

# St Martin's Extra-Care Gillingham

**Acoustic Report** 

29 June 2018

For ering

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# Contents

SUMN	1ARY	2
1.0	INTRODUCTION	3
2.0	DESCRIPTION OF SITE	3
3.0	NOISE SURVEY METHODOLOGY	4
4.0	NOISE SURVEY RESULTS	5
5.0	EXTERNAL NOISE INTRUSION	6
5.1 Ext	ernal Noise Levels	6
5.2 Inte	rnal Noise Level Limits	6
5.3 Ext	ernal Façade Acoustic Requirements	7
6.0	BUILDING SERVICES PLANT NOISE EMISSIONS	7
6.1 Ext	ernal Noise Limits	7
6.2 Control of Noise Emissions		
APPE	IDIX A – ACOUSTIC TERMINOLOGY	9
APPE	IDIX B – TIME HISTORY GRAPHS	10
Positio	۱ A	10
Positio	ו B	11



	SUMMARY		
A new 60-bed extra-o Gillingham. The developm generate	care development is proposed on ent site is affected by noise from e noise emissions due to items of	St Martin's Squard road traffic and al building services p	e/Queen Street in so has the potential to plant.
<b>auricl</b> has undertaken an e n	environmental noise survey at the oise levels affecting the site and i	e proposed to deve ts surroundings.	elopment site, to assess
Based on the noise surver requirements of the re	ey results, calculations have been esidential façades, so as to achiev accordance with BS 8233	undertaken to de e reasonable inter : 2014.	termine the acoustic rnal noise levels, in
It was concluded that conv be expec	entional thermal double glazing a ted to provide the appropriate le	and non-acoustic t vel of sound reduc	rickle ventilators would ction.
In addition, on the wester levels would be close to whilst across the remaine the	n façade of the proposed develog the 'reasonable' levels specified ler of the development internal n 'good' and 'reasonable' levels wi	pment, it is predic by BS 8233: 2014 oise levels are pre th windows open.	ted that internal noise with windows open, dicted to be between
A detailed acoustic specif	ication for the proposed develop later project design sta	ment façades will age.	be produced during a
Noise limits for new build survey and North Dorse disc	ling services plant have been prop t District Council's requirements. ussed, which will be refined as th	oosed, based on th Noise mitigation r e design develops	ne results of the noise measures have been
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# **1.0 Introduction**

A new 60-bed extra-care development is proposed on St Martin's Square/Queen Street in Gillingham. The development site is affected by noise from road traffic and also has the potential to generate noise emissions due to items of building services plant.

**auricl** has been appointed to undertake an environmental noise survey at the proposed to development site, to assess noise levels affecting the site and its surroundings, and to assess the noise impact on the proposed development and nearby noise sensitive properties.

This report presents the methodology and results of a noise survey to determine ambient and background noise levels affecting the site and its surroundings, as well as subsequent preliminary acoustic assessments.

# 2.0 Description of Site

The proposed development site is located on the eastern side of St Martin's Square/Queen Street in Gillingham, Dorset. The existing site is occupied by an existing, disused care facility and a separate disused building

The site is located in a predominantly residential area and is bounded by St Martin's Square/Queen Street to the west, residential properties to the north and south, and open ground leading to Shreen Water to the east.

Figure 2.1 shows the approximate existing site extent in **red** and the surrounding properties.



Figure 2.1 Existing Site Extent and Surroundings



# 3.0 Noise Survey Methodology

An unmanned environmental noise survey was undertaken at the proposed development site over approximately 4 days between Friday 22 June 2018 and Tuesday 26 June 2018.

The unmanned noise survey period was selected to determine typical ambient and background noise levels during the daytime and night-time over weekday and weekend periods, when the various development will be occupied and operational.

The unmanned measurement positions are indicated in **purple** on Figure 3.1 and described in Table 3.1.



Figure 3.1 Site Plan Indicating Approximate Locations of Measurement Positions

Table 3.1 Description of Measurement Positions

Position	Description	
А	Protruding from a first-floor level window on the western side of the site, overlooking Queen Street	
В	Attached to a railing at first floor level within the centre of the existing site	

Measurement position A was selected to assess worst-case noise levels affecting the proposed façades due to road traffic using Queen Street, as well as background noise levels at noise sensitive receptors along this site boundary.

Measurement position B was selected was selected as a secure, accessible that was screened from road traffic noise that is considered representative of background noise levels at the nearest existing noise sensitive properties.

The equipment used for the noise survey is summarised in Table 3.2.



Measurement Position	ltem	Make & Model	Serial Number
А	Type 1 automated logging sound level meter	01dB DUO	10129
	Type 1 ½" microphone	GRAS 40CD	136919
D	Type 1 automated logging sound level meter	01dB DUO	10506
D	Type 1 ½" microphone	GRAS 40CD	144941
Calibrator		01dB CAL21	34213781

 Table 3.2 Description of Equipment used for Noise Survey

 $L_{Amax}$ ,  $L_{Aeq}$  and  $L_{A90}$  sound pressure levels were measured throughout the noise survey over contiguous 125-millisecond intervals.

Due to the nature of the noise survey, i.e. unmanned, we are unable to comment on the weather conditions throughout the entire noise survey period. However, at the beginning of the survey period, there was noted to be a clear sky with very dry, still and clear conditions. These conditions are understood to be representative of the full survey period and are considered appropriate for undertaking environmental noise measurements.

The noise monitoring equipment was calibrated before and after the noise survey period. No significant change was found. Laboratory equipment calibration certificates can be provided upon request.

### **4.0 Noise Survey Results**

Appendix B presents time history graphs showing the  $L_{Amax}$ ,  $L_{Aeq}$  and  $L_{A90}$  sound pressure levels measured throughout the noise survey at the unmanned measurement positions.

Due to measurement position A being close to the facade of the existing building, the measured noise levels have been reduced by 2 dB to more closely resemble "free-field" conditions (in accordance with guidance from BS 8233: 2014).

We would consider the levels measured to be reasonable, considering the location of the measurement positions and the dominant nearby noise sources.

Due to the nature of the unmanned noise survey we are unable to comment on the exact noise climate throughout the entire survey period. However, at the beginning and end of the survey period the daytime noise climate at measurement position A was noted to be affected by road traffic using Queen Street, St Martin's Square, Turner's Lane and more distantly Le Neubourg Way to the west.

The daytime noise climate at measurement position B was noted to be affected by the same road traffic sources, although more distant.

We anticipate the above would also be true of night-time periods.



# **5.0 External Noise Intrusion**

This section presents our preliminary assessment and advise in relation to noise intrusion within the proposed extra-care apartments, due to external sources.

#### 5.1 External Noise Levels

Table 5.1 presents the external noise levels that are predicted to affect the various proposed residential façades, derived from the noise survey results.

Table 5.1 External Noise Levels Affecting Proposed Residential Façades

Proposed Façade	Daytime L <sub>Aeq (16 hour)</sub> (dB)	Night-time L <sub>Aeq (8 hour)</sub> (dB)
West	55	48
Other Façades	50	46

We have also considered a typical night-time L<sub>Amax, fast</sub> noise level of 63 dB for the site.

#### 5.2 Internal Noise Level Limits

British Standard 8233: 2014 "Guidance on sound insulation and noise reduction for buildings" recommends acceptable internal noise limits for residential dwellings, as presented in Table 5.2.

Table 5.2 BS 8233: 2014 Internal Noise Limits

Activity	Location	07:00 – 23:00 hours	23:00 – 07:00 hours
Resting	Living room	35 dB L <sub>Aeq, 16 hr</sub>	-
Sleeping / daytime resting	Bedroom	<b>35 dB</b> L <sub>Aeq, 16 hr</sub>	30 dB L <sub>Aeq, 8 hr</sub>

The document advises that the limits shown in Table 5.2 can be relaxed by up to 5 dB and reasonable internal conditions still achieved (resulting in 40 dB in living rooms during the daytime and 35 dB in bedrooms during the night).

In addition, the World Health Organisation (WHO) document "*Guidelines for Community Noise*" (1999) advises the following:

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L<sub>Amax</sub> more than 10-15 times per night (Vallet & Vernet 1991)"

Our assessment of external noise intrusion has considered both the BS 8233: 2014 and WHO guidance presented above.



#### 5.3 External Façade Acoustic Requirements

Our calculations indicate that reasonable internal noise levels could be achieved in the proposed apartments by considering and specifying suitable external façade constructions – conventional thermal double glazing (4mm glass / 16mm cavity / 4mm glass) and non-acoustic trickle ventilators would be expected to provide the appropriate level of sound reduction.

The non-glazed areas of the external façades are assumed to achieve sound insulation of at least  $R_w$  52 dB i.e. a typical brick/block cavity construction or a suitable lightweight build-up.

On the western façade of the proposed development, internal noise levels would be close to the 'reasonable' levels specified by BS 8233: 2014 with windows open, whilst across the remainder of the development internal noise levels are predicted to be between the 'good' and 'reasonable' levels with windows open.

This advice.3 is for preliminary guidance only. Further analysis will be undertaken throughout the project design stage to determine detailed glazing and ventilator acoustic specifications.

### 6.0 Building Services Plant Noise Emissions

#### 6.1 External Noise Limits

We understand North Dorset District Council typically require noise emissions associated with any new building services plant to be limited so as to correlate with a "*low noise impact*" in accordance with BS 4142: 2014 "*Method for rating and assessing industrial and commercial sound*".

The standard presents a method for assessing the level of impact due to building services plant, based on a comparison of the source noise level and the background noise level, both of which are measured or predicted at a noise sensitive receiver e.g. a residential property.

The specific noise level due to the source is determined, with corrections applied if the source is tonal or intermittent, or contains any other distinctive audible characteristics. The rating level is then compared to the background noise level and the level of impact can be estimated, depending on context, in accordance with the following advice:

- A difference of around +10 dB or more is likely to be an indication of a significant adverse noise impact
- A difference of around +5 dB is likely to be an indication of an adverse noise impact
- Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low noise impact

Table 6.1 presents typical background noise levels measured around the site.



Noise Sensitive	Measured L <sub>A90, T</sub> Background Noise Level (dB)			
Property	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)		
North, West, South of Site	45	30		
East of Site	39	29		

#### Table 6.1 Measured Background Noise Levels

In accordance with BS 4142: 2014, a low noise impact should be achieved if building services noise emissions are limited to so as not to exceed the levels presented in Table 6.1, when measured 1m external to the nearest noise sensitive property (existing and proposed) and including the total cumulative noise level with all relevant plant operating simultaneously.

Where noise emitted from the proposed plant will contain unfavourable characteristics (e.g. tonality, impulsivity, intermittency, etc.), the noise levels shall be reduced further, in accordance with the guidance given in BS 4142: 2014.

#### 6.2 Control of Noise Emissions

At this stage in the design process it is considered that the building services plant design is sufficiently flexible to ensure that suitably quiet, non-tonal plant can be procured and where necessary mitigation options can be included to ensure the noise limits are not exceeded.

The building services design is at an early stage, but it is expected that supply and extract fans will be required for the communal kitchen, as well as a CHP/boiler plantroom and some external heat reject plant.

In the first instance, plant noise emissions will be controlled to achieve suitable limits within and outside the proposed apartments, therefore noise emissions to surrounding noise sensitive properties will be even lower.

Noise mitigation measures that will be considered for the plant are as follows:

- Housing of certain items of building services plant within internal plantrooms, to contain radiated noise within the building envelope
- Selection of low-noise fans and condenser units, including night set-back modes
- Sensible location of external plant, so as to maximise distance and screening from noise sensitive façades
- Appropriate casings on external fans and air handling units, so as to limit noise break-out
- Use of appropriate atmospheric duct-mounted attenuators on fans and air handling units



# Appendix A – Acoustic Terminology

Parameter	Description		
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing (20x10 <sup>-6</sup> Pascals).		
Sound Pressure Level $(L_p)$	The sound pressure level is the sound pressure fluctuation caused by vibrating objects relative to the threshold of hearing.		
A-weighting (L <sub>A</sub> or dBA)	The sound level in dB with a filter applied to increase certain frequencies and decrease others to correspond with the average human response to sound.		
L <sub>Amax</sub>	The A-weighted maximum noise level measured during the measurement period.		
L <sub>Aeq,T</sub>	The A-weighted equivalent continuous noise level over the time period T (typically T= 16 hours for daytime periods, T = 8 hours for night-time periods).		
	This is the sound level that is equivalent to the average energy of noise recorded over a given period.		
L <sub>А90, Т</sub>	The noise level exceeded for 90% of the time (also referred to as the background noise level), measured over the time period T		
R <sub>w</sub>	The weighted (w) sound reduction index (R), a single figure rating of the <b>laboratory</b> airborne sound insulation performance of a construction, usually measured across the frequency range 100-3150Hz.		
	The higher the value, the greater the sound insulation, and the more onerous the requirement.		
D <sub>n,e,w</sub>	The weighted (w) element (e) normalised (n) level difference (D), a single figure indicator of the ability of a small building element (such as a trickle ventilator) to reduce sound. The higher the value, the greater the sound reduction, and vice versa.		



# **Appendix B – Time History Graphs**

Position A



## St Martin's Extra-Care, Gillingham Acoustic Report



#### **Position B**

