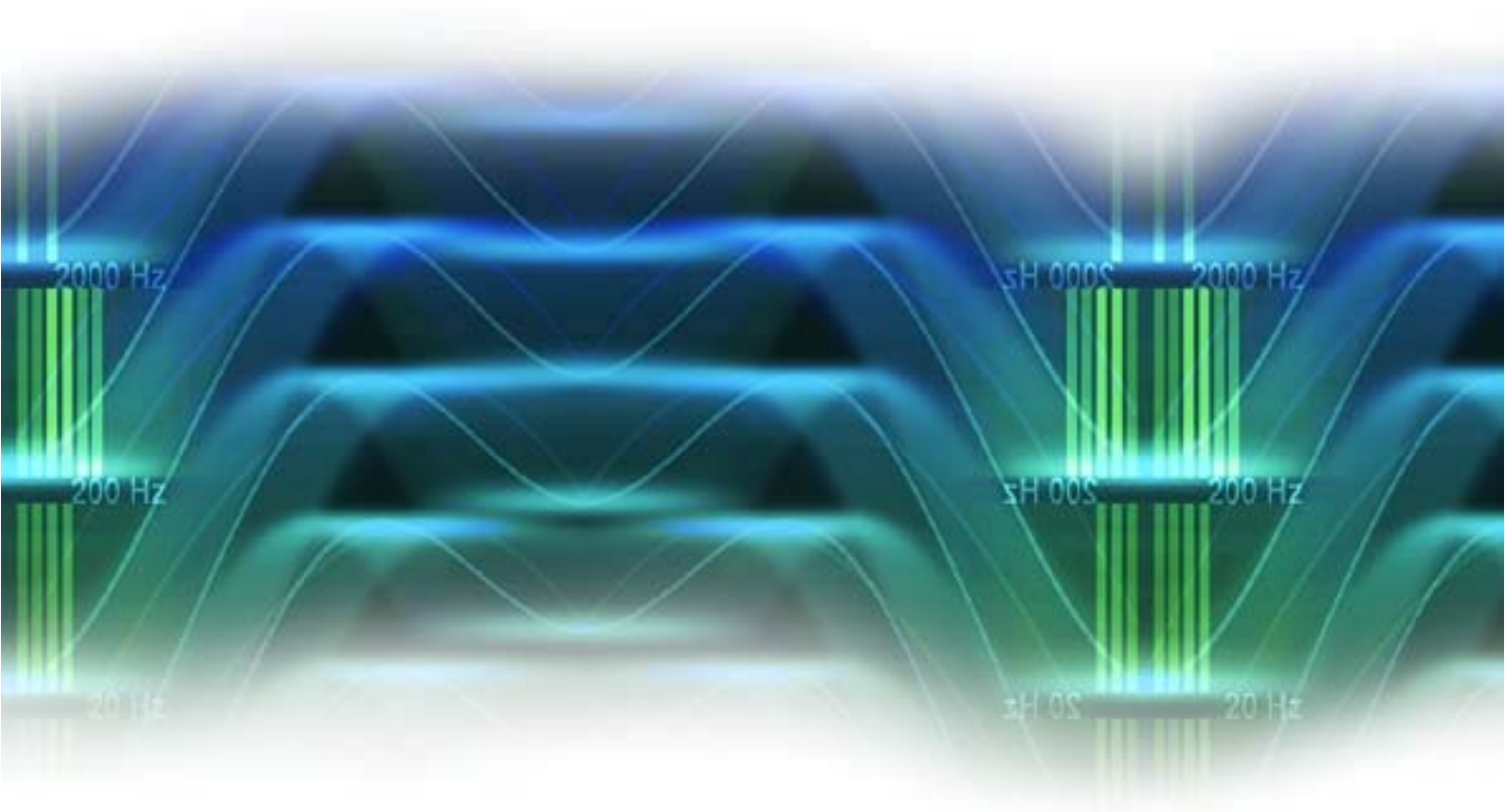
Noise Assessment for a Proposed Residential Development at Glebe Court, Tankersley

Report ref.
RK817/11377

Date
February 2012

Issued to
Bowker Sadler Partnership Ltd



Issued by
Rob Kirkaldy BSc (Hons) AMIOA
Consultant

Spectrum
ACOUSTIC CONSULTANTS

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1. INTRODUCTION

Bowker Sadler Partnership Ltd's client is seeking planning permission for a residential development at land which is currently disused, next to Glebe Court in Tankersley, South Yorkshire. The proposal involves constructing twenty houses at the development site. Accordingly, Bowker Sadler Partnership have commissioned Spectrum Acoustic Consultants to complete a noise assessment in order to accompany the planning application.

The assessment includes the results and observations taken from a noise measurement survey completed at the proposed development site from Wednesday 18 to Thursday 19 January 2012.

The measurement and assessment of noise was completed in accordance with PPG24 Planning Guidance 24: Planning and Noise. A façade sound insulation specification has also been provided, in connection with the noise assessment.

2. SITE DESCRIPTION

The site is currently vacant, and was formally used as a paddock for horses on the outskirts of the rural village of Tankersley, South Yorkshire. The A61 runs along the southern boundary of the site, which is a busy dual carriageway. Westwood New Road runs along the western boundary and is the main access road into the village of Tankersley.

Directly to the north of the site is Glebe Court, a care home for the elderly. Beyond Glebe Court to the north and east are a number of existing houses. Beyond these houses, approximately 400m further east of the site, is the M1 motorway.

The main noise sources affecting the site are from road traffic movements on the A61, Westwood New Road and the M1.

A Google Earth plan is included in Appendix A, which shows the existing site along with the noise measurement positions. The proposed scheme layout plan is also included in Appendix B.

3. CRITERIA FOR ACCEPTABILITY

3.1 PLANNING POLICY GUIDANCE 24: PLANNING AND NOISE

Planning Policy Guidance 24: Planning and noise (PPG24) is central government guidance on the use of planning powers to minimise the adverse impact of noise.

It outlines the considerations to be taken into account in determining planning applications both for noise-sensitive developments and for those activities which will generate noise. In the case of residential developments, PPG24 introduces the concept of Noise Exposure Categories (NEC) and advocates their use to provide a method for assessing the suitability of land. PPG24 also advises on the use of conditions to minimise the impact of noise.

For proposed residential use, PPG24 sets out a precise, quantifiable process to assist the Local Authority in determining the application.

Four NECs are defined which rate the importance of noise when considering permission for a new residential development. The advice for each category is given below in Table 1.

NEC	Description
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

Table 1: Description of NECs

The noise levels corresponding to each category is given in Table 2.

Noise Levels Corresponding To The Noise Exposure Categories For New Dwellings $L_{Aeq,T}$ dB					
Noise Source		Noise Exposure Category A	B	C	D
Road traffic:	0700-2300	<55	55-63	63-72	>72
	2300-0700	<45	45-57	57-66	>66
Rail traffic:	0700-2300	<55	55-66	66-74	>74
	2300-0700	<45	45-59	59-66	>66
Air traffic:	0700-2300	<57	57-66	66-72	>72
	2300-0700	<48	48-57	57-66	>66
Mixed sources:	0700-2300	<55	55-63	63-72	>72
	2300-0700	<45	45-57	57-66	>66

Table 2: Noise level ranges for each NEC (free field noise levels)

Where maximum noise levels (measured as L_{ASmax}) regularly exceed 82 dB during the night, PPG24 states the site should be classified as NEC C, unless otherwise in NEC D by virtue of the $L_{Aeq,8hr}$.

3.2 BS8233:1999 SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS. CODE OF PRACTICE

PPG24 refers to BS8233 “Sound insulation and noise reduction for buildings – code of practice” in relation to specifying acceptable indoor and outdoor noise levels. Therefore, complying with BS8233 is, in turn, in accordance with the guidance in PPG24.

BS8233 advises that the main criteria are to provide reasonable resting/sleeping conditions in bedrooms, and good listening conditions in other rooms.

BS8233 recommends internal noise levels in bedrooms at night of $L_{Aeq,8\ hour}$ 30-35 dB and L_{AFmax} 45 dB. In living areas during the day, this should be $L_{Aeq,16\ hour}$ 30-40 dB.

These guidelines levels are a reflection of those set out in “Guidelines for Community Noise - World Health Organization, 1999” (WHO). WHO sets out these values in table 4.1, and lists them as being Guideline values for community noise. The preface to WHO states that community noise includes road, rail and air traffic, industries, construction and public work, and the neighbourhood.

For protection of outdoor living areas WHO guidelines for community noise indicate that few people will be moderately annoyed with noise levels of $L_{Aeq,\ 16\ hour}$ 50 dB, indicating that levels lower than $L_{Aeq,\ 16\ hour}$ 55 dB are desirable. BS8233 indicates that whilst the main requirement is for protection of noise in bedrooms and living rooms, it is desirable that noise levels in gardens should not exceed L_{Aeq} 55 dB.

In any case, section 7.6.1.2 of BS 8233:1999 Sound insulation and noise reduction for buildings. Code of practice states that the main [acoustic] criteria are reasonable resting/sleeping conditions in bedrooms, and good listening conditions in other rooms. Therefore external areas are a secondary matter when it comes to assessing amenity.

4. NOISE MEASUREMENT SURVEY

4.1 MEASUREMENT PROCEDURE

Noise measurements were completed over the period Wednesday 18 to Thursday 19 January 2012. These were typical working days. Throughout the survey, weather conditions were mild and dry.

The parameters recorded during the noise measurement survey included L_{Aeq} and L_{AFmax}. In addition, a full range of statistical parameters (L_{A10}, L_{A90} etc.) were also recorded. Both overall and octave band measurements were also stored for later analysis.

For the duration of the survey, two remote noise loggers were utilised for recording of 5-minute period measurements. Measurement position 1 is representative of a proposed plot 2 façade close to the A61. Position 2, is representative of proposed plot 10 façade close to Westwood New Road. Both measurement positions were 1.5m above ground.

A site location plan, showing the noise measurement positions, is shown on the Google Earth image included in Appendix A. A proposed scheme layout plan is also included in Appendix B.

4.2 MEASUREMENT EQUIPMENT

The following equipment was used during the survey:

- Bruel & Kjaer Type 2260 Sound Level Meter s/n 1772229
- Bruel & Kjaer Type 4189 Microphone s/n 2199530
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 2229957

- Bruel & Kjaer Type 2260 Sound Level Meter s/n 2311704
- Bruel & Kjaer Type 4189 Microphone s/n 2733049
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 2688672

Before and after the survey, the sound level meters were field-calibrated in accordance with the manufacturer's guidelines, and no significant drift was observed. The meters, microphones and field calibrators are laboratory calibrated biennially in accordance with UKAS procedures or to traceable National Standards.

4.3 RESULTS & OBSERVATIONS

Noise levels across the site are dominated by road traffic movements on the surrounding roads during both the daytime and night time periods. Charts showing a graphical representation of the noise profile measured at each measurement position are included in Appendix C.

A summary of the measured noise data, used to specify the noise exposure categories over the daytime and night time periods is included in table 3 below. For both measurement positions, the overall daytime 0700-2300 L_{Aeq} has been calculated from the average of both the daytime periods.

PPG 24 states that if L_{ASmax} values regularly exceed 82dB at night, the site is automatically classified as NEC C, unless it is otherwise in NEC D. World Health Organisation (WHO) guidelines for community noise, define regular as not more than 10-15 events per night. Therefore the L_{ASmax} levels measured by the noise logger for the night time period have been sorted from highest to lowest. It is then possible to read off the 10-15th highest L_{Amax} level during the night which is regarded as being typical. These typical highest L_{ASmax} values for the night-time period obtained in this survey are shown in table 3.

Position	Time Period	Noise level over period (dB)	
		L_{Aeq}	L_{AFmax} [2]
1 (Facing A61)	Daytime 1330-2300	66	
	Daytime 0700-1100	68	
	Daytime 0700-2300 [1]	67	
	Night time 2300-0700	62	73
2 (Facing Westwood New Rd)	Daytime 1345-2300	61	
	Daytime 0700-1030	63	
	Daytime 0700-2300 [1]	62	
	Night time 2300-0700	55	70

Table 3: Summary of noise data recorded at the site

Notes: 1 Calculated Daytime 0700-2300 taken from log average over periods 1 and 2
2 The L_{Amax} data is only relevant to the night time period

The established noise levels at position 1 are L_{Aeq}, 16 hour 67dB during the daytime and L_{Aeq}, 8 hour 62dB during the night time.

The established noise levels at position 2 are L_{Aeq}, 16 hour 62dB during the daytime and L_{Aeq}, 8 hour 55dB during the night time.

During the night time period, maximum noise levels did not exceed L_{ASmax} 82dB at either measurement position.

5. ASSESSMENT FOR SITE NOISE LEVELS

Noise levels at position 1, overlooking the A61, during the daytime and night time are in NEC C. For sites in NEC C, PPG 24 states "*Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise."*

Noise levels at position 2, overlooking Westwood New Road, during the daytime and night time are in NEC B. For sites in NEC B, PPG 24 states *"Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise."*

A mitigation scheme is provided below which achieves the acoustic standards for internal noise levels across the whole site.

6. MITIGATION

6.1 NUMERIC SPECIFICATION

Internal noise levels can be calculated from the external noise level taking account of the size and construction of the elements of the building façade including glazing and ventilation.

The sound insulation scheme will be designed to meet the recommendations of BS8233:1999 L_{Aeq} i.e. 35dB for living rooms during the day (between the good and reasonable standard) and a 'good' standard of L_{Aeq} 30dB/L_{AFmax} 45dB, for bedrooms (night time).

The facade insulation requirements for the bedrooms and living rooms are detailed in table 4 as follows.

Position	Parameter	Room	Outside noise Level dB(A)	Indoor target dB(A)	Reduction Required dB
1 (Facing A61)	L_{Aeq}	Living Room	67 (daytime)	35	32
	L_{Aeq}	Bedrooms	62 (night-time)	30	32
	L_{AFmax}	Bedrooms	74 (night-time)	45	29
2 (Facing Westwood New Rd)	L_{Aeq}	Living Room	62 (daytime)	35	27
	L_{Aeq}	Bedrooms	55 (night-time)	30	25
	L_{AFmax}	Bedrooms	72 (night-time)	45	27

Table 4: Numeric sound insulation requirements for sensitive rooms at the proposed development
Note: Sensitive rooms are living rooms and bedrooms

For the proposed properties which face the A61 (plots 1 to 9), a reduction of 32dB is required in living rooms and bedrooms when recommending a façade specification.

For all other properties, a reduction of 27dB is required in living rooms and bedrooms when recommending a façade specification.

6.2 MATERIALS SPECIFICATION

The sound insulation specification has been determined from the individual sound insulation rating of the three main elements of the façade (window, wall and ventilator). As this is a small development, a single mitigation scheme has been determined. Table 5 below details the sound insulation specification for the development. Intrusive noise level calculations are shown in Appendix D.

The numeric sound insulation rating for the glazing and the ventilator openings has been specified in terms of $R_w + C_{tr}$ and $D_{n,e\ w} + C_{tr}$ respectively, which takes account of the predominant road traffic noise source.

The proposed scheme layout plan included in Appendix B shows a 2.5m high acoustic barrier fence running along the boundary of the site which adjoins the A61 and the entrance to Westwood New Road. The scheme layout plan also shows the position of a number of other smaller garden boundary fences.

A 9dB screening correction which has been applied to the daytime noise levels, which has been calculated with the use of a computer noise model. Therefore, noise levels during the daytime will be reduced, and the façade sound insulation performance can be relaxed in order to achieve acceptable internal noise levels in living rooms situated at ground floor level. The noise model is in accordance with ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation. The results of this computer noise model are shown in Appendix E.

Room	Wall Type	Window Performance Rw+Ctr dB	Vent Performance Dn,e,w+Ctr dB
Living Room	Brick/block	25	32
Bedroom	Brick/block	29	42

Table 5: Sound insulation specification for the proposed development

For all proposed living rooms at the development site, the acoustic performance can typically be achieved by using a double glazed unit comprising of a layer of 4mm float glass, with a 12mm cavity and another layer of 4mm float glass, as well as two hit and miss trickle ventilators.

For all proposed bedrooms at the development site, the acoustic performance can typically be achieved by using a double glazed unit comprising of a layer of 10mm float glass, with a 12mm cavity and another layer of 4mm float glass, as well as two acoustic trickle ventilators.

6.3 OUTDOOR AMENITY AREAS

During the daytime, noise levels at position 1, overlooking the A61 are L_{Aeq}, 16 hour 67dB. As this is a sensitive site, a 2.5m acoustic barrier fence is proposed to be installed along the entire boundary with the A61, as well as along part of the boundary with the entrance to Westwood New Road. A number of additional smaller garden boundary fences are also proposed. The positions of all of these fences are shown in Appendix B

In order to calculate daytime noise levels in the gardens, with the proposed barrier fences in place, a computer noise model was set up in accordance with ISO 9613-2:1996. A 3D image of the noise model, along with a full breakdown of the calculated results is shown in Appendix E.

In general, noise levels in the gardens of the proposed properties which face the A61 are approximately 3dB higher than the WHO guidance for noise levels in outdoor amenity areas. This is not considered to be a significant excess. For all of the other proposed gardens, noise levels are below the WHO guidance.

In any case, for reasons discussed in Section 3.2, external areas are considered to be a secondary matter when it comes to assessing external amenity.

7. CONCLUSIONS

Bowker Sadler Partnership Ltd have commissioned spectrum Acoustic Consultants to complete a noise assessment for a proposed residential development at glebe Court, Tankersley.

This report sets out the noise considerations by reference to Planning Policy Guidance 24 “Planning and Noise” (PPG 24), as well as BS 8233:1999 *Sound insulation and noise reduction for buildings. Code of practice* and Guidelines for Community Noise – World Health Organisation, 1999.

Road traffic noise is the dominant noise source at the site. A mitigation scheme is provided that satisfies internal noise level requirements for all aspects of the site in accordance with the national amenity guidelines. Mitigation measures in the form of acoustic barrier fences have also been proposed in order to reduce noise levels in external amenity areas.

8. SUPPLIERS

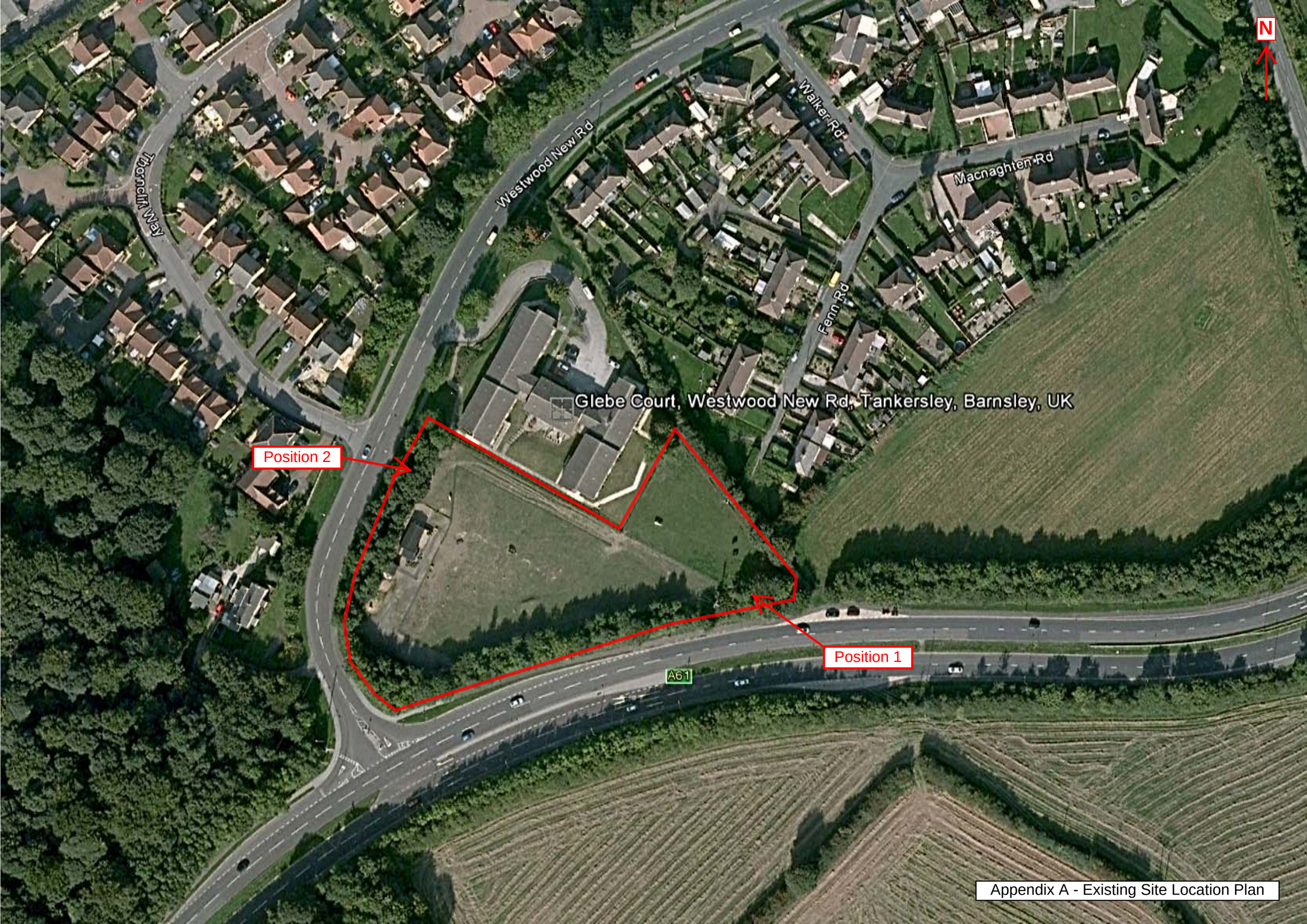
Where required, acoustic glazing, together with proprietary acoustic and standard ventilation systems, designed specifically for the purpose of incorporating into a façade or whole-building ventilation scheme, are available from the following suppliers:

Supplier	Product	Phone Number
Pilkington Glass	Acoustic Laminate Glass	01744 692000
Titon	Sonair Acoustic Wall vents	01206 713800
Passivent Ltd	Passivent Acoustic wall vents	01732 355519
Rytons	Acoustic AirCore vent	01536 511874
Silavent	Acoustic wall vents	01252 878272
Greenwood window vents	Through-frame ventilation units	01903 777137

Report Code: A/D/EH

APPENDIX A

Existing Site Location Plan Including Measurement Positions



Appendix A - Existing Site Location Plan

APPENDIX B

Proposed Scheme Layout Plans

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WESTWOOD NEW ROAD

Village Green

A61

Plot 1
Plot 2
Plot 3
Plot 4
Plot 5
Plot 6
Plot 7
Plot 8
Plot 9
Plot 10
Plot 11
Plot 12
Plot 13
Plot 14
Plot 15
Plot 16
Plot 17
Plot 18
Plot 19
Plot 20

Shed
Bins

1 Site Plan Proposed
1 : 200

Schedule of Accommodation				
Plot Number	**House Type**	**Level**	**Area GIA**	**Totals**
Plot 1	2 Bed 4 Person A	Ground Floor	37.00	
Plot 1	2 Bed 4 Person A	First Floor	37.00	
				74
Plot 2	2 Bed 4 Person A	Ground Floor	37.00	
Plot 2	2 Bed 4 Person A	First Floor	37.00	
				74
Plot 3	2 Bed 4 Person B	Ground Floor	37.00	
Plot 3	2 Bed 4 Person B	First Floor	37.00	
				74
Plot 4	2 Bed 4 Person B	Ground Floor	37.00	
Plot 4	2 Bed 4 Person B	First Floor	37.00	
				74
Plot 5	2 Bed 4 Person B	Ground Floor	37.00	
Plot 5	2 Bed 4 Person B	First Floor	37.00	
				74
Plot 6	2 Bed 4 Person + 3 Bed 5 Person B	Ground Floor	37.00	
Plot 6	2 Bed 4 Person + 3 Bed 5 Person B	First Floor	37.00	
				74
Plot 7	2 Bed 4 Person + 3 Bed 5 Person B	Ground Floor	43.00	
Plot 7	2 Bed 4 Person + 3 Bed 5 Person B	First Floor	43.00	
				86
Plot 8	2 Bed 4 Person + 3 Bed 5 Person A	Ground Floor	43.00	
Plot 8	2 Bed 4 Person + 3 Bed 5 Person A	First Floor	43.00	
				86
Plot 9	2 Bed 4 Person + 3 Bed 5 Person A	Ground Floor	37.00	
Plot 9	2 Bed 4 Person + 3 Bed 5 Person A	First Floor	37.00	
				74
Plot 10	2 Bed 3 Person C	Ground Floor	57.00	
Plot 11	2 Bed 3 Person C	Ground Floor	57.00	
Plot 12	2 Bed 3 Person C	Ground Floor	57.00	
Plot 13	2 Bed 3 Person A	Ground Floor	57.00	
Plot 14	2 Bed 3 Person A	Ground Floor	57.00	
Plot 15	2 Bed 3 Person B	Ground Floor	57.00	
Plot 16	2 Bed 3 Person B	Ground Floor	57.00	
Plot 17	3 Bed 5 Person B	Ground Floor	44.00	
Plot 17	3 Bed 5 Person B	First Floor	44.00	
				88
Plot 18	3 Bed 5 Person B	Ground Floor	43.00	
Plot 18	3 Bed 5 Person B	First Floor	43.00	
				86
Plot 19	3 Bed 5 Person A	Ground Floor	43.00	
Plot 19	3 Bed 5 Person A	First Floor	44.00	
				87
Plot 20	3 Bed 5 Person A	Ground Floor	44	
Plot 20	3 Bed 5 Person A	First Floor	44	
				88

1:5 / 1:50 1m 2 3 4 5 6 7m

1:1 / 1:100 1m 2 3 4 5 6 7 8 9 10 11 12 13 14 15

REV.	DATE	DRN.	CHKD.

PROJECT
Fenn Road, Tankersley

CLIENT
Equity Housing Group

DRAWING
Site Plan as Proposed

SCALE	SHEET SIZE	DRAWN	CHECKED	DATE
1 : 200	@ A1	KLM	CL	24/01/12

Bowker Sadler
Hatherlow House, Hatherlow, Romiley, Stockport SK6 3DY
Telephone: 0161 406 7333 Facsimile: 0161 406 7444
Email: bsp@bowker-sadler.co.uk
Web: www.bowker-sadler.co.uk

JOB No	DRAWING No	REVISION
11-048	100	

STATUS
Preliminary

Building Information Modeling



KEY	HEIGHT	CONSTRUCTION
	2100mm	TIMBER FENCE (INC'G 300mm TRELIS)
	1800mm	TIMBER FENCE (INC'G 600mm TRELIS)
	1000mm	STEEL RAILING SET IN KERB UPSTAND.
	1000mm	STEEL BOLLARD
	2500mm	CLOSE BOARDED (ACOUSTIC) TIMBER FENCE

(SEE DWG. 11-048/660 TYPICAL BOUNDARY TREATMENT).

BOUNDARY TREATMENTS
BBP 24.01.12

Schedule of Accommodation

7no. 2bed/3person/57m2 Bungalows
7no. 2bed/4person/73m2 Houses
6 no. 3bed/5person/84m2 Houses

20no. TOTAL

100% Car Parking for 2bed units
200% Car Parking for 3bed units

REV.	DATE	DRN.		CHKD.
B	11.01.12	CL	Revised Layout	

CLIENT: Equity Housing Group

PROJECT: Fenn Road., Tankersley

DRAWING: Masterplan as Proposed

SCALE	SHEET SIZE	DRAWN	CHECKED	DATE
1:500 Approx	@A3	CL		05/12/11

JOB No: 11-048 | DRAWING No: 004 | REVISION: B

STATUS: PRELIMINARY

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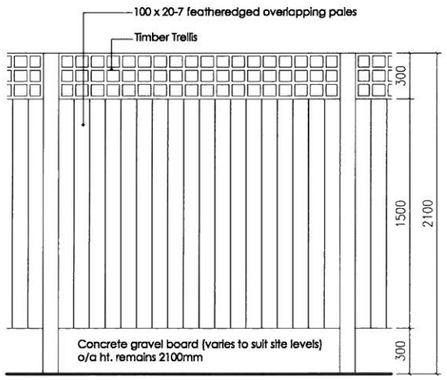
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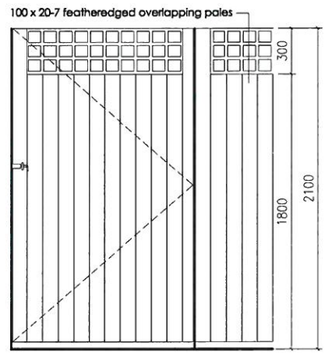
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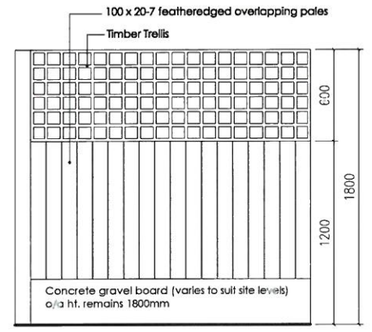
1800MM HIGH ROBUST CLOSE BOARDED TIMBER FENCE & TRELLIS TO LPS1175 SECURITY RATING

2.1m high timber fence and trellis - (Rear and Street Fronting Boundary)



2100MM HIGH ROBUST CLOSE VERTICAL BOARDED TIMBER GATE / FENCE INC. 300MM TRELLIS

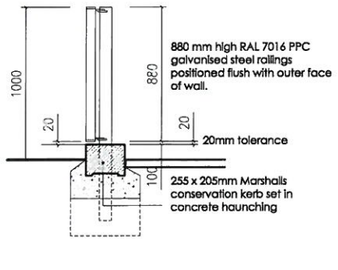
2.1m timber secure side gate



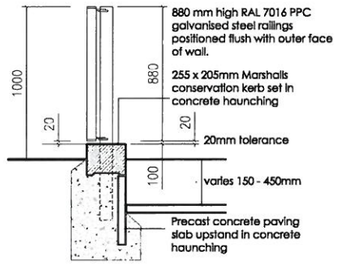
1800MM HIGH ROBUST CLOSE BOARDED TIMBER FENCE & TRELLIS

1.8m high timber fence and trellis - (Plot division)

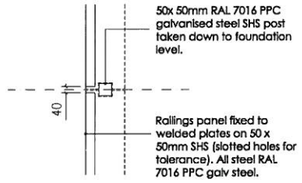
TO ALL REAR & SIDE BOUNDARIES AS REQUIRED



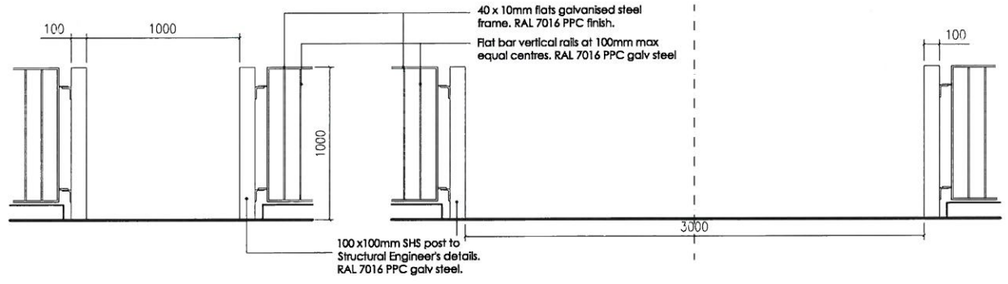
Section through 1.0m high wall- Conservation kerb



Section through 1.0m high wall- Conservation kerb, change in level



Plan on post - Conservation kerb



1.0m high Pedestrian access opening - (Front Boundary)

1.0m high Steel vehicle access gate - (Front Boundary)

TO ALL FRONT BOUNDARIES AS REQUIRED

REV	DATE	DRN.	CHKD.

PROJECT
Fenn Road
Tankersley, Barnsley

CLIENT
Equity Housing Group

DRAWING
Typical Boundary Treatment

SCALE	SHEET SIZE	DRAWN	CHECKED	DATE
1:20	A1	CL		23.1.12

Bowker Sadler
Hatherlow House, Hatherlow, Romiley, Stockport SK6 3DY
Telephone: 0161 406 7333 Facsimile: 0161 406 7444
Email: bsp.s@bowker-sadler.co.uk
Web: www.bowker-sadler.co.uk

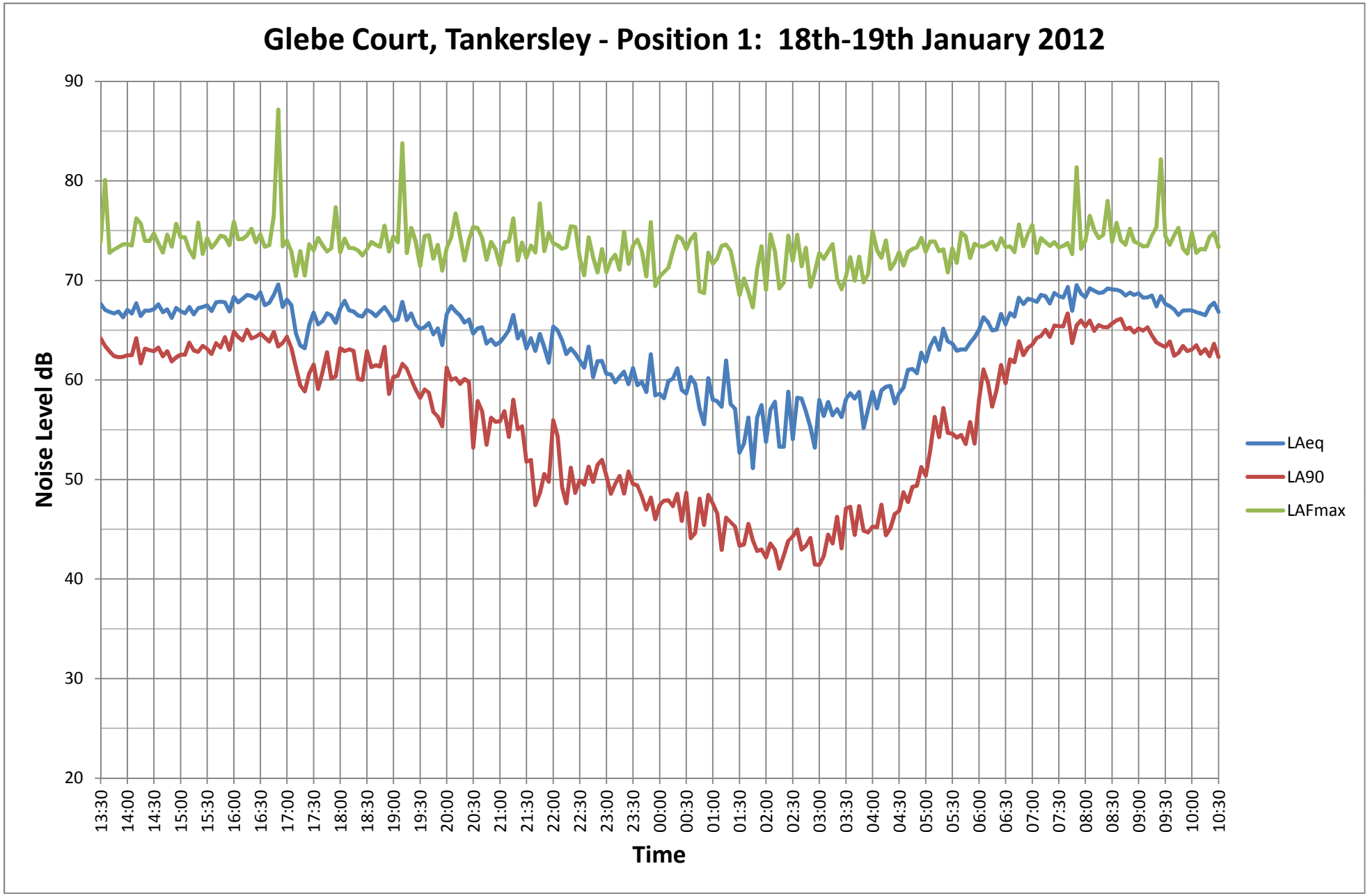
JOB No	DRAWING No	REVISION
11-048	660	

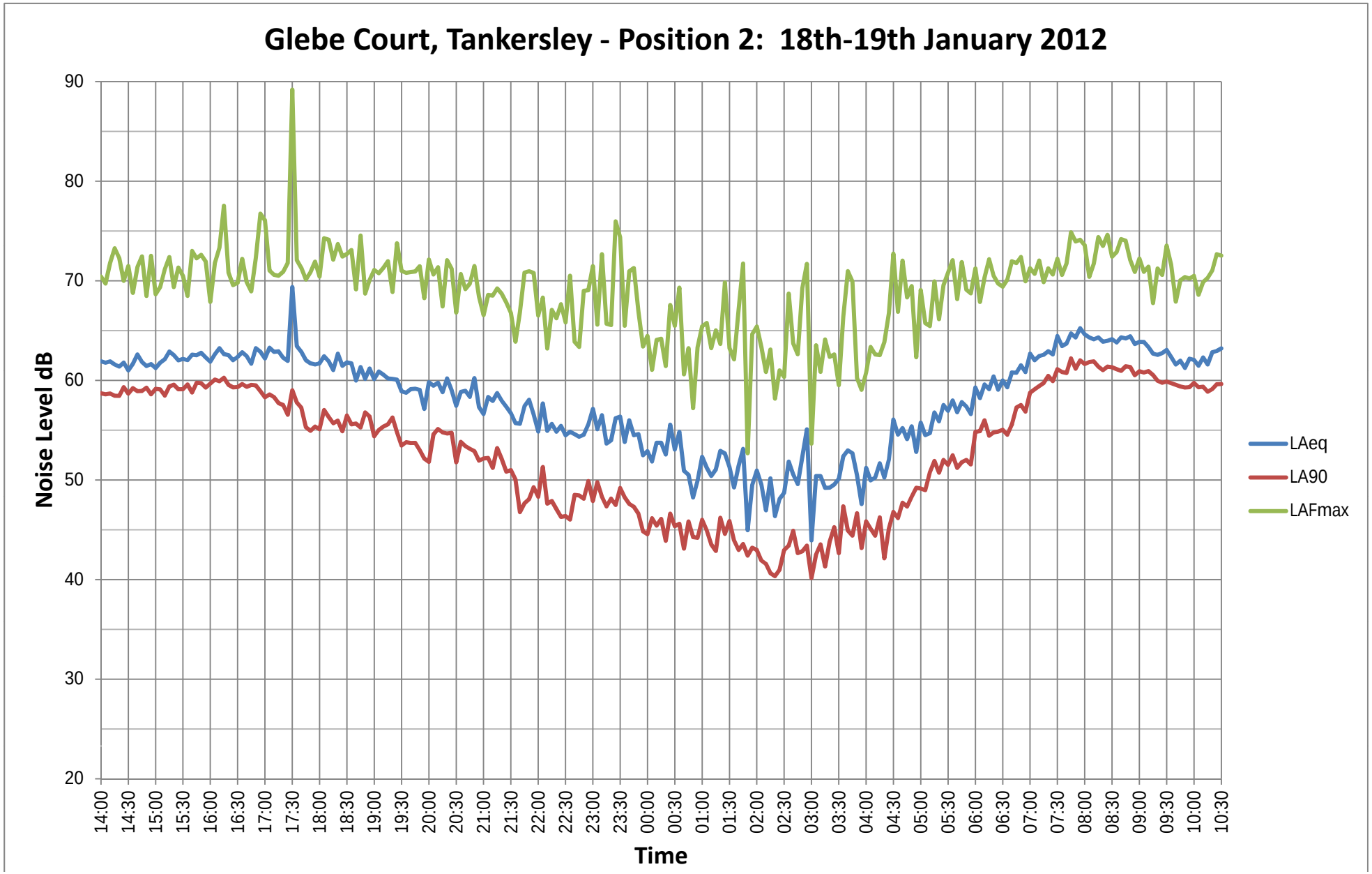
STATUS
CONSTRUCTION

P:\2011\11-048\Drawings\660-Typical boundary treatments.dwg, 1:2.00296

APPENDIX C

Noise Logger Charts


Glebe Court, Tankersley - Position 1: 18th-19th January 2012
Noise Level dB
90
80
70
60
50
40
30
20
13:30
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
19:30
20:00
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04:00
04:30
05:00
05:30
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
10:30
Time
LAeq
LA90
LAFmax


Glebe Court, Tankersley - Position 2: 18th-19th January 2012
Noise Level dB
90
80
70
60
50
40
30
20
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
19:30
20:00
20:30
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05:00
05:30
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
10:30
Time
LAeq
LA90
LAFmax

APPENDIX D

Intrusive Noise Level Calculations

Date : 09/02/2012 **Project No.:** 11377 **Project:** Daytime Leq levels into Living Rooms

Receiver room for this calculation:

Estimated Indoor Ambient Noise Levels

Estimation of the indoor ambient noise level in a room based on the external noise levels and façade sound insulation taken from equations in Section 6.7.2.1 of BS8233:1999

$$L_{internal} = L_{external} - \Sigma R + 10 \log S + 10 \log T - 10 \log 0.163V + 3 + C$$

Where: -

- $L_{internal}$ - estimated indoor reverberant sound pressure level
- $L_{external}$ - measured external sound pressure level ($L_{eq, 30min}$) - i.e. the design external L_{eq}
- C - correction factor to convert the measured external sound pressure level to 'free field' (6dB for measurements within millimetres of the façade, 3dB for mesurements 2m from the façac
- Σ R - overall sound reduction of the facade
- T - reverberation time inside the room in question
- V - volume of the room in question

			Octave Band Centre Frequency (Hz)						
External Noise Spectral Data		**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
$L_{external, 16hr}$	67	69.0	64.0	60.0	59.0	65.0	59.0	47.0	37.0
Barrier Correction Factor		9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
External Noise Spectral Data									
Double Glazing, 4/12/4									
Area:		2.9	m^2						
R:		24	24	20	25	35	38	35	35
Double leaf Masonry Wall									
Area:		31.1	m^2						
R:		30	40	44	45	51	56	56	56
Doors									
Area:			m^2						
R:									
Rooflight									
Area:			m^2						
R:									
Ventilators									
Hit & miss trickle vent	Number off:	4							
	D_{ne}	38	38	37	34	30	34	37	46
Room Data									
Reverberation Time		0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.6
Total Façade Area		34	m^2						
Room Volume		58	m^3						
Overall sound reduction of the facade									
Combined sound reduction		28.4	32.1	29.5	31.2	29.2	33.1	35.8	42.3
			Octave Band Centre Frequency (Hz)						
Estimated Indoor Noise Level		**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
dB(A)									
35.4		38.6	29.9	29.1	26.4	34.4	23.9	9.2	-8.0

Date : 09/02/2012 **Project No.:** 11377 **Project:** Night time Leq levels into Bedrooms

Receiver room for this calculation:

Estimated Indoor Ambient Noise Levels

Estimation of the indoor ambient noise level in a room based on the external noise levels and façade sound insulation taken from equations in Section 6.7.2.1 of BS8233:1999

$$L_{internal} = L_{external} - \Sigma R + 10 \log S + 10 \log T - 10 \log 0.163V + 3 + C$$

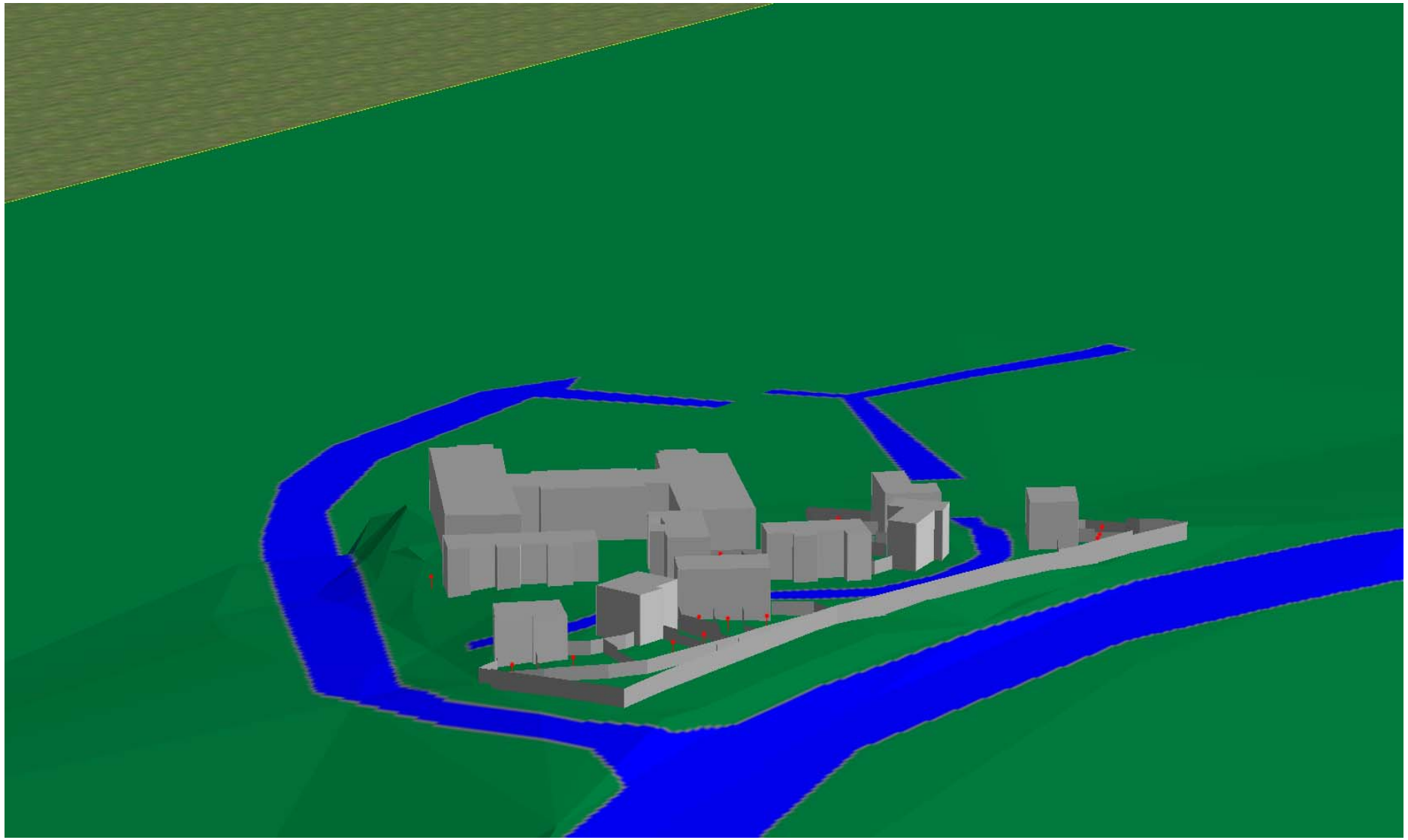
Where: -

- $L_{internal}$ - estimated indoor reverberant sound pressure level
- $L_{external}$ - measured external sound pressure level ($L_{eq,\ 30min}$) - i.e. the design external L_{eq}
- C - correction factor to convert the measured external sound pressure level to 'free field' (6dB for measurements within millimetres of the façade, 3dB for mesurements 2m from the façac
- Σ R - overall sound reduction of the facade
- T - reverberation time inside the room in question
- V - volume of the room in question

			Octave Band Centre Frequency (Hz)						
External Noise Spectral Data		**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
$L_{external,\ 8hr}$	62	64.0	59.0	55.0	55.0	59.0	54.0	42.0	30.0
Barrier Correction Factor		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Noise Spectral Data									
Double Glazing, 10/12/4									
Area:		1	m^2						
R:		25	25	22	33	40	43	44	44
Double leaf Masonry Wall									
Area:		12	m^2						
R:		30	40	44	45	51	56	56	56
Doors									
Area:			m^2						
R:									
Rooflight									
Area:			m^2						
R:									
Ventilators									
Acoustic trickle vent	Number off:	2							
	D_{ne}	34	34	40	39	42	49	43	43
Room Data									
Reverberation Time		0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.4
Total Façade Area		13	m^2						
Room Volume		25	m^3						
Overall sound reduction of the facade									
Combined sound reduction		27.5	30.2	31.7	35.8	39.5	45.9	40.8	40.8
			Octave Band Centre Frequency (Hz)						
Estimated Indoor Noise Level		**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
dB(A)									
28.6		41.5	33.8	29.1	25.0	25.3	13.1	6.2	-6.8

APPENDIX E

Computer Noise Model: 3D View and Results



Appendix E - Computer Noise Model: 3D view and Results

Report: Table of Results
Model: Proposed Layout 1 - Fencing option1
LAeq per octave: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	Description	Height	Day Total	31	63	125	250	500	1000	2000	4000	8000
_A	Plot 2	1.50	58	28	39	43	45	49	57	49	33	13
_A	Plot 1	1.50	58	27	40	44	45	49	56	49	33	13
_A	Plot 9	1.50	58	27	39	43	44	49	56	49	32	14
_A	Plot 5	1.50	58	27	38	43	44	49	56	48	32	11
_A	Plot 8	1.50	58	26	38	42	44	49	56	49	32	12
_A	Plot 3	1.50	58	27	38	42	44	48	56	49	32	12
_A	Plot 4	1.50	58	27	38	42	44	48	56	48	32	12
_A	Plot 6	1.50	57	27	39	42	44	48	56	48	31	12
_A	Plot 7	1.50	57	26	38	42	44	48	55	48	31	12
_A	Plot 10	1.50	56	30	40	42	40	46	54	47	33	17
_A	Plot 11	1.50	53	27	38	40	39	44	50	43	27	9
_A	Plot 13	1.50	52	28	39	40	38	42	51	43	25	3
_A	Plot 18	1.50	52	26	38	39	38	42	51	43	26	4
_A	Plot 14	1.50	52	28	38	40	38	42	50	42	25	4
_A	Plot 19	1.50	52	26	37	39	37	41	50	43	26	3
_A	Plot 12	1.50	51	26	36	38	37	42	49	42	27	11
_A	Plot 20	1.50	51	26	37	38	35	39	50	43	26	2
_A	Plot 17	1.50	51	26	37	38	37	41	49	42	25	5
_A	Plot 15	1.50	50	27	37	38	36	40	49	41	24	2
_A	Plot 16	1.50	50	26	36	37	35	39	48	40	24	3

All shown dB values are A-weighted