ENCLOSURE 3 - ACOUSTIC REPORT

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REQUIREMENTS FOR SOUND INSULATION

CLUB KARMA,
17 STATION HILL, CHIPPENHAM SN15 1EQ

10 November 2012

Client: SN15 Leisure Limited
29 Gay Street
Bath
BA1 2NT

CONTENTS

1. SUMMARY

1. An assessment has been made of the sound insulation requirements for a new night club at 17 Station Hill, Chippenham.

2. The site is located in the middle of Chippenham and has been used as a night club by the previous owners. It has been reported that this use did not generate complaint to the Local Authority regarding noise emissions.

3. The current operators wish to alter the configuration of the building (including the provision of an external amenity area) and extend the hours of operation. A study has therefore been carried out to establish the likely impact of noise emanating from the night club, due to both amplified music, building services plant and external activities.

4. Ian Sharland Limited has carried out an initial assessment of the building, to provide recommendations for limiting noise levels emanating from the building.

5. The primary remedial works relate to the upgrading of external doors and the refurbishment (and in some cases addition) of internal door sets. Windows to the front and rear are to be blocked up to a defined specification (if not already done so), as are old ventilation apertures.

6. Recommendations have been provided in respect of the PA system, and the requirements for both a sound limiting device and anti-vibration loudspeaker mounts.

7. The use of external amenity spaces at the rear of the building has been discussed and guidelines provided for controlling activity therein (management of the area and controlling the hours of use).

8. Finally, the question of noise break-out through the south wall and roof of the building has been discussed. Previous 'acceptable' use of the building as a club might indicate that the core structure of the building is acoustically sufficient. However, outline recommendations have been provided for upgrading these two elements to the best standard reasonably practical. It is suggested that these measures be adopted at the outset of the refurbishment, or that testing be undertaken, with the new PA system operating at its intended level, to confirm their need, or otherwise.

2. INTRODUCTION

An assessment of sound insulation requirements has been commissioned by SN15 Leisure Limited to determine acoustic measures which will be required to provide an acceptable degree of sound insulation for the Club Karma at 17 Station Hill, Chippenham. Figure 1 provides an aerial photograph of the site, alongside key local points of interest.

The site, originally the Palace Cinema, has been operating as a night club for some 10 years or more. It is understood (though subject to Local Authority confirmation) that operation of the club in its most recent form did not cause adverse comment from local residents, in respect of music or plant noise break-out.

The Club Karma Building

The new owners of the building are currently progressing with a refurbishment of the building, which will include three significant changes:

(i) The ground floor area is to change from a dance area to a lounge bar, with background music at a significant level but one which does not precluding conversation;
(ii) The upper floor will become the dance area, with a new PA system to be installed;
(iii) A courtyard at the rear of the building is to be altered to provide an external amenity area during the evening. It is proposed that the space be limited later in the evening, as a smoking area only.

Figures 2 - 4 provide floor plans of the building and the proposed external amenity space.

There are residential properties within close proximity of the Club, as indicated in the photographs below:

Flats immediately adjacent to the Club

The Rectory, directly across Station Hill

Whilst the previous night club appears to have operated with no adverse acoustic impact, concern has been expressed that noise from operations of the refurbished Club Karma, with extended operating hours and external space, will by audible at the noise-sensitive properties nearby. An assessment of likely noise emanating from the proposed club has therefore been commissioned. The objectives of the current exercise may be summarised as follows:

(a) To confirm likely internal noise levels within different areas of the club;
(b) To confirm external noise level targets;
(c) To specify requirements for the shell of the building, to limit noise transmission from within.

This report details the activities carried in respect of the above, and summarises the conclusions which have been drawn.

3. ENVIRONMENTAL NOISE SURVEY

The primary objective of the exercise is to ensure that noise from the club does not cause disturbance to any local residents.

One means of assessing the likely disturbance is to consider the predicted noise against the ambient noise climate in the area. The difference between the two quantities would indicate the likelihood of adverse impact.

An inspection of the two neighbouring properties (as indicated earlier) suggested that the rear facing flats adjacent to the club would currently enjoy the quietest conditions at night (particularly after regular rail services had ceased).

In order to determine the existing ambient noise climate, therefore, an environmental noise analyser was positioned at the rear of the club building, on the corner of the lower patio area (see Figure 4). This location offered a clear line of sight to the rear elevation of the adjacent block of flats

The survey was conducted over a 8 day period, from Tuesday 2nd October to Wednesday 10th October 2012. A Rion NL31 sound level meter was configured to record 5 minute samples of the ambient noise climate. The following acoustic parameters were recorded:

L_{Aeq} The A-weighted equivalent continuous sound pressure level which, over the sample period, contains the same acoustic energy as the time-varying signal being recorded.

L_{Amax} The A-weighted maximum sound pressure level recorded during each sample period (as measured on fast response).

L_{A90} Another statistical parameter, representing the A-weighted noise level exceeded for 90% of each sample period. This gives a measure of the underlying noise, and is commonly used to describe the ambient background noise.

The equipment was calibrated before and after the survey. Weather conditions varied through the period, as indicated below:

Date	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**	**9th**
Rainfall, mm	2	8	0.4	4	0	0	0	0.2
Ave. Wind Speed, m/s	4	4	3	4	3	2	4	4
Direction	S	S	S	S/W	N	N/E	E	N/E

Figure 5 indicates the variation of the three parameters during the survey period. It can be seen that in the period up to 2.00 am each morning, the background noise parameter, L_{90}, can fall to a level of about 25 dB(A). The equivalent ambient noise levels fall to a minimum of 30 dB(A) L_{Aeq}.

The significance of these levels will be discussed below.

4. DESIGN CRITERIA

The possibility of disturbance to local residents is dependent upon the absolute level of noise radiating from the club, and the prevailing level of 'background noise' at that time. Any formal assessment of noise from commercial plant affecting residential properties would normally be based upon the recommendations of British Standard 4142:1997 "Method for rating industrial noise affecting mixed residential and industrial areas".

Briefly, this rating method first determines the "specific noise level" due to the equipment, at the facades of the nearest residential properties concerned. For twenty-four operation of the commercial site, this would be the equivalent continuous noise level of the source(s) under consideration evaluated over a five-minute sampling period, its $L_{Aeq\ (5\ mins)}$. A correction of +5 dB is then made to this measured level if the noise is noticeably tonal in content or intermittent in duration to give the "Rating Noise Level". If the Rating Noise Level exceeds background noise level by more than 10 dB(A), complaints are to be expected. An excess of 5 dB(A) is said to be "of marginal significance". If the Rating Noise Level is 10 dB below the ambient background noise, this is a positive indication that complaints would not be expected.

BS4142 does indicate in Section 1 Scope that the method is not suitable when the background noise levels and rating noise levels are very low low, defined to be 30 dB and 35 dB respectively.

Given the very low levels of background noise measured here at night, it is therefore recommended that any noise from new **building services plant** is limited to a level of 35 dB(A) at the windows of the nearest residential properties, or 30 dB(A) if the noise is tonal or intermittent.

Based on a closing time of 02.00, it is also recommended that any **music emanating from the Club** should not exceed a level of 25 dB(A)[1] at the windows of any adjacent noise-sensitive properties. To further protect residents from the low frequency component, which is commonly associated with music, it is recommended that the following limits are also specified:

$L_{eq,\ 5\ mins}$ not greater than 47 dB in the 63 Hz octave band
$L_{eq,\ 5\ mins}$ not greater than 35 dB in the 125 Hz octave band

This should provide a reasonable safeguard to the residents for the following reasons.

In relative terms, the overall noise level would be commensurate with the current noise climate and, although just audible outside the building, should cause a negligible increase overall. As an absolute level, 25 dB(A) outside a bedroom window would equate to a level of perhaps 15 dB(A) within the bedroom if the windows were open.

[1] This target to be considered as a five minute sample of the equivalent continuous noise levels, referred to as a $L_{Aeq,\ 5\ minutes}$

This is some 15 dB below the usual design target for bedrooms, as recommended in British Standard 8233:1999 "Sound insulation and noise reduction for buildings – Code of practice". If the windows were closed, the internal noise level would be at least 10 dB(A) lower and would be all but inaudible.

The overall dB(A) measure adversely weights the low frequency contribution of any given noise. When the noise in question has a significant low frequency component, as here, it may be argued that the dB(A) parameter is not the best means of representing the 'loudness' or 'impact' of the noise. Therefore, it is necessary to specify limits for the particular frequencies of concern. The frequency limits for 63 and 125 Hz are derived from standard Noise Rating curves. These are curves of equal loudness and reflect the ear's response to noise of different frequencies. The limits imposed are taken from the NR15 curve. Overall, this equates to a level of about 20 - 25 dB(A), and by specifying the low frequency bands levels, it will be possible to ensure than the residual noise within the residential properties does not contain an excess of the bass element.

5. NOISE GENERATED WITHIN THE DEVELOPMENT

It can be confirmed that the major noise source will be amplified music in the main Dance Area on the first floor, with a secondary source of music in the ground floor lounge bar.

For the purposes of this exercise, it will be assumed that noise levels across the Dance Area may be contained to a limit of 100 dB(A). It is noted that the music will feature a prominent low frequency content. Noise levels within the Lounge Bar will be somewhat lower, and this assessment is predicated on a limit of 85 dB(A) therein.

The amplified music aside, the only other significant noise sources would be building services plant and activity in the external amenity space at the rear.

Details of any new building services plant (if any) should be confirmed to the Acoustic Consultant for review. A limit for this noise has been defined in Section 4 above.

In respect of patrons outside the building, it will be assumed that the late night smoking area (to be restricted to the upper Patio Bar) will be limited to no more than 20 persons. With no music relayed externally, likely noise levels will be in the region of 60 - 65 dB(A) in the smoking area. This must, however, be subject to management control.

If the lower patio area is to be set out as an external drinking area with seating, noise levels would be expected to be somewhat higher, at perhaps 70 dB(A). Again, management of this area will be critical to ensure reasonable acoustic conditions are maintained.

6. RECOMMENDATIONS FOR NOISE CONTROL MEASURES

The following schedule of works represents a recommended programme of works to ensure the building provides no less than a reasonable level of sound insulation, with due regard to the design targets specified above. It is understood that the management of the club would be conscious of the need to monitor the operation of the establishment, and to take further action as required.

6.1 Ground Floor Doors

The majority of work on the ground floor relates to the control of noise emanating from external doors. The specific recommendations are provided below (door codes are clarified in Figure 2):

Door	Recommendations
DG-1	Existing door to be refurbished to achieve a sound reduction of 35 dB Rw, as per the notes below
DG-2	Doors to be reinstated. 50mm solid core timber leaves, with rebated meeting style and self-closing mechanism, in a rebated frame. Acoustic seals to the head and jambs
DG-3	Existing door to be refurbished to achieve a sound reduction of 35 dB Rw, as per the notes below
DG-4	Existing door to be refurbished to achieve a sound reduction of 35 dB Rw, as per the notes below
DG-5	Existing door to be refurbished to achieve a sound reduction of 35 dB Rw, as per the notes below
DG-6	Existing door to be refurbished to achieve a sound reduction of 35 dB Rw, as per the notes below
DG-7	Replace existing door with a proprietary steel door set rated at 45 dB Rw. This would then require internal noise levels to be limited to 65 dB(A), which is very quiet for the intended use. The alternative is to modify the area inside the external door to create a lobby. The new internal door of the lobby, and DG7, must then achieve a sound reduction index of 35 dB Rw, as per the notes below
DG-8	Existing door to be refurbished to achieve a sound reduction of 35 dB Rw, as per the notes below
DG-9	Internal door to the Cloak Room must be kept closed, and would benefit from a set of standard acoustic seals to the head and jambs.

Notes:

35 dB Rw Doorset - 50mm thick solid timber leaf, well fitting into a rebated frame. Acoustic seals to the head, jambs and (where appropriate) meeting styles. Automatic dropping seal at the base or (preferred) drag seal and raised steel threshold plate. See Appendix 1 for details.

Lobby Construction - Either in 100mm aggregate block, or 70mm fully insulated stud with 2 x 15mm Wallboard to either side. Ceilings (if appropriate) built as 22mm t&g chipboard over fully insulated joists with 2 x 15mm Wallboard to the underside.

6.2 First Floor Doors

With reference to the door codes in Figure 3, the following works are necessary:

Door	Recommendations
DF-1	Existing door to be refurbished to achieve a sound reduction of 35 dB Rw, as per the notes in 5.1. Self closing mechanism also required
DF-2	Existing door to be refurbished to achieve a sound reduction of 35 dB Rw, as per the notes in 5.1.
DF-3	Existing door to be refurbished to achieve a sound reduction of 35 dB Rw, as per the notes in 5.1
DF-4	New internal door be installed into the structural opening here. Door construction to achieve 35 dB Rw.
DF-5	Existing door to be refurbished to achieve a sound reduction of 35 dB Rw, as per the notes in 5.1. This will involve the adjustment of the existing leaves to provide a rebated meeting style
DF-6	Existing door to be refurbished to achieve a sound reduction of 35 dB Rw, as per the notes in 5.1. Door to be kept closed which Club is active.

It is noted that there is a potential weakness in the sound insulation strategy, with a noise path from the dance floor across the bar servery (which will be open), directly to external door DF-2 and then to outside. This is likely to warrant the requirement for an additional 35 dB Rw doorset set between the Bar and the Glass Wash area, or between the Glass Wash area and DF-2.

6.3 Additional Works

There are a number of ventilation grills in the rear elevation of the building. Those which are redundant should be removed and blocked off with 100mm thick aggregate block work.

Those which are still in use will need to be acoustically tested for break-out noise once the PA system is operational, and then formally signed off by the Acoustic Consultant.

At first floor level, behind the existing bar, there are two windows which have been covered with a lightweight stud construction. It will be necessary

> either to remove the windows and replace with 100mm aggregate block, lined with a 70mm insulated stud which is set 20mm clear of the block work. The studs would be faced with 2 x 15mm SoundBloc plasterboard
>
> or, to remove the existing lining internally. Erect a 70mm insulated stud, 10mm in front of the window and face on the room side only with 2 x 15mm SoundBloc. Then, erect a second 70mm insulated stud as far removed from the first stud as possible. Face this, on the room side only, with 30mm SoundBloc plasterboard. In all cases, the insulation should be 45 kg/m3 mineral fibre slabs.

Similarly, there are windows at the front of the building, at first floor level, which have been blocked or covered up. The exact nature of the existing remedial work should be confirmed to the Acoustic Consultant. It will then be possible to confirm whether similar works (as detailed immediately above) will be required.

In the roof space over the first floor dance area, there is a circulation opening in the gable end (overlooking Station Hill). It is believed this is related to a now-redundant ventilation scheme. To ensure no leakage to outside via the loft space, it is recommended that the opening be further blocked off with

> either 100mm aggregate block work
>
> or a twin stud construction built in the opening, with 2 x 15mm SoundBloc plasterboard to each frame, 50mm insulation in the void, and a nominal cavity width (between the plasterboard linings) of at least 150mm.

If the roof space needs to be ventilated, details of the required free area should be issued to the Acoustic Consultant, who will then detail an appropriate, acoustically treated ventilation grill.

6.4 Audio Systems

In order to prevent structural excitation, all loudspeakers in the building should be installed on anti-vibration mounts. Bass units should be floor mounted, and installed in cabinets resting on open springs which will give a static deflection of 12.5 mm under the self-weight loading. Smaller mid-range units, which are typically hung or wall mounted, should rest on neoprene pads or turret mounts. Proprietary anti-vibration hangers or wall mounts, such as range by Power Drive (or equal approved) would be acceptable.

The primary audio system controller, both at ground and first floor levels of the building, must include both zoning and suppression systems. These will enable separate control of the noise levels in different areas of the building. The controls should be allow both the overall level to be limited in each zone, and the levels in specific frequencies (the precision must not be less than 1/3rd octave band width). A digital controller such as the SoundWeb system is strongly recommended for the flexibility it will offer.

The PA system must be secure and tamper proof.

6.5 Secondary Works

On completion of the works indicated above, and installation of the PA system. it will be necessary to conduct commissioning tests to set the overall levels internally such that there is no significant residual noise externally.

This work would confirm the effectiveness of the treatment to doors and other apertures in the building shell, and thus whether the building structure itself would require acoustic enhancement to achieve the desired internal noise levels.

An inspection of the walls indicates a substantial structure but it would be beneficial to consider an independent lining to the south walls at ground and first floor, where the lounge bar and dance area (respectively) are exposed directly to the outside wall. A suitable treatment here would be a 70mm independent stud set 10mm clear of the wall, 50mm of 45 kg/m3 mineral fibre slab in the void and a lining of 2 x 15mm Wallboard.

Similarly the roof construction over the dance floor does in principle appear very light[2]. Given the existing construction, a standard recommendation would be to

(i) insulate and overboard the existing ceiling joists with 45 kg/m3 mineral fibre slabs and 22mm t&g chipboard.
(ii) install a resiliently hung secondary ceiling beneath the primary ceiling, comprising 2 x 15mm SoundBloc plasterboard on an

[2] A roof of tiles on timber boards on pitched rafters. Joists with no insulation and plasterboard to the underside. There does not appear to be a secondary ceiling, but this should be confirmed.

MF grid which is itself hung on proprietary anti-vibration hangers. (open spring on rubber turret mount type)

The prior operation of the night club (with dance area on the first floor level) without apparent complaint from neighbouring residents may suggest a reasonable level of sound insulation through the ceiling and roof. However, at this stage of the design, it is not possible to confirm that the existing structure will be sufficient to contain levels of 100 dB(A) on the dance floor.

One option is simply to adopt these recommendations at the outset of the project. The alternative is to run a PA system at the appropriate level (once the other remedial works are complete) and thus determine whether the secondary remedial works for external walls and roof will be required.

6.6 External Amenity Space

It is proposed that the external space to the rear area of the building be developed to offer seating during the early evening and a smoking area later. It is understood that this area was used as such for many years when the night club was under previous management.

It is noted that all external doors will to be kept closed and that there will be no music relayed to the external areas.

The seating area would be set on the Lower Patio, as shown in Figure 4 and indicated in the near field of the photograph below:

The southerly part of this patio (nearest the camera) does have a line of sight to the rear elevation of the neighbouring block of flats and, given the height of that building relative to the patio, it is concluded that site screening by means of fencing is not a totally effective acoustic solution.

If is proposed that the floor of the area will be covered with a soft matting, the fence to the perimeter will be increased by 1m, and that large umbrellas will be used over each table. To a greater or lesser extent, each will provide a finite reduction in the noise transmitted between the seated area and the neighbouring windows.

Avoiding significant disturbance to the occupants of those flats, it would be suggested that the external seating area should be usable up to 23.00 each evening. The precise limits for use, however, will be largely governed by the management of the space, and the reaction to any adverse comment from local residents. It is therefore recommended that the operators adopt the following management plan:

(i) Post signs in the external area to highlight the proximity of residential neighbours

(ii) Initially, allow access to the seating area up to 23.00 each evening and thereafter reduce access back to the covered area shown in the photograph above. This location will benefit the residents by the increased distance and the screening from the noise-sensitive buildings. If managed as a smoking area, rather than an area to congregate and converse at length, noise levels should be significantly lower therein, perhaps 60 - 65 dB(A). Residual levels at the residential windows would be between 25 and 30 dB(A), which would be deemed acceptable.

(iii) Within the management plan, allow for a regular inspection of the external areas by staff. They should be instructed to act upon any rowdy or noisy behaviour

(iv) If, after a few weeks of use, the external area in this fashion does not generate any contact from the neighbours, consider extending the usable hours of the seating area, by no more than 1 hr at a time, and then gauge community reaction. If complaints are received, however, a restriction on the use may be required

Figure 1 - Site Location

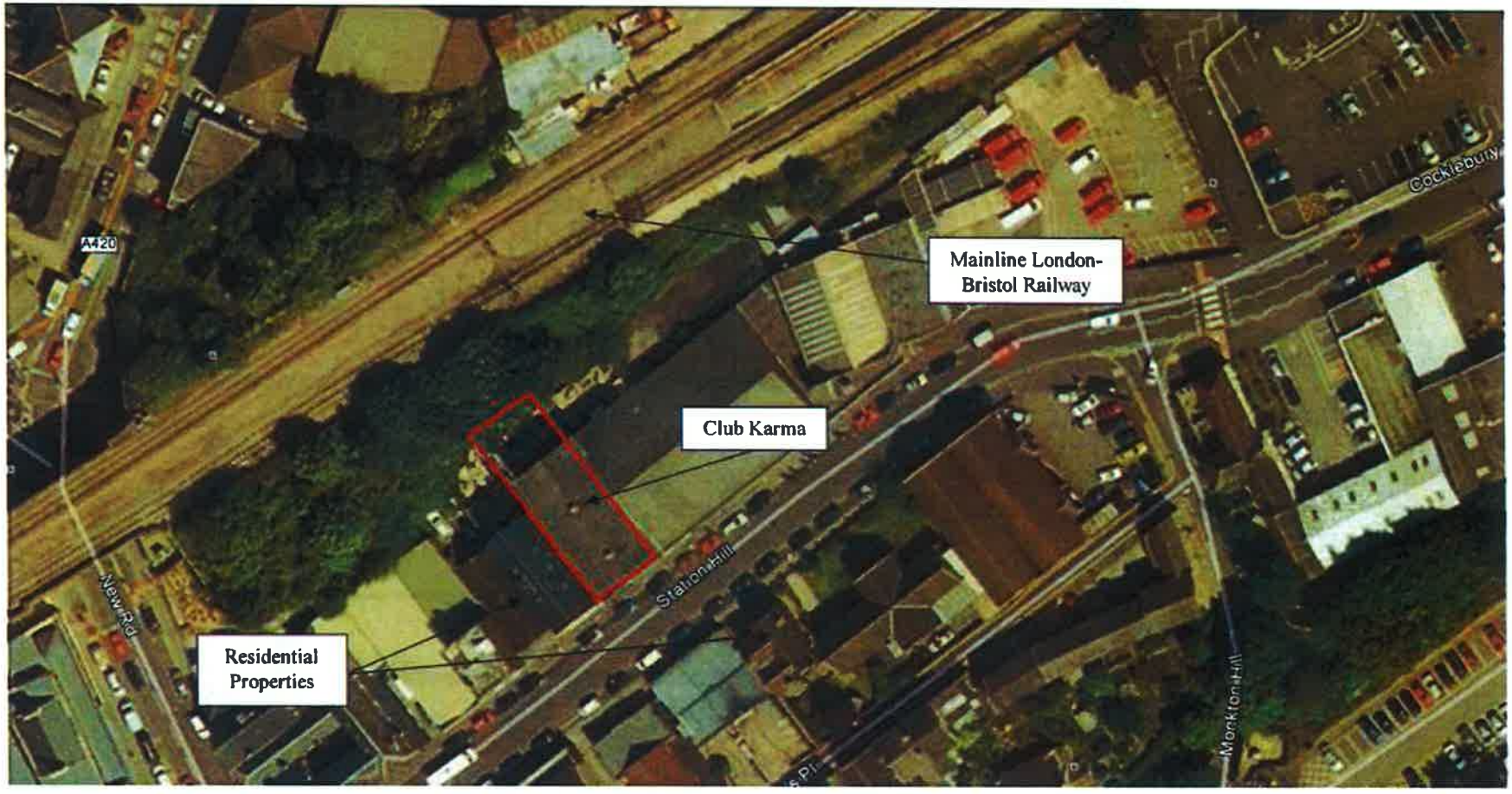


Figure 2 - Proposed Ground Lounge Bar

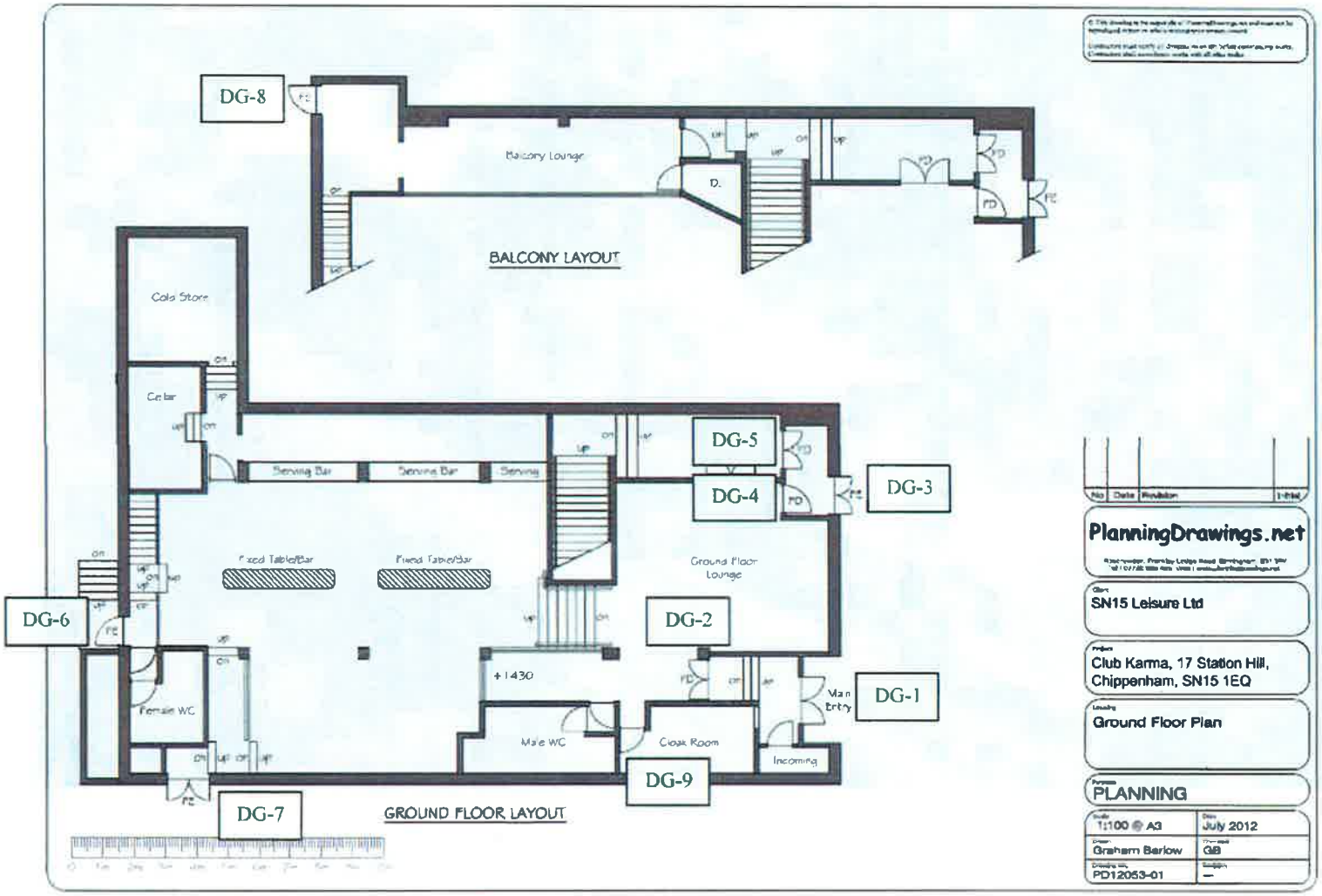


Figure 3 - Proposed First Floor Dance Area

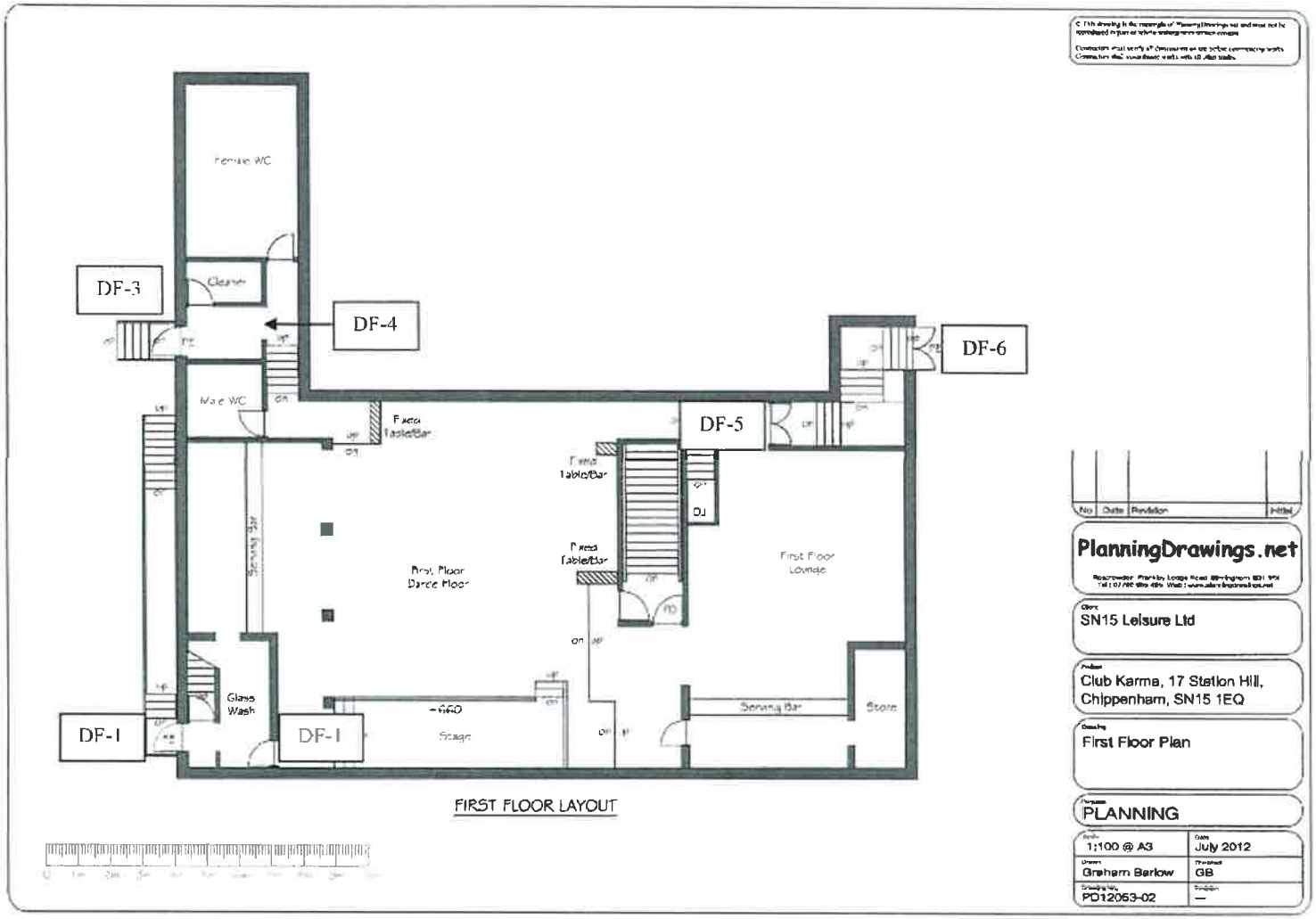


Figure 4 - Proposed External Amenity Space

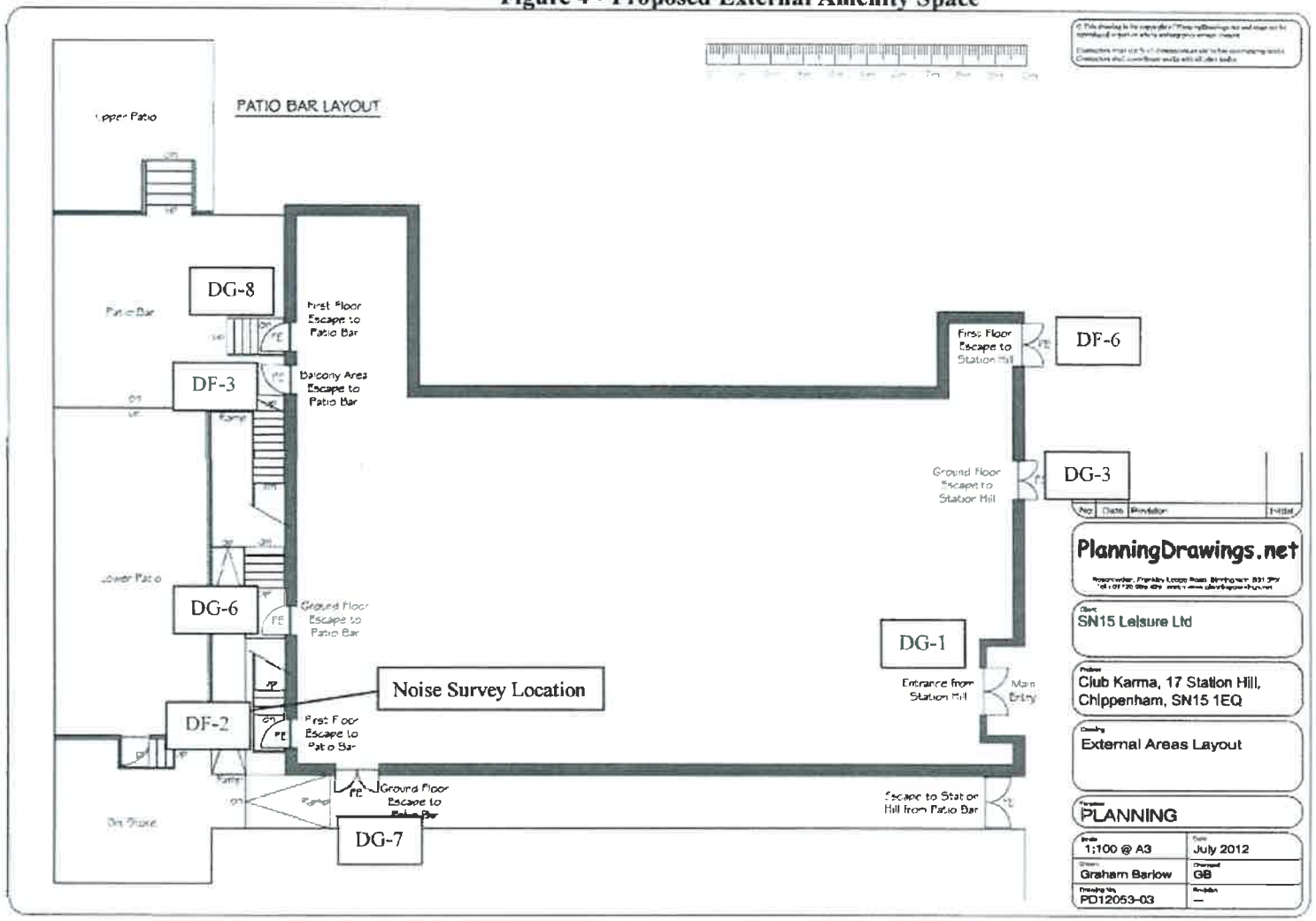
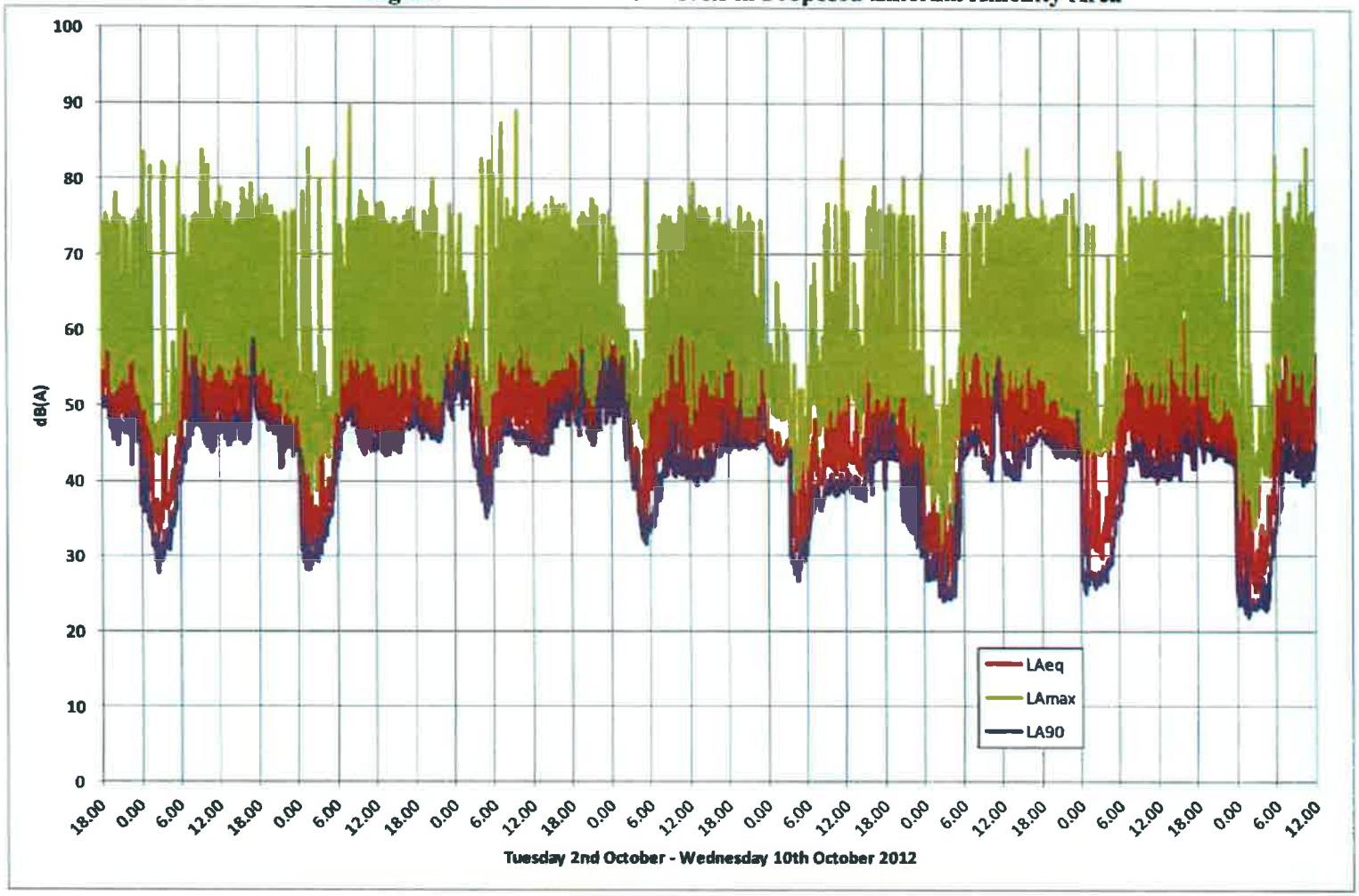


Figure 5 - Measured Noise Levels in Proposed External Amenity Area



Appendix 1 - Details of Suitable Door Sealing Systems

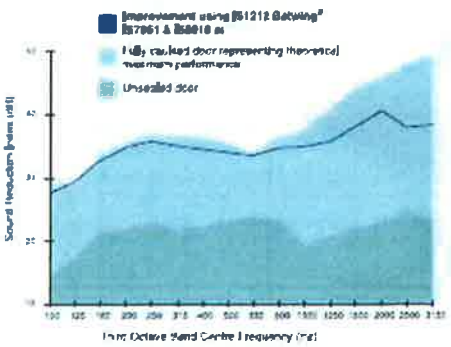
LORIENT

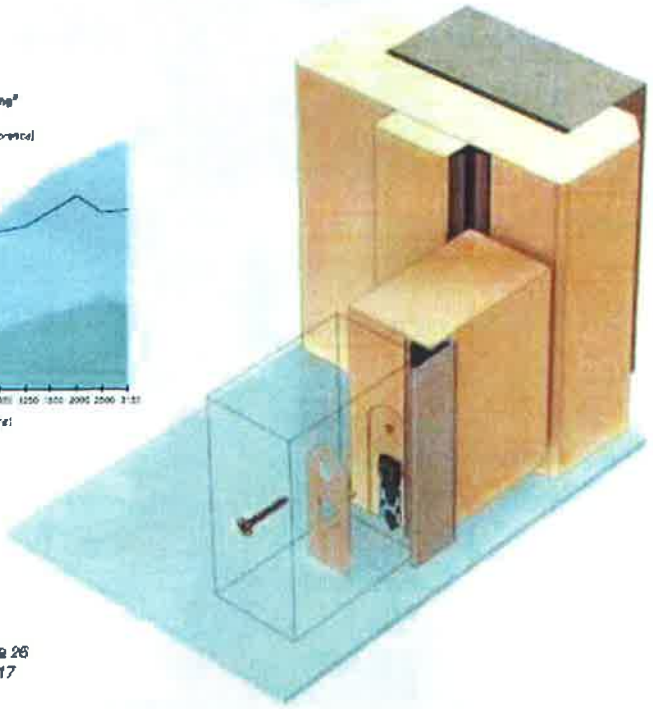
Specialist Acoustic Doors

IS1212 & IS7061 & IS8010 si

Double Leaf / Single Swing

R_w STC 37dB





For Selwing® information – see page 26
For IS7061 information – see page 17

IS8010 si Automatic Threshold (Door Bottom) Seal

A medium duty, automatic threshold seal featuring a high efficiency mechanism. The seal is lifted clear of the floor as soon as the door is opened by a few millimetres – resulting in exceptional low door operating forces.

- Internal fins provide superior acoustic properties – tested in accordance with BS EN ISO 140-3: 1995
- Meets the smoke leakage performance requirements of BS 6888 when tested in accordance with BS 476: Pt.31.1: 1983
- Also fire tested under the conditions of BS EN 1634-1: 2000
- Tested for up to 60 minutes under the conditions of BS 476: Pt.20/22: 1987 without compromising fire resistance
- Requires no power connection and is self-levelling on uneven surfaces
- Highly durable – has achieved over 1,000,000 cycles on a full size door assembly

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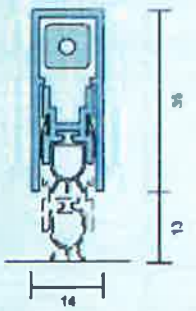
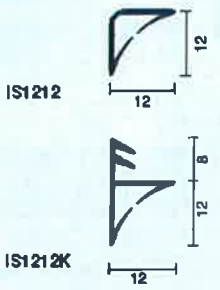


IS1212/IS1212K Batwing® Acoustic and Smoke Perimeter Seal



The Batwing® seal minimises the opening and closing resistance of the door leaf due to its unique, curved elastomeric fins, which provide ongoing performance and durability in service.

- Symmetrical design ensures fins are always in contact with two surfaces of the door leaf, creating an air chamber to provide **excellent acoustic performance** – tested in accordance with BS EN 1634-1: 2000
- **Proven smoke performance** from ambient up to 200°C
- **Highly durable** – has achieved over 1,000,000 cycles on a full size door assembly
- **Variety of standard colours** to blend with door designs

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CERTIFIRE
CF126

IS8010 si Automatic Threshold (Door Bottom) Seal

A medium duty, automatic threshold seal featuring a high efficiency mechanism. The seal is lifted clear of the floor as soon as the door is opened by a few millimetres – resulting in exceptional low door opening forces.

- **Internal fins** provide superior acoustic properties – tested in accordance with BS EN ISO 140-3: 1995
- Meets the **smoke leakage performance requirements of BS 5588** when tested in accordance with BS 476: Pt.31.1: 1983
- Also fire tested under the conditions of **BS EN 1634-1: 2000**
- Tested for up to 60 minutes under the conditions of BS 476: Pt.20/22: 1987 **without compromising fire resistance**
- Requires **no power connection** and is **self-levelling** on uneven surfaces
- **Highly durable** – has achieved over 1,000,000 cycles on a full size door assembly

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CF126