

# Guild Living Epsom Hospital

## Residential External Building Fabric Report

26691/EBF1/Rev1

19 December 2019

For:  
Cast Real Estate  
Black Bull Yard  
24-28 Hatton Wall  
London  
EC1N 8JH



**Hann Tucker Associates**



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# Residential External Building Fabric Report 26691/EBF1/Rev1

## Document Control

Rev	Date	Comment	Prepared by	Authorised by
1	19/12/2019	Project proposal description and drawing reference updated		
			Xiaoyi Li Assistant Consultant MSc, BA(Hons), TechIOA	Andrew Fermer Director BSc(Hons), MIOA
0	18/12/2019	-	Xiaoyi Li Assistant Consultant MSc, BA(Hons), TechIOA	Andrew Fermer Director BSc(Hons), MIOA

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## **Residential External Building Fabric Report 26691/EBF1/Rev1**

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### **Attachments**

Acoustic Specification



## 1.0 Introduction

It is proposed to redevelop the south part of the site of Epsom General Hospital for Class C2 residential care use. This includes demolition of all existing buildings on the site and construction of 2No. buildings containing 306No. residential units with ancillary restaurant, retail, wellness centre and nursery.

An environmental noise survey has previously been undertaken by ourselves, to establish the existing airborne noise levels due to road traffic and other environmental sources of airborne noise around the proposed development. During the periods we were on site the dominant noise sources were noted to be nearby road traffics.

The data obtained has subsequently been used to undertake a detailed acoustic analysis to determine the sound insulation requirements of the external building fabric elements in order to control the aforementioned environmental airborne noise levels in line with appropriate internal acoustic design criteria. Our findings and recommendations are presented herein.

This report will need to be revised once the planning conditions are available.

## 2.0 Objectives

To specify internal noise level design criteria for all areas within the site. Specify design criteria which are both practical and relevant to the operational conditions, and not merely provide statements of maximum noise levels.

Based upon the Environmental Noise Survey data and the agreed internal noise criteria, sound reduction performance specifications will be produced for the critical external building fabric elements, particularly the glazed areas. Advice will be given, where appropriate, on the likely ability of the proposed scheme to achieve the required performance specifications, with alternative forms of construction recommended where necessary. However, it will be the responsibility of the successful tenderer or the nominated supplier to comply with the specification.

## 3.0 External Noise Levels

The full results of our survey are presented in our Environmental Noise Survey Report 26691/ENS1 dated 17 June 2019. The results presented therein, with suitable corrections applied from the source noise data upon which our analysis and recommendations are based.



## 4.0 Architectural Assumptions

### 4.1 Room Finishes

In our calculations we have assumed bedrooms and living areas will have typical furnishings including beds, sofas, chairs etc.

### 4.2 Drawings

Our calculations have been based on the following drawings by Marchese Partners.

Reference	Title	Date
18120-MPI-XX-00-DR-A-20_001	LEVEL 00 FLOOR PLAN	20 December 2019
18120-MPI-XX-01-DR-A-20_002	LEVEL 01 FLOOR PLAN	20 December 2019
18120-MPI-XX-02-DR-A-20_003	LEVEL 02 FLOOR PLAN	20 December 2019
18120-MPI-XX-03-DR-A-20_004	LEVEL 03 FLOOR PLAN	20 December 2019
18120-MPI-XX-04-DR-A-20_005	LEVEL 04 FLOOR PLAN	20 December 2019
18120-MPI-XX-05-DR-A-20_006	LEVEL 05-08 FLOOR PLAN	20 December 2019
18120-MPI-XX-06-DR-A-20_007	LEVEL ROOF PLAN	20 December 2019
18120-MPI-ZZ-00-DR-A-20_100	EAST BUILDING - LEVEL 00	20 December 2019
18120-MPI-ZZ-01-DR-A-20_101	EAST BUILDING - LEVEL 01	20 December 2019
18120-MPI-ZZ-02-DR-A-20_102	EAST BUILDING - LEVEL 02	20 December 2019
18120-MPI-ZZ-03-DR-A-20_103	EAST BUILDING - LEVEL 03	20 December 2019
18120-MPI-ZZ-04-DR-A-20_104	EAST BUILDING - LEVEL 04	20 December 2019
18120-MPI-ZZ-05-DR-A-20_105	EAST BUILDING - LEVEL 05-08	20 December 2019
18120-MPI-ZZ-06-DR-A-20_106	EAST BUILDING - LEVEL ROOF	20 December 2019
18120-MPI-ZZ-00-DR-A-20_107	WEST BUILDING - LEVEL 00	20 December 2019
18120-MPI-ZZ-01-DR-A-20_108	WEST BUILDING - LEVEL 01	20 December 2019
18120-MPI-ZZ-02-DR-A-20_109	WEST BUILDING - LEVEL 02	20 December 2019
18120-MPI-ZZ-03-DR-A-20_110	WEST BUILDING - LEVEL 03	20 December 2019
18120-MPI-ZZ-04-DR-A-20_111	WEST BUILDING - LEVEL 04	20 December 2019
18120-MPI-ZZ-05-DR-A-20_112	WEST BUILDING - LEVEL 05-08	20 December 2019
18120-MPI-ZZ-06-DR-A-20_113	WEST BUILDING - LEVEL ROOF	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_200	SITE SECTIONS	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_201	BUILDING SECTION A-A' & B-B'	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_202	BUILDING SECTION C-C' & D-D'	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_203	BUILDING SECTION E-E'	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_300	ELEVATION 1-1	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_301	ELEVATION 2-2	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_302	ELEVATION 3-3	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_303	ELEVATION 4-4	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_304	ELEVATION 5-5	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_305	ELEVATION 6-6	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_306	ELEVATION 7-7 & 8-8	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_307	ELEVATION 9-9 & 10-10	20 December 2019



Reference	Title	Date
18120-MPI-XX-ZZ-DR-A-20_308	ELEVATION 11-11	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_309	ELEVATION 12-12 & 13-13	20 December 2019
18120-MPI-XX-ZZ-DR-A-21_300	TYPICAL BAY STUDY - BAY 1 - JULIET BALCONY DETAIL	20 December 2019
18120-MPI-XX-ZZ-DR-A-21_301	TYPICAL BAY STUDY - BAY 2 - BOLT ON BALCONY DETAIL	20 December 2019
18120-MPI-XX-ZZ-DR-A-21_302	TYPICAL BAY STUDY - BAY 3 - DROP OFF DETAIL	20 December 2019

## 5.0 Acoustic Design Criteria

There are no criteria in current Building Regulations concerning external noise intrusion. We also understand the Planning Authority have not imposed any noise criteria for external noise intrusion. Therefore, there are no statutory requirements for controlling external noise intrusion on this project.

### 5.1 BS 8233: 2014 “Guidance on sound insulation and noise reduction for buildings”

British Standard 8233: 2014 “Guidance on sound insulation and noise reduction for buildings” states that it is desirable that internal ambient noise levels do not exceed the following guideline values:

Activity	Location	Desirable Internal Ambient Criteria	
		07:00 – 23:00	23:00 to 07:00
Resting	Living Rooms	35 dB LAeq,16hour	-
Dining	Dining Room/Area	40 dB LAeq,16hour	-
Sleeping (Daytime Resting)	Bedroom	35 dB LAeq,16hour	30 dB LAeq,8hour

BS8233: 2014 also states:

*“Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved.”*

### 5.2 Local Authority

We understand Epsom & Ewell Borough Council have not imposed any planning condition in respect to internal noise levels for the development.



### 5.3 Summary

On the basis of the above we propose external noise intrusion levels (whether from road, rail or aircraft sources), should, after attenuation by the composite building envelope, not exceed the following criteria when measured in accordance with the Association of Noise Consultants Guidance Noise Measurements in Buildings – Part 2: *Noise from External Sources*.

Activity	Location	Desirable Internal Ambient Criteria	
		07:00 – 23:00	23:00 to 07:00
Resting	Living Rooms	35 dB $L_{Aeq,16hour}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hour}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

Where external noise levels are above WHO guidelines, the above levels may be relaxed by up to 5dB.

The above is subject to approval of Epsom & Ewell Borough Council.

### 6.0 Sound Reduction Performance of Cladding

The composite sound reduction performance required of any portion of the building envelope will depend on its location relative to the principal noise sources around the site and the nature of the spaces behind it (noise criteria, size, room finishes etc).

The levels of noise incident upon each façade of the building are different. Consequently, each façade therefore has its own unique sound insulation requirement. In our experience, however, it is not appropriate to prepare numerous performance specifications. In this instance, for the sake of simplicity, we have prepared a specification with the highest performance level, which corresponds to an appropriate notional glazing configuration.

The enclosed Acoustic Specification for Cladding details our recommended minimum octave band sound reduction indices (SRI's). In all cases, it is essential that the system is tested in accordance with BS EN ISO 10140-2:2010 and that the quoted minimum sound reduction specifications are met by the system as a whole, including frames, ventilators etc as appropriate - not just the glass.

Where structural glass or non-vision spandrel panels are proposed, they should provide sound reduction performance at least equal to that required of the cladding in order to maintain the acoustic integrity of the building envelope.



In order to comply with Building Regulations (Part F), it is necessary to provide background ventilation to habitable rooms (living rooms and bedrooms). Where ventilators do not form an integral part of the cladding they should comply with the Acoustic Specification for Ventilators which details the recommended minimum octave band element normalised level differences. In all cases, it is essential that ventilators are tested in accordance with BS EN ISO 10140-2:2010. Where ventilators form an integral part of the cladding system the ventilators shall be tested in conjunction with the cladding system.

The specified octave band SRI's and  $D_{n,e,w}$ 's are based upon typical vent performances. It is acknowledged that alternative SRI and  $D_{n,e,w}$  shapes may also comply with the internal noise criteria but these would need to be reviewed by ourselves.

## 7.0 Construction Guidance For Glazing And Ventilators

It is essential that prospective cladding system suppliers can demonstrate compliance with the acoustic performance detailed in our specification rather than simply offering a generic glazing configuration. However, we would suggest that the following configurations could typically be expected to provide the required levels of noise insulation.

Façade/Zone	Construction Guidance			
	Glazing		Vent	
	Example Configuration	Minimum $R_w + C_{tr}$	Example Vent	Minimum $D_{n,e,w} + C_{tr}$ with vent open
All residential	10/16/6 double glazing	33	Acoustic trickle ventilator	35

N.B. The  $R_w + C_{tr}$  and  $D_{n,e,w} + C_{tr}$  figures above are single figure simplifications. They are

**N.B.** It is very difficult to give construction guidance regarding glass as there are so many influencing non-acoustic factors and these all need to be taken into account (by others), to a greater or lesser degree, when considering suitable specification. The above guidance is given on the assumption that even if there are no acoustic requirements, a glazing configuration such as 10/16/6 double glazing or equivalent is required to meet the non-acoustic factors. Please advise if this is not the case, because a more economical construction may still be acoustically adequate.

The constructions outlined above should provide reasonable sound insulation when windows are closed.





With partially opened windows it is generally accepted that the typical noise reduction achieved is around 15dBA (ref. BS 8233:2014 Annex G.1). This value is the difference between dBA levels measured outside and inside typical dwellings, therefore 3dBA should be added to free field noise levels to determine outside levels.

The predicted internal noise levels with windows partially opened exceed the proposed target levels (as is often the case). The minimum mitigation available to future occupants would be to close their window.

Ventilation will be provided to comply with the requirements of the Building Regulations Approved Document F. The occupants will thus have the option of keeping windows closed for most of the time and opening windows for purge ventilation.

When purge ventilation is required for short durations i.e. removing food/decorating smells, this is usually acoustically acceptable. When purge ventilation is required to provide cooling during the warmer summer months, a cooling strategy not reliant on opening the windows may be required i.e. mechanical cooling.

## 8.0 Flanking Transmission Performance of Cladding

In order to avoid weakness at junctions between cladding and party walls/floors the cladding shall incorporate suitable elements on partitioning lines against which partitions can be sealed. The complete system shall be tested for flanking transmission at a junction with party walls (between adjoining rooms at the same floor abutting cladding) and with floor slabs (between adjoining floors abutting cladding). The system shall provide a weighted normalised flanking level difference of at least  $D_{nf,w} + C_{tr}$  55 dB when tested in a laboratory in general accordance with BS EN ISO 10848-2:2006 and rated in accordance with BS EN ISO 717-1:2013. Junctions with floor slabs shall be tested in the absence of raised floors and suspended ceilings.

N.B. To adequately control flanking transmission it is recommended that all party walls should be sealed to 2No. separate mullions and all party floors should be sealed to 2No. separate transoms.



## 9.0 Conclusion

The existing environmental noise levels due to traffic and other environmental sources have been previously established and presented in our Environmental Noise Survey Report.

Suitable environmental noise intrusion criteria have been proposed specified on the basis of BS 8233: 2014 and in accordance with the relevant planning condition.

Acoustic analysis has been undertaken to assess the sound insulation requirements of the external glazing and ventilators.

This has enabled a sound reduction performance specification for the glazing and ventilators to be prepared, along with advice to be given on types of constructions we would typically expect to provide the required acoustic performance.

We would stress however, that the proposed glazing and ventilator systems (including frames) must comply with the relevant enclosed performance specifications.

**Guild Living**  
**Acoustic Specification**  
**For**  
**Cladding To Residential Façades**

**SOUND REDUCTION PERFORMANCE**

The complete glazing system shall achieve the following minimum sound reduction indices when tested in accordance with BS EN ISO 10140-2:2010.

Façade/Zone	Minimum Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)					R <sub>w</sub> + C <sub>tr</sub> (see note)
	125	250	500	1k	2k	
All residential	26	27	34	40	38	33

Note: R<sub>w</sub> + C<sub>tr</sub> figures are single figure simplifications. They are provided for guidance purposes only.

The minimum sound reduction indices specified are required to ensure that levels of environmental traffic noise intrusion are controlled with regard to the criteria stated. It is the responsibility of the glazing system supplier to ensure that these performances are achieved as installed on site, and that the systems proposed for this project and methods of installation are selected in order to achieve this.

The specified octave band SRI's are based upon typical glazing configurations. It is acknowledged that alternative SRI shapes may also comply with the internal noise criteria but these would need to be reviewed, and agreed in writing, by ourselves.

**FLANKING PERFORMANCE**

Where party walls/floors abut the cladding it shall incorporate suitable elements on partitioning lines against which walls/floors can be sealed to control flanking. The complete system shall be tested for flanking transmission at a junction with party walls (between adjoining rooms at the same floor abutting cladding) and with floor slabs (between adjoining floors abutting cladding). The system shall provide a weighted normalised flanking level difference of at least  $D_{nf,w} + C_{tr}$  55 dB when tested in a laboratory in general accordance with BS EN ISO 10848-2:2006 and rated in accordance with BS EN ISO 717-1:2013. Junctions with floor slabs shall be tested in the absence of raised floors and suspended ceilings. N.B. To adequately control flanking transmission it is recommended that all party walls should be sealed to 2No. separate mullions and all party floors should be sealed to 2No. separate transoms.

The supplier must demonstrate through developed design details that vulnerable areas subjected to the passage of unwanted sound i.e. flanking transmission have been so developed along with trades immediately adjoining the cladding to produce sound reduction figures as prescribed by the Acoustic Engineer.

## **TEST DATA**

The supplier shall allow for the cost for supplying and testing a representative test sample in accordance with BS EN ISO 10848-1:2006 in an independent UKAS accredited or international equivalent acoustic test laboratory.

Fully detailed test reports shall be supplied. All test reports shall be in English or, a full English translation.

Test data should include the  $\frac{1}{3}$  octave band results from 100Hz to 3150Hz inclusive, together with the corresponding octave band results from 125Hz to 4000Hz inclusive.

The test report shall be provided for test samples which are representation of the complete system for the relevant facades - including frames, joints, seals, spandrel panels and opening lights and trickle vents (as appropriate). The samples proposed should be approved by Hann Tucker Associates.

**Guild Living**  
**Acoustic Specification**  
**for Ventilators**

SOUND INSULATION: Ventilators shall be tested in accordance with BS EN 15010-2:2010. This will involve testing in 1/3 octaves from at least 100Hz to 2500Hz inclusive. These results, together with suitably converted octave band results from 125Hz to 2000Hz shall be provided for a ventilator unit which is representative of the proposed ventilator for the relevant façade. The samples proposed should be approved by Hann Tucker Associates.

The following element normalised level differences shall be achieved with vents open (not closed):

Façade/Zone	D <sub>n,e,w</sub> at Octave Band Centre Frequency (Hz)					D <sub>n,e,w</sub> + C <sub>tr</sub> (see Note)
	125	250	500	1k	2k	
All residential	31	35	40	39	31	35

Note: D<sub>n,e,w</sub> + C<sub>tr</sub> figures are single figure simplifications. They are provided for guidance purposes only.

The specified octave band D<sub>n,e,w</sub>'s are based upon typical vent performances. It is acknowledged that alternative D<sub>n,e,w</sub> shapes may also comply with the internal noise criteria but these would need to be reviewed, and agreed in writing, by ourselves.