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MANOR NURSERY ANGMERING WEST SUSSEX

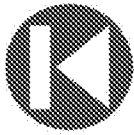
ENVIRONMENTAL NOISE REPORT

Reference: 5698/DO/pw

April 2014

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**Manor Nursery, Angmering
Environmental Noise Report**

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Issue Number

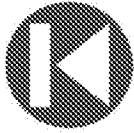
1st Issue

Revision 'A'

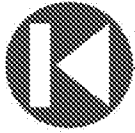
Date

4th April 2014

11th April 2014

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Environmental Noise Report****INDEX**

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1.0 INTRODUCTION

Hanbury Properties Limited appointed Acoustic Consultants Limited to carry out a site noise monitoring survey to measure road traffic and to address the noise related aspects of an outline planning application for the proposed residential development on the site at Manor Nursery in Angmering, West Sussex.

The report aims to establish the impact of existing transportation noise on residential amenity on the site.

2.0 THE SITE

The proposed residential development is on the site of an existing nursery adjacent to the A280 in Angmering, West Sussex. The planning application is for residential development of the site comprising 32 dwellings. The site layout is based on the OSP Architects drawing 'Coloured Site Layout' with reference number 13114 / SK07.

The site is bordered by agricultural land to the north and south. To the west is a large detached residential building and to the east is the A280.

The main noise source affecting the site is road traffic along the A280 to the east.

3.0 NOISE CRITERIA

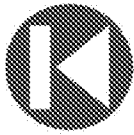
3.1 National Planning Policy Framework

The National Planning Policy Framework was published in March 2012. Section 11 entitled 'Conserving and enhancing the natural environment' addresses noise as a requirement of planning.

Paragraph 109 states:

"109. The planning system should contribute to and enhance the natural and local environment by:

- *preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability."*



Paragraph 123 states:

“123. Planning policies and decisions should aim to:

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

The document does not prescribe any assessment methodology or criteria to assess the adverse affect of noise. It is our opinion that the following assessment methods are the most relevant for this submitted scheme.

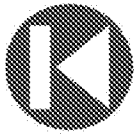
3.2 Noise Policy Statement for England

The NPPF refers to the Noise Policy Statement for England (NPSE). This was published in March 2010 and aims to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion and applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

The NPSE sets out the long term vision of Government noise policy. This long term vision is supported by three noise policy aims as follows:

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

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



The NPSE introduces the concept of “Significant adverse” and “Adverse” impacts of noise which relate to the noise policy aims. These are applied as follows:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The NPSE does not provide any assessment criteria for the noted effect levels.

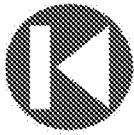
With regard to where there is potential for noise impact it states the following in relation to the second noise policy aim:

“The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.”

3.3 World Health Organisation Guidelines on Community Noise 1999

The World Health Organisation document entitled ‘Guidelines on Community Noise’ was published in 1999 and provides noise criteria for specific environments. For noise levels internally and externally to dwellings it states:

“In Dwellings. The effect of noise in dwellings, typically, are sleep disturbance, annoyance and speech interference. For bedrooms the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30 LAeq for continuous noise and 45 LMax for single sound events. Lower noise levels may be disturbing depending on the nature of the noise source. At night-time, outside sound levels about 1 metre from façades of living spaces should not exceed 45 dB LAeq, so that people may sleep with bedroom windows open. This value was obtained by assuming the noise reduction from outside to inside with the window open is 15 dB. To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35 dB LAeq. The maximum sound pressure level should be measured with the sound pressure meter set at “fast”. ”



Based on the same methodology used to determine the night time noise level outside a residential property the daytime noise level about 1 metre from façades of living spaces should not exceed 50 dB L_{Aeq} where open windows provide ventilation. We would point out that criteria in the WHO document 'Guidance for Community Noise' published in 1999 was reviewed in a report by the National Physical Laboratory (reference CMAM16) which states:

'Exceedance of the WHO guideline values does not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher levels of noise exposure are reached'.

Therefore it is not necessarily the case that where these levels are exceeded the noise will adversely affect nearby residential properties.

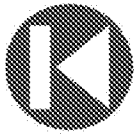
3.4 British Standard 8233:2014

British Standard 8233:2014 entitled "Guidance on sound insulation and noise reduction for buildings" came into effect on 28th February 2014 and supersedes British Standard 8233:1999. In the section entitled 'Information about this document' it outlines the principal changes to the previous version. The changes relevant to new residential development are as follows:

- Publication in England of the National Planning Policy Framework in March 2012, with the concurrent withdrawal of numerous individual planning guidance and policy statement documents, including those specifically relating to noise.
- A reappraisal of the tabular content with respect to setting targets for various classes of living space in the light of research findings.

3.4.1 Internal Equivalent Noise Levels

Section 7.7.2 Table 4 of the British Standard provides internal ambient noise levels for dwellings from noise sources 'without a specific character' and are based on existing guidelines issued by the World Health Organisation 1999. It is considered that road traffic noise would be 'without a specific character' for the purposes of this assessment.



The British Standard guideline states that *"in general for steady state external noise sources it is desirable that the internal ambient noise level"* for annual average conditions does not exceed those as noted in Table 4 of the British Standard and this is summarised below:

Table 1: British Standard 8233:2014 Internal Noise Criteria

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16 \text{ hour}}$	-
Dining	Dining Room/area	40 dB $L_{Aeq,16 \text{ hour}}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16 \text{ hour}}$	30 dB $L_{Aeq,8 \text{ hour}}$

British Standard 8233:2014 section 7.7.2 Note 7 states:

"Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."

Section 7.7.2 Note 5 states:

"If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level."

Therefore, where the external noise levels are such that the World Health Organisation external noise guidelines are exceeded and the internal noise criteria in the table above cannot be achieved with an open window it will be necessary to provide noise mitigation measures to the residential buildings. The mitigation measures need to control external noise ingress such that noise levels inside habitable rooms do not exceed the following criteria with adequate ventilation being provided.

Table 2: British Standard 8233:2014 Internal Noise Criteria (Where WHO External Criteria are Exceeded)

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	40 dB $L_{Aeq,16 \text{ hour}}$	-
Dining	Dining Room/area	45 dB $L_{Aeq,16 \text{ hour}}$	-
Sleeping (daytime resting)	Bedroom	40 dB $L_{Aeq,16 \text{ hour}}$	35 dB $L_{Aeq,8 \text{ hour}}$

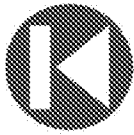


Table 2 of the British Standard provides Indoor ambient noise level criteria in spaces when they are unoccupied and privacy is also important. For a living room the design range is 35-40 $L_{Aeq(16 \text{ hour})}$ decibels.

The British Standard states:

“Noise levels generally apply to steady sources, such as those due to road traffic, mechanical services or continuously running plant, and should be the noise level in the space during normal hours of occupation but excluding any noise produced by the occupants and their activities.”

As such, an internal noise level due to road traffic of up to 40 $L_{Aeq(16 \text{ hour})}$ decibels can be seen to have a benefit to occupants. This is especially the case in buildings of multiple dwellings such as HMO's, flats and terraced housing where noise from neighbours through the separating wall or floor can cause a disturbance.

3.4.2 Internal Maximum Noise Levels

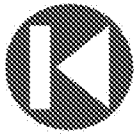
Section 7.7.2 Note 4 states *“Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values”*.

Section 3.4 of the WHO Guidance states *“For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 L_{Amax} more than 10-15 times per night (Vallet & Verbey 1991)”*.

3.4.3 External Amenity Areas

Section 7.7.3.2 of British Standard 8233:2014 is entitled ‘Design criteria for external noise and states the following:

“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as inner city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practical levels in these external amenity spaces, but should not be prohibited.”



3.5 Proposed Noise Criteria

Based on the above noted criteria, we propose, as follows, noise limits for different residential locations:

3.5.1 Internal Equivalent Noise Levels

Based on British Standard 8233:2014 and the references to the World Health Organisation guidelines the proposed noise criteria are as follows:

Where External Noise Levels are below World Health Organisation Guidelines

Where noise levels 1 metre from the façade of the residential building do not exceed the World Health Organisation guidelines of 50 dB $L_{Aeq(16 \text{ hour})}$ between 07:00 and 23:00, and 45 dB $L_{Aeq(8 \text{ hour})}$ between 23:00 and 07:00.

Table 3: Proposed Noise Criteria

Location	07:00 to 23:00	23:00 to 07:00
Living Room	35 dB $L_{Aeq,16 \text{ hour}}$	-
Dining Room/area	40 dB $L_{Aeq,16 \text{ hour}}$	-
Bedroom	35 dB $L_{Aeq,16 \text{ hour}}$	30 dB $L_{Aeq,8 \text{ hour}}$

Where External Noise Levels are above World Health Organisation Guidelines

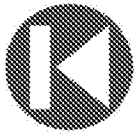
Where noise levels 1 metre from the façade of the residential building exceed the World Health Organisation guidelines of 50 dB $L_{Aeq(16 \text{ hour})}$ between 07:00 and 23:00, and 45 dB $L_{Aeq(8 \text{ hour})}$ between 23:00 and 07:00.

Table 4: Proposed Noise Criteria

Location	07:00 to 23:00	23:00 to 07:00
Living Room	40 dB $L_{Aeq,16 \text{ hour}}$	-
Dining Room/area	45 dB $L_{Aeq,16 \text{ hour}}$	-
Bedroom	40 dB $L_{Aeq,16 \text{ hour}}$	35 dB $L_{Aeq,8 \text{ hour}}$

3.5.2 Internal Maximum Noise Levels

The World Health Organisation guidelines state a maximum noise level in Bedrooms of 45 dB $L_{Amax(fast)}$.



Section 3.4 of the WHO Guidance states *“For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 L_{Amax} more than 10-15 times per night (Vallet & Verbey 1991)”*.

Therefore the maximum noise level criteria is that noise levels in bedrooms at night should not exceed 45 dB L_{Amax(fast)} more than 10-15 times per night. This equates to 60 dB L_{Amax(fast)} levels 1 metre from the façade of the residential building with an open window.

3.5.3 External Amenity Areas

Based on British Standard 8233:2014 the target noise levels in external amenity areas such as gardens, patios and balconies are as follows:

Desirable level: 50 dB L_{Aeq(16 hour)}

Upper Limit: 55 dB L_{Aeq(16 hour)}

However, it is noted that these levels may not be achievable and where this is the case the development design should aim to reduce noise as far as practically possible. Noise control measures should follow the guidance in section 5.4 of the British Standard.

4.0 ASSESSMENT METHODOLOGY

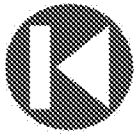
The assessment methodology is based on the criteria outlined in section 3.5 above.

Measured on site noise data is to be used in conjunction with the site layout to create a noise model of the site.

Noise maps are generated to determine the noise level at the façades of the residential properties of the development.

Where noise levels 1 metre from the façade of the residential building do not exceed 50 dB L_{Aeq(16 hour)} between 07:00 and 23:00, 45 dB L_{Aeq(8 hour)} and 60 dB L_{Amax(fast)} between 23:00 and 07:00 no noise mitigation is required. Noise levels in these rooms will achieve the criteria stated in table 1 which would be considered to be below the Lowest Observed Adverse Effect Level of the NPSE and comply with the first policy aim of the NPSE.

Where noise levels 1 metre from the façade of the residential building exceed 50 dB L_{Aeq(16 hour)} between 07:00 and 23:00, 45 dB L_{Aeq(8 hour)} and 60 dB L_{Amax(fast)} between 23:00 and 07:00 noise mitigation is required. This would fall between the Lowest Observed Adverse Effect Level and the Significant Observed Adverse Effect Level and as such noise mitigation measures would be required in accordance with the second policy aim of the NPSE.



The noise mitigation measures should achieve the criteria stated in Table 4 to provide reasonable conditions and the maximum noise levels in section 3.5.2 should also be achieved.

The outline noise mitigation measures will be provided based on standard construction techniques and different glazing and ventilation requirements.

Noise mapping is used to identify the noise levels in the external amenity areas of the development.

5.0 NOISE MEASUREMENT PROCEDURES

Sound Pressure Levels were measured using a CEL 593 Sound Level Meter, with a half-inch condenser microphone using the "fast" setting.

The equipment is checked regularly using a Quality System meeting the requirements of British Standard EN ISO/IEC 17025:2005 and in accordance with British Standard EN 10012:2003 and traceable to the National Standards.

This equipment was checked and calibrated as noted below and the certificates are available for inspection. Table 5 provides the equipment and calibration status.

Table 5: Equipment and Calibration Status

Equipment Description / Manufacturer / Type	Serial number	Date of calibration	Calibration Certification Number
Real Time Analyser, CEL, Type 593	0271040	09/09/13	K043915
Pre-Amplifier, CEL, Type 527	3/0221937	09/09/13	K043915
Microphone, CEL, Type 250	4951	09/09/13	K043915
Calibrator, CEL, Type 284/2	3/02716829	09/09/13	K043916

The measurement system was checked before and after use with the noted calibrators and no drift greater than 0.1 decibels was detected.

6.0 ON SITE MONITORING

A partially attended twenty four hour noise monitoring exercise commenced at 11:05 hours on the 4th March 2014.

The sound level meter was located at Monitoring Location 'A', twelve metres from the edge of the nearside carriageway of the A280.

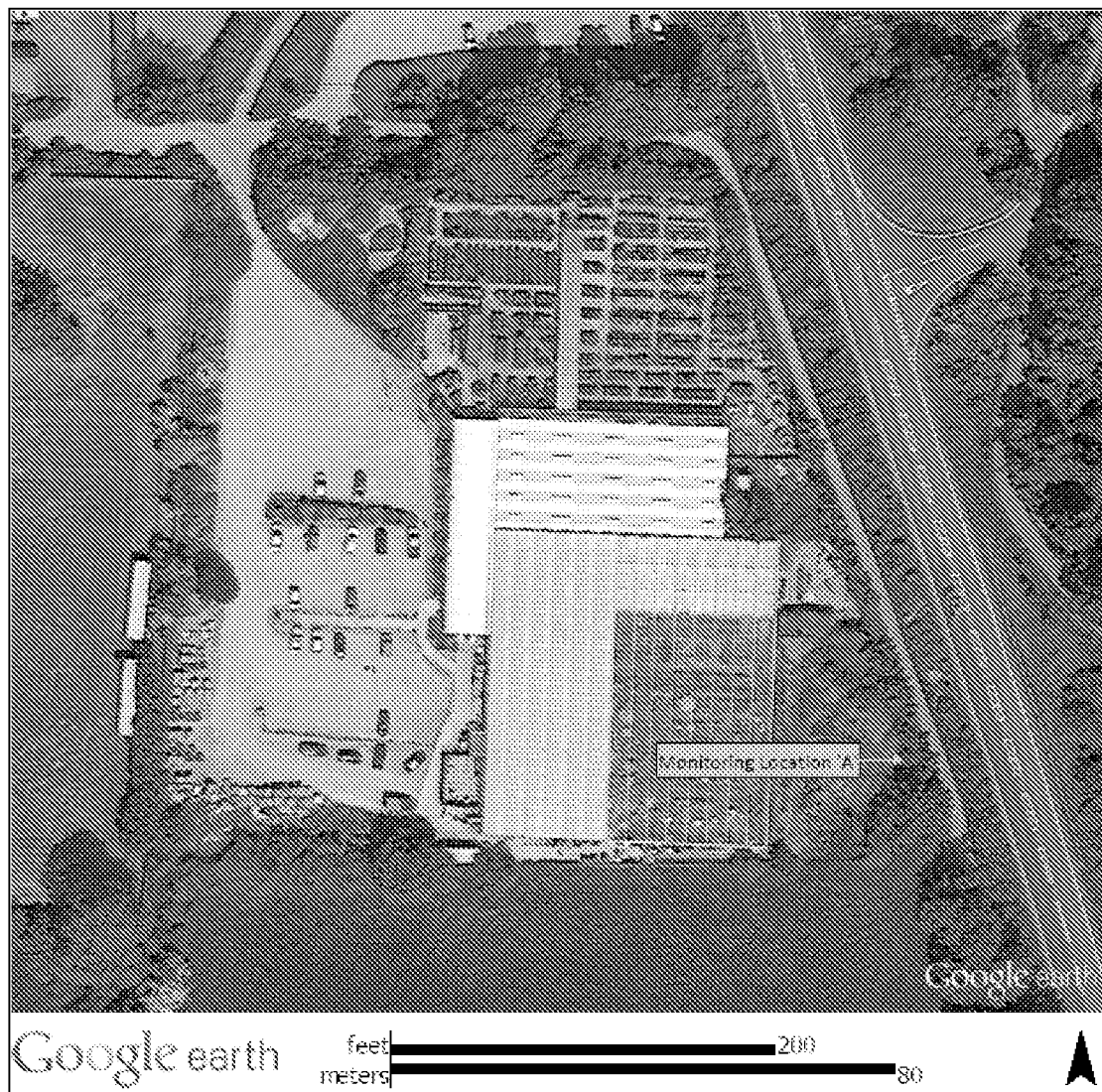


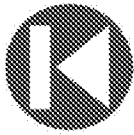
The meter was placed on a tripod approximately 1.5 metres above the ground with windshield fitted in a free field position.

The meter was set to record five minute measurement periods measuring L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} parameters. The monitoring location is provided in Figure 1/5698 below. The measured five minute measurement data is provided in Appendix 2/5698 at the end of this report.

During the measurement exercise the weather was clear with daytime temperatures of around 12 degrees centigrade with a south westerly wind of approximately 3 metres per second. These conditions are not expected to have a significant effect on the measured noise levels.

Figure 1/5698 – Monitoring Location





6.1 Measured Noise Levels

The noise levels at monitoring location 'A' have been determined directly from the measurement data. The determined 24-hour noise levels at Monitoring Location 'A' are as follows:

Table 6: External Noise Levels (Façade Level)

Daytime (07:00 - 23:00 hours)	Night-time (23:00 – 07:00 hours)	
L _{Aeq} 16hr (dB)	L _{Aeq} 8hr (dB)	L _{Amax} 8hr (dB)
59	50	70

7.0 NOISE MODELLING

Noise modelling has been carried out using the noise modelling software CadnaA by Datakustik to determine the noise levels at each façade of the proposed residential buildings. The noise prediction software bases its road noise predictions on the methodology set out in the Department of Transport publication "Calculation of Road Traffic Noise" 1988 (CRTN).

Residential buildings have a height of 10 metres. Garages, apart from where they are part of a residential building, have not been included within the map. Fences around gardens have been included within the model and are at a height of 1.8 metres.

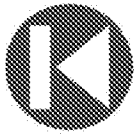
The ground is considered as 'soft' apart from roads which are reflective. Houses are also reflective. Reflections have been calculated using the correction in Calculation of Road Traffic Noise.

The road is level with the site.

The daytime noise levels are predicted at a height of 1.5 metres (ground floor level) whilst the night time levels are predicted at a height of 5 metres (first floor level).

7.1 Noise Levels at Façades of Residential Properties

Figures 2/5698 and 3/5698 and 4/5698 at the end of this report show the daytime, night time and maximum night time external noise levels below which the internal noise criteria stated in table 3 would be achieved and is considered to be below the



Lowest Observed Adverse Effect Level of the NPSE and comply with the first policy aim of the NPSE.

The maps show areas where the criteria are achieved in green and where they are exceeded in yellow.

The majority of the site falls within the noted noise criteria. Noise levels within these plots, with an open window, is predicted to fall within the British Standard 8233 criteria and is not expected to adversely affect the residential amenity of the properties. This achieves the aims of the NPPG and NPSE.

The following plots exceed the noted criteria and need to be assessed in terms of noise mitigation measures.

- Plots 1-4 Inclusive
- Plots 14-18 Inclusive
- Plots 19-23 Inclusive

Noise mitigation measures for these plots are provided in section 9.

7.2 External Amenity Areas

Figure 5/5698 shows the daytime external noise levels across the site in terms of the external amenity area criteria of British Standard 8233:2014 in different colours. The colour key is as follows:

- Green: These areas are below the desirable noise level of 50 L_{Aeq} dB.
- Blue: These areas are below the upper limit of 55 L_{Aeq} dB.
- Yellow: These areas exceed the British Standard 8233 criteria.

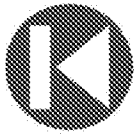
The noise map shows that all plots have an areas were the predicted noise level is below 50 L_{Aeq} dB and that the noise level in the gardens do not exceed 55 L_{Aeq} dB. This achieves the aims of the NPPG and NPSE.

8.0 IMPACT OF NOISE ON DEVELOPMENT DESIGN

The following plots exceed the criteria of British Standard 8233:2014 for dwellings with open windows and need to be assessed in terms of noise mitigation measures.

- Plots 1-4 Inclusive
- Plots 14-18 Inclusive
- Plots 19-23 Inclusive

In accordance with the design guidance in British Standard 8233:2014 it will be necessary to design the building fabric of the residential properties to control noise ingress. The target internal noise levels are stated in Table 4 to provide Reasonable



conditions with a maximum internal noise level in bedrooms at night of 45 $L_{Amax(fast)}$ decibels no more than 10-15 times during the 8 hour period.

The noise mitigation measures are based on standard constructions with cavity masonry or twin stud timber walls and an uninhabited loft space above habitable rooms. The outline noise mitigation measures consider the window construction and ventilation.

8.1 Plots 1-4 Inclusive

Noise mitigation measures need to be applied to the bedrooms on the north, south and east façades of the properties only.

The noted habitable rooms will require closed double glazed windows and acoustic trickle vents which provide a sound level difference (outside to inside) of 30 dB(A). Based on the sound reduction of road traffic of a double glazed window stated in Planning Policy Guidance Document 24 the total sound reduction is expected to be in the order of 30 dB(A) outside to inside.

With the noted outline noise mitigation measures external noise is expected to be controlled to a reasonable level in the bedrooms of the residential properties.

8.2 Plots 14-18 Inclusive

Noise mitigation measures need to be applied to the daytime and night time habitable rooms on the north, south and east façades of the properties only.

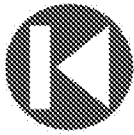
The noted habitable rooms will require closed double glazed windows and acoustic trickle vents which provide a sound level difference (outside to inside) of 30 dB(A). Based on the sound reduction of road traffic of a double glazed window stated in Planning Policy Guidance Document 24 the total sound reduction is expected to be in the order of 30 dB(A) outside to inside.

With the noted outline noise mitigation measures external noise is expected to be controlled to a reasonable level in the bedrooms of the residential properties.

8.3 Plots 19-23 Inclusive

Noise mitigation measures need to be applied to the daytime habitable rooms on the north and east facades only; and night time habitable rooms on all façades of the properties.

The noted habitable rooms will require closed double glazed windows and acoustic trickle vents which provide a sound level difference (outside to inside) of 30 dB(A). Based on the sound reduction of road traffic of a double glazed window stated in



Planning Policy Guidance Document 24 the total sound reduction is expected to be in the order of 30 dB(A) outside to inside.

With the noted outline noise mitigation measures external noise is expected to be controlled to a reasonable level in the bedrooms of the residential properties.

9.0 LIMITATIONS

The report limits itself to addressing solely on the road traffic noise aspects as included in this report. We provide advice only in relation to noise and acoustics. It is recommended that appropriate expert advice is sought on all the ramifications (e.g., CDM, structural, condensation, fire, legal, etc.) associated with any proposals in this report or as advised and concerning the appointment.

The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above.

The report is provided for the sole use of the named Client and is confidential to them and their professional advisors. No responsibility is accepted to other parties.

It should be noted that noise predictions are based on the current information as we understand it and on the performances noted in this report. Any modification to these parameters can alter the predicted level. All predictions are in any event subject to a degree of tolerance of normally plus or minus three decibels. If this tolerance is not acceptable, then it would be necessary to consider further measures.

10.0 SUMMARY & CONCLUSIONS

Hanbury Properties Limited appointed Acoustic Consultants Limited to carry out a site noise monitoring survey to measure road traffic and to address the noise related aspects of an outline planning application for the proposed residential development on the site at Manor Nursery in Angmering, West Sussex.

The main noise source affecting the site is road traffic along the A280 to the East.

Site monitoring and noise modelling has been undertaken to determine noise levels across the site and determine the requirement for noise mitigation measures in accordance with the National Planning Policy Guidance, Noise Policy Statement for England and British Standard 8233:2014.



Noise levels within the majority of plots across the site, with an open window, are predicted to fall within the British Standard 8233 criteria and are not expected to adversely affect the residential amenity of the properties. This achieves the aims of the NPPG and NPSE.

Plots closest to the road will require noise mitigation measures in the form of an acoustic attenuated trickle vent with the windows kept closed. This achieves the aims of the NPPG and NPSE.

Noise levels in the residential amenity areas have been predicted and it is demonstrated that all plots have an areas were the predicted noise level is below 50 L_{Aeq} dB and that the noise level in the gardens do not exceed 55 L_{Aeq} dB.

A planning condition could be placed on the consent stating that the design of the site and buildings should achieve the internal noise levels of the criteria of British Standard 8233:2014 should be achieved.

Road traffic noise affecting the development is adequately controlled across the site so that that residential amenity of the residential properties is not adversely affected. In terms of noise the proposals are considered acceptable based on the National Planning Policy Guidance, Noise Policy Statement for England and British Standard 8233:2014.

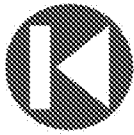
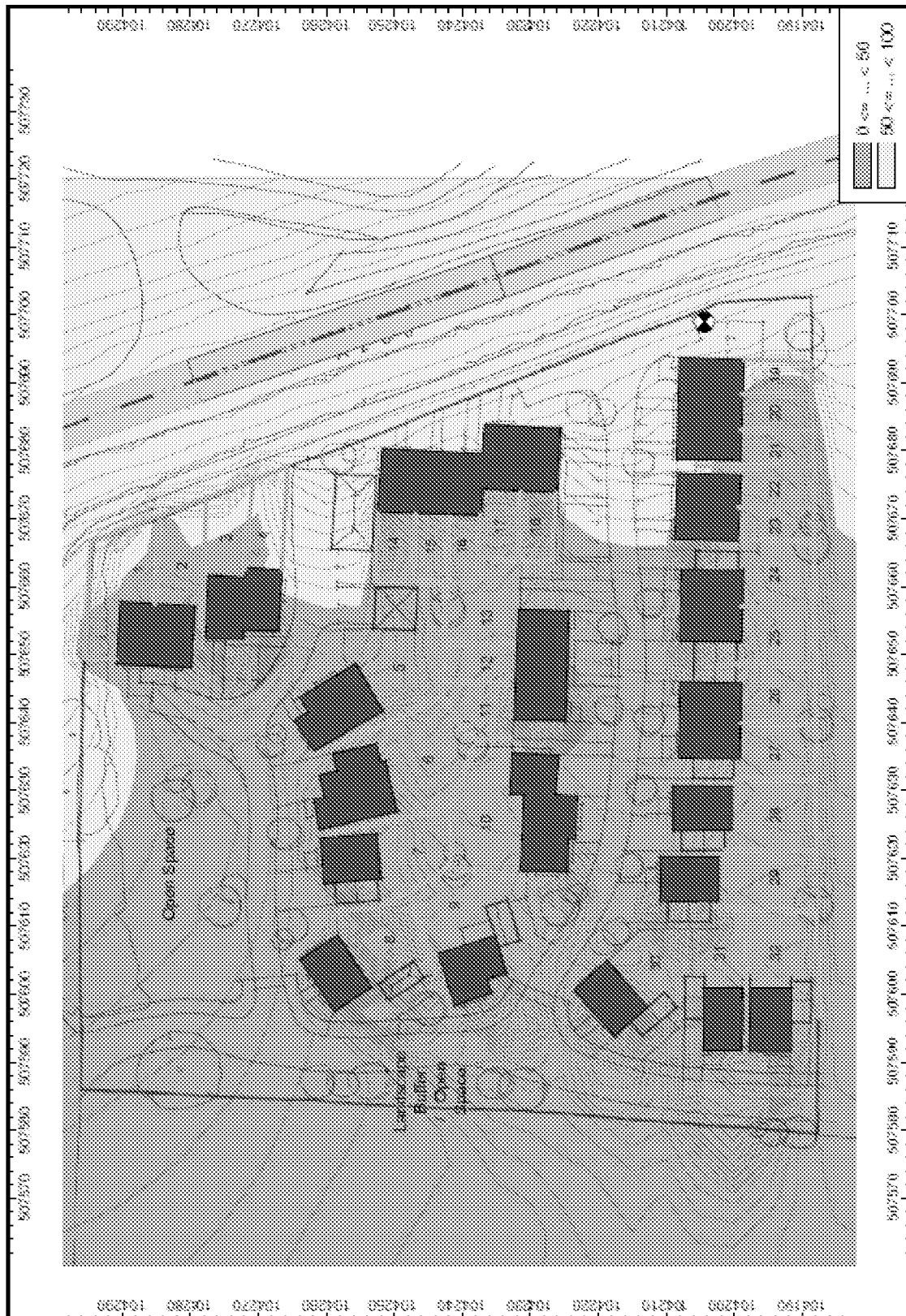


Figure 2/5698 – Daytime Noise Levels across the Site, $L_{Aeq}(16 \text{ hour})$ dB



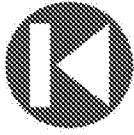
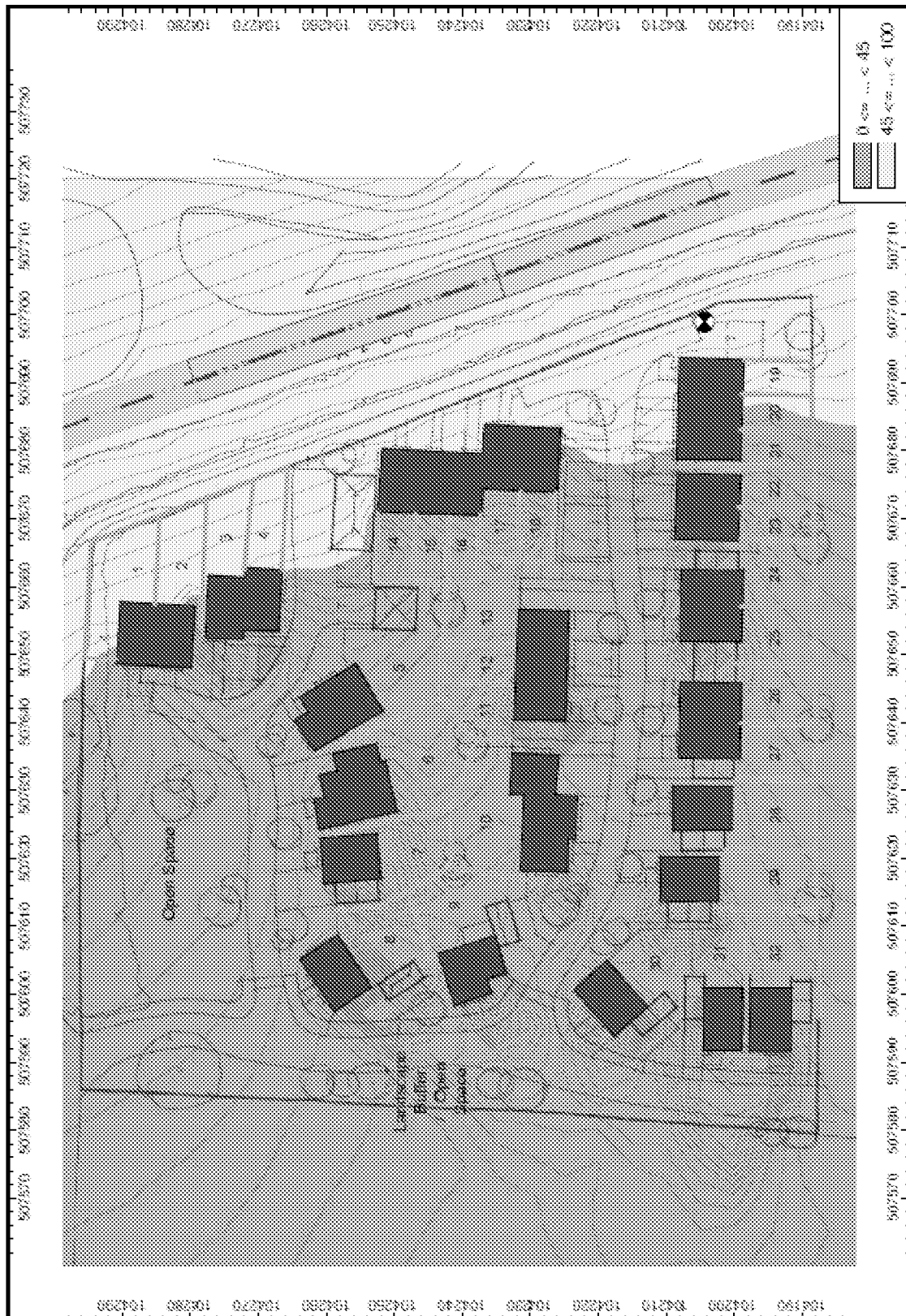


Figure 3/5698 – Night time Noise Levels across the Site, $L_{Aeq}(8 \text{ hour})$ dB



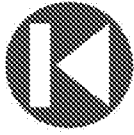
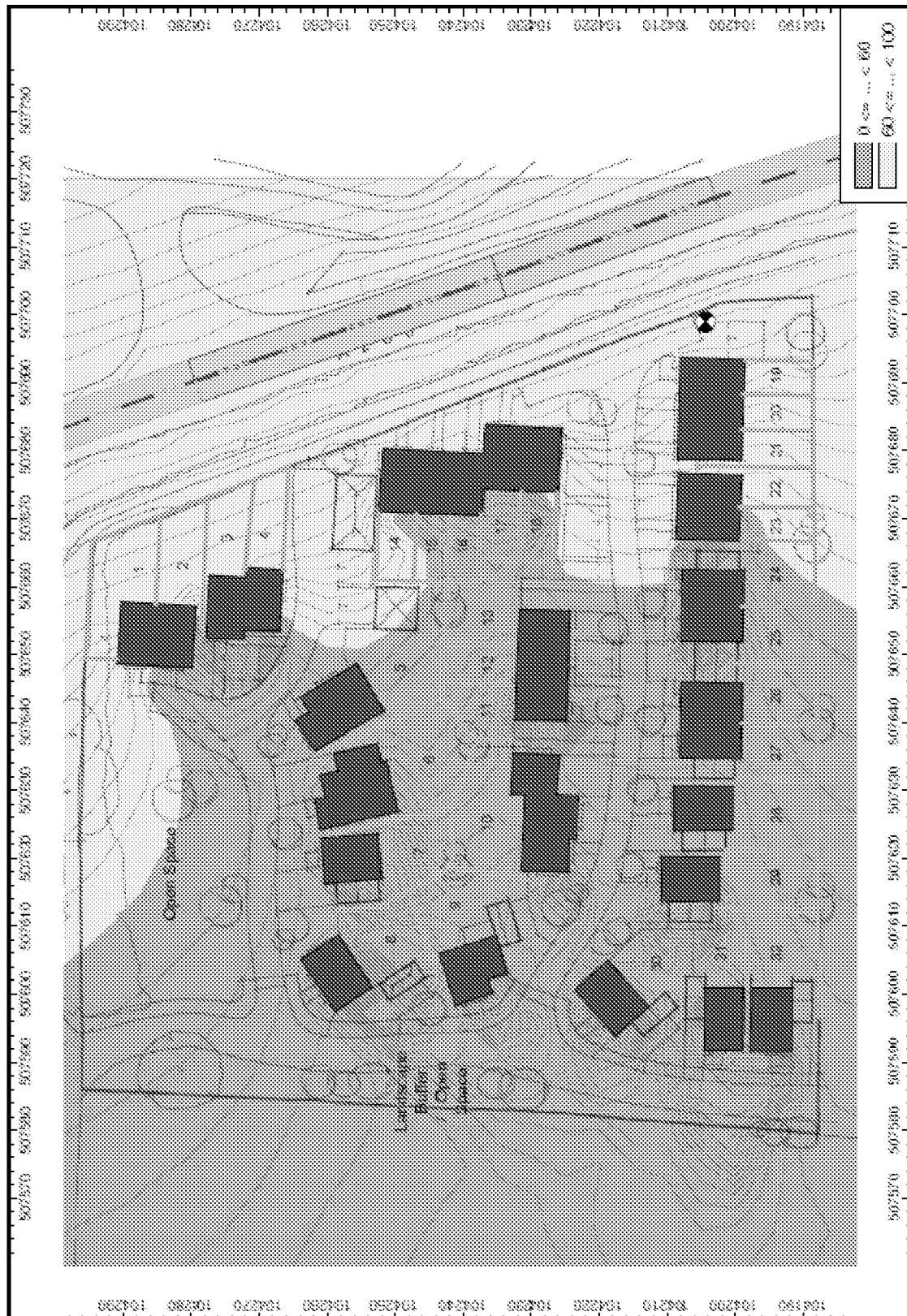


Figure 4/5698 – Night time Noise Levels across the Site, $L_{Amax(fast)}$ dB



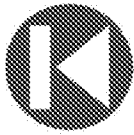
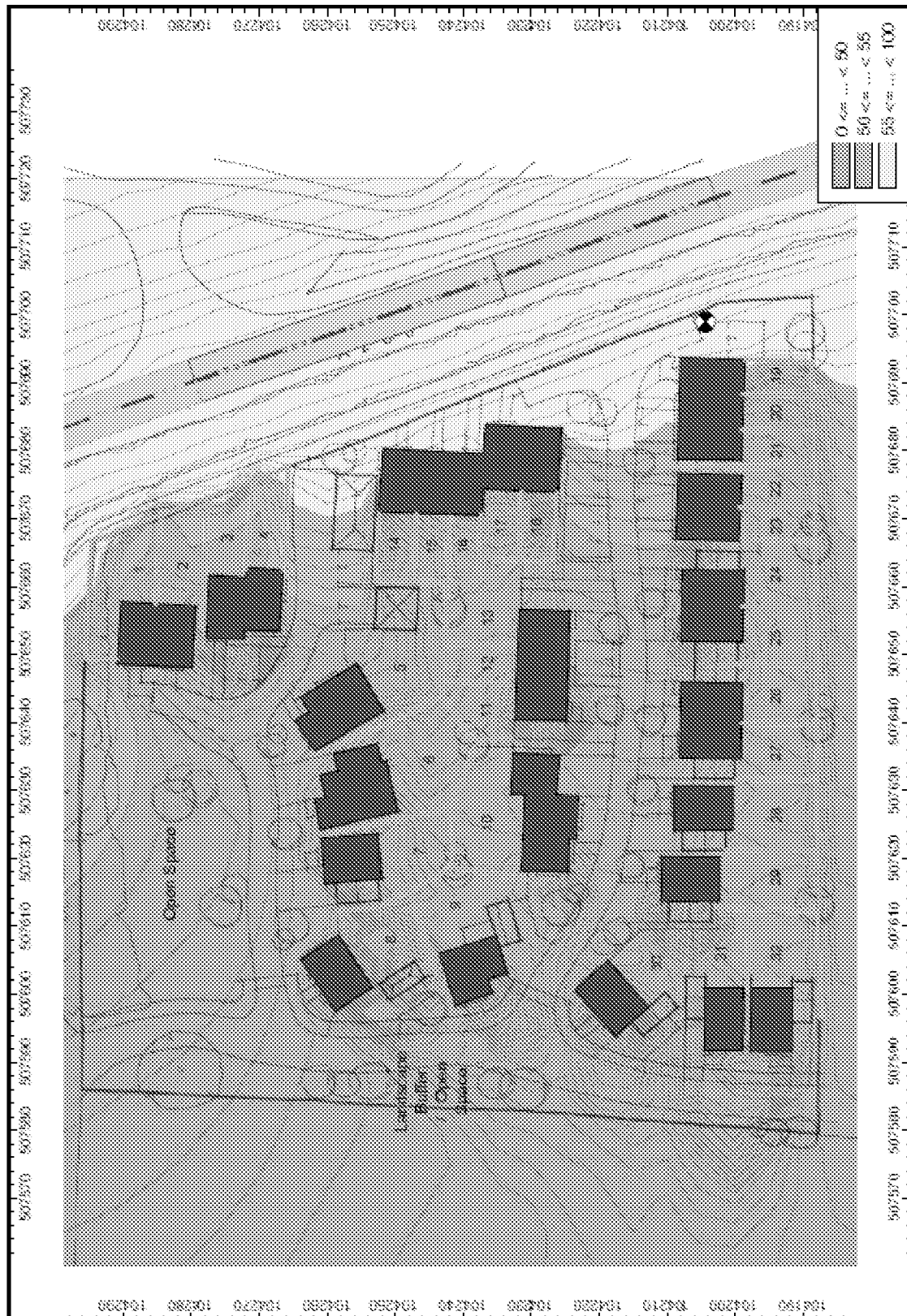
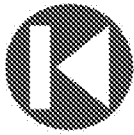


Figure 5/5698 – Noise Levels in External Amenity Areas, $L_{Aeq}(16 \text{ hour})$ dB

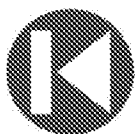


**Appendix 1/5698 – Measured Noise Levels at Monitoring Location ‘A’**

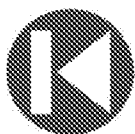
Date and Time	L _{Aeq} (5 minutes) dB	L _{Amax} (fast) dB	L _{A10} (5 minutes) dB
04/03/2014 11:05	59	73	64
04/03/2014 11:10	60	72	64
04/03/2014 11:15	59	73	63
04/03/2014 11:20	58	71	63
04/03/2014 11:25	60	73	64
04/03/2014 11:30	59	73	63
04/03/2014 11:35	60	74	63
04/03/2014 11:40	58	73	62
04/03/2014 11:45	59	72	63
04/03/2014 11:50	59	74	63
04/03/2014 11:55	59	72	64
04/03/2014 12:00	61	80	64
04/03/2014 12:05	59	73	63
04/03/2014 12:10	60	76	63
04/03/2014 12:15	62	84	63
04/03/2014 12:20	59	73	64
04/03/2014 12:25	61	78	64
04/03/2014 12:30	58	72	62
04/03/2014 12:35	58	73	62
04/03/2014 12:40	60	77	63
04/03/2014 12:45	59	73	62
04/03/2014 12:50	58	71	62
04/03/2014 12:55	59	71	63
04/03/2014 13:00	62	85	64
04/03/2014 13:05	60	73	64
04/03/2014 13:10	59	70	64
04/03/2014 13:15	60	73	64
04/03/2014 13:20	62	74	66
04/03/2014 13:25	59	71	64
04/03/2014 13:30	60	74	63
04/03/2014 13:35	59	73	64
04/03/2014 13:40	59	72	63
04/03/2014 13:45	58	74	63
04/03/2014 13:50	59	70	63
04/03/2014 13:55	60	76	64
04/03/2014 14:00	59	70	63
04/03/2014 14:05	59	70	63
04/03/2014 14:10	57	68	62
04/03/2014 14:15	60	71	64



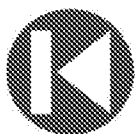
04/03/2014 14:20	59	74	63
04/03/2014 14:25	59	72	64
04/03/2014 14:30	59	71	64
04/03/2014 14:35	60	73	64
04/03/2014 14:40	61	75	64
04/03/2014 14:45	61	74	65
04/03/2014 14:50	61	74	64
04/03/2014 14:55	59	69	64
04/03/2014 15:00	59	72	63
04/03/2014 15:05	60	71	64
04/03/2014 15:10	61	73	64
04/03/2014 15:15	60	73	64
04/03/2014 15:20	57	70	62
04/03/2014 15:25	61	78	64
04/03/2014 15:30	59	72	64
04/03/2014 15:35	60	75	64
04/03/2014 15:40	59	74	63
04/03/2014 15:45	60	76	64
04/03/2014 15:50	61	75	65
04/03/2014 15:55	58	68	63
04/03/2014 16:00	61	72	64
04/03/2014 16:05	59	72	63
04/03/2014 16:10	59	71	63
04/03/2014 16:15	61	78	65
04/03/2014 16:20	60	72	64
04/03/2014 16:25	61	74	65
04/03/2014 16:30	61	75	65
04/03/2014 16:35	60	74	64
04/03/2014 16:40	61	74	64
04/03/2014 16:45	60	69	64
04/03/2014 16:50	60	73	64
04/03/2014 16:55	60	70	64
04/03/2014 17:00	60	73	64
04/03/2014 17:05	61	75	64
04/03/2014 17:10	62	72	65
04/03/2014 17:15	59	69	63
04/03/2014 17:20	60	69	64
04/03/2014 17:25	59	68	64
04/03/2014 17:30	61	79	64
04/03/2014 17:35	60	73	64
04/03/2014 17:40	61	73	65
04/03/2014 17:45	60	71	63



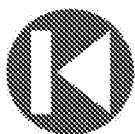
04/03/2014 17:50	60	75	64
04/03/2014 17:55	60	77	64
04/03/2014 18:00	60	70	64
04/03/2014 18:05	60	69	64
04/03/2014 18:10	60	72	64
04/03/2014 18:15	60	72	64
04/03/2014 18:20	60	70	64
04/03/2014 18:25	60	71	64
04/03/2014 18:30	60	73	64
04/03/2014 18:35	58	70	63
04/03/2014 18:40	59	70	64
04/03/2014 18:45	59	68	63
04/03/2014 18:50	58	71	63
04/03/2014 18:55	57	68	62
04/03/2014 19:00	59	70	63
04/03/2014 19:05	57	67	62
04/03/2014 19:10	59	72	64
04/03/2014 19:15	58	69	63
04/03/2014 19:20	58	68	62
04/03/2014 19:25	57	69	63
04/03/2014 19:30	57	72	62
04/03/2014 19:35	58	69	62
04/03/2014 19:40	56	69	61
04/03/2014 19:45	57	70	62
04/03/2014 19:50	59	78	62
04/03/2014 19:55	55	68	60
04/03/2014 20:00	60	82	63
04/03/2014 20:05	57	74	61
04/03/2014 20:10	56	68	62
04/03/2014 20:15	56	67	61
04/03/2014 20:20	56	72	61
04/03/2014 20:25	54	66	59
04/03/2014 20:30	56	68	61
04/03/2014 20:35	54	67	59
04/03/2014 20:40	56	71	61
04/03/2014 20:45	54	69	59
04/03/2014 20:50	54	69	58
04/03/2014 20:55	53	66	58
04/03/2014 21:00	55	66	60
04/03/2014 21:05	55	67	60
04/03/2014 21:10	55	73	60
04/03/2014 21:15	52	71	56



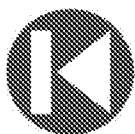
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04/03/2014 21:30	54	69	59
04/03/2014 21:35	53	66	58
04/03/2014 21:40	53	66	58
04/03/2014 21:45	53	69	56
04/03/2014 21:50	52	67	56
04/03/2014 21:55	55	72	59
04/03/2014 22:00	53	66	58
04/03/2014 22:05	53	69	57
04/03/2014 22:10	52	67	57
04/03/2014 22:15	53	71	56
04/03/2014 22:20	53	66	57
04/03/2014 22:25	54	70	57
04/03/2014 22:30	53	67	58
04/03/2014 22:35	54	67	59
04/03/2014 22:40	54	70	57
04/03/2014 22:45	50	67	51
04/03/2014 22:50	51	66	55
04/03/2014 22:55	49	69	51
04/03/2014 23:00	51	66	55
04/03/2014 23:05	53	70	56
04/03/2014 23:10	49	65	52
04/03/2014 23:15	60	85	55
04/03/2014 23:20	51	71	53
04/03/2014 23:25	53	72	50
04/03/2014 23:30	48	65	46
04/03/2014 23:35	49	65	52
04/03/2014 23:40	49	65	51
04/03/2014 23:45	46	63	46
04/03/2014 23:50	48	67	47
04/03/2014 23:55	46	63	44
05/03/2014 00:00	47	69	43
05/03/2014 00:05	48	68	48
05/03/2014 00:10	46	64	46
05/03/2014 00:15	48	66	48
05/03/2014 00:20	39	60	35
05/03/2014 00:25	44	67	39
05/03/2014 00:30	50	71	51
05/03/2014 00:35	52	70	47
05/03/2014 00:40	41	64	36
05/03/2014 00:45	44	65	36



05/03/2014 00:50	42	63	38
05/03/2014 00:55	45	64	42
05/03/2014 01:00	45	64	44
05/03/2014 01:05	48	65	50
05/03/2014 01:10	46	65	44
05/03/2014 01:15	49	68	46
05/03/2014 01:20	46	66	44
05/03/2014 01:25	49	71	44
05/03/2014 01:30	50	68	47
05/03/2014 01:35	34	54	33
05/03/2014 01:40	48	67	44
05/03/2014 01:45	30	40	33
05/03/2014 01:50	43	63	37
05/03/2014 01:55	42	63	38
05/03/2014 02:00	53	74	53
05/03/2014 02:05	30	38	33
05/03/2014 02:10	29	35	31
05/03/2014 02:15	33	40	36
05/03/2014 02:20	51	71	49
05/03/2014 02:25	29	34	31
05/03/2014 02:30	44	65	41
05/03/2014 02:35	45	68	38
05/03/2014 02:40	30	40	35
05/03/2014 02:45	47	64	47
05/03/2014 02:50	43	65	35
05/03/2014 02:55	46	66	45
05/03/2014 03:00	31	42	34
05/03/2014 03:05	43	62	42
05/03/2014 03:10	48	67	46
05/03/2014 03:15	51	73	48
05/03/2014 03:20	48	66	49
05/03/2014 03:25	49	66	47
05/03/2014 03:30	28	35	30
05/03/2014 03:35	45	66	43
05/03/2014 03:40	42	63	39
05/03/2014 03:45	49	67	45
05/03/2014 03:50	46	66	40
05/03/2014 03:55	42	62	36
05/03/2014 04:00	28	38	31
05/03/2014 04:05	49	69	47
05/03/2014 04:10	49	68	48
05/03/2014 04:15	42	64	33



05/03/2014 04:20	48	67	50
05/03/2014 04:25	46	63	46
05/03/2014 04:30	45	63	44
05/03/2014 04:35	49	69	47
05/03/2014 04:40	49	64	53
05/03/2014 04:45	51	71	52
05/03/2014 04:50	50	67	53
05/03/2014 04:55	44	60	42
05/03/2014 05:00	48	65	49
05/03/2014 05:05	51	69	55
05/03/2014 05:10	47	64	48
05/03/2014 05:15	51	68	54
05/03/2014 05:20	53	67	57
05/03/2014 05:25	51	67	56
05/03/2014 05:30	51	65	55
05/03/2014 05:35	53	67	58
05/03/2014 05:40	52	65	56
05/03/2014 05:45	52	63	57
05/03/2014 05:50	52	67	57
05/03/2014 05:55	53	67	58
05/03/2014 06:00	53	66	58
05/03/2014 06:05	53	64	58
05/03/2014 06:10	53	65	57
05/03/2014 06:15	53	64	58
05/03/2014 06:20	53	65	59
05/03/2014 06:25	55	65	59
05/03/2014 06:30	53	67	57
05/03/2014 06:35	57	76	60
05/03/2014 06:40	55	67	59
05/03/2014 06:45	56	68	60
05/03/2014 06:50	55	66	59
05/03/2014 06:55	57	71	61
05/03/2014 07:00	56	67	60
05/03/2014 07:05	55	67	60
05/03/2014 07:10	57	74	61
05/03/2014 07:15	57	67	61
05/03/2014 07:20	57	70	61
05/03/2014 07:25	57	68	61
05/03/2014 07:30	57	76	60
05/03/2014 07:35	56	69	61
05/03/2014 07:40	56	68	61
05/03/2014 07:45	59	73	62



05/03/2014 07:50	56	67	60
05/03/2014 07:55	59	71	63
05/03/2014 08:00	59	71	64
05/03/2014 08:05	60	73	64
05/03/2014 08:10	60	68	64
05/03/2014 08:15	61	74	64
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05/03/2014 10:35	61	76	65
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05/03/2014 10:45	61	73	65
05/03/2014 10:50	59	74	64
05/03/2014 10:55	61	74	65
05/03/2014 11:00	61	74	65