

Ref: PJB8651/18507

Date: 13 March 2019



Shanna Jackson
Swann Edwards Architecture
Black Barn
Fen Road
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Cambs PE13 4AA

Dear Shanna

**LAND WEST OF MCDONALD'S RESTAURANTS LTD, VICARAGE LANE, LONG SUTTON, SPALDING -
PLANNING CONDITION 9**

Following your instruction, Spectrum have investigated the acoustic issues and analysed the requirements for discharging the above planning condition relating to this development. Please find our analysis described below.

1. BACKGROUND

Swann Edwards Architecture are assisting their client, Mr J Hoey to develop a mixed use site comprising a fishing lake, site office, up to 30 caravan pitches, a workshop building and caravan sales area, and 12 x 2-bed holiday cottages and 10 x 3-bed holiday cottages with associated parking and landscape bunding. The planning approval for the development (ref. H11-0420-18), issued by South Holland District Council, includes a condition relating to environmental noise affecting the development, requiring protection of future occupiers from disturbance, as follows:

9. *Details of external/internal acoustic measures to be provided to protect future occupiers from noise generated from traffic noise from the A17 and activity associated with the restaurant to the east shall be submitted to and approved in writing by the Local Planning Authority. The approved details shall be fully implemented before any static caravan or holiday cottage is brought into use..*

2. GUIDELINES FOR ACCEPTABILITY

The guidance in *BS 8233:2014 Guidance on sound insulation and noise reduction for buildings* provides recommendations for acceptable internal noise levels. Compliance with the requirements of Table 4 of BS8233 regarding indoor noise levels is considered to satisfy the requirements of the condition.

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

Table 1: Indoor ambient noise levels for dwellings recommended in BS8233:2014

The Notes to Table 4 in BS8233 include some important additional guidance which informs these noise level recommendations. Salient notes are as follows:

HEAD OFFICE:
27-29 High Street
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Registered in England No. 2378475

- NOTE 4:** 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_{AFmax} , depending on the character and number of events per night. Sporadic noise events could require separate values.
- NOTE 5:** If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the facade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.
- NOTE 7:** 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.

These points are discussed in relation to this development later within this technical letter.

BS 8233 also provides guidelines for noise levels in private amenity areas. It says:

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 also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the 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 practicable levels in these external amenity spaces, but should not be prohibited.

This technical letter describes the procedure undertaken to ensure that the requirements of condition 9 are met. In particular, the McDonald's operates early and late opening hours and over the weekend trades on a 24 hour basis. Therefore, it is necessary to ensure that issues associated with this use are properly mitigated by the proposed scheme.

3. SITE DESCRIPTION

The site is located to the north of Vicarage Lane, at the junction of the A17 and the A1101. It is immediately south of the A17 and immediately west of McDonalds. Access to the site is via an internal roadway off Vicarage Lane which is shared with McDonalds.

The site is positioned within a commercial area with McDonalds to the east and Long Sutton Barn Craft Village to the south. Opposite McDonalds to the east there is a former petrol filling station which is currently used for static caravan sales with a car sales business. To the north of the site, on the opposite side of the A17 is a BP petrol filling station, food outlets and a Travel Lodge.

The Planning Approval is for a mixed use development comprising fishing lake, site office, 30 caravan pitches, a workshop building and caravan sales area, and 12 x 2-bed holiday cottages and 10 x 3-bed holiday cottages with associated parking and landscape bunding.

The existing access (which is currently used by McDonalds) will be extended at both parts of the turning head, creating two internal access points. The northern access will lead to the caravan sales area and workshop and the western access will lead to the caravans and holiday cottages.

The site is divided into two sections with the workshop and caravan sales area to the north, and the holiday accommodation, comprising the cottages and caravans, to the south. The fishing lake is positioned to the east of the site, near to McDonalds with the site office and refuse store positioned directly to the south. The permanent holiday cottage accommodation is arranged around the periphery of the caravan pitches.

The western and southern boundaries will be supported 1.5m high earth bunding with landscaping above. A 2.1m high acoustic fence will be positioned on the eastern boundary where the site joins McDonalds and between the northern cottages and the caravan sales area.

A site location plan is shown in Attachment 1.

4. NOISE INGRESS LEVELS

4.1 Procedure

The internal noise level guidelines recommended in BS8233 are dependent on the external noise level, the façade sound insulation and acoustic properties of the habitable rooms within the building. These effects have been analysed and the façade sound insulation specified in order to achieve the internal noise levels shown in Table 1 above.

4.2 Noise survey date, location and equipment

Ambient noise measurements were carried out during a site survey between 13 and 18 February, 2019. This survey consisted of long-term, unattended noise measurements at two locations on the subject site, prior to any construction or demolition work taking place. The measurement positions were as follows:

- Position 1:** North of the McDonald's car park, 1.5m above local ground level in free field conditions, 25m from the carriageway edge of the A17 and 65m from the A1101 with clear line-of-sight to these roads.
- Position 2:** To the south west of the McDonalds site, near the roadway entrance and takeaway order point, 5m above local ground level 125m from the carriageway edge of the A17 and 75m from the A1101 with clear line-of-sight to all external activity on the McDonalds site.

The long-term monitoring locations are shown in site location plan in Attachment 1.

The following equipment was used during the survey:

Position 1

- Bruel & Kjaer Type 2250 Sound Level Meter s/n 3010945
- Bruel & Kjaer Type 4189 Microphone s/n 3060807
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 3010648

Position 2

- Bruel & Kjaer Type 2250 Light Sound Level Meter s/n 3006950
- Bruel & Kjaer Type 4952 Microphone s/n 2922623

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

Measurements have been summarised into contiguous 5 minute periods to present the noise profile throughout the monitoring period. Noise parameters consisted of equivalent continuous ($L_{Aeq,T}$) noise levels and maximum (L_{AFmax}) noise levels as well as statistical noise levels (termed L_n , where n is the percentage of time the level is exceeded during the measurement period). Overall and octave band measurements were stored for later analysis.

The results of the measurements are shown graphically in Attachment 2. In addition, the results have been summarised into relevant daytime (07:00-23:00 hours) and night-time (23:00-07:00 hours) periods, coinciding with widely agreed definitions, in Table 2, below.

Noise parameter	Positon 1	Positon 2
Daytime L_{Aeq}	62	59
Night-time L_{Aeq}	58	53
Night-time L_{AFmax}^1	72	71

Table 2: Aggregated summary results of noise monitoring

Note 1: The numerical $L_{AFmax,5min}$ levels for each 8 hour night-time period have been sorted by value from highest to lowest. From this, it is possible to read off the 10-15th highest L_{AFmax} level for each night. The highest of these values is then taken as the representative L_{AFmax} at the respective monitoring location for subsequent use in assessing L_{AFmax} levels inside residences on the site. This is in accordance with the guidance in the WHO "Guidelines for community noise" document, which states that, for a good nights' sleep, the L_{AFmax} level should not exceed 45 dB more than 10 to 15 times.

The charts in Attachment 2 show consistent noise levels throughout the day, punctuated by short-term noisy events. During the evening typical minimum noise levels (L_{A90} levels) taper off to rise again the following morning. This is a characteristic noise environment near main transport routes.

4.4 Noise survey specifically of McDonald's activity

Following completion of the long-term ambient noise survey described above, a shorter-term, attended survey of the noise specifically from activity within the car park and takeaway ordering point were monitored. This comprised a 30-minute continuous period of measurement at Location 3 (Attachment 1) within the car park at 1.5m height. Measurements included the same parameters as described previously, measured in contiguous 20 second periods.

4.5 Observations

At the beginning and end of the survey, observations of the main noise sources in the area were undertaken to inform the subsequent noise modelling process. In general, road traffic noise on the two main adjacent roads was the dominant noise source. Noise from vehicles entering Vicarage Lane and the McDonalds was also audible as was car starts, doors closing, takeaway order point conversations and plant noise. The car park area was observed to be very busy during the survey, which occurred between 1.00 and 1.30pm on 18 February (i.e. over lunchtime).

On the subject site itself, noise from McDonalds car park activity was not prominent in the context of road traffic noise from the A17, the A1011, Vicarage Lane or the McDonalds entrance road.

4.6 Results

The resulting noise level within the carpark was as shown in Table 3

dB(A)	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
60	71	64	58	56	67	63	46	41

Table 3: Measured car park noise

5. PREDICTION OF ENVIRONMENTAL NOISE LEVELS AT LOCATIONS ACROSS THE SITE

The measurement results presented in Tables 2 and 3 are representative of the environmental noise conditions at the respective measurement locations.

The proposed buildings and site caravans comprise habitable rooms and spaces at various heights, distances and aspects relative to the surrounding roads and carpark. As a result, the noise level affecting different locations across the development will be subject to differing levels of distance attenuation, screening and angle of view to the surrounding noise sources. Therefore, analysis has been undertaken to predict the noise level at the various facades of the dwellings in the development, based on the measurement results and taking these effects into account.

The procedure that has been followed is as summarised below:

- Generate a three dimensional numerical noise model of the site conditions at the time of the survey using Bruel and Kjaer's 7810 'Predictor' software. This acoustic model implements the procedures set out in ISO 9613-2:1996 "*Acoustics – Attenuation of sound during propagation outdoors Part 2: General method of calculation to determine noise levels*"
- Validate the noise prediction model against actual noise measurement data taken at the site. This validation is carried out in respect of daytime and night-time $L_{Aeq,T}$ levels, as well as night-time L_{AFmax} noise.
- Alter the noise model to replace the physical configuration at the time of the measurements with the proposed new cottages and caravans at their future location and height.
- Predict noise levels at numerous locations around the façades of the building, representative of the proposed windows of habitable rooms. A graphical representation of this model is shown at Attachment 3. It is important to note that, within this model the level of noise from the McDonalds' carpark during the 'lunchtime rush' has been included as occurring at all times, even though this is a significant overestimate of its noise, particularly at night-time.
- Use these noise level predictions as the starting point for intrusive noise calculations at key locations around the development.
- Compare predicted indoor noise levels against the guideline noise levels.
- Using actual measured sound insulation data for commercially available façade components, set the façade sound insulation specifications for the relevant elements so that the noise limits are met.

Within the noise model, the roads are modelled as line sources and car park noise is modelled as an area source 1m above ground height. The L_{AFmax} level used for design purposes is the L_{AFmax} level shown in Table 2, as this data was obtained at locations equivalent to the most affected proposed cottages.

The most noise-exposed dwellings on the development is the 2-bed unit in the north east corner, nearest to the McDonalds. This has a daytime $L_{Aeq,16hr}$ of 59 dB at ground floor level and 63 dB at first floor level. At night-time the first floor $L_{Aeq,8hr}$ is 59 dB. The most affected static caravan site is Unit 30, the eastern-most unit, with a daytime $L_{Aeq,16hr}$ of 58 dB and a night-time $L_{Aeq,8hr}$ of 53 dB.

6. ANALYSIS OF INTRUSIVE NOISE INSIDE HABITABLE ROOMS

6.1 Description of Calculations

Internal noise levels can be calculated from external noise levels, given the size and construction of the building façade elements including glazing and ventilation, as well as acoustic properties of the receiving room, such as the volume and reverberation time. Usually, it is the glazing and, depending upon the particular strategy, the ventilation apertures that admit most noise into residences. It is then a matter of providing façade elements with adequate sound insulation performance to achieve sufficient noise reduction and thereby meet the internal noise target.

The method that has been followed is described in Annex G2.1 of *BS 8233:2014 Guidance on sound insulation and noise reduction for buildings*.

The analysis carried out here assumes typical internal finishes for the type of rooms considered, based on acoustic properties Spectrum have measured in a range of occupied dwellings. The general construction of the building envelope is as follows:-

- External walls (inside to outside) comprising 1layers of 12.5mm plasterboard on dabs to concrete block inner skin, insulated cavity, and 103mm brickwork.
- Pitched roof of concrete tile with insulated ceiling void to plasterboard ceiling.
- Window/door glazing having a specification as described later within this document.
- Ventilation to meet the requirements of Part F of the Building Regulations as discussed in the following section.

Sound insulation data for the façade elements have been taken from sources such as standard data provided by BRE and DETR, Spectrum library of manufacturer's measured product data, calculations using Marshall Day's *Insul* software as well as manufacturer's data and the BRE/CIRIA publication 'Sound Control for Homes'.

Attachment 4 shows sample intrusive noise calculations for the most noise-exposed living rooms and bedrooms of the development. Similar calculations have been carried out other locations across the development in order to establish the necessary façade glazing specification necessary to achieve guideline internal noise levels.

When there are external walls of a room having more than one façade, the noise exposure of the wall having the highest predicted noise levels is assumed to occur outside all parts of that room. This presents a robust assessment.

The above calculation process is not really applicable to static caravans due to the lightweight nature of the external shell as well as all facades of the unit being exposed to environmental noise. On a previous project, Spectrum have conducted a long-term concurrent measurement survey of noise levels inside and outside of a static caravan exposed to road traffic noise. This showed that the noise level difference from outside to inside with windows normally closed is 18 dB.

6.2 Ventilation

Approved Document F of the Building Regulations (ADF) is the document which describes methods of providing adequate ventilation for people in a building. It focuses on performance-based guidance, suggesting what level of ventilation should be sufficient, rather than how it should be achieved. It recognises that in noisy locations, it may be appropriate to use either sound attenuating background ventilators or mechanical ventilation solutions, depending on the noise level and any planning conditions.

In habitable rooms, there is a requirement for continuous whole dwelling ventilation (formerly known as background ventilation); extract ventilation from rooms where water vapour and / or pollutants are present

(such as kitchens – this ventilation may be continuous or intermittent); and purge ventilation (formerly known as rapid ventilation) to aid removal of high concentrations of pollutants and water vapour released from occasional activities

ADF provides 4 methods of achieving these modes of ventilation, namely:

1. Background ventilators and intermittent extract fans
2. Passive stack ventilation
3. Continuous mechanical extract
4. Continuous mechanical supply and extract with heat recovery

Of these systems, *Method 1* is to be used for all of the permanent cottages within this development.

6.3 Background ventilators and intermittent extract fans (Method 1)

Under System 1, external air is drawn into habitable rooms of the dwelling through window-mounted trickle vents (1 vent per bedroom and 2 vents per living room in all locations). Air passes through the dwelling and is discharged via a mechanical extract fan located in wet areas (e.g. bathrooms), ducted to the external façade. The component of external intrusive noise entering habitable rooms through the trickle ventilation elements is included in the calculations used to derive the acoustic performance requirement.

6.4 Purge ventilation

For all ADF ventilation methods, *Purge ventilation* is typically provided by opening external windows. This ventilation mode is occasional and short term for the rapid dilution of indoor pollutants (e.g. burnt food). It is widely agreed that no specific acoustic criterion applies for purge ventilation conditions as the imperative to eliminate the pollutant overrides other concerns for the short period during which it occurs.

6.5 Façade acoustic specification for cottages

Using the procedure described above, the predicted external façade noise levels have been used to calculate intrusive noise inside a representative sample of permanent cottages, taking into account façade element sizes and sound insulation, room volume and typical absorption.

This analysis shows that the glazing across the whole development will be acceptable with standard, thermal double glazing having an sound reduction index performance of R_w 32 dB, R_w+C_{tr} 26 dB. Example double glazed units include 4mm pane, 12mm airgap and 4mm pane. The glazing acoustic specifications referred to above are specified as both the R_w and the R_w+C_{tr} performance standards. This second parameter is sometimes written as R_{tra} . It is recommended that the glazing supplier confirms that both the R_w and the R_w+C_{tr} performance shown in the mark-ups is met or exceeded by the selected window system including frames, seals, furniture, etc.

In some locations, a higher acoustic performance window trickle vent is required to achieve the requisite indoor ambient noise level in *bedrooms*. The required performance in these locations is $D_{n,e,w}$ 39 dB and $D_{n,e,w}+C_{tr}$ 37dB. In all other cases (including in all living spaces) standard (non-acoustic) hit-and-miss window trickle vents are

Attachment 5 includes a site layout plan, marked-up to indicate the façade locations where higher acoustic performance window trickle vents are required. Where there is no coloured specification for a window, standard (non-acoustic) trickle vents will be acoustically acceptable. This is equivalent to a $D_{n,e,w}$ 33 dB and $D_{n,e,w}+C_{tr}$ 32.

6.6 Static Caravans

The site layout in Attachment 1 shows that the design site has been specifically directed towards protecting the static caravans from surrounding noise sources. This includes:

- A 2.1m continuous close boarded fence along the northern boundary to the Caravan Sales yard
- A 2.1m continuous close boarded fence along the eastern boundary to the McDonald's site
- Aligning the permanent cottages along the northern and southern perimeters to provide acoustic screening to the roads beyond, and
- Locating the caravans, as much as possible, to the western side of the site.

The effect of these measures is shown in Attachment 6, discussed later in this technical letter. However, there is a limited degree of sound insulation provided by the fabric of the Static Caravans and there is no real opportunity to upgrade this sound insulation.

As noted above, the most affected static caravan site is Unit 30, the eastern-most unit, with a daytime $L_{Aeq,16hr}$ of 58 dB and a night-time $L_{Aeq,8hr}$ of 53 dB. The typical sound reduction for these units is 18 dB, resulting in internal noise levels of (at worst) $L_{Aeq,16hr}$ of 40 dB during the daytime and $L_{Aeq,8hr}$ of 35 dB at night-time.

Note 7 to Table 4 in BS8233 shows that this acoustic environment still represents reasonable conditions for occupants. Given that a high degree of acoustic attenuation is provided within the design of the site and that the units will not be occupied on a permanent basis, this is considered to be an acceptable compromise.

7. OUTDOOR NOISE LEVELS

The site layout includes outdoor amenity spaces including a fishing lake, with these spaces significantly screened from noise sources to the north and east.

The numerical noise model described in Section 5 has again been used to predict noise levels in this outdoor amenity space at a height of 1.5m above the ground at the completion of the development. The results are shown in contour form in Attachment 6.

This shows that the great majority of outdoor space is predicted to have noise levels at or below the $L_{Aeq,16hr}$ 50 dB and almost all areas at or below the $L_{Aeq,16hr}$ 55 dB as recommended in BS8233. There are some isolated spaces where these levels are exceeded by 1 to 3 dB, although alternative quieter areas are available within the curtilage of all units.

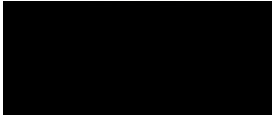
Accordingly, the proposals in respect of outdoor amenity are considered acoustically acceptable.

8. CONCLUSION

The acoustic specifications for glazing to habitable rooms described within this report will enable suitable indoor noise levels to be met at the proposed residences at this development, in accordance with Condition 9 of permission H11-0420-18.

If you have any questions or require further information, please don't hesitate to contact me.

Yours sincerely



Phill Banks
Principal Consultant

Attachment 1 - 1 page

General Notes
1. This drawing shall not be scaled, figured dimensions only to be used.
2. All dimensions are shown in 'mm' unless otherwise stated.
3. The contractor, sub-contractors and suppliers must verify all dimensions on site prior to the commencement of any work.
4. This drawing is to be read in conjunction with all relevant engineers and specialist sub-contractors drawings and specifications.
5. Any discrepancies are to be brought to the designers attention.

SITE PLAN KEY

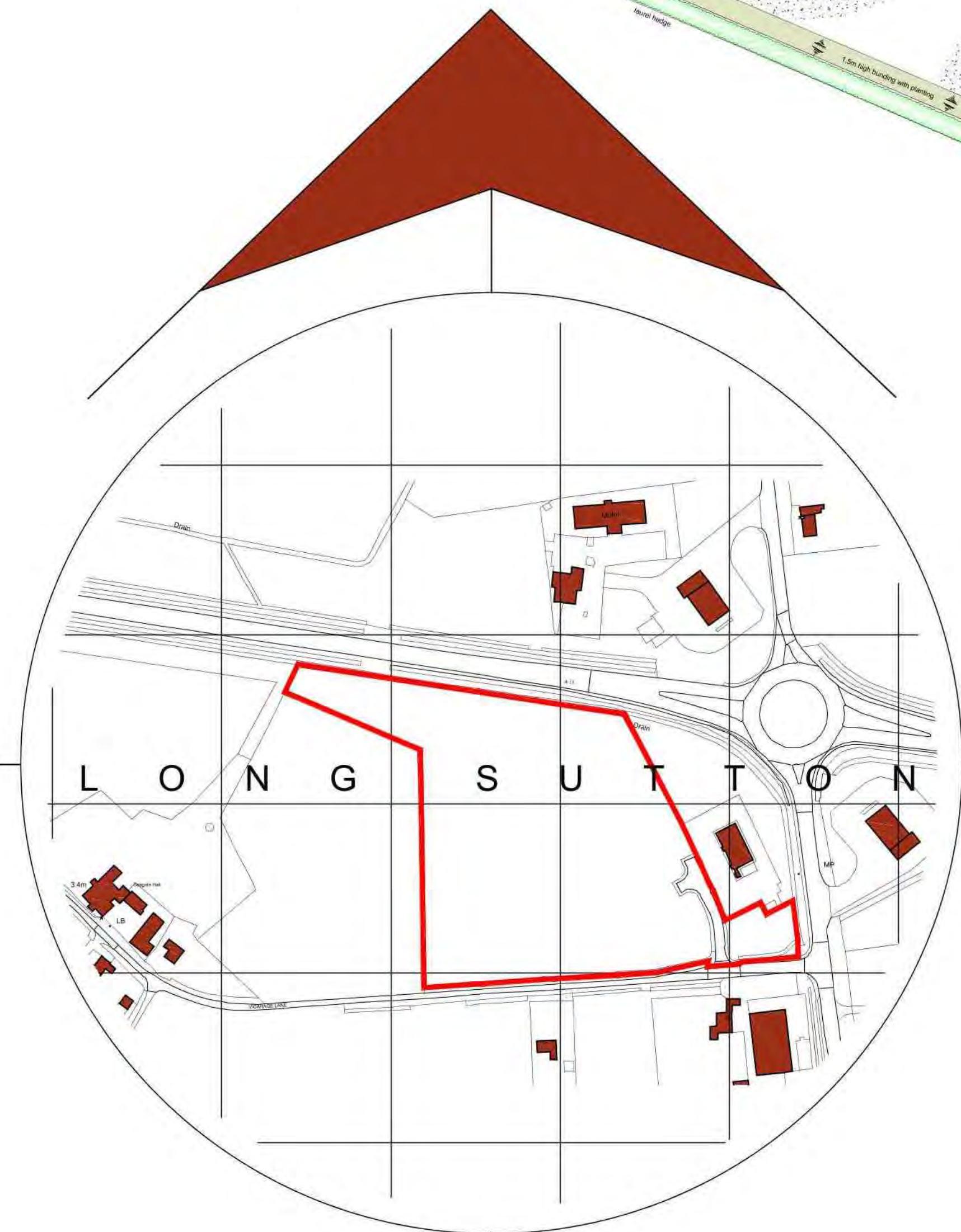
- Indicates neighboring properties (from ordinance survey location plan)
- Indicates proposed tarmac access road
- Indicates proposed static caravan bases
- Indicates proposed parking spaces
- Indicates existing trees and planting
- Indicates proposed trees and planting
- Indicates proposed 1.5m high bunding with planting
- Indicates proposed gravel
- Indicates proposed grass
- Indicates proposed fishing lake

Revisions		
A	Jan 2018	Scheme Amendments
B	Apr 2018	Site Amendments
C	June 2018	Site Amendments

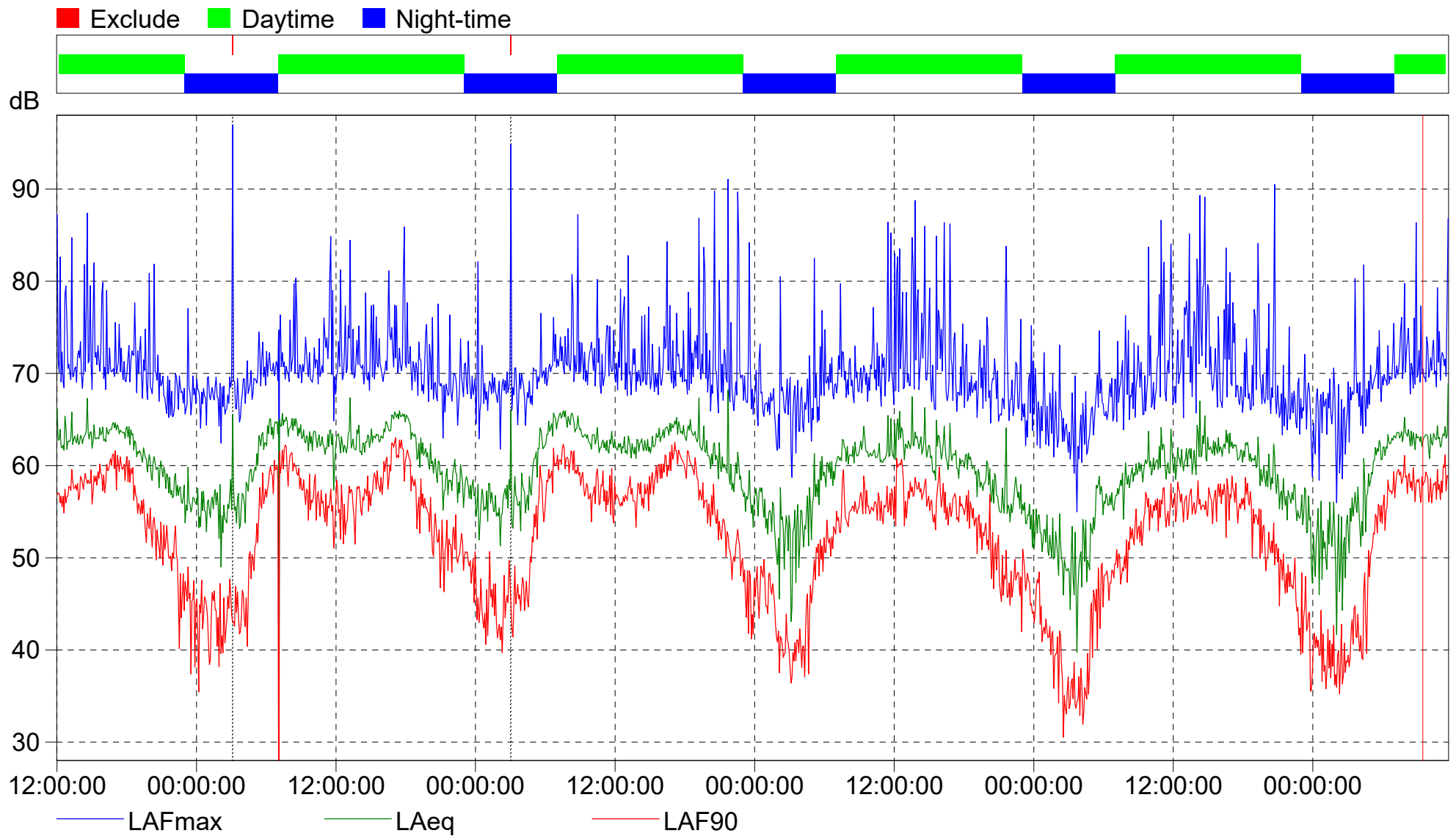
Status
FOR APPROVAL

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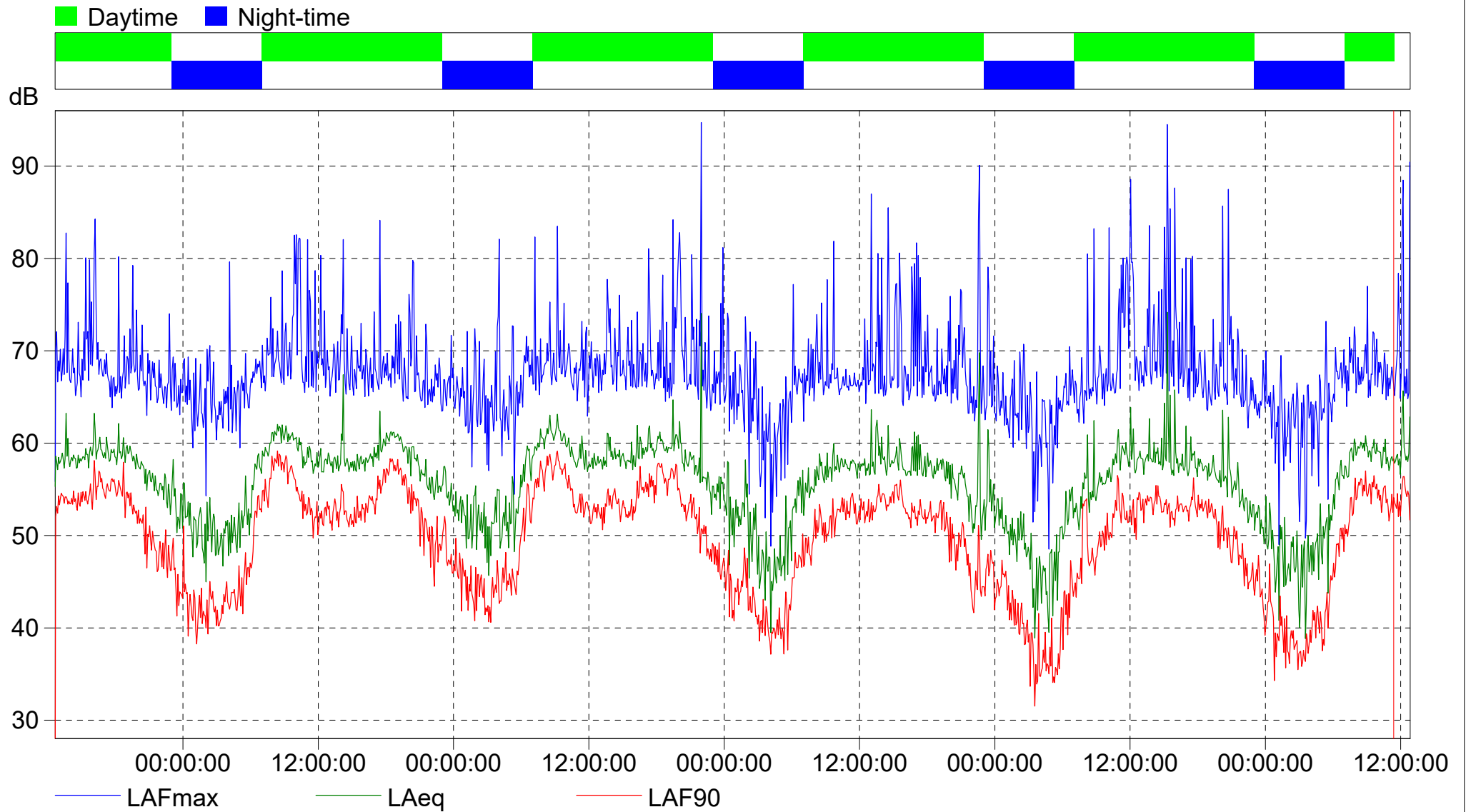
Job Title	Date	Scale
Proposed Caravan Park, Caravan Sales, Shop & Building Plots Land North of Vicarage Road, Long Sutton, for J Hoey	October 2016	Various Sheet Size A1
Drawing Title	Job No.	Drawn by
Planning Drawing Site and Location Plan	SE-571	She
Dwg No.	Revision	
10	C	



Long term noise survey results at Position 1 - Vicarage Lane

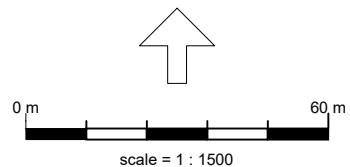


Long term noise survey results at Position 2 - Vicarage Lane



Attachment 3 - 2 pages

- Area sources
- Line sources
- Grids
- Receivers
- Barriers
- Buildings
- Height lines



200

100

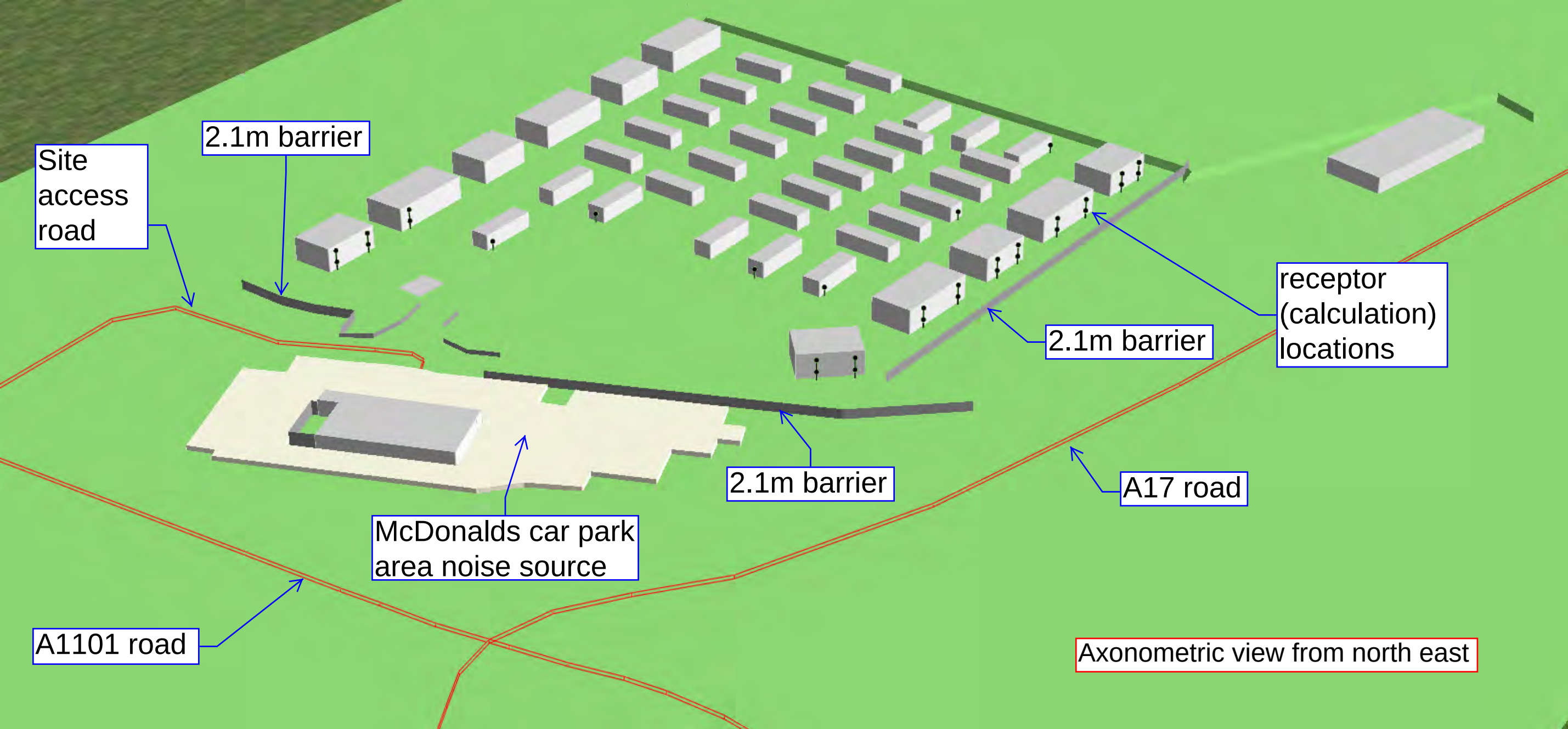


100

200

300

400



Site
access
road

2.1m barrier

receptor
(calculation)
locations

2.1m barrier

A17 road

2.1m barrier

McDonalds car park
area noise source

A1101 road

Axonometric view from north east

Attachment 4 - 4 pages

Calculated Indoor Ambient Noise Levels (as per BS 8233:2014 Annex G)



Project:	Vicarage Lane, Long Sutton
Project number:	18507
Date:	13/03/2019

Plot:	North-east 2 bed
Room:	LKD

Daytime (<i>L</i> Aeq,16hr)				Octave band centre frequency											
	Unit	Value	Description	Term	63	125	250	500	1k	2k	4k	8k	Broadband term		
EXTERNAL NOISE LEVEL															
External noise level			Façade 1	<i>L</i> eq,1	65	60	57	56	56	50	41	32	<i>L</i> Aeq,1	59 dB	
Façade correction factor				C	0	0	0	0	0	0	0	0			
INCIDENT FAÇADE NOISE LEVEL															
Incident noise level			Façade 1	<i>L</i> eq,ff	65	60	57	56	56	50	41	32	<i>L</i> Aeq,ff	59 dB	
ROOM DATA															
Room description and reverberation time	Volume	93.6	Living Room	RT60	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3		s	
FAÇADE ELEMENTS (Façade 1)															
Glazing	Area	6.5	Pilkington 4/6-16/4	Rw	20	21	17	25	35	37	31	36	Rw / Rw+Ctr	29 / 25 dB	
Wall	Area	29.5	Brick and block external wall	Rw	34	40	44	45	51	56	60	63	Rw / Rw+Ctr	50 / 47 dB	
Vent	No. off.	2	Greenwood 4000 SBW (Hit and miss)	Dn,e	38	38	37	34	30	34	37	46	Dn,e,w / Dn,e,w+Ctr	33 / 32 dB	
None			--												
RESULTS															
Total calculated indoor noise level				<i>L</i> eq,2	43	37	36	29	27	17	8	-	<i>L</i> Aeq,2	32 dB	

Calculated Indoor Ambient Noise Levels (as per BS 8233:2014 Annex G)



Project:	Vicarage Lane, Long Sutton
Project number:	18507
Date:	13/03/2019

Plot:	North-east 2 bed
Room:	Bedroom

Daytime (<i>L</i> _{Aeq,16hr})				Octave band centre frequency											
	Unit	Value	Description	Term	63	125	250	500	1k	2k	4k	8k	Broadband term		
EXTERNAL NOISE LEVEL															
External noise level			Façade 1	<i>L</i> _{eq,1}	66	60	60	59	60	55	47	38		<i>L</i> _{Aeq,1}	63 dB
Façade correction factor				C	0	0	0	0	0	0	0	0			
INCIDENT FAÇADE NOISE LEVEL															
Incident noise level			Façade 1	<i>L</i> _{eq,ff}	66	60	60	59	60	55	47	38		<i>L</i> _{Aeq,ff}	63 dB
ROOM DATA															
Room description and reverberation time	Volume	23.1	Bedroom	RT60	0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.2			s
FAÇADE ELEMENTS (Façade 1)															
Glazing	Area	1.5	Pilkington 4/6-16/4	Rw	20	21	17	25	35	37	31	36		Rw / Rw+Ctr	29 / 25 dB
Wall	Area	7.38	Brick and block external wall	Rw	34	40	44	45	51	56	60	63		Rw / Rw+Ctr	50 / 47 dB
Vent	No. off.	1	Greenwood 5000EAW.AC1 (Acoustic trickle)	Dn,e	32	38	37	31	43	43	40	40		Dn,e,w / Dn,e,w+Ctr	39 / 37 dB
Roof	Area	9.625	Tile/slate 12.5mm plbd ceiling absorbing layer	Rw	22	27	37	43	48	52	56	60		Rw / Rw+Ctr	46 / 39 dB
RESULTS															
Total calculated indoor noise level				<i>L</i> _{eq,2}	49	40	38	34	23	16	12	-		<i>L</i> _{Aeq,2}	34 dB

Calculated Indoor Ambient Noise Levels (as per BS 8233:2014 Annex G)



Project:	Vicarage Lane, Long Sutton
Project number:	18507
Date:	13/03/2019

Plot:	North-east 2 bed
Room:	Bedroom

Night time ($L_{Aeq,8hr}$)				Octave band centre frequency											
	Unit	Value	Description	Term	63	125	250	500	1k	2k	4k	8k	Broadband term		
EXTERNAL NOISE LEVEL															
External noise level			Façade 1	$L_{eq,1}$	62	55	55	55	55	50	41	33		$L_{Aeq,1}$	58 dB
Façade correction factor				C	0	0	0	0	0	0	0	0			
INCIDENT FAÇADE NOISE LEVEL															
Incident noise level			Façade 1	$L_{eq,ff}$	62	55	55	55	55	50	41	33		$L_{Aeq,ff}$	58 dB
ROOM DATA															
Room description and reverberation time	Volume	23.1	Bedroom	RT60	0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.2			s
FAÇADE ELEMENTS (Façade 1)															
Glazing	Area	1.5	Pilkington 4/6-16/4	Rw	20	21	17	25	35	37	31	36		Rw / Rw+Ctr	29 / 25 dB
Wall	Area	7.38	Brick and block external wall	Rw	34	40	44	45	51	56	60	63		Rw / Rw+Ctr	50 / 47 dB
Vent	No. off.	1	Greenwood 5000EAW.AC1 (Acoustic trickle)	Dn,e	32	38	37	31	43	43	40	40		Dn,e,w / Dn,e,w+Ctr	39 / 37 dB
Roof	Area	9.625	Tile/slate 12.5mm plbd ceiling absorbing layer	Rw	22	27	37	43	48	52	56	60		Rw / Rw+Ctr	46 / 39 dB
RESULTS															
Total calculated indoor noise level				$L_{eq,2}$	45	35	33	30	18	11	6	-		$L_{Aeq,2}$	30 dB

Calculated Indoor Ambient Noise Levels (as per BS 8233:2014 Annex G)



Project:	Vicarage Lane, Long Sutton
Project number:	18507
Date:	13/03/2019

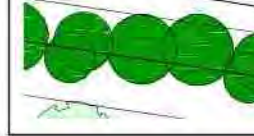
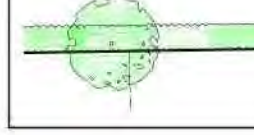
Plot:	North-east 2 bed
Room:	Bedroom

Night time ($L_{A\text{Max}}$)				Octave band centre frequency											
	Unit	Value	Description	Term	63	125	250	500	1k	2k	4k	8k	Broadband term		
EXTERNAL NOISE LEVEL															
External noise level			Façade 1	$L_{\text{Max},1}$	81	74	69	68	68	64	58	52		$L_{A\text{Max},1}$	72 dB
Façade correction factor				C	0	0	0	0	0	0	0	0			
INCIDENT FAÇADE NOISE LEVEL															
Incident noise level			Façade 1	$L_{\text{Max},\text{ff}}$	81	74	69	68	68	64	58	52		$L_{A\text{Max},\text{ff}}$	72 dB
ROOM DATA															
Room description and reverberation time	Volume	23.1	Bedroom	RT60	0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.2			s
FAÇADE ELEMENTS (Façade 1)															
Glazing	Area	1.5	Pilkington 4/6-16/4	Rw	20	21	17	25	35	37	31	36		Rw / Rw+Ctr	29 / 25 dB
Wall	Area	7.38	Brick and block external wall	Rw	34	40	44	45	51	56	60	63		Rw / Rw+Ctr	50 / 47 dB
Vent	No. off.	1	Greenwood 5000EAW.AC1 (Acoustic trickle)	Dn,e	32	38	37	31	43	43	40	40		Dn,e,w / Dn,e,w+Ctr	39 / 37 dB
Roof	Area	9.625	Tile/slate 12.5mm plbd ceiling absorbing layer	Rw	22	27	37	43	48	52	56	60		Rw / Rw+Ctr	46 / 39 dB
RESULTS															
Total calculated indoor noise level				$L_{\text{Max},2}$	63	53	48	43	31	25	23	14		$L_{A\text{Max},2}$	45 dB

Key
- All trickle vents to bedrooms on facade marked  to have acoustic performance Dne,w 39dB, Dne,w + Ctr 37 dB

General Notes
1. This drawing shall not be scaled, figured dimensions only to be used.
2. All dimensions are shown in 'mm' unless otherwise stated.
3. The contractor, sub-contractors and suppliers must verify all dimensions on site prior to the commencement of any work.
4. This drawing is to be read in conjunction with all relevant engineers and specialist sub-contractors drawings and specifications.
5. Any discrepancies are to be brought to the designers attention.

SITE PLAN KEY

-  Indicates neighboring properties (from ordinance survey location plan)
-  Indicates proposed tarmac access road
-  Indicates proposed static caravan bases
-  Indicates proposed parking spaces
-  Indicates existing trees and planting
-  Indicates proposed trees and planting
-  Indicates proposed 1.5m high bunding with planting
-  Indicates proposed gravel
-  Indicates proposed grass
-  Indicates proposed fishing lake

Revisions		
A	Jan 2018	Scheme Amendments
B	Apr 2018	Site Amendments
C	June 2018	Site Amendments

Status
FOR APPROVAL

**SWANN EDWARDS**
ARCHITECTURE

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Job Title		Date	Scale
Proposed Caravan Park, Caravan Sales, Shop & Building Plots Land North of Vicarage Road, Long Sutton, for J Hoey		October 2016	Various Sheet Size A1
Drawing Title		Job No.	Drawn by
Planning Drawing Site and Location Plan		SE-571	She
		Dwg No.	Revision
		10	C



Location Plan
Scale: 1:2500

Site Plan
Scale: 1:500

