



Barratt Homes and David Wilson Homes Yorkshire West

Low Barugh, Barnsley

Noise Assessment for Discharge of Conditions 12 & 13 (Planning Reference 2015/0891) and 23 (Planning Reference 2013/0280)

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1.0 Introduction

1.1 Purpose of this Report

This report presents the findings of a noise assessment to enable the discharge of conditions 12 and 13 of the reserved matters application (planning reference 2015/0891) which state:

"12. *No development shall commence until a detailed scheme has been submitted to and approved by the Local Planning Authority in writing in order to mitigate the impact of low frequency noise from the electrical substation to the south-east of the site, as shown on plan IL21235-20 Rev B, upon noise levels within the dwellings hereby permitted. The scheme shall broadly accord with the Cole Jarman Planning Noise Assessment submitted as part of the application dated 13 June 2013 (Report 13/0190/R1 Revision 6) and shall:*

- a) demonstrate that internal noise levels at the 100Hz one-third octave band centre frequency shall not exceed an unweighted 48 dB $L_{eq\ 5\ min}$ during the day (0700-2300h) and 43 dB $L_{eq\ 5\ min}$ at night (2300-0700h) respectively at any location within the dwellings due to the operation of the electrical substation; and*
- b) include specifications for the installed performance of external building fabric such as windows and include the provision of alternative means of background ventilation in order to achieve the noise levels set out in (a) above.*

The development shall be carried out in accordance with approved scheme

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

13. *The development hereby permitted shall not commence until a detailed scheme has been submitted and approved by the Local Planning Authority in writing in order to mitigate the impact of low frequency noise from the electrical substation to the south east of the site, as shown on plan IL21235-020 Rev B, upon noise levels within the gardens of the dwellings hereby permitted. The scheme shall broadly accord with the Cole Jarman planning Noise Assessment submitted as part of the application dated 13 June 2013 (Report 13/0190/R1 Revision 6) and shall demonstrate that within each garden there is provision for an area subject to noise levels at the 100Hz one – third octave band centre frequency shall not exceed an unweighted 54 dB $L_{eq\ 5\ min}$ to the operation of the electrical substation.*

The development shall be carried out in accordance with approved scheme

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



Furthermore, the assessment presented below has also been undertaken with regard to conditions 21 and 22 of the outline planning permission (planning reference 2013/0280) which mirror the conditions above.

The report also has been undertaken to enable the discharge condition 23 of the outline planning permission (planning reference 2013/0280) which states:

- "23 *Saving in so far such matters are addressed in accordance with Condition 21 and 22, the development hereby permitted shall not commence until a detailed scheme has been submitted to and approved by the local planning authority in writing in order to mitigate the impact of external noise, from existing sources, upon noise levels within the dwellings hereby permitted. The scheme shall broadly accord with the Cole Jarman Planning Noise Assessment submitted as part of the application dated 13 June 2013 (Report/0190/R1 Revision 6) or any subsequent update to the Noise Assessment which may be submitted alongside a reserved matters application pursuant to condition 2, and approved by the Council and shall:*
- a) demonstrate that internal noise levels within habitable rooms, from existing external sources, shall not exceed 35 dB $L_{Aeq, 16h}$ during the day (0700 – 2300h) and 30 dB $L_{Aeq, 8h}$ at night (2300 – 0700h)*
 - b) shall include specifications for the installed performance of external building fabric such as windows and include the provision of alternative means of background ventilation, if necessary, in order to achieve the noise levels, set out in (a) above*

The development shall be carried out in accordance with the approved scheme.

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

The detailed scheme required by these conditions is set out in Section 4.1 of this report and includes specifications for the installed performance of external building fabric such as windows, and includes the provision of alternative means of background ventilation as specified in the condition.

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



2.0 Assessment Criteria

In accordance with the requirements of Conditions 12 and 13 (planning reference 2015/0819) and Condition 23 (planning reference 2013/0280), the following criteria have been used to determine the level of noise control to ensure that noise levels within the consented properties as a result of the existing environment;

2.1 Internal Noise Assessment Criteria

- 35 dB L_{Aeq} , 16hr in living rooms and dining rooms (0700hrs - 2300hrs)
- 30 dB L_{Aeq} , 8hr and not regularly exceed 45 dB L_{Amax} within bedrooms (2300hrs - 0700hrs)
- 55 dB L_{Aeq} , 16hr in outdoor amenity space (0700hrs - 2300hrs)

Low Frequency (100 Hz) Assessment

- 48 dB L_{eq} , 5min in all areas during the daytime (0700hrs – 2300hrs)
- 43 dB L_{eq} , 5min in all areas during the night-time (2300hrs – 0700hrs)
- 54 dB L_{eq} , 5min in outdoor amenity space (0700hrs - 2300hrs)

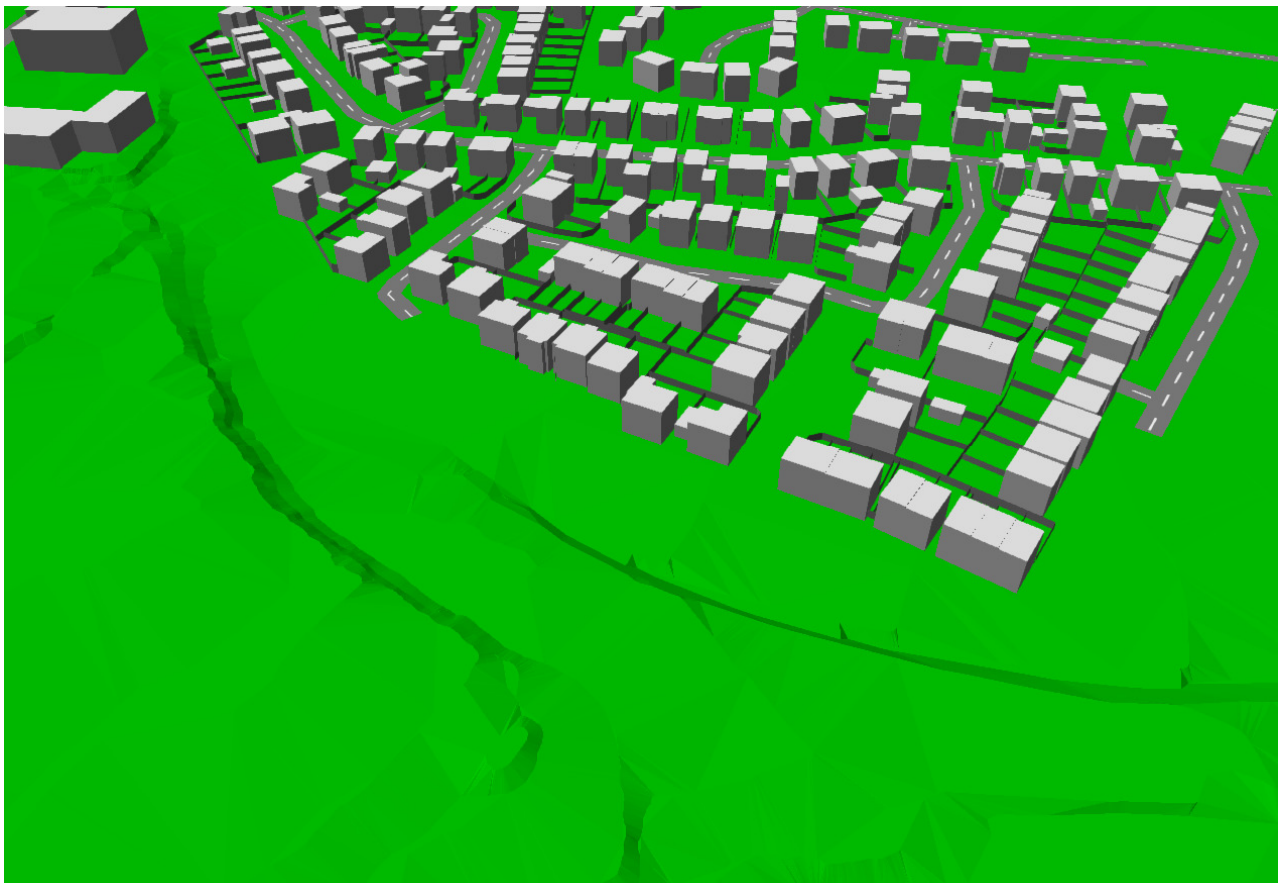
The scheme presented in 4.1 has been produced in accordance with the criteria defined in conditions 12 and 13 (planning reference 2015/0819) and condition 23 (planning reference 2013/0280).

3.0 Assessment Methodology

3.1 Noise Modelling Methodology

Three dimensional noise modelling has been undertaken based on the monitoring data to predict L_{Aeq} and L_{Amax} noise levels at a large number of locations both horizontally and vertically. CADNA noise modelling software has been used (as shown in Figure 3.1). 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.

Figure 3.1 CADNA Noise Model



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

Table 3.1 Modelling Parameters Sources and Input Data

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels	Ordnance Survey	Ordnance Survey including Topographical survey (Site) 1m Lidar data (BRC site) Wider area – 10m panorama contours
Traffic data, main surrounding roads	WYG	Traffic flows for local roads based on WYG observations and experience.
Building heights – around site	WYG Observations	8m height
Barrier heights	WYG Observations	But jointed timber boarding lapped fences have included based on the details presented within the technical layout drawing. An acoustic fence specification is presented in Appendix C with the location of where 2.5m acoustic fences are proposed presented in SK05.
Receptor positions	WYG	1 m from façade, height of 2.5 m for ground floor, 5 m for first floor (to account for proposed finished floor levels which as a worst case could be 1m higher than relative topography) 1.5 m height for model grid and monitoring locations for validation.
Plans	DK Designs	Technical Layout I Drawing No. 2017-075-01. Rev. C Dated: April 17

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

3.2 Model Input Data

3.2.1 Existing Ambient Noise Climate

Sources affecting the site, including surrounding roads and railway, noise sources from BRC and the electrical substation have been included in the models. For this assessment, consideration has been given to the electrical sub-station, noise from BRC to the south, surrounding roads and the railway to the east.

3.2.2 BRC Industrial Noise Data

Noise sources from the BRC operations to the south of the site have been included in the model. Measurements were taken on site at BRC by WYG and the model inputs and geometries have been then since agreed by RBA Acoustics on behalf of BRC as being representative of typical case noise levels, and confirmed these noise levels have remained the same since the original outline planning permission. The noise levels used in the model are shown in the table below.

Table 3.2 – Noise Levels from BRC Operations

Description	Frequency (Hz)								L _{Amax} @ 1m dB	Source Height (m)
	63	125*	250	500	1k	2k	4k	8k		
Warehouse Door Breakout	89.0	83.9	80.9	81.0	82.0	83.1	82.4	78.4	92.3	4.0
Small Forklift Truck	97.0	93.9	87.9	87.0	92.0	84.0	76.1	71.6	91.4	1.0
Large Forklift Truck	97.5	98.4	89.4	88.5	86.5	83.6	78.6	72.6	85.6	1.5
Forklift Reversing Alarm	92.6	88.5	82.5	82.6	96.6	86.6	74.7	69.9	90.3	1.5
Material Movements	95.7	92.6	88.6	84.7	81.7	82.8	90.0	90.9	80.6	5.0

3.2.3 Electrical Substation Noise Data

Noise from the electrical substation to the south-east of the site have been included in the model. Measurements were taken on site by Cole Jarman. The noise levels used in the model are shown in the table below.

Table 3.3 – Noise Levels from Electrical Substation

Description	Sound Power Level
	Frequency: 100 Hz
Electrical Substation	84.5 dB (Lin)



An asterisk next to the data in Table 3.2 above represents data used for the low frequency noise assessment, presented in section 5. For a more robust assessment however, a full frequency assessment has been conducted. Furthermore, although conditions 12 and 13 only relate to the low frequency noise impact from the electrical substation all assessments also include frequency specific noise levels from the BRC operations to the south of the site. The noise model has been verified to a noise level of 76 dB @ 100Hz at the boundary of the substation as assessed within the Cole Jarman Report.

3.2.4 Sensitive Receptors

Noise levels from existing noise sources surrounding the site have been assessed at proposed properties across the site. The locations of the proposed receptors are shown in SK01 of Appendix B.

4.0 The Proposed Detailed Scheme and Assessment of Predicted Internal Noise Levels

4.1 Noise Intrusion Assessment – Proposed Detailed Scheme

The proposed detailed scheme, which has been agreed upon with the client prior to this assessment and produced in accordance with the Cole Jarman Noise Report (Reference 13/0190/R1 Revision 6), includes the use of 'Ford Windows' triple glazing (with a sound reduction R_w 46 dB), which will be used for facades on the southern boundary (marked with an asterisk in the tables below and as referred to on the Technical Layout plan (Drawing No. 2017-075-01. Rev. C)) of the site facing the electrical substation and the BRC industrial site. Dwellings elsewhere on the site will feature glazing of with a minimum sound reduction of (double glazing of 6/16/4mm) R_w 36 dB – manufacturer specifications for both types of glazing are shown in appendix C.

As an additional control, an additional means of ventilation will be provided for all dwellings where triple glazing is proposed with a Positive Input Ventilation (PIV) system. For all other dwellings across the site, ventilation will be provided using System 1 which is a combination of background ventilators and intermittent extract fans. Background ventilation will be provided by trickle ventilators, calculated to comply with Approved Document F1 2010 Table 5.2a, with a minimum specification equivalent to that of the glazing. These additional measures will enable target ventilation rates in compliance with Building Regulations (Part F) to be achieved without the requirement to open windows.

In terms of site layout, rooms with a greater sensitivity (bedrooms and living rooms) are orientated away from the electrical substation and BRC where possible.

The results presented in tables 5.1 – 5.3 below show the predicted noise intrusion levels at properties across the site. The noise levels stipulated in planning condition 23 are met across the site during the daytime and night-time.

Table 4.1 Daytime Noise Intrusion Levels L_{Aeq} 16 hour

Location	External L_{Aeq} at 1m from facade	Internal L_{Aeq} with windows closed	Criteria Internal L_{Aeq}
R01	47.7	11.7	35
R02	48.2	12.2	35
R03	52.5	16.5	35
R04*	48.6	0.0	35
R05*	50.3	0.0	35
R06*	52.8	6.8	35
R07*	55.5	9.5	35
R08*	55.4	9.4	35
R09*	55.2	9.2	35
R10*	52.8	6.8	35
R11*	54.6	8.6	35

Location	External L _{Aeq} at 1m from facade	Internal L _{Aeq} with windows closed	Criteria Internal L _{Aeq}
R12*	54.3	8.3	35
R13*	52.9	6.9	35
R14	49.7	13.7	35
R15	50.6	14.6	35
R16	49.6	13.6	35
R17	40.6	4.6	35
R18	43.7	7.7	35
R19	49.7	13.7	35
R20	46.6	10.6	35
R21	46.9	10.9	35
R22	44.5	8.5	35
R23	41.4	5.4	35
R24	44.1	8.1	35
R25	40.3	4.3	35
R26	44.1	8.1	35
R27	46.0	10.0	35
R28	42.9	6.9	35

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

Table 4.2 Night-time Noise Intrusion Levels L_{Aeq} 8 hour

Location	External L _{Aeq} at 1m from facade	Internal L _{Aeq} with windows closed	Criteria Internal L _{Aeq}
R01	50.6	14.6	30
R02	49.9	13.9	30
R03	54.6	18.6	30
R04*	53.3	7.3	30
R05*	55.9	9.9	30
R06*	54.2	8.2	30
R07*	56.9	10.9	30
R08*	56.8	10.8	30
R09*	56.5	10.5	30
R10*	53.9	7.9	30
R11*	55.8	9.8	30
R12*	55.4	9.4	30
R13*	54.2	8.2	30
R14	50.8	14.8	30
R15	51.7	15.7	30
R16	50.2	14.2	30
R17	44.0	8.0	30
R18	48.2	12.2	30
R19	52.8	16.8	30
R20	50.6	14.6	30
R21	51.1	15.1	30
R22	49.5	13.5	30



Location	External L_{Aeq} at 1m from facade	Internal L_{Aeq} with windows closed	Criteria Internal L_{Aeq}
R23	46.2	10.2	30
R24	45.8	9.8	30
R25	42.9	6.9	30
R26	48.3	12.3	30
R27	47.0	11.0	30
R28	42.6	6.6	30

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

Table 4.3 Night-time Noise Intrusion Levels L_{Amax}

Location	External L_{Amax} at 1m from facade	Internal L_{Amax} with windows closed	Criteria Internal L_{Amax}
R01	58.1	22.1	45
R02	56.6	20.6	45
R03	59.2	23.2	45
R04*	57.2	11.2	45
R05*	60.2	14.2	45
R06*	58.2	12.2	45
R07*	60.9	14.9	45
R08*	60.6	14.6	45
R09*	60.4	14.4	45
R10*	58.8	12.8	45
R11*	59.4	13.4	45
R12*	59.6	13.6	45
R13*	58.2	12.2	45
R14	55.6	19.6	45
R15	56.2	20.2	45
R16	56.4	20.4	45
R17	48.3	12.3	45
R18	53.3	17.3	45
R19	56.9	20.9	45
R20	54.8	18.8	45
R21	56.2	20.2	45
R22	54.0	18.0	45
R23	51.9	15.9	45
R24	51.6	15.6	45
R25	48.8	12.8	45
R26	53.3	17.3	45
R27	51.2	15.2	45
R28	57.3	21.3	45

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



4.2 External Amenity Noise Level Assessment - Proposed Garden Receptors

For completeness, daytime noise levels in gardens and private external spaces of the proposed development have been assessed in the table below. The location of the indicative 'garden' receptor locations, which align with the approved layout plan (Ref: 1414.01-Planning Layout Revision G), are shown on SK01 in Appendix B.

Table 4.4 Private External Amenity Area Noise Levels

Ref	External $L_{Aeq, 16hr}$ Daytime
G1	48.4
G2	47.3
G3	45.3
G4	48.7
G5	50.0
G6	51.4
G7	48.9
G8	41.2
G9	42.7
G10	39.8
G11	40.9
G12	41.1
G13	46.1
G14	40.5
G15	43.8
G16	37.7
G17	37.7
G18	37.6
G19	43.4
G20	42.7
G21	44.7
G22	44.9
G23	41.8
G24	42.2
G25	38.8
G26	45.9
G27	48.1
G28	38.3

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

The results in the table above show that overall daytime L_{Aeq} noise levels within private external amenity areas are not predicted to exceed the condition 23 criteria of 55 dB $L_{Aeq, 16hr}$.

4.3 Low Frequency (100Hz) Noise Assessment

In accordance with the requirements of Conditions 12 and 13 (planning reference 2015/0891), although only noise from the electrical substation is required to be assessed, low frequency noise from the existing electrical substation and nearby industrial noise sources have been assessed with respect to the proposed residential dwellings.

A scheme (outlined in detail in section 4.1 above), which has been agreed with the client prior to this assessment, includes the use of 'Ford Windows' triple glazing (with an overall sound reduction of R_w 46 dB and a sound reduction of 38 dB at 100Hz) has been used for facades on the southern boundary (marked with an asterisk in the tables below and as referred to on the Technical Layout plan (Drawing No. 2017-075-01. Rev. C)) of the site facing the electrical substation and the BRC industrial site. Dwellings elsewhere on the site will feature glazing with a minimum sound reduction of (double glazing of 6/16/4mm) R_w 36 dB, with a sound reduction of 22 dB at 100 Hz.

The results presented in tables 4.5 and 4.6 below show the predicted noise intrusion levels at properties across the site. The required levels are met across the site during the daytime and night-time, assuming a windows-closed scenario. The means of ventilation will enable target ventilation rates across the development site in compliance with Building Regulations (Part F) to be achieved without the requirement to open windows is outlined in section 4.1. Internal noise levels at the 100 Hz frequency band from the adjacent substation and nearby industrial noise sources is predicted to be within the planning permission criteria at all receptor locations.

Table 4.5 Daytime Noise Intrusion Levels L_{Leq} 16 hour (100Hz)

Location	External L_{Leq} (100 Hz) at 1m from facade	Internal L_{Leq} (100 Hz) with windows closed	Criteria Internal L_{Leq} (100 Hz)
R01	48.5	26.5	48
R02	48.8	26.8	48
R03	53.5	31.5	48
R04*	53.7	15.5	48
R05*	50.4	15.7	48
R06*	55.2	12.4	48
R07*	57.6	17.2	48
R08*	57.5	19.6	48
R09*	58.6	19.5	48
R10*	56.7	20.6	48
R11*	58.6	18.7	48
R12*	57.9	20.6	48
R13*	59.8	19.9	48
R14	57.7	21.8	48
R15	59.2	19.7	48
R16	62.1	21.2	48
R17	50.3	28.3	48
R18	48.6	26.6	48

Location	External L_{Leq} (100 Hz) at 1m from facade	Internal L_{Leq} (100 Hz) with windows closed	Criteria Internal L_{Leq} (100 Hz)
R19	51.7	29.7	48
R20	47.4	25.4	48
R21	50.8	28.8	48
R22	54.3	32.3	48
R23	52.6	30.6	48
R24	53.8	31.8	48
R25	49.9	27.9	48
R26	49.2	27.2	48
R27	52.2	30.2	48
R28	61.1	39.1	48

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

Table 4.6 Night-time Noise Intrusion Levels L_{Leq} 8 hour (100Hz)

Location	External L_{Leq} (100 Hz) at 1m from facade	Internal L_{Leq} (100 Hz) with windows closed	Criteria Internal L_{Leq} (100 Hz)
R01	49.9	27.9	43
R02	51.2	29.2	43
R03	55.6	33.6	43
R04*	55.1	17.1	43
R05*	53.6	15.6	43
R06*	55.6	17.6	43
R07*	57.8	19.8	43
R08*	57.9	19.9	43
R09*	58.9	20.9	43
R10*	57.0	19.0	43
R11*	58.8	20.8	43
R12*	58.2	20.2	43
R13*	60.1	22.1	43
R14	58.0	20.0	43
R15	59.5	21.5	43
R16	62.4	24.4	43
R17	51.8	29.8	43
R18	51.1	29.1	43
R19	53.5	31.5	43
R20	50.0	28.0	43
R21	52.0	30.0	43
R22	55.8	33.8	43
R23	55.1	33.1	43
R24	54.9	32.9	43
R25	52.9	30.9	43
R26	52.5	30.5	43
R27	53.2	31.2	43
R28	61.3	39.3	43

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

4.3.1 Room Nodes

As agreed following consultation between WYG and Caroline Petty, Group Leader, Pollution and Licensing, Regulatory Services, Barnsley Council, an example proposed house type opposite the sub station and an example proposed house type opposite BRC have been considered with regard to room nodes. An assessment of the Finchley housetype (Plots 81 – 85 opposite the substation) and the Lincoln housetype (Plot 138 opposite BRC) have been assessed.

In accordance with the Cole Jarman report, room dimensions where there is the potential for significant room nodes to occur are in the order of multiples of $1.70\text{m} \pm 0.05\text{m}$. The dimensions which have been considered include $1.70\text{m} \pm 0.05\text{m}$, $3.40\text{m} \pm 0.1\text{m}$, $5.10\text{m} \pm 0.15\text{m}$ and $6.80\text{m} \pm 0.2\text{m}$. The dimensions of rooms facing the sub station and BRC are tabulated in Appendix D.

In general, the dimensions are outside of the range where there is the potential for significant room nodes to occur. However, within the lounge of the Lincoln housetype, the dimensions are within the criteria where significant room nodes could occur. Therefore, a false or thicker wall to reduce the dimensions of the walls to below the design range (length of $<5.05\text{m}$) is proposed.

4.4 Private External Amenity Areas (Low Frequency)

Daytime low frequency noise levels in gardens and private external spaces of the proposed development have been assessed in the table below. The location of the indicative 'garden' receptor locations, which align with the approved layout plan (Ref: 1414.01-Planning Layout Revision G), are shown on SK01 in Appendix B.

Table 4.7 Private External Amenity Area Noise Levels (100Hz)

Ref	External $L_{\text{Leq, 16hr (100 Hz)}}$ [linear] Daytime	Condition Criteria $L_{\text{Leq (100 Hz)}}$ [linear]
G1	49.2	54
G2	48.5	54
G3	46.1	54
G4	52.7	54
G5	51.7	54
G6	51.0	54
G7	50.6	54
G8	50.2	54
G9	51.0	54
G10	49.0	54
G11	48.7	54
G12	51.9	54
G13	52.6	54
G14	52.1	54



Ref	External $L_{Leq, 16hr (100 Hz)}$ [linear] Daytime	Condition Criteria $L_{Leq (100 Hz)}$ [linear]
G15	52.2	54
G16	50.0	54
G17	52.8	54
G18	52.8	54
G19	48.5	54
G20	50.7	54
G21	52.5	54
G22	53.1	54
G23	51.7	54
G24	50.7	54
G25	48.7	54
G26	50.1	54
G27	49.4	54
G28	52.7	54

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

The results in the table above show that daytime L_{Aeq} (100Hz) noise levels within private external amenity areas are not predicted to exceed the planning permission criteria at receptors across the development site.



5.0 Conclusions of Noise Assessment

This report presents the findings of a noise assessment for the discharge of Conditions 12 and 13 of the reserved matters planning reference 2015/0891 and Condition 23 of the outline planning reference 2013/0280.

Condition 12, 13 (2015/0891) and 23 (2013/028)

The assessment presented in Section 4.0 shows that the proposed detailed scheme set out at 4.1 (consisting of glazing, ventilation, barriers in the form of acoustic fences around specific garden boundaries and specified layout matters which has been agreed upon with the client and produced in accordance with the Cole Jarman Report Reference 13/0190/R1 Revision 6) is sufficient to minimise the impact of noise from the electrical substation upon noise levels within the permitted dwellings, the impact of noise from the electrical substation upon noise levels within the gardens of the dwellings and the impact of external noise from existing sources upon noise levels with the permitted dwellings so that there is compliance with the criteria required in the relevant planning conditions 12, 13 and 23:

- 35 dB $L_{Aeq,16hr}$ in living rooms and dining rooms (0700hrs - 2300hrs)
- 30 dB $L_{Aeq,8hr}$ and not regularly exceed 45 dB L_{Amax} within bedrooms (2300hrs - 0700hrs)
- 55 dB $L_{Aeq,16hr}$ in outdoor amenity space (0700hrs - 2300hrs)

Low Frequency (100 Hz) Assessment

- 48 dB $L_{eq,5min}$ in all areas during the daytime (0700hrs – 2300hrs)
- 43 dB $L_{eq,5min}$ in all areas during the night-time (2300hrs – 0700hrs)
- 54 dB $L_{eq,5min}$ in outdoor amenity space (0700hrs - 2300hrs)

As such, the conditions can be discharged.



Appendices



Appendix A – Acoustic Terminology and Abbreviations

Acoustic Terminology

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



Abbreviations

CADNA – Computer Aided Noise Abatement

DMRB – Design Manual for Roads and Bridges

HGV – Heavy Goods Vehicle

PPG – Planning Practice Guidance

UDP – Unitary Development Plan

UKAS – United Kingdom Accreditation Service

WYGE – WYG Environment



Appendix B – Sketches

SK01a Site Layout and Receptor Locations

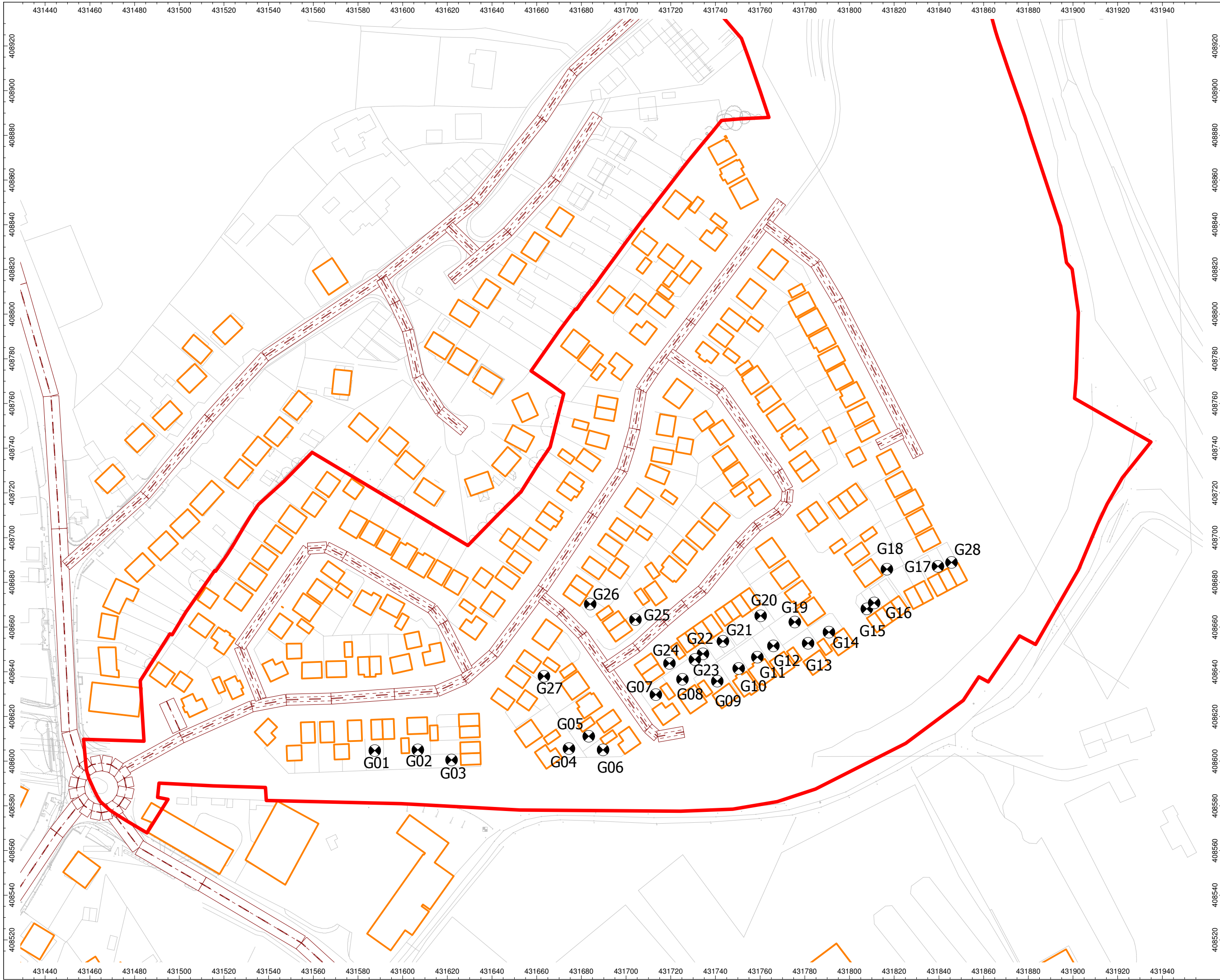
SK01b Private External Amenity Receptor Locations

SK02 Existing Daytime $L_{Aeq,16hr}$

SK03 Existing Night-time $L_{Aeq,8hr}$

SK04 Glazing and Ventilation Strategy

SK05 Acoustic Fence Locations



Client:
**Barratt Homes and
David Wilson Homes**

Project:
Low Barugh, Barnsley

Project Number:
A102475

Drawing Title:
**Receptor Location
Plan (Gardens)**

Drawing Number:
SK01a

Key:

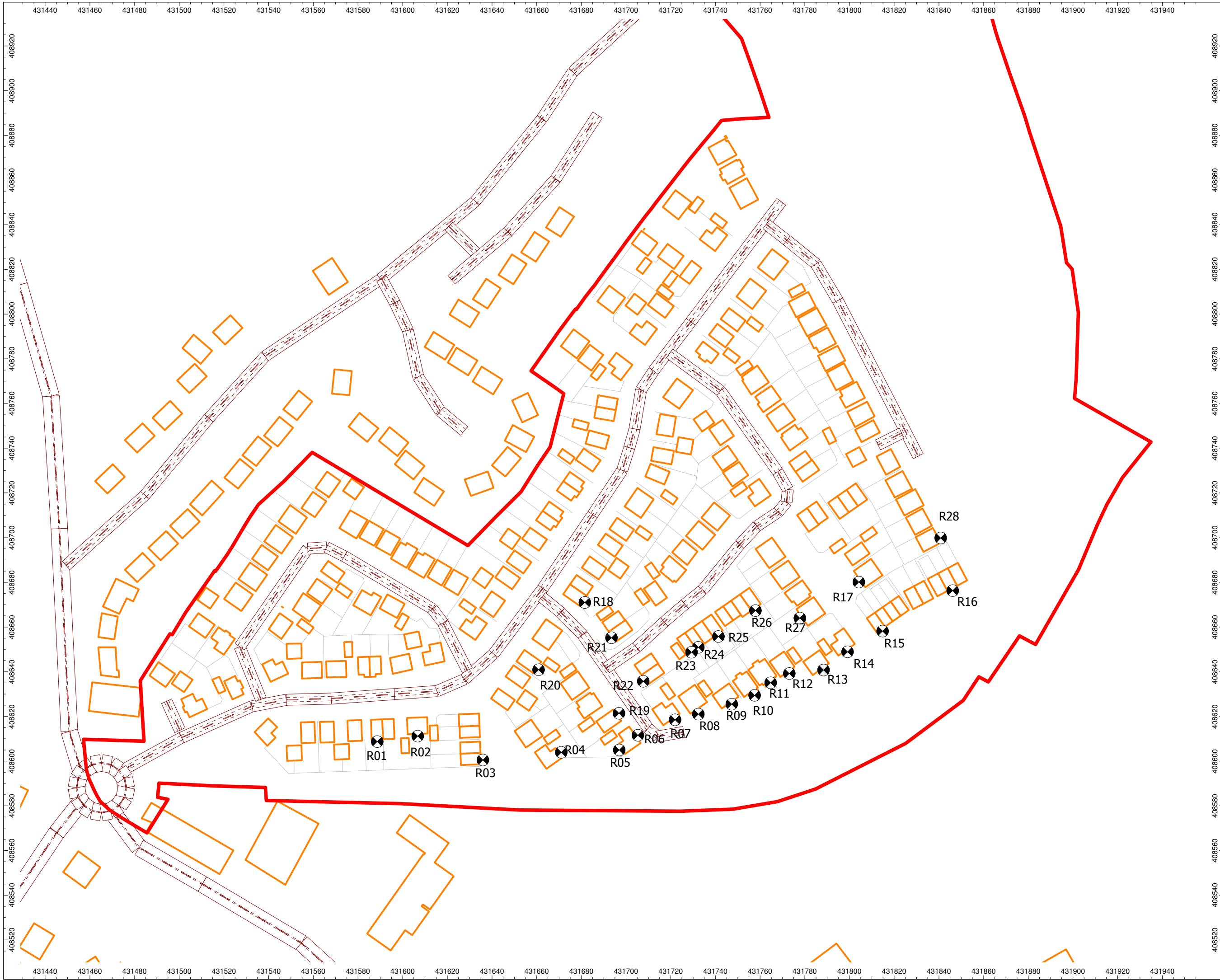
Receptor Location:

WYGE Leicester 17.08.17



Executive Park
Avalon Way
Anstey
Leicestershire
LE7 7GR
Tel 0116 234 8000

© WYGE Environment



Client:
**Barratt Homes and
David Wilson Homes**

Project:
Low Barugh, Barnsley

Project Number:
A102475

Drawing Title:
**Receptor Location
Plan (Facades)**

Drawing Number:
SK01b

Key:

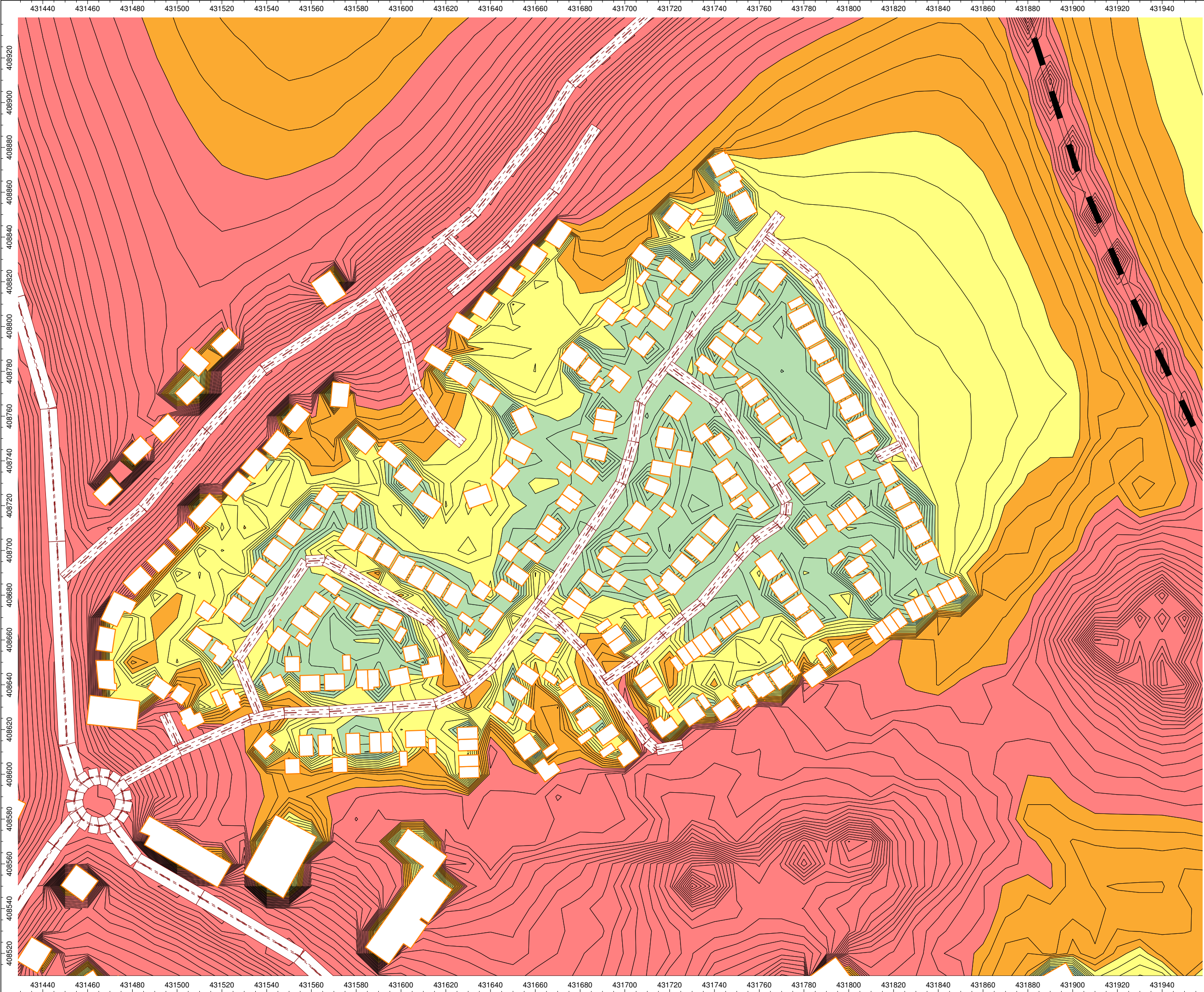
Receptor Location:

WYGE Leicester 16.08.17



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Avalon Way
Anstey
Leicestershire
LE7 7GR
Tel 0116 234 8000

© WYG Environment



Client:
**Barratt Homes and
David Wilson Homes**

Project:
Low Barugh, Barnsley

Project Number:
A102475

Drawing Title:
**LAeq,16hour
Daytime Noise
Contour Plot**

Drawing Number:
SK02

Key:

0.0 - 40.0 dB
40.0 - 45.0 dB
45.0 - 50.0 dB
>50.0 dB

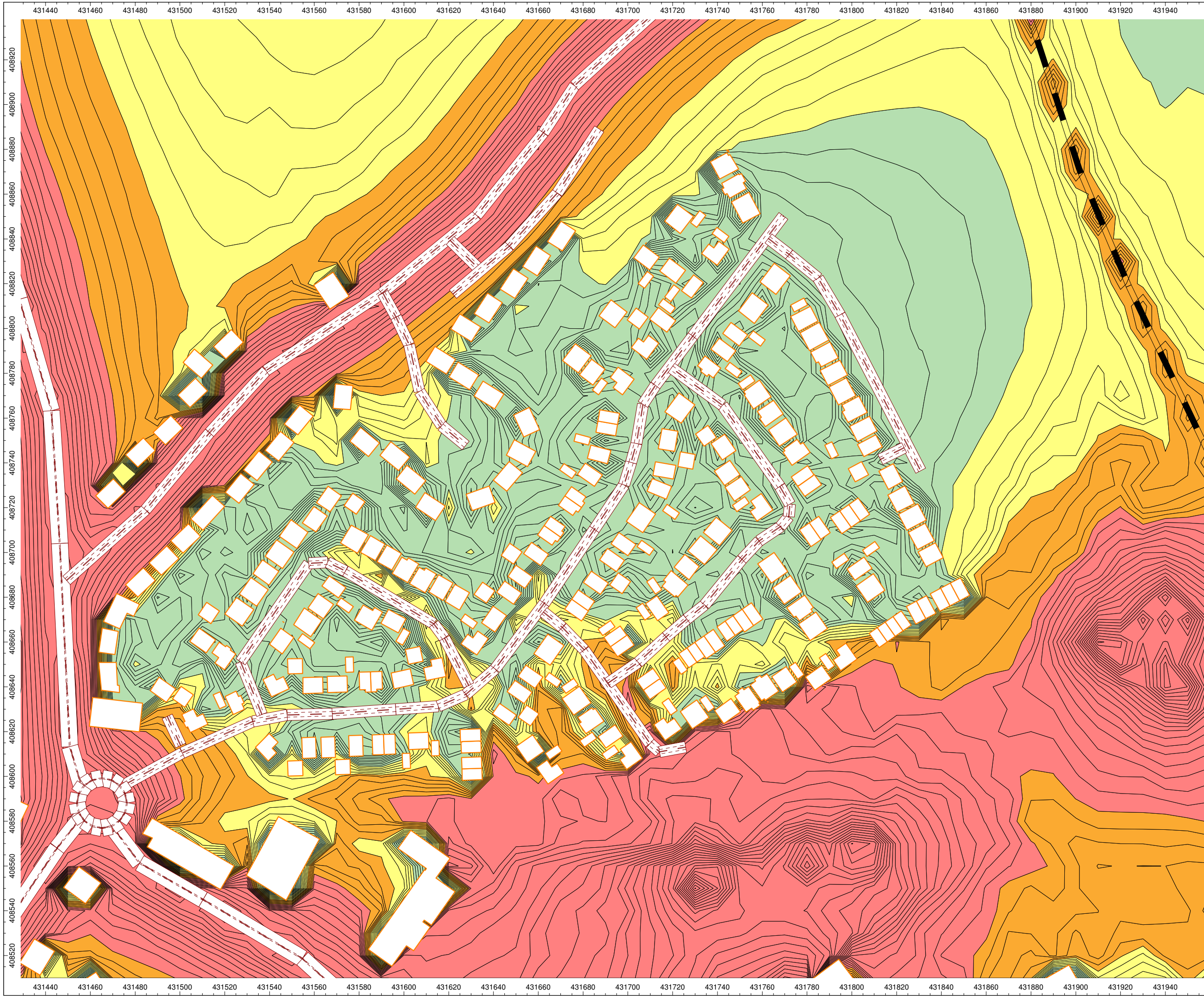
Contour Plot Presented for
Indicative Purposes Only

Scale : Not to scale

WYGE Leicester 21.08.17



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Avalon Way
Anstey
Leicestershire
LE7 7GR
Tel 0116 234 8000
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Client:
**Barratt Homes and
David Wilson Homes**

Project:
Low Barugh, Barnsley

Project Number:
A102475

Drawing Title:
**LAeq,8hour
Night-time Noise
Contour Plot**

Drawing Number:
SK03

- Key:
- 0.0 - 40.0 dB
 - 40.0 - 45.0 dB
 - 45.0 - 50.0 dB
 - >50.0 dB

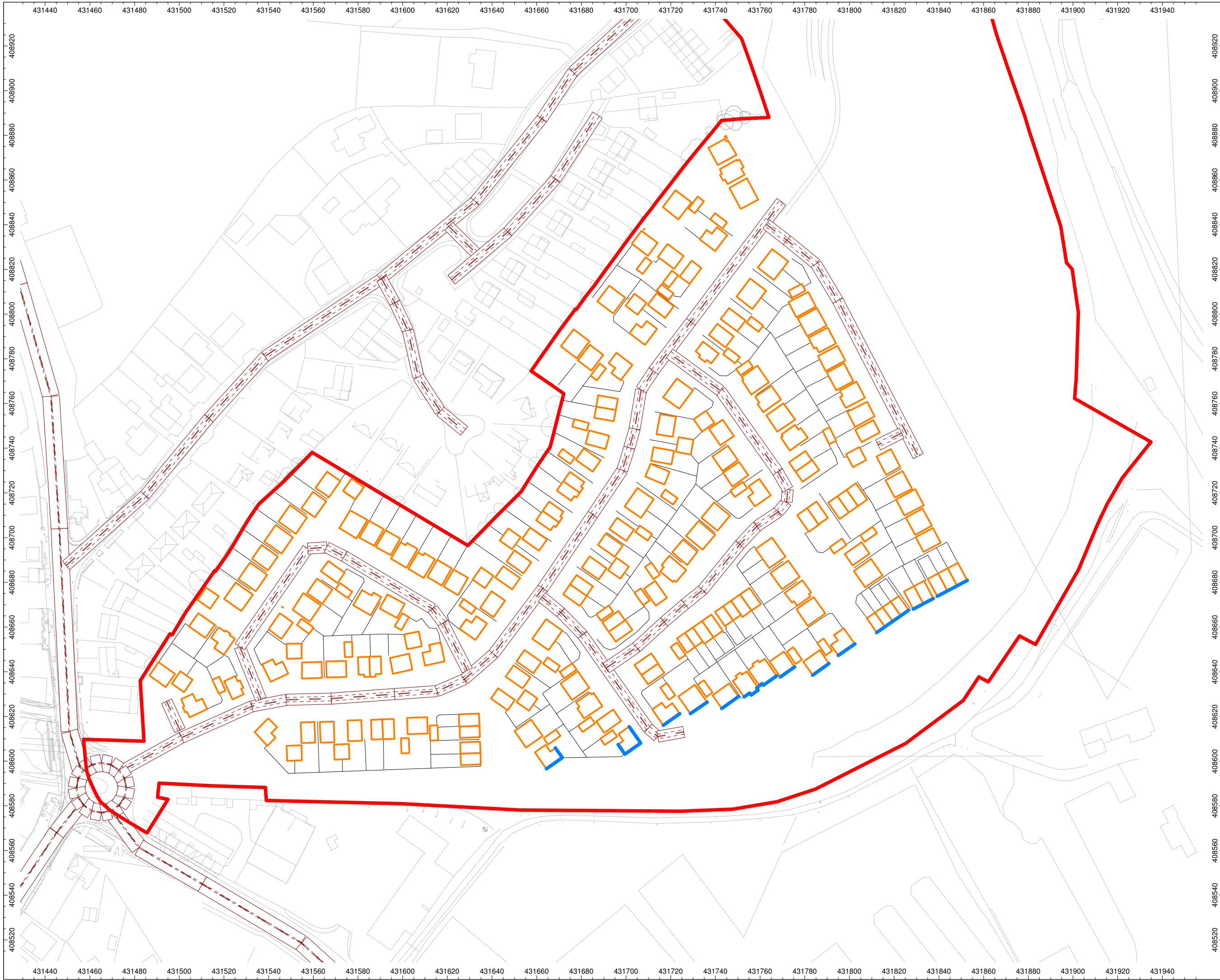
Contour Plot Presented for
Indicative Purposes Only

Scale : Not to scale

WYGE Leicester 21.08.17



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Leicestershire
LE7 7GR
Tel 0116 234 8000
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Client:
**Barratt Homes and
David Wilson Homes**

Project:
Low Barugh, Barnsley

Project Number:
A102475

Drawing Title:
**Glazing and
Ventilation Strategy**

Drawing Number:
SK04

Key:

Ford Windows
Triple Glazing &
PIV Ventilation
(Rw 46 dB) : 

All Other Windows:
Double Glazing &
Trickle Vents
(Rw 36 dB)

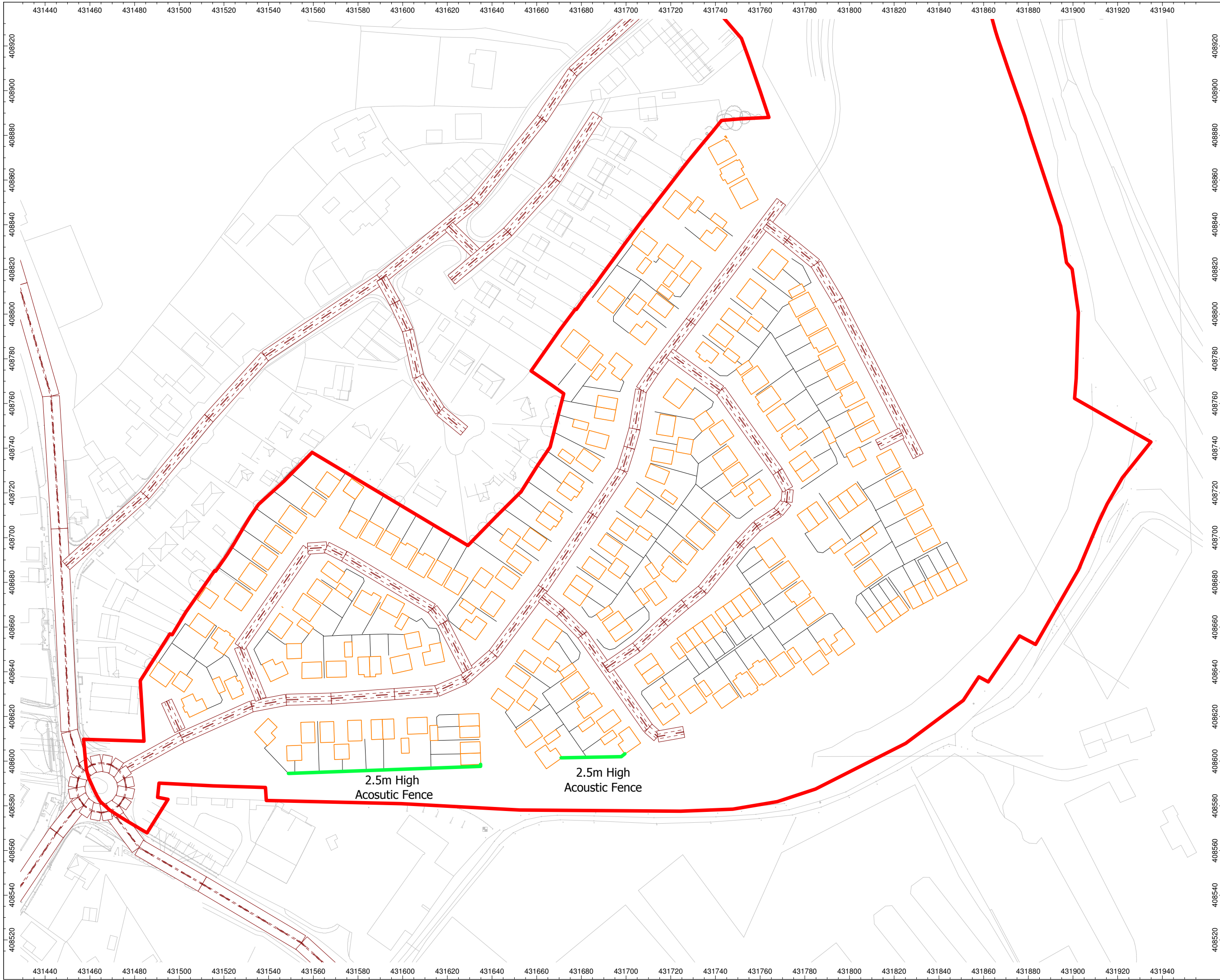
Scale : Not to scale

WYGE Leicester 21.08.17



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Leicestershire
LE7 7GR
Tel 0116 234 8000

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Client:
**Barratt Homes and
David Wilson Homes**

Project:
Low Barugh, Barnsley

Project Number:
A102475

Drawing Title:
**Acoustic
Fence Locations**

Drawing Number:
SK06

Key:

2.5m High
Acoustic
Fence: 

Scale : Not to scale

WYGE Leicester 05.09.17

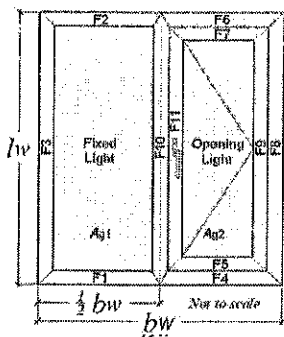


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Leicestershire
LE7 7GR
Tel 0116 234 8000

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Appendix C – Manufacturer Data Sheets / Barrier Specification



Sample Style:
Casement

Fixed Light /
Side Hung

Blue line illustrates
opening light length
(air leakage)

Frame offset: No

Nominal 4mm etc to 0DP, others 1DP

Glazing dimensions and properties.

Thickness of pane 1	4	mm
Pane 1/2 distance	20	mm
Gas fill (1/2)	Argon 90%	
Thickness of pane 2	4	mm
Complete next 3 cells for TG IGU		
Pane 2/3 distance		mm
Gas fill (2/3)		
Thickness of pane 3		mm
Glazing Trans. - 3DP	U_g 1.070	W/(m ² ·K)
g-value - 2DP	g_L 0.55	

Thermal transmittance of window from hot box test

U_w - 2DP W/(m²·K)

Window Dimensions:			Area	
	Length	Width	No gasket	With gasket
Section	(m)	(m)	(m ²)	(m ²)
Fixed Light	1.3600	0.5200	0.7072	0.7072
Opening light	1.2560	0.4260	0.5393	0.5393
Total glazing, A_g			1.2465	1.2465
Frame	(m)	(m)	(m ²)	(m ²)
F1	0.6150	0.0600	0.0341	0.0341
F2	0.6150	0.0600	0.0341	0.0341
F3	1.4800	0.0600	0.0852	0.0852
F4	0.6150	0.0600	0.0341	0.0341
F5	0.5200	0.0470	0.0222	0.0222
F6	0.6150	0.0600	0.0341	0.0341
F7	0.5200	0.0470	0.0222	0.0222
F8	1.4800	0.0600	0.0852	0.0852
F9	1.3600	0.0470	0.0617	0.0617
F10	1.4800	0.0700	0.0994	0.0994
F11	1.3600	0.0470	0.0617	0.0617
Total Frame			0.5739	0.5739
Total Window, A_w			1.8204	1.8204
Percentage fixed light glass area			38.85%	38.85%
Percentage opening light glass area			29.63%	29.63%
Percentage glass area (total)			68.47%	68.47%

Solar Factor, g-value:	F_w 0.9
	g_w 0.34

U_{window}	No bars; or attached bars	1.23	W/(m ² ·K)
	Single cross bar in IGU	1.3	
	Multiple cross bar in IGU	1.4	
	Glazing bar (Georgian bar)	1.6	

BFRC Rating kWh/(m ² ·yr)	Label index	EWER Rating Scale	Window Rating
0.10 < 10		A+	B
10.10 < 20		A	
20.10 < 30		B	
30.10 < 40		C	
40.10 < 50		D	
50.10 < 60		E	
60.10 < 70		F	

Report Number: L2989
Report Date: 13 May 2015
Project Details: Logik 70 Casement - Planiclear / Argon / Superspacer
Premium / Planitherm One T - Full Thermal Inserts

THIS SPREADSHEET IS THE PROPERTY OF THE BFRC AND CAN
ONLY BE USED IN CONJUNCTION WITH A BFRC LICENCE

Input Values:

Yellow input, green intermediary, blue finals

X' DP is no. of decimal places to enter

Parameter	Symbol	Units
Total window height 0DP	l_w	1480 mm
Total window width 0DP	b_w	1230 mm

Frame dimensions:	Frame width, b_f	Gasket protrusion, b_g	Frame & gasket widths	
	(mm)	(mm)	(mm)	
All frame values round to nearest 1mm, gaskets to 1DP				
F1 fixed sill	60	0.0	60.0	Total
F2 fixed head	60	0.0	60.0	
F3 fixed jamb	60	0.0	60.0	
F4 + F5 sash sill				
F4 fixed sash sill	60	n/a	60.0	107.0
F5 moving sash sill	47	0.0	47.0	
F6 + F7 sash head				
F6 fixed sash head	60	n/a	60.0	107.0
F7 moving sash head	47	0.0	47.0	
F8 + F9 sash jamb				
F8 Fixed sash jamb	60	n/a	60.0	107.0
F9 moving sash jamb	47	0.0	47.0	
F10 + F11 mullion				
F10 fixed mullion	70	0.0	70.0	117.0
F11 moving mullion	47	0.0	47.0	
Total gasket area		0	m ²	

Where a U_w value from hot box testing is available, no $L_{f, 2D}$ or $L_{w, 2D}$ values need to be entered

Frame conductance:	All L values to 4DP. All b values to 0DP					
	L_f^{2D}	$W/(m \cdot K)$	b_p (mm)	L_ψ^{2D}	$W/(m \cdot K)$	b_g (mm)
F1 fixed sill		0.2630	190		0.2990	190
F2 fixed head		0.2630	190		0.2990	190
F3 fixed jamb		0.2630	190		0.2990	190
F4 + F5 sash sill		0.3309	190		0.3666	190
F6 + F7 sash head		0.3309	190		0.3666	190
F8 + F9 sash jamb		0.3309	190		0.3666	190
F10 + F11 mullion		0.5436	380		0.6159	380

Frame:	Frame width, b_f	Frame U -value, U_f	Frame areas, A_f	Frame heat flow, H_U	Linear trans., $W/(m^2 \cdot K)$	Linear length, l_b	Junction heat flow, H_ϕ
Section	(m)	(W/(m ² ·K))	(m ²)	(W/K)	(W/(m ² ·K))	(m)	(W/K)
F1 fixed sill	0.0600	1.1187	0.0341	0.0381	0.0286	0.5200	0.0149
F2 fixed head	0.0600	1.1187	0.0341	0.0381	0.0286	0.5200	0.0149
F3 fixed jamb	0.0600	1.1187	0.0852	0.0953	0.0286	1.3600	0.0389
F4 + F5 sash sill	0.1070	1.2819	0.0563	0.0710	0.0283	0.4260	0.0120
F6 + F7 sash head	0.1070	1.2819	0.0563	0.0710	0.0283	0.4260	0.0120
F8 + F9 sash jamb	0.1070	1.2819	0.1466	0.1854	0.0283	1.2660	0.0356
F10 + F11 mullion	0.1170	1.2978	0.1611	0.2091	0.0575	1.3130	0.0754
Totals			0.5739	0.7080		Total	0.2039

Air Leakage loss:

Air leakage at 50 Pa per hour & per unit length of opening light (BS 6375-1) - 2DP	0.00	m ³ /(m·h)
Opening light length	3.7600 m	Total air leakage
L_{50} 0.00 m ³ /(m ² ·h)		Heat loss = 0.0166 L_{50} 0.00 W/(m ² ·K)

Other parameters needed for calculation, taken from simulations:			$d_p = d_g = 0.028$ m
$\lambda_p = 0.035$ W/(m·K)	$R_{se} = 0.04$ K/W		$R_{so} = 0.13$ m ² ·K/W
$R_p = 0.8000$ m ² ·K/W	$R_{tot} = 0.9700$ K/W		$U_p = 1.0309$ W/(m ² ·K)

BFRC Rating =

218.6g window - 68.5 x (U_{window} + Effective L_{50}) =

-9.93

Climate zone is:

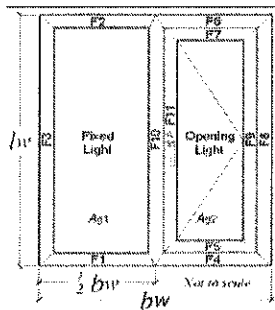
UK

Thermal transmittance, $W/(m^2 \cdot K)$	U_{window} 1.2
Solar factor	g_{window} 0.34
Window air leakage heat loss, $W/(m^2 \cdot K)$	L_{factor} 0.00



BFRC Certified
Simulator 022

Simulator Name: Andy Grosse



Sample Style:
Casement

Fixed Light /
Side Hung

Blue line illustrates
opening light length
(air leakage)

Report Number: **L1522**

Issue No.21: 04/03/2009

Report Date: **24 April 2013**

Project Details: **Eurologik 70 - Float/Argon/SG Planitherm Total
Plus/Swisspacer V (Full Thermal Inserts) Butyl- 7006**

Input Values:

Yellow input, green intermediary, blue finals

X' DP is no. of decimal places to enter

Parameter	Symbol	Units
Total window height ODP	l_w	1480 mm
Total window width ODP	b_w	1230 mm

Nominal 4mm etc to **ODP**, others **1DP**

Glazing dimensions and properties:

Thickness of pane 1	4	mm
Pane 1/2 distance	20	mm
Gas fill (1/2)	Argon 90%	
Thickness of pane 2	4	mm
Complete next 3 cells for TG IGU		
Pane 2/3 distance		mm
Gas fill (2/3)		
Thickness of pane 3		mm
Glazing Trans. - 3DP	U_g	1.182 W/(m ² ·K)
g-value - 2DP	g_L	0.71

Thermal transmittance of window from hot box test

U_w - 2DP	W/(m ² ·K)
--------------------	-----------------------

Window Dimensions:		Area	
Section	Length (m)	Width (m)	No gasket (m ²)
Fixed Light	1.3300	0.5050	0.6717
Opening light	1.2360	0.4110	0.5080
Total glazing, A_g			1.1796
Frame	(m)	(m)	(m ²)
F1	0.6160	0.0750	0.0420
F2	0.6150	0.0750	0.0420
F3	1.4800	0.0750	0.1054
F4	0.6150	0.0750	0.0420
F5	0.5050	0.0470	0.0215
F6	0.6150	0.0750	0.0420
F7	0.5050	0.0470	0.0215
F8	1.4800	0.0750	0.1054
F9	1.3300	0.0470	0.0603
F10	1.4800	0.0700	0.0984
F11	1.3300	0.0470	0.0603
Total Frame			0.6408
Total Window, A_w			1.8204
Percentage fixed light glass area			36.90%
Percentage opening light glass area			27.91%
Percentage glass area (total)			64.80%

Where a U_g value from hot box testing is available, no L_f or L_{ψ} values need to be entered					
Frame conductance:		All L values to 4DP . All b values to ODP			
		$W/(m^2 \cdot K)$	b_g (mm)	$W/(m^2 \cdot K)$	b_g (mm)
F1 fixed sill	L_f 2DP	0.2835	190	L_{ψ} 2DP	0.3388
F2 fixed head		0.2835	190		0.3388
F3 fixed jamb		0.2835	190		0.3388
F4 + F5 sash sill		0.3510	190		0.4033
F6 + F7 sash head		0.3510	190		0.4033
F8 + F9 sash jamb		0.3510	190		0.4033
F10 + F11 mullion		0.5436	380		0.6674

Frame:	b_f (no gaskets)	U_f	Frame areas (no gaskets)	Heat flow	ψ	l_g	Heat flow
Section	(m)	(W/(m ² ·K))	(m ²)	(W/K)	(W/(m ² ·K))	(m)	(W/K)
F1 fixed sill	0.0750	1.1683	0.0420	0.0491	0.0266	0.5050	0.0134
F2 fixed head	0.0750	1.1683	0.0420	0.0491	0.0266	0.5050	0.0134
F3 fixed jamb	0.0750	1.1683	0.1054	0.1231	0.0266	1.3300	0.0354
F4 + F5 sash sill	0.1220	1.2715	0.0635	0.0808	0.0236	0.4110	0.0097
F6 + F7 sash head	0.1220	1.2715	0.0635	0.0808	0.0236	0.4110	0.0097
F8 + F9 sash jamb	0.1220	1.2715	0.1657	0.2107	0.0236	1.2360	0.0292
F10 + F11 mullion	0.1170	1.2978	0.1587	0.2059	0.0664	1.2830	0.0852
Totals			0.6408	0.7994		Total	0.1960

Solar Factor, g-value:	F_w	0.9
	g_w	0.41

U_{window}	U_w	1.31 W/(m ² ·K)
--------------	-------	-----------------------------------

Air Leakage loss:

Air leakage at 50 Pa per hour & per unit length of opening light (BS 6375-1) - 2DP				0.00	m ³ /(m·h)
Opening light length	3.6700	m	Total air leakage	0.000	m ³ /h
L_{50}	0.00	m ³ /(m ² ·h)	Heat loss = 0.0165 L_{50}	0.00	W/(m ² ·K)

Other parameters needed for calculation, taken from simulations:
Panel thickness, $d_p = d_g =$ **0.028** m

$\lambda_p =$ **0.035** W/(m·K) $R_{so} =$ **0.04** m²·K/W $R_{se} =$ **0.13** m²·K/W
 $R_p =$ **0.8000** m²·K/W $R_{tot} =$ **0.9700** m²·K/W $U_p =$ **1.0309** W/(m²·K)

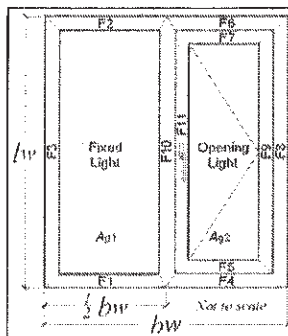
BFRC Rating kWh/(m ² ·yr)	Label index	EWER Rating Scale	Window Rating
10 to < 20	0	A	A
20 to < 30		B	
30 to < 40		C	
40 to < 50		D	
50 to < 60		E	
60 to < 70		F	
70 to < 80		G	

BFRC Rating =	
218.6g $_{window}$ - 68.5 x (U_{window} + Effective L_{50}) =	-0.11
Climate zone is:	UK
Thermal transmittance, W/(m ² ·K)	U_{window} 1.3
Solar factor	g_{window} 0.41
Window air leakage heat loss, W/(m ² ·K)	L_{factor} 0.00



Simulator Name: **Phil Parry**

BFRC Certified
Simulator **023**



Sample Style:
Casement
Fixed Light /
Side Hung

Blue line illustrates
opening light length
(air leakage)

Report Number: **L726**
Report Date: **24th June 2010**
Project Details: **Eurologik 70 - Float/Argon/SG Planitherm Total Plus/Swisspacer V (Thermal Inserts) Polysulfide - 7006 All**

Issue No.21: 04/03/2009

BUTYL

Input Values:

Yellow input, green intermediary, blue finals

X' DP is no. of decimal places to enter

Parameter	Symbol	Units
Total window height ODP	l_w	1480 mm
Total window width ODP	b_w	1230 mm

Nominal 4mm etc to ODP , others 1DP			
Glazing dimensions and properties:			
Thickness of pane 1	4	mm	
Pane 1/2 distance	20	mm	
Gas fill (1/2)	Argon 90%		
Thickness of pane 2	4	mm	
Complete next 3 cells for TG IGU			
Pane 2/3 distance		mm	
Gas fill (2/3)			
Thickness of pane 3		mm	
Glazing Trans. - 3DP	U_g	1.182	W/(m ² ·K)
g-value - 2DP	g_L	0.71	

Thermal transmittance of window from hot box test		
U_w - 2DP		W/(m ² ·K)

Window Dimensions:			Area	
	Length	Width	No gasket	With gasket
Section	(m)	(m)	(m ²)	(m ²)
Fixed Light	1.3300	0.5050	0.6717	0.6717
Opening light	1.2360	0.4110	0.5080	0.5080
Total glazing, A_g			1.1796	1.1796
Frame	(m)	(m)	(m ²)	(m ²)
F1	0.6150	0.0750	0.0420	0.0420
F2	0.6150	0.0750	0.0420	0.0420
F3	1.4800	0.0750	0.1054	0.1054
F4	0.6150	0.0750	0.0420	0.0420
F5	0.5050	0.0470	0.0215	0.0215
F6	0.6150	0.0750	0.0420	0.0420
F7	0.5050	0.0470	0.0215	0.0215
F8	1.4800	0.0750	0.1054	0.1054
F9	1.3300	0.0470	0.0603	0.0603
F10	1.4800	0.0700	0.0984	0.0984
F11	1.3300	0.0470	0.0603	0.0603
Total Frame			0.6408	0.6408
Total Window, A_w			1.8204	1.8204
Percentage fixed light glass area			36.90%	36.90%
Percentage opening light glass area			27.91%	27.91%
Percentage glass area (total)			64.80%	64.80%

Solar Factor, g-value:		
F_w	0.9	
g_w	0.41	

U_{window}	U_w	1.37	W/(m ² ·K)
--------------	-------	-------------	-----------------------

Other parameters needed for calculation, taken from simulations:
Panel thickness, $d_p = d_g = 0.028$ m

Frame dimensions:		Without gasket	Gasket protrusion	With gasket	
	(b_f)	(mm)	(mm)	(mm)	
All frame values to nearest 0.5mm, gaskets to 1DP					
F1 fixed sill		75	0.0	75	Total
F2 fixed head		75	0.0	75	
F3 fixed jamb		75	0.0	75	
F4 + F5 sash sill		75	n/a	75	122
F5 moving sash sill		47	0.0	47	
F6 + F7 sash head		75	n/a	75	122
F7 moving sash head		47	0.0	47	
F8 + F9 sash jamb		75	n/a	75	122
F9 moving sash jamb		47	0.0	47	
F10 + F11 mullion		70	0.0	70	117
F11 moving mullion		47	0.0	47	
Total gasket area		0		m ²	

Where a U_d value from hot box testing is available, no L_f^{2D} or L_ψ^{2D} values need to be entered							
Frame conductance:		All L values to 4DP . All b values to ODP					
		$W/(m^2 \cdot K)$	b_p (mm)		$W/(m^2 \cdot K)$	b_g (mm)	
F1 fixed sill	L_f^{2D}	0.2993	190	L_ψ^{2D}	0.3600	190	
F2 fixed head		0.2993	190		0.3600	190	
F3 fixed jamb		0.2993	190		0.3600	190	
F4 + F5 sash sill		0.3653	190		0.4237	190	
F6 + F7 sash head		0.3653	190		0.4237	190	
F8 + F9 sash jamb		0.3653	190		0.4237	190	
F10 + F11 mullion		0.5436	380		0.6674	380	

Frame:	b_f (no gaskets)	U_f	Frame areas (no gaskets)	Heat flow	ψ	l_g	Heat flow
Section	(m)	(W/(m ² ·K))	(m ²)	(W/K)	(W/(m·K))	(m)	(W/K)
F1 fixed sill	0.0750	1.3790	0.0420	0.0579	0.0320	0.5050	0.0162
F2 fixed head	0.0750	1.3790	0.0420	0.0579	0.0320	0.5050	0.0162
F3 fixed jamb	0.0750	1.3790	0.1054	0.1453	0.0320	1.3300	0.0426
F4 + F5 sash sill	0.1220	1.3887	0.0635	0.0882	0.0297	0.4110	0.0122
F6 + F7 sash head	0.1220	1.3887	0.0635	0.0882	0.0297	0.4110	0.0122
F8 + F9 sash jamb	0.1220	1.3887	0.1657	0.2301	0.0297	1.2360	0.0367
F10 + F11 mullion	0.1170	1.2978	0.1587	0.2059	0.0664	1.2830	0.0852
Totals		0.6408	0.8736			Total	0.2212

Air Leakage loss:			
Air leakage at 50 Pa per hour & per unit length of opening light (BS 6375-1) - 2DP			
Opening light length	3.6700 m	Total air leakage	0.000 m ³ /h
L_{50}	0.00 m ³ /(m ² ·h)	Heat loss = 0.0165 L_{50}	0.00 W/(m ² ·K)

BFR Rating kWh/(m ² ·yr)	Label index	EWER Rating Scale	Window Rating
10 to < 20	-4	A	B
20 to < 30		B	
30 to < 40		C	
40 to < 50		D	
50 to < 60		E	
		G	

BFR Rating =	
218.6g_{window} - 68.5 x (U_{window} + Effective L₅₀) =	
Climate zone is:	
Thermal transmittance, W/(m²·K)	
U_{window}	1.4
Solar factor	
g_{window}	0.41
Window air leakage heat loss, W/(m²·K)	
L_{factor}	0.00

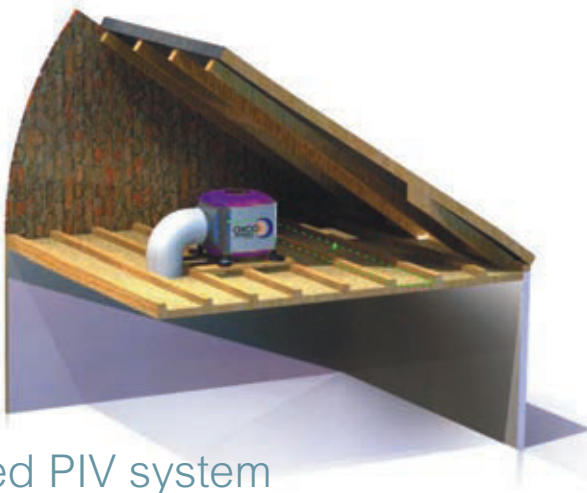


BFR Certified
Simulator 024

Simulator Name: **Paul Turner**



Axco Positive Input Ventilation Systems



Axco Loft Mounted PIV system

The loft mounted unit takes maximum advantage of the benefits of solar gain from within the loft space – the natural accumulation of heat from the sun on bright days. Temperatures in the loft space are on average 3°C higher than outside, and as the loft mounted unit draws fresh air from the loft and delivers it into the property via the innovative diffuser, this results in a relative saving of around 150 Watts of heat energy per day in an average modern family home.



Axco Wall Mounted PIV system

Suitable for apartments/flats, the wall mounted unit has an air inlet from outside (inlet can be left or right handed to the side or rear of the unit). The unit also benefits from a double skin carcass for improved insulation.



Axco Air-Source PIV system

Ideal for homes with a small or unventilated loft space, the Axco Air-Source PIV unit has the facility to source cooler air from outside the building when the temperature in the loft space rises above 25°C. Detecting the rise in temperature, the unit starts to draw air from the atmosphere. This not only provides efficient perception cooling into the property during warmer weather, but also maintains the required level of ventilation continuously throughout the year. This facility is greatly beneficial for properties affected by high levels of Radon.

Axco Air-Source PIV units have the additional facility to draw air from the atmosphere during the warmer months of the year.

	Speed	Loft PIV	Wall PIV	Air-Source PIV
Airflow	Trickle	19	9	23
	Boost	47	20	46
Watts	Trickle	3.03	3.4	3.2
	Boost	9.76	6.1	8.0
Specific Fan Power (SFP)	Trickle	0.15	0.39	0.14
	Boost	0.20	0.30	0.17
Unit Dimensions (W x H x D) (mm)		325 x 415 x 330	505 x 380 x 185	515 x 576 x 481
Integral comfort Pre Heater		✓	✓	✓
Integral G4 filter		✓	✓	✓
Square Ceiling Valve (mm) 300 x 300 x 30		✓	✓	✓

Client: Barratt Homes and
David Wilson Homes

Project: Low Barugh,
Barnsley

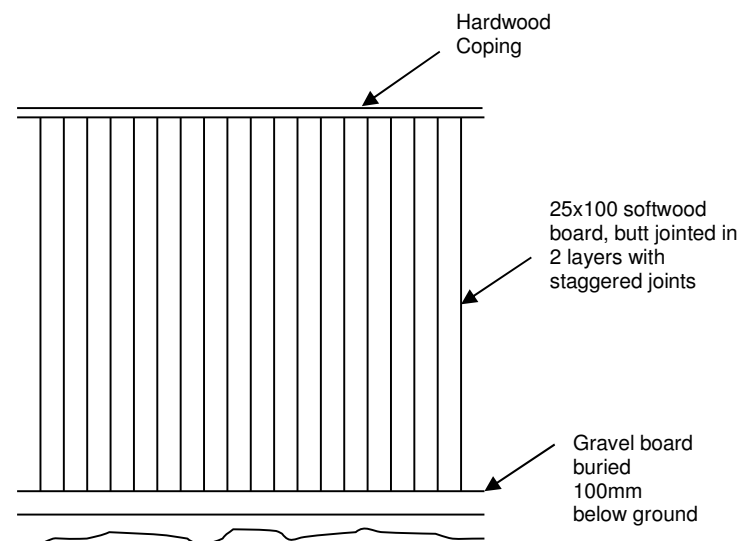
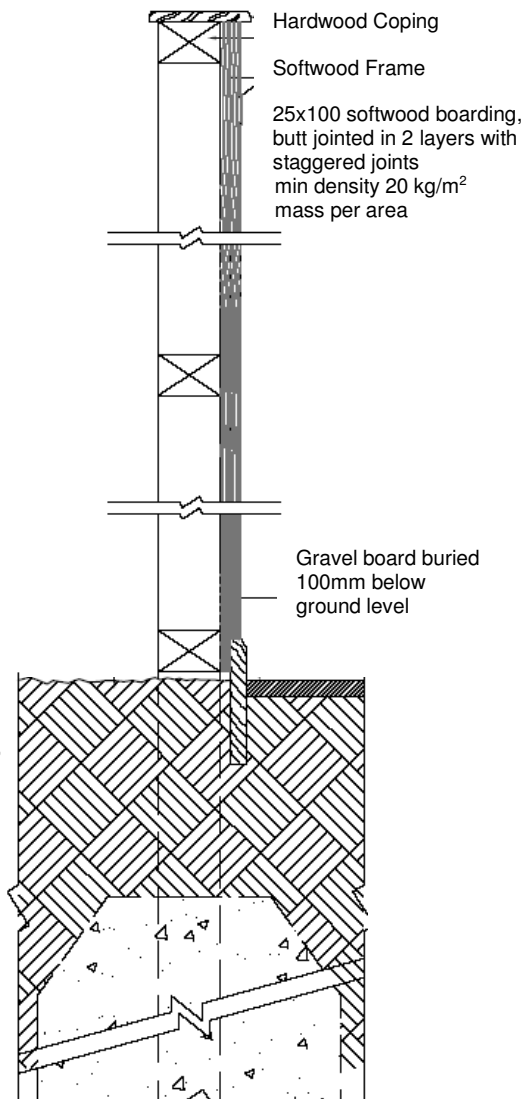
Project Number: A102475

Site Address: Low Barugh,
Barnsley

Drawing Title / Scenario:
Acoustic Garden Fence
Detail

Scale: Not to Scale

WYG Leicester





Appendix D – Room Dimensions

	Width (m)	Length (m)	Height (m)
Finchley	Lounge		
	3.89	4.997	2.31
	Bedroom 1		
	2.632	3.634	2.283
	Bedroom 3		
	1.955	2.718	2.283
Lincoln	Lounge		
	3.188	5.203	2.31
	Dining		
	2.924	3.346*	2.31
	Bedroom 2		
	3.804	3.2	2.298
	Bedroom 3		
	3.755	3.2	2.298

Falls within 100Hz room node range

* Irregular room shape: unlikely significant 100Hz room nodes would be present