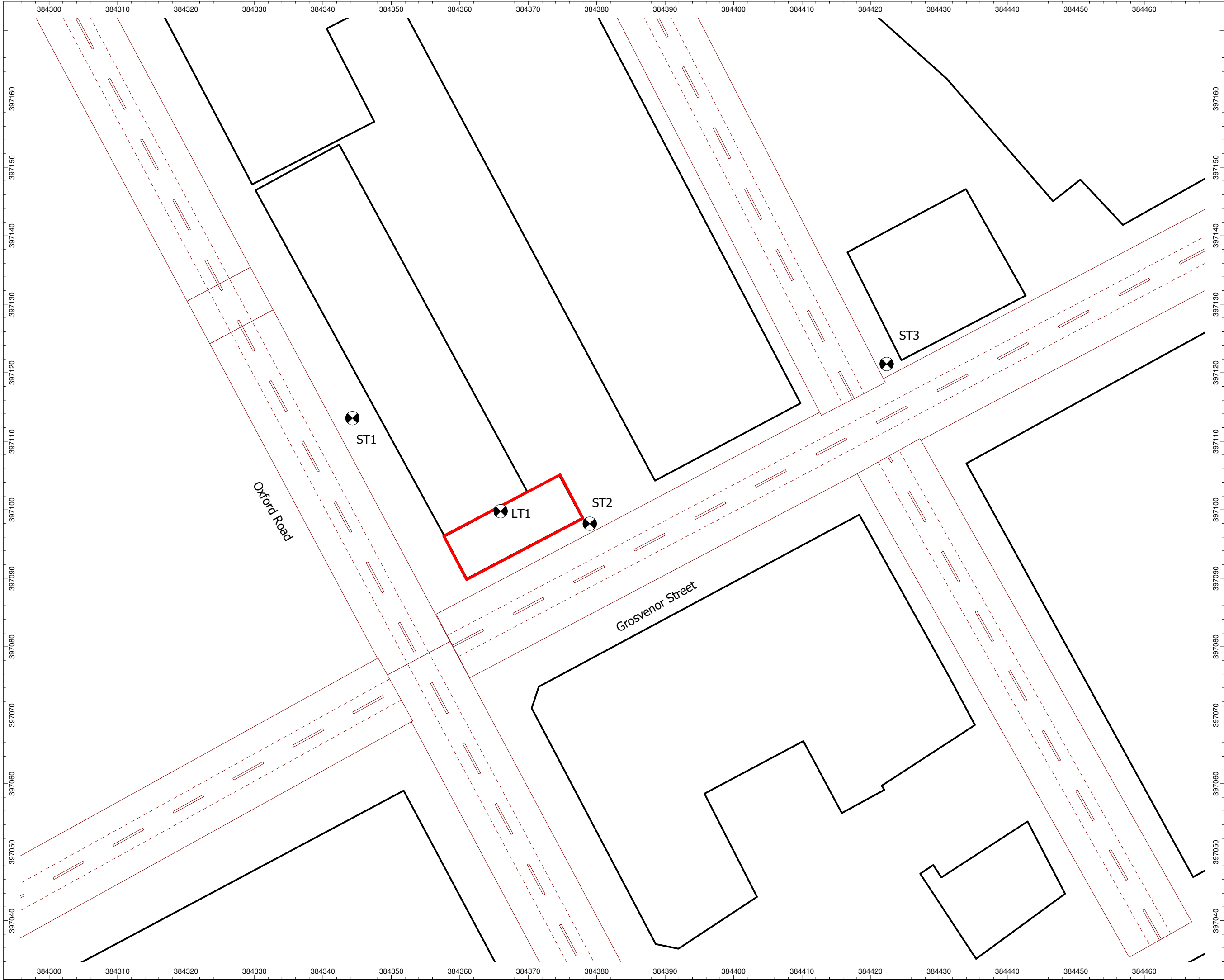
## **Appendix B – Sketches**

SK01 Noise Monitoring Locations

SK02 Sensitive Receptor Locations

SK03 Daytime  $L_{Aeq}$  Noise Levels

SK04 Night-time  $L_{Aeq}$  Noise Levels



Client:  
Soller Eight Ltd

Project:  
A117616-1 Oxford Road,  
Manchester

Drawing Title / Scenario:  
Noise Monitoring Locations

Drawing Number:  
SK01

Key:

Site Boundary: —

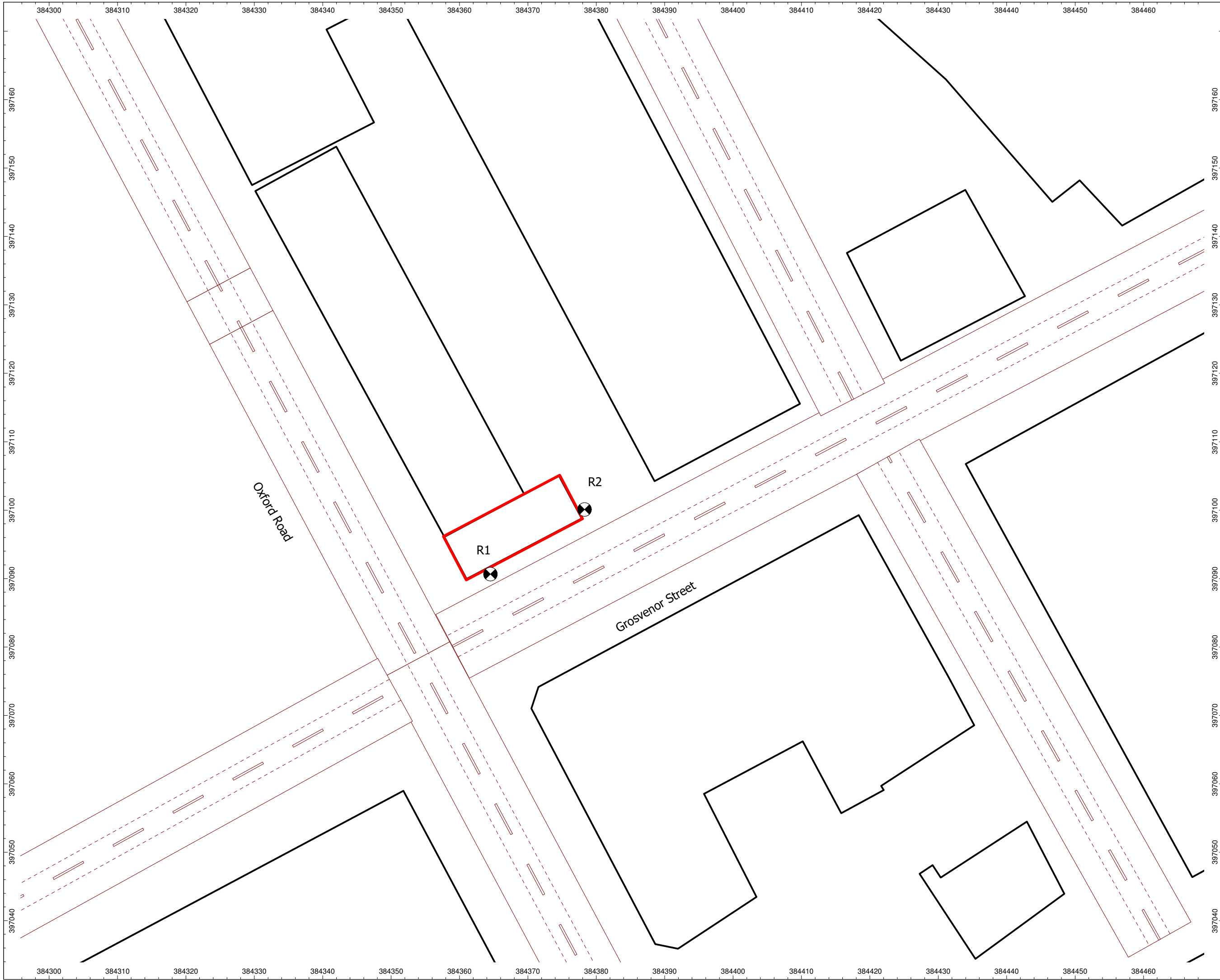
Scale : Not to scale

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Anstley  
Leicestershire  
LE7 7GR  
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Client:  
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Project:  
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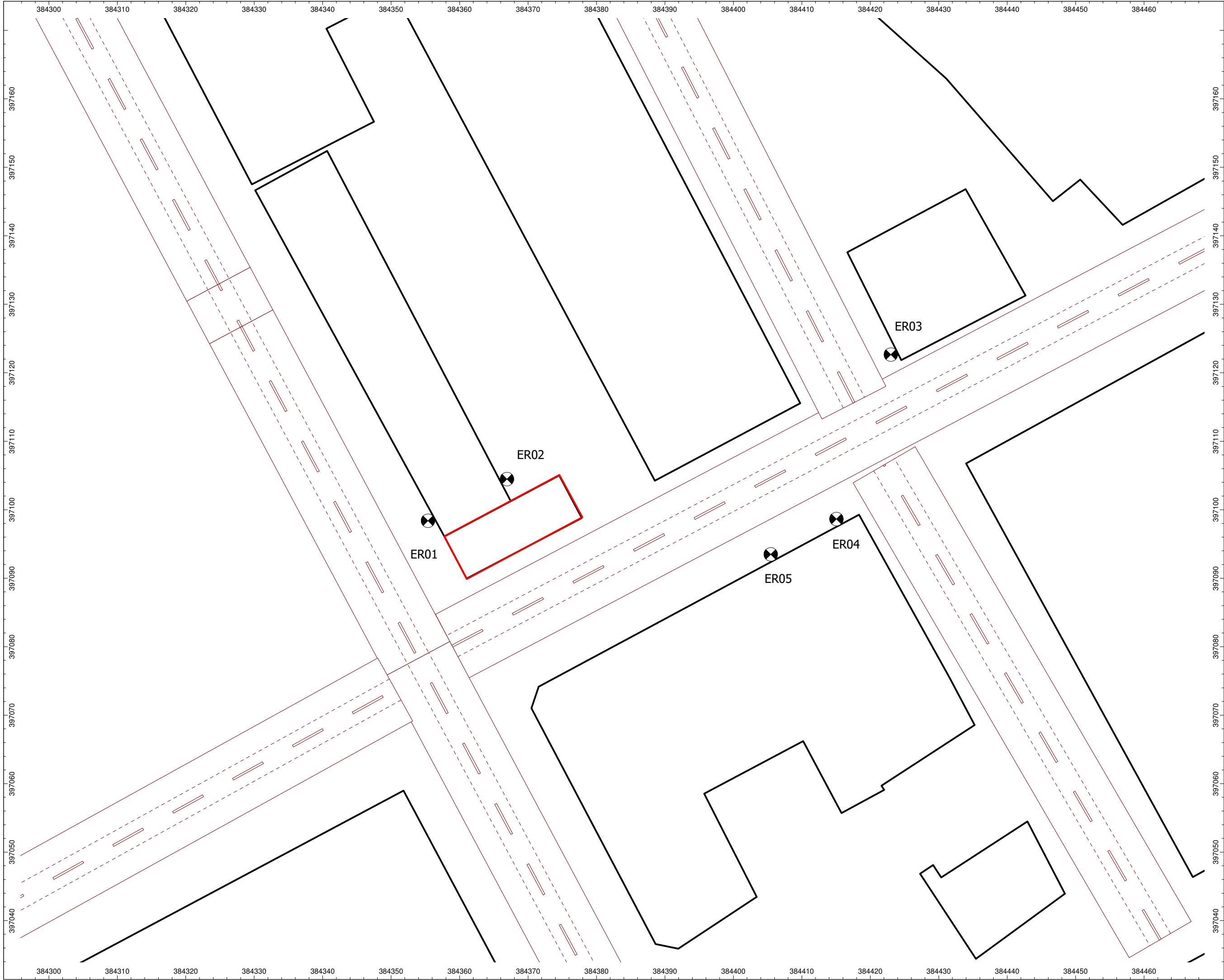
Drawing Title / Scenario:  
Proposed Sensitive  
Receptor Locations

Drawing Number:  
SK02a

Scale : Not to scale

Key:

Site Boundary: —



Client:  
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Project:  
A117616-1 Oxford Road,  
Manchester

Drawing Title / Scenario:  
Existing Sensitive  
Receptor Locations

Drawing Number:  
SK02b

Key:

Site Boundary: —

Scale : Not to scale

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Client:  
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Project:  
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Drawing Title / Scenario:  
Daytime Noise  
Contour Plot  
LAeq,1hour

Drawing Number:  
SK03

- Key:
- Site Boundary: —
- 0 - 50.0 dB(A)
  - 50.0 - 60.0 dB(A)
  - 60.0 - 70.0 dB(A)
  - > 70.0 dB(A)

Scale : Not to scale

Grid Height = 10.0m

Please note: Noise contour  
plots are for illustrative  
purposes only

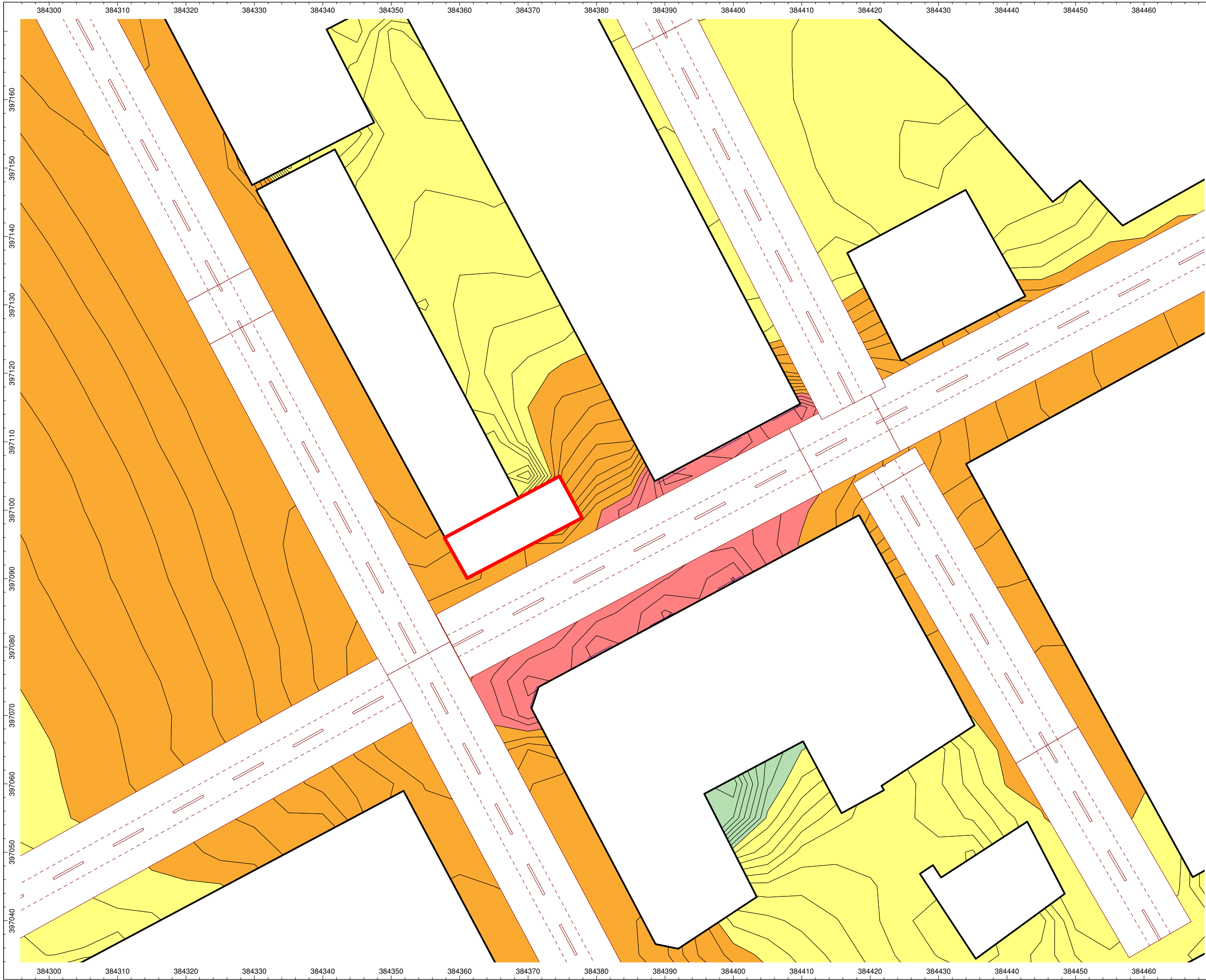
Scale : Not to scale

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Client:  
Soller Eight Ltd

Project:  
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Manchester

Drawing Title / Scenario:  
Night-time Noise  
Contour Plot  
LAeq,15 min

Drawing Number:  
SK04

Key:

Site Boundary: ---

0 - 50.0 dB(A)  
50.0 - 60.0 dB(A)  
60.0 - 70.0 dB(A)  
> 70.0 dB(A)

Scale : Not to scale

Grid Height = 10.0m

Please note: Noise contour  
plots are for illustrative  
purposes only

Scale : Not to scale

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## **Appendix C – Report Conditions**

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The whole of the report must be read as other sections of the report may contain information which puts into context the findings in any executive summary.

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