

## City Airport Development Programme (CADP1)

### Condition 89: CONSTRUCTION SOUND INSULATION SCHEME



**Bickerdike Allen Partners LLP** is an integrated practice of Architects, Acousticians, and Construction Technologists, celebrating over 50 years of continuous practice.

**Architects:** Design and project management services which cover all stages of design, from feasibility and planning through to construction on site and completion.

**Acoustic Consultants:** Expertise in planning and noise, the control of noise and vibration and the sound insulation and acoustic treatment of buildings.

**Construction Technology Consultants:** Expertise in building cladding, technical appraisals and defect investigation and provision of construction expert witness services.

**Sustainability Consultants:** Energy Conservation and Environmental Specialists and registered assessors for the Code for Sustainable Homes.

<b>Contents</b>	<b>Page No.</b>
1.0 INTRODUCTION .....	4
2.0 Purpose of the scheme .....	5
3.0 AFFECTED DWELLINGS .....	7
4.0 Construction sound insulation scheme .....	9
5.0 Administration.....	14
Appendix 1: Glossary of Acoustic Terminology	
Appendix 2: Planning Conditions related to Construction Sound Insulation Scheme	
Appendix 3: Annexure 10 from Section 106 Agreement dated 27 <sup>th</sup> April 2016	

*This report and all matters referred to herein remain confidential to the Client unless specifically authorised otherwise, when reproduction and/or publication is verbatim and without abridgement. This report may not be reproduced in whole or in part or relied upon in any way by any third party for any purpose whatsoever without the express written authorisation of Bickerdike Allen Partners LLP. If any third party whatsoever comes into possession of this report and/or any underlying data or drawings then they rely on it entirely at their own risk and Bickerdike Allen Partners LLP accepts no duty or responsibility in negligence or otherwise to any such third party.*

*Bickerdike Allen Partners LLP hereby grant permission for the use of this report by the client body and its agents in the realisation of the subject development, including submission of the report to the design team, contractor and sub-contractors, relevant building control authority, relevant local planning authority and for publication on its website.*

## 1.0 INTRODUCTION

### 1.1 General

1.1.1 The City Airport Development Programme (CADP) 1 planning application (13/01228/FUL) was granted planning permission by the Secretaries of State for Communities and Local Government and Transport in July 2016 following an appeal and public inquiry which was held in March/April 2016.

1.1.2 Condition 89 of the CADP1 permission requires that:

*“No Development shall be Commenced until a Construction Sound Insulation Scheme for the purposes of Conditions 90 and 91 has been submitted to and approved in writing by the local planning authority. The Construction Sound Insulation Scheme shall provide a sound reduction of not less than 35dB averaged over 100 Hz to 3150 Hz in accordance with the procedure of British Standard Publication BS EN ISO 140: Part 5 for each Sensitive Receptor.*

*Reason: To ensure that affected Sensitive Receptors are suitably mitigated against intrusive construction noise impacts. ”*

1.1.3 The planning permission also provides the following definition of the ‘**Construction Sound Insulation Scheme**’ :

*– “a scheme of insulation against construction noise that will provide (as a minimum) an average sound reduction of 35dB for each dwelling that is eligible by means of high performance double glazing and mechanical ventilation equipment or secondary glazing and mechanical ventilation equipment.”*

This report sets out the proposed Construction Sound Insulation Scheme (CSIS) for the purposes of discharging the requirements of Condition 89 and includes the following:

Section 2.0 – the purpose of the Scheme;

Section 3.0 – a description of the Affected Dwellings eligible under the Scheme;

Section 4.0 – a description of the Construction Sound Insulation Scheme (CSIS); and

Section 5.0 – a description of how the Scheme will be administered.

- 1.1.4 A glossary of acoustic terminology used is included in Appendix A.
- 1.1.5 There are a number of additional planning conditions in the CADP1 permission related to the management of construction noise. These include a condition requiring the approval of a Construction Environmental Management Plan (CEMP) (including a Construction Noise and Vibration Management and Mitigation Strategy (CNVMMS)) (Condition 88), a night time construction noise sound insulation scheme (Condition 90) and a daytime construction noise sound insulation scheme (Condition 91). Conditions 90 and 91 define eligibility thresholds for sound insulation works. These conditions are reproduced in Appendix 2.
- 1.1.6 These planning conditions, in combination with condition 89, reflect the commitments to mitigate against the construction noise effects identified in the Updated Environmental Statement (UES).
- 1.1.7 A description of the framework of the CSIS is set out within Annexure 10 of the CADP Section 106 Agreement which is reproduced here at Appendix 3.

## **2.0 PURPOSE OF THE SCHEME**

### **2.1 Existing Provisions**

- 2.1.1 There is currently no Construction Sound Insulation Scheme in place at London City Airport.

### **2.2 CADP Assessment**

- 2.2.1 Chapter 8 of the CADP UES identifies that there will be a relatively small number of properties untreated under the Airport's air noise Sound Insulation Scheme that will be exposed to potentially significant levels of Out of Operational Hours (OOOH) construction noise. It explains that various mitigation measures will reduce the effect of construction noise on these receptors. These include a re-assessment of receptors exposed to construction noise when a contractor is appointed, a commitment to monitor and manage noise, physical mitigation in the form of local and temporary noise barriers, and a Construction Sound Insulation Scheme.
- 2.2.2 The CSIS presented in Chapter 8 of the UES is set out below:
- Those properties who are exposed to construction noise levels at night in the range 50 dB to 55 dB  $L_{Aeq,15min}$  (for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months) and who previously refused works under the Sound Insulation Scheme will

be re-offered treatment under the Airport's enhanced First Tier Scheme, as set out in the CNVMMS given in Appendix 8.23 of the UES;

- Enhanced Second Tier Scheme (secondary or 100% cost of high acoustic performance thermal double glazing and acoustic vents) will be made available to properties predicted to exceed CNVMMS noise limits (55 dB  $L_{Aeq,15min}$  at night) regularly (for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months).

- 2.2.3 The CADP UES concludes that on the basis of the number of properties affected and the mitigation measures proposed, the residual construction noise effects will give rise to a **negligible** impact during daytime operational hours and **minor adverse** impact during Out of Operational Hours.

## 2.3 The Proposed Scheme

- 2.3.1 The proposed scheme is described in detail in Section 4.0 below and provides for sound insulation works to be undertaken at Affected Dwellings in order to mitigate the noise impacts of the construction of the CADP, as described in the UES. Subsequent to the publication of the UES, the scheme has been extended to offer greater protection to those dwellings likely to be affected by construction noise, as described in Annexure 10 of the Section 106 Agreement for CADP included here in Appendix 3 and as described in Section 4.0 below. Section 4.0 also identifies some additional provisions over those described in Annexure 10.
- 2.3.2 The designation of an Affected Dwelling is not influenced by whether or not its occupant(s) or owner(s) has previously been offered and refused works under the Airport's existing air noise related Sound Insulation Schemes.
- 2.3.3 The Scheme will comprise the following:
- A. Advance Sound Insulation Works; and
  - B. Standard Sound Insulation Works



- 2.3.4 Advance Sound Insulation Works will comprise a package of replacement high acoustic performance windows and acoustic ventilation. Standard Sound Insulation Works will comprise a package of secondary acoustic glazing and acoustic ventilation. Both Works packages will include loft insulation where applicable to ensure those habitable rooms at the top of blocks of flats or houses are adequately protected.

### **3.0 AFFECTED DWELLINGS**

#### **3.1 Affected Dwellings – Advance Sound Insulation Works**

- 3.1.1 An Affected Dwelling for the purpose of Advance Sound Insulation Works is:

(i) a residential dwelling listed in the appendix to Annexure 10 of the Section 106 agreement (at the time of the Appeal predicted to experience or considered to be at risk of experiencing night time (2300 to 0700 hours) construction noise levels of 55 dB  $L_{Aeq, 15}$  min or more when measured at 1 metre from the facade either (a) for at least 10 days in any 15 consecutive working days or (b) for at least 20 days in any 6 consecutive months);

or

(ii) a residential dwelling which is predicted in the Construction Noise and Vibration Monitoring and Management Strategy (CNVMMS), forming part of the Construction Environmental Management Plan ("CEMP") approved under condition 88 attached to the Planning Permission, to experience night time (2300 to 0700 hours) construction noise levels of 55 dB  $L_{Aeq, 15}$  min or more when measured at 1 metre from the facade either (a) for at least 10 days in any 15 consecutive working days or (b) for at least 20 days in any 6 consecutive months (the "Advance Sound Insulation Works Noise Level");

or

(iii) a residential dwelling which, through actual measurement during the construction of the development, is found to experience night time construction noise equivalent to the Advance Sound Insulation Works Noise Level.

#### **3.2 Affected Dwellings – Standard Sound Insulation Works**

- 3.2.1 An Affected Dwellings for the purpose of Standard Sound Insulation Works is:

(i) a residential dwelling which is not eligible for the Advance Sound Insulation Works; and

(ii) a residential dwelling which is predicted in the approved CNVMMS, or through actual measurement found to experience:

- A. night time (2300 to 0700 hours) construction noise levels of 50 dB  $L_{Aeq, 15 \text{ min}}$  or higher when measured at 1 metre from the facade either (a) for at least 10 days in any 15 consecutive working days or (b) for at least 20 days in any 6 consecutive months; or
- B. daytime (0700 to 2300 hours) construction noise levels in excess of those set out in the table below either (a) for at least 10 days in any 15 consecutive working days or (b) for at least 20 days in any consecutive 6 months (the night time and daytime noise levels being each referred to as the "Standard Sound Insulation Works Noise Level").

**Table 1 – Construction Noise Levels**

Day	Time (hours)	Averaging period, T (hours)	Noise insulation trigger level $L_{Aeq,T}$ (façade)
Monday to Friday	0800 to 1800	10	75
	0700 to 0800 and 1800 to 2300	1	65
Saturday	0800 to 1300	5	75
Saturday	0700 to 0800 and 1300 to 2300	1	65
Sunday	0800 to 2300	1	55



## **4.0 CONSTRUCTION SOUND INSULATION SCHEME**

### **4.1 CSIS Works – Acoustic performance standard**

- 4.1.1 The CSIS works described in Annexure 10 in Appendix 3 and described further below are to improve further the standard of sound insulation and to provide any necessary acoustic ventilation to those properties identified as Affected Dwellings. The CSIS will provide works to achieve a sound reduction of not less than 35dB averaged over 100 Hz to 3150 Hz in accordance with the procedure of British Standard Publication BS EN ISO 140.
- 4.1.2 Compliance with the above acoustic performance standard will be demonstrated by acoustic testing on a representative sample of property types; the sample of properties will be agreed with LBN. This is an additional commitment to the scheme described in Annexure 10.
- 4.1.3 The tests will be taken in accordance with BS EN ISO 140-5: 1998 “Measurement of sound insulation in buildings and of building elements – Part 5: Field measurements of airborne sound insulation of façade elements and facades”. Field measurements of aircraft noise should be used as the noise source for the tests. Tests in accordance to BS EN ISO 16283-3:2016 and BS EN ISO 16283-1:2014 are also acceptable.
- 4.1.4 Testing should be carried out by a suitably competent testing body. The testing body should have appropriate third party accreditation. Accreditation from either United Kingdom Accreditation Service (UKAS) or Association of Noise Consultants Registration Scheme for Sound Insulation Testing<sup>1</sup> (ANC) is deemed acceptable. For the purpose of the CSIS, Bickerdike Allen Partners LLP are the competent testing body or as otherwise agreed between LCA and the local authority.

---

<sup>1</sup> ANC accreditation covers internal sound insulation testing under the BS EN ISO 140 series. It does not cover façade testing in accordance with BS EN ISO 140-5. However, test companies with ANC accreditation for internal testing are deemed competent to carry out external acoustic testing for the purposes of this scheme.

## **4.2 Eligible elevations**

- 4.2.1 Only elevations that directly face the Airport (where the CADP works will occur) will be eligible to benefit from works undertaken pursuant to the CSIS.

## **4.3 Eligible rooms**

- 4.3.1 Any habitable room is eligible. A habitable room is defined as;
- a) living room;
  - b) a bedroom (but not including a bathroom or en-suite);
  - c) a dining room; and
  - d) if the living room in the relevant premises is less than 14 square metres, a kitchen in excess of 7 square metres, or, if the living room in the relevant premises is 14 square metres or more, a kitchen in excess of 11 square metres.

but in any case not including a corridor.

## **4.4 Window acoustic specification – secondary glazing option – Standard Sound Insulation Works**

- 4.4.1 The CSIS contractor shall initially carry out a survey of the windows to be treated and shall produce a survey report including information on current window specification (secondary glazing/thermal double or single), opening type, and any significant defects to the primary and, if applicable, secondary glazing to be agreed by LCA, LBN and the occupiers of the properties. LCA and LBN shall agree which defects must be remedied to ensure that the noise insulation meets the required acoustic design standard and/or so that it can be satisfactorily fixed, and shall also agree how the costs of any such remedial work shall be apportioned.

4.4.2 Where reasonably practicable an offer of secondary glazing and sound attenuating ventilators will be made for habitable rooms with existing thermal double or single glazing of a satisfactory standard PROVIDED THAT:

- The type of secondary glazing units fitted shall relate to the form of the primary windows. The design of secondary units shall be such as to facilitate cleaning of both surfaces of the primary windows from within the treated room. Secondary units shall be either a side-hung casement type, or horizontally or vertically sliding units.
- The secondary system shall generally comprise 4mm float glass within white polyester powder-coated aluminium frames. However, 6mm float glass and toughened glass shall be used where required by BS6206 for safety reasons. Anodic oxidation shall comply with British Standard 1615.

4.4.3 The minimum air gap between primary and secondary panes is to be 100mm, where this can be accommodated within existing reveals PROVIDED THAT:

- Where the reveal depth is insufficient to achieve an air gap of 100mm, secondary glazing shall be fitted flush with the inner face of existing walls subject to a minimum of 75mm being achieved.
- Where a minimum air gap of 75mm cannot be achieved within existing reveals and with the secondary glazing fitted flush with the inner face of existing walls, boxing out of the reveals will be necessary. In these cases the reveals shall be boxed out to achieve a minimum reveal depth of 75mm.
- In all cases where a minimum gap of 100mm cannot be achieved, the glass thickness of the secondary pane shall be increased to 6mm.
- The top and side reveals between primary and secondary windows are to be lined with an approved sound absorbent material treated with a suitable fungicide.

4.4.4 The secondary glazing system is to be mounted on a timber frame with painted finish. Any gaps between sub-frame and reveal shall be sealed with an approved resilient sealant.

#### **4.5 Window acoustic specification – high performance double glazing – Advance Sound Insulation Works**

4.5.1 The high acoustic performance double glazed unit shall generally comprise 10mm glass /10-16mm cavity/6.8mm acoustic laminated glass within a UPVC or aluminium frame. Any alternative double glazing specification that can be demonstrated through acoustic testing to

comply with the CSIS performance standard will also be suitable subject to written approval from LBN.

- 4.5.2 Toughened glass shall be used where required for safety reasons.
- 4.5.3 The high acoustic performance double glazed unit shall be designed to comply with relevant thermal efficiency requirements of the current Building Regulations (Approved Document L).
- 4.5.4 External doors to Habitable Rooms will be fitted with high acoustic and weather specification seals (approved by the Council) to the thresholds, jambs and heads. Opening fanlights over doors shall be sealed and fixed in a closed position (additional to Annexure 10).
- 4.5.5 Glazed doors and fanlights shall be evaluated on an individual case by case basis to ensure sufficient sound insulation provision is achieved where reasonably practicable (additional to Annexure 10).
- 4.5.6 Fully glazed or patio doors or French windows will be treated as windows for consideration of eligibility.

#### **4.6 Ventilation – Both Standard and Advance Sound Insulation Works**

- 4.6.1 CSIS Works will only be carried out with appropriate sound attenuating ventilators.
- 4.6.2 Existing air bricks within habitable rooms shall be replaced by permanent sound-attenuating vents subject to the requirements of the current Building Regulations.
- 4.6.3 In addition to the replacement of existing air bricks by permanent sound attenuating vents, the following combination of ventilators are required,
  - two permanent passive “Type A” sound attenuating vents,
  - one combined mechanical and permanent sound attenuating vent; or
  - one mechanical sound attenuating vent and one permanent sound attenuating vent.

- 4.6.4 Type A and combined mechanical and permanent sound attenuating vents shall be in accordance with the standards given in the Noise Insulation Regulations 1975. Mechanical vents shall be wired to the domestic supply in compliance with current Building Regulations. Suitable ducting shall be provided from room to outside air, complete with an external grille.
- 4.6.5 The mechanical sound attenuating vent shall comprise a Siegenia-Aubi Aeropac SN Acoustic Ventilator (unless otherwise agreed with the Local Planning Authority).
- 4.6.6 All ventilators must be installed in strict accordance with manufacturer's guidance.

#### **4.7 Loft insulation**

- 4.7.1 Where a ceiling separates an eligible habitable room from a loft space, an offer of installation of loft insulation will be made subject to the following (additional to Annexure 10):
- 4.7.2 Where no loft insulation is present, 250mm thick thermal grade mineral wool insulation will be laid in the loft.
- 4.7.3 Where existing loft insulation is found to be unsatisfactory, further layers of insulation will be added to increase the total thickness of insulation to 250mm.

#### **4.8 Building, gas and electric regulations**

- 4.8.1 The CSIS installer shall be responsible for ensuring that the property meets the ventilation requirements of the current Building and Gas Regulations on completion of sound insulation works. All additional ventilation shall be sound attenuated.
- 4.8.2 Any requirements for additional ventilation in the future arising from amendments to the building, to its gas appliance or the Regulations, shall be the responsibility of the building owner or occupier, as the case may be.

#### **4.9 Blinds**

- 4.9.1 Free hanging venetian blinds are to be supplied and fitted between primary and secondary windows to eligible rooms. Blinds are to be white, with tilt mechanism. In no case shall it be required that blinds be fitted where following the agreement of the owners of the property it is decided that such installation would be impracticable.

## **5.0 ADMINISTRATION**

### **5.1 Administration – Advance Sound Insulation Works**

5.1.1 The Airport Companies will offer the owner and (if different) the occupier of each Affected Dwelling the opportunity to have Advance Sound Insulation Works undertaken at the Affected Dwelling in accordance with the following procedure:

(i) for owners and (if different) the occupier of Affected Dwellings listed within the Appendix of Annexure 10 which is reproduced here at Appendix 3, the Airport Companies shall make an offer to provide Advance Sound Insulation Works at least six months before the Commencement of Development. (Note: LCA wrote on 24<sup>th</sup> August 2016 to the owner/occupier of all of those Affected Dwellings listed within Annexure 10 of the CADP1 Section 106 Agreement offering Advance Sound Insulation Works);

(ii) for owners and (if different) the occupier of Affected Dwellings identified as such through the CNVMMS, the Airport Companies shall make offers to provide Advance Sound Insulation Works in accordance with the approved Phasing Plan as part of the CNVMMS submitted under Condition 88 of the CADP1 permission.. This shall have the objective of ensuring that (subject to acceptance by the owner and occupier of the offer of works and permitting access to the relevant dwelling) the Advance Sound Insulation Works are completed at each Affected Dwelling before the construction activity, which is predicted to give rise to the Advance Sound Insulation Works Noise Level at that Affected Dwelling, begins; and

(iii) for owners and (if different) the occupier of Affected Dwellings which, through measurement, are found to experience night time construction noise equivalent to the Advance Sound Insulation Works Noise Level, the Airport Companies shall make an offer to provide Advance Sound Insulation Works as soon as reasonably practicable and in any event no later than 28 days following identification of the Affected Dwelling through measurement.

- 5.1.2 Where within one month of making the same an offer of Advance Sound Insulation Works is accepted by the owner/occupier of the Affected Dwelling and access is provided to the Affected Dwelling, the Operator shall implement the Advance Sound Insulation Works as soon as reasonably practicable following acceptance of the offer and access being provided and, in any event, in accordance with the approved Phasing Plan as part of the Construction Noise and Vibration Mitigation and Monitoring Strategy (CNVMMS) submitted under Condition 88 of the CADP1 permission.

## **5.2 Administration – Standard Sound Insulation Works**

- 5.2.1 The Airport Companies will offer the owner and (if different) the occupier of each Affected Dwelling the opportunity to have Standard Sound Insulation Works undertaken at the Affected Dwelling in accordance with the following procedure:
- (i) for owners and (if different) the occupier of Affected Dwellings identified as such through the CNVMMS, the Airport Companies shall make an offer to provide Standard Sound Insulation Works in accordance with the approved Phasing Plan as part of the CNVMMS submitted under Condition 88 of the CADP1 permission with the objective of ensuring that (subject to acceptance by the owner and occupier of the offer of works and permitting access to the relevant dwelling) the Standard Sound Insulation Works are completed at each Affected Dwelling before the construction activity, which is predicted to give rise to the Standard Sound Insulation Works Noise Level at that Affected Dwelling, begins; and
  - (ii) for owners and (if different) the occupier of Affected Dwellings which, through measurement, are found to experience night time construction noise equivalent to the Standard Sound insulation Works Noise Level, the Airport Companies shall make an offer to provide Standard Sound Insulation Works as soon as reasonably practicable and in any event within 28 days following identification of the Affected Dwelling through measurement.
- 5.2.2 Where within one month of making the same, an offer of Standard Sound Insulation Works is accepted by the owner/occupier of the Affected Dwelling and access is provided to the Affected Dwelling, the Operator shall implement the Standard Sound Insulation Works as soon as reasonably practicable following acceptance of the offer and access being provided and in any event in accordance with the approved Phasing Plan as part of the CNVMMS submitted under Condition 88 of the CADP1 permission.



**David Trew**  
**for Bickerdike Allen Partners LLP**

**Peter Henson**  
**Partner**

## APPENDIX 1

### Glossary of Acoustic Terminology

### **The Decibel, dB**

The unit used to describe the magnitude of sound is the decibel (dB) and the quantity measured is the sound pressure level. The decibel scale is logarithmic and it ascribes equal values to proportional changes in sound pressure, which is a characteristic of the ear. Use of a logarithmic scale has the added advantage that it compresses the very wide range of sound pressures to which the ear may typically be exposed to a more manageable range of numbers. The threshold of hearing occurs at approximately 0 dB (which corresponds to a reference sound pressure of  $2 \times 10^{-5}$  Pascals) and the threshold of pain is around 120 dB.

The sound energy radiated by a source can also be expressed in decibels. The sound power is a measure of the total sound energy radiated by a source per second, in watts. The sound power level,  $L_w$  is expressed in decibels, referenced to  $10^{-12}$  watts.

### **Frequency, Hz**

Frequency is analogous to musical pitch. It depends upon the rate of vibration of the air molecules that transmit the sound and is measure as the number of cycles per second or Hertz (Hz). The human ear is sensitive to sound in the range 20 Hz to 20,000 Hz (20 kHz). For acoustic engineering purposes, the frequency range is normally divided up into discrete bands. The most commonly used bands are octave bands, in which the upper limiting frequency for any band is twice the lower limiting frequency, and one-third octave bands, in which each octave band is divided into three. The bands are described by their centre frequency value and the ranges which are typically used for building acoustics purposes are 63 Hz to 4 kHz (octave bands) and 100 Hz to 3150 Hz (one-third octave bands).

### **A-weighting**

The sensitivity of the ear is frequency dependent. Sound level meters are fitted with a weighting network which approximates to this response and allows sound levels to be expressed as an overall single figure value, in dB(A).

## Environmental Noise Descriptors

Where noise levels vary with time, it is necessary to express the results of a measurement over a period of time in statistical terms. Some commonly used descriptors follow.

Statistical Term	Description
$L_{Aeq,T}$	The most widely applicable unit is the equivalent continuous A-weighted sound pressure level ( $L_{Aeq,T}$ ). It is an energy average and is defined as the level of a notional sound which (over a defined period of time, T) would deliver the same A-weighted sound energy as the actual fluctuating sound.
$L_{A90}$	The level exceeded for 90% of the time is normally used to describe background noise.
$L_{Amax,T}$	The maximum A-weighted sound pressure level, normally associated with a time weighting, F (fast), or S (slow)

## Sound Transmission in Rooms

Sound energy is reflected from the room surfaces and this gives rise to reverberation. At short distances from a sound source, the sound level will fall off at a rate of 6 dB per doubling of distance, as it would in the open air – this is known as the direct field. Beyond a certain distance, the effect of reverberation takes over and the level ceases to fall off significantly with distance from the source. This is known as the reverberant field. For receiver positions in this part of the room, sound levels can be reduced by applying sound absorbing finishes to the surfaces of the room. A 3 dB reduction can normally be obtained by doubling the absorption present, which corresponds to halving the reverberation time (see below).

## **Sound Insulation - Airborne**

Voices, hi-fi systems, television and radio sound and musical instruments are all sources of airborne sound. They excite the air around them and the vibration in the air is transmitted to surrounding surfaces, such as walls, ceilings and floors. This sets these constructions into vibration and this vibration is radiated in neighbouring rooms as sound. Energy is lost in the transmission path and this is referred to as transmission loss or, more generally, sound insulation. The most simple measure of sound insulation is the sound level difference,  $D$ , which is the arithmetic difference between the sound level, in dB, in the source room and the sound level in the receiving room.

Other measures of sound insulation include the sound reduction index,  $R$ , which is a measure of the acoustical performance of a partition, obtained in a laboratory, and the standardised level difference,  $D_{nT}$ , which is used mainly in the sound insulation of domestic separating walls and separating floors. The relevant test procedures are laid down in BS EN ISO 140. A single figure “weighted” result can be obtained from one-third octave band test results by using a curve-fitting procedure laid down in BS EN ISO 717. The subscript “w” is added to the relevant descriptor (eg  $D_{nT,w}$ ).

The sound reduction index,  $R$ , is used in the specification of components, such as partitions, doors and windows. It is important to bear in mind that the performance of components in the field is usually lower than can be obtained in a laboratory. The transmission of sound via other components common to both rooms (“flanking transmission”) can reduce the apparent sound reduction index ( $R'$ ) significantly.

## **Sound Insulation - Impact**

In the case of impact sound, the building construction is caused to vibrate as a result of a physical impact. Footsteps on floors are the most obvious example. The vibration is radiated as sound in neighbouring rooms. Impact insulation is measured using a standard tapping machine, which drops weights cyclically onto a floor. The sound pressure level is measured in the receiving room below and the result is known as the impact level,  $L_i$  for laboratory tests and  $L'_i$  for field tests.

## APPENDIX 2

### Planning Conditions related to Construction Sound Insulation Scheme

### 5.3 Planning condition 88 – Construction Environmental Management Plan (CEMP)

5.3.1 *“Prior to Commencement of Development a Construction Environmental Management Plan (CEMP) shall be submitted to and approved in writing by the local planning authority.*

5.3.2 *The CEMP shall be implemented as approved. The CEMP shall include (but not be limited to):*

- *a Construction Noise and Vibration Management and Mitigation Strategy (CNVMMS);*
- *an Air Quality Construction Management and Mitigation Strategy (AQCMMS); and*
- *details of wheel washing equipment.*

5.3.3 *The CEMP shall be in accordance with the environmental standards, mitigation measures, embedded mitigation measures, requirements, recommendations and methods of implementing the Development contained in the UES, appendices and addenda therein relevant to the Development.*

5.3.4 *Reason: To ensure a satisfactory standard of development and to safeguard the amenities of the surrounding area.”*

5.3.5 Planning Condition 88 includes reference to the CNVMMS. The CNVMMS is defined within the decision notice. The definition is reproduced below,

***‘Construction Noise and Vibration Management and Mitigation Strategy (CNVMMS)’ means a strategy in accordance with the environmental standards, mitigation measures, embedded mitigation measures, requirements, recommendations and methods of implementing the Development contained in the Updated Environmental Statement and appendices to include (but not limited to) the following:***

- *maximising the use of daytime hours;*
- *mechanisms of Control;*
- *community Liaison and complaints handling;*
- *monitoring procedure;*
- *reporting of monitoring data;*
- *reporting of complaints;*



- *identification of any predicted Sensitive Receptors to be offered the Construction Sound Insulation Scheme in accordance with Conditions 90 and 91 and the proposed Phasing Plan for the carrying out such Construction Sound Insulation in each case;*
- *section 61 procedure and ownership;*
- *location, dimensions and materials of any construction noise barriers; and*
- *any other mitigation measures to be implemented at source"*

#### **5.4 Planning condition 89 – Construction sound Insulation for sensitive receptors**

5.4.1 *"No Development shall be Commenced until a Construction Sound Insulation Scheme for the purposes of Conditions 90 and 91 has been submitted to and approved in writing by the local planning authority. The Construction Sound Insulation Scheme shall provide a sound reduction of not less than 35dB averaged over 100 Hz to 3150 Hz in accordance with the procedure of British Standard Publication BS EN ISO 140: Part 5 for each Sensitive Receptor.*

5.4.2 *Reason: To ensure that affected Sensitive Receptors are suitably mitigated against intrusive construction noise impacts."*

#### **5.5 Planning condition 90 – night time construction sound insulation**

5.5.1 *"Prior to Commencement of Development of the relevant Phase approved under Condition 4, any works required in accordance with the Construction Sound Insulation Scheme approved under Condition 89 shall be offered to Sensitive Receptors, predicted or measured to be exposed to construction noise levels between 2300 hours and 0700 hours the following day above 50dB  $L_{Aeq}$  15min at 1 metre from the façade as a result of the Construction of the Development:*

- *for at least 10 days in any 15 consecutive working days; or*
- *for at least 20 days in any consecutive 6 months;*

5.5.2 *unless sound insulation of equivalent acoustic performance to that set out in the Construction Sound Insulation Scheme has already been installed under the Airport's existing sound insulation schemes.*

5.5.3 *Where such an offer is accepted and access provided to the relevant dwelling the*

*Airport shall implement the insulation works required under the approved Construction Sound Insulation Scheme in accordance with the Phasing Plan forming part of the CEMP approved under Condition 88.*

5.5.4 *Reason: To ensure a satisfactory standard of development and to safeguard the amenities of the surrounding area."*

## **5.6 Condition 91 - Day time construction noise mitigation**

5.6.1 *"Condition 4, any works required in accordance with the Construction Sound Insulation Scheme approved under Condition 89 shall be offered to Sensitive Receptors predicted or measured to be exposed to construction noise levels as a result of the Construction of the Development at 1 metre from the façade in excess of those set out in the table below either:*

- *for at least 10 days in any 15 consecutive working days; or*
- *for at least 20 days in any consecutive 6 months;*

5.6.2 *unless sound insulation of equivalent acoustic performance to that set out in the Construction Sound Insulation Scheme has already been installed under the Airport's existing sound insulation schemes.*

Day	Time (hours)	Averaging period, T (hours)	Noise insulation trigger level LAeq,T (façade)
Monday to Friday	0800 to 1800	10	75
	0700 to 0800 and 1800 to 2300	1	65
Saturday	0800 to 1300	5	75
Saturday	0700 to 0800 and 1300 to 2300	1	65
Sunday	0800 to 2300	1	55

5.6.3 *Where such offer is accepted and access provided to the relevant dwelling the Airport shall implement the insulation works required under the approved Construction Sound Insulation Scheme in accordance with the Phasing Plan forming part of the CEMP approved under Condition 88.*

5.6.4 *Reason: To ensure a satisfactory standard of development and to safeguard the amenities of the surrounding area."*

## APPENDIX 3

Annexure 10 from Section 106 Agreement dated 27<sup>th</sup>  
April 2016

## ANNEXURE 10

### Construction Sound Insulation Scheme

#### 1 Purpose of the Scheme

- 1.1 This Scheme provides for sound insulation works to be undertaken at Affected Dwellings in order to mitigate the noise impacts of the construction of the Development.
- 1.2 The Scheme will comprise the following:
  - (a) Advance Sound Insulation Works; and
  - (b) Standard Sound Insulation Works
- 1.3 The Scheme will provide works to achieve an average sound reduction of not less than 35 dB averaged over 100 to 3150 Hz in accordance with the procedure of British Standard Publication BS EN ISO 16283-3:2016 and BS EN ISO 16283-1:2014 (or any subsequent revisions of these publications) in respect of each Affected Dwelling.
- 1.4 An Affected Dwelling will be eligible for these works notwithstanding the refusal of a previous offer by the Airport Companies to undertake at that dwelling any Past Noise Insulation Works and any CADP Noise Insulation Works.

#### 2 Advance Sound Insulation Works

- 2.1 Scope of works
  - (a) Advance Sound Insulation Works will consist of high performance double glazing and mechanical ventilation or (at the owner's/occupier's election) secondary glazing and mechanical ventilation.
  - (b) Only the "Habitable Rooms" in a dwelling may benefit from the works undertaken pursuant to the Construction Sound Insulation Scheme; these are the following rooms: living room, bedroom (not including a bathroom or an en-suite), dining room, either a kitchen in excess of 7 m<sup>2</sup> if the living room is less than 14 m<sup>2</sup> or a kitchen in excess of 11 m<sup>2</sup> where the living room is 14 m<sup>2</sup> or more.
  - (c) Only elevations facing the Development can benefit from works undertaken pursuant to the Construction Sound Insulation Scheme
- 2.2 Affected Dwellings
  - (a) An Affected Dwelling for the purpose of Advance Sound Insulation Works is:
    - (i) a residential dwelling listed in the Appendix to this Annexure (at the time of the Appeal predicted to experience or considered to be at risk of experiencing night time (2300 to 0700 hours) construction noise levels of 55 dB LAeq, 15 min or more when measured at 1 metre from the façade either (a) for at least 10 days in any 15 consecutive working days or (b) for at least 20 days in any 6 consecutive months; or
    - (ii) a residential dwelling which is predicted in the Construction Environmental Management Plan ("CEMP") approved under the conditions attached to the Planning Permission to experience night time (2300 to 0700 hours) construction noise levels of 55 dB LAeq, 15 min or more when measured at 1 metre from the

façade either (a) for at least 10 days in any 15 consecutive working days<sup>1</sup> or (b) for at least 20 days in any 6 consecutive months (the "Advance Sound Insulation Works Noise Level"); or

- (iii) a residential dwelling which, through actual measurement during the construction of the development, is found to experience night time construction noise equivalent to the Advance Sound Insulation Works Noise Level.

## 2.3 Procedure

- (a) The Airport Companies will offer the owner and (if different) the occupier of each Affected Dwelling the opportunity to have Advance Sound Insulation Works undertaken at the Affected Dwelling in accordance with the following procedure:
  - (i) for owners and (if different) the occupier of Affected Dwellings listed within the Appendix to this Annexure 10, the Airport Companies shall make an offer to provide Advance Sound Insulation Works at least six months before the Commencement of Development;
  - (ii) for owners and (if different) the occupier of Affected Dwellings identified as such through the CEMP, the Airport Companies shall make offers to provide Advance Sound Insulation Works in accordance with the phasing plan in the approved CEMP with the objective of ensuring that (subject to acceptance by the owner and occupier of the offer of works and permitting access to the relevant dwelling) the Advance Sound Insulation Works are completed at each Affected Dwelling before the construction activity, which is predicted to give rise to the Advance Sound Insulation Works Noise Level at that Affected Dwelling, begins; and
  - (iii) for owners and (if different) the occupier of Affected Dwellings which, through measurement, are found to experience night time construction noise equivalent to the Advance Sound Insulation Works Noise Level, the Airport Companies shall make an offer to provide Advance Sound Insulation Works as soon as reasonably practicable and in any event no later than 28 days following identification of the Affected Dwelling through measurement.
- (b) Where within one month of making the same an offer of Advance Sound Insulation Works is accepted by the owner/occupier of the Affected Dwelling and access is provided to the Affected Dwelling, the Operator shall implement the Advance Sound Insulation Works as soon as reasonably practicable following acceptance of the offer and access being provided and in any event, in accordance with the Phasing Plan forming part of the approved CEMP.

## 3 Standard Sound Insulation Works

### 3.1 Scope of works

- (a) Standard sound insulation works will consist of secondary glazing and mechanical ventilation.
- (b) Only the "Habitable Rooms" in a dwelling may benefit from the works undertaken pursuant to the Construction Sound Insulation Scheme; these are the following rooms: living room, bedroom (not including a bathroom or an en-suite), dining room, either a kitchen in excess of 7 m<sup>2</sup> if the living room is less than 14 m<sup>2</sup> or a kitchen in excess of 11 m<sup>2</sup> where the living room is 14 m<sup>2</sup> or more.
- (c) Only elevations facing the Development can benefit from works undertaken pursuant to the Construction Sound Insulation Scheme

---

<sup>1</sup> "working days" in this Annexure means any day on which construction works forming part of the Development are undertaken

### 3.2 Affected Dwellings

- (a) An Affected Dwellings for the purpose of Standard Sound Insulation Works is:
- (i) a residential dwelling which is not eligible for the Advance Sound Insulation Works;
  - (ii) a residential dwelling which is predicted in the approved CEMP, or through actual measurement, found to experience:
    - (A) night time (2300 to 0700 hours) construction noise levels of 50 dB LAeq, 15 min or higher when measured at 1 metre from the façade either (a) for at least 10 days in any 15 consecutive working days or (b) for at least 20 days in any 6 consecutive months; or
    - (B) daytime (0700 to 2300 hours) construction noise levels in excess of those set out in the table below either (a) for at least 10 days in any 15 consecutive working days or (b) for at least 20 days in any consecutive 6 months (the night time and daytime noise levels being each referred to as the "Standard Sound Insulation Works Noise Level").

Day	Time	Averaging period, T	Noise insulation trigger level LAeq,T (façade)
Monday to Friday	0800 to 1800	10 hours	75
	0700 to 0800	1 hour	65
	1800 to 2300	1 hour	65
Saturday	0700 to 0800	1 hour	65
	0800 to 1300	5 hours	75
	1300 to 2300	1 hour	65
Sunday	0800 to 2300	1 hour	55

### 3.3 Procedure

- (a) The Airport Companies will offer the owner and (if different) the occupier of each Affected Dwelling the opportunity to have Standard Sound Insulation Works undertaken at the Affected Dwelling in accordance with the following procedure:
- (i) for owners and (if different) the occupier of Affected Dwellings identified as such through the CEMP, the Airport Companies shall make an offer to provide Standard Sound Insulation Works in accordance with the phasing plan in the approved CEMP with the objective of ensuring that (subject to acceptance by the owner and occupier of the offer of works and permitting access to the relevant dwelling) the Standard Sound Insulation Works are completed at each Affected Dwelling before the construction activity, which is predicted to give rise to the Standard Sound Insulation Works Noise Level at that Affected Dwelling, begins; and
  - (ii) for owners and (if different) the occupier of Affected Dwellings which, through measurement, are found to experience night time construction noise equivalent to the Standard Sound Insulation Works Noise Level, the Airport Companies shall make an offer to provide Standard Sound Insulation Works as soon as reasonably practicable and in any event within 28 days following identification of the Affected Dwelling through measurement.
- (b) Where within one month of making the same an offer of Standard Sound Insulation Works is accepted by the owner/occupier of the Affected Dwelling and access is provided to the Affected Dwelling, the Operator shall implement the Standard Sound Insulation Works as soon as reasonably practicable following acceptance of the offer and access being provided and in any event in accordance with the Phasing Plan forming part of the CEMP.

## Appendix to Construction Noise Sound Insulation Scheme

Construction Noise Sound Insulation Scheme				
ALBION HOUSE		FLAT 21	CHURCH STREET	E16 2ND
ALBION HOUSE		FLAT 22	CHURCH STREET	E16 2ND
ALBION HOUSE		FLAT 23	CHURCH STREET	E16 2ND
ALBION HOUSE		FLAT 29	CHURCH STREET	E16 2ND
ALBION HOUSE		FLAT 30	CHURCH STREET	E16 2ND
ALBION HOUSE		FLAT 31	CHURCH STREET	E16 2ND
ALBION HOUSE		FLAT 25	CHURCH STREET	E16 2ND
ALBION HOUSE		FLAT 26	CHURCH STREET	E16 2ND
ALBION HOUSE		FLAT 27	CHURCH STREET	E16 2ND
	19		CLAREMONT CLOSE	E16 2LR
	20		CLAREMONT CLOSE	E16 2LR
	21		CLAREMONT CLOSE	E16 2LR
	22		CLAREMONT CLOSE	E16 2LR
	23		CLAREMONT CLOSE	E16 2LR
	24		CLAREMONT CLOSE	E16 2LR
	25		CLAREMONT CLOSE	E16 2LR
	26		CLAREMONT CLOSE	E16 2LR
	27		CLAREMONT CLOSE	E16 2LR
	28		CLAREMONT CLOSE	E16 2LR
	29		CLAREMONT CLOSE	E16 2LR
	30		CLAREMONT CLOSE	E16 2LR
	31		CLAREMONT CLOSE	E16 2LR
	32		CLAREMONT CLOSE	E16 2LR
	33		CLAREMONT CLOSE	E16 2LR
	35		CLAREMONT CLOSE	E16 2LR
	36		CLAREMONT CLOSE	E16 2LR
	37		CLAREMONT CLOSE	E16 2LR
	38		CLAREMONT CLOSE	E16 2LR
	39		CLAREMONT CLOSE	E16 2LR
	40		CLAREMONT CLOSE	E16 2LR
	41		CLAREMONT CLOSE	E16 2LR
	42		CLAREMONT CLOSE	E16 2LR
	55		CLAREMONT CLOSE	E16 2LR
	56		CLAREMONT CLOSE	E16 2LR
	60		CLAREMONT CLOSE	E16 2LR
	61		CLAREMONT CLOSE	E16 2LR
	62		CLAREMONT CLOSE	E16 2LR
	63		CLAREMONT CLOSE	E16 2LR
	65	FLAT 7	CLAREMONT CLOSE	E16 2LR
	65	FLAT 3	CLAREMONT CLOSE	E16 2LR
SHAW HOUSE		FLAT 30	CLAREMONT STREET	E16 2LP
SHAW HOUSE		FLAT 21	CLAREMONT STREET	E16 2LP



SHAW HOUSE		FLAT 22	CLAREMONT STREET	E16 2LP
SHAW HOUSE		FLAT 29	CLAREMONT STREET	E16 2LP
SHAW HOUSE		FLAT 25	CLAREMONT STREET	E16 2LP
SHAW HOUSE		FLAT 26	CLAREMONT STREET	E16 2LP
	12		FELIXSTOWE COURT	E16 2RR
	17		FELIXSTOWE COURT	E16 2RR
	18		FELIXSTOWE COURT	E16 2RR
	33		FELIXSTOWE COURT	E16 2RR
	34		FELIXSTOWE COURT	E16 2RR
	35		FELIXSTOWE COURT	E16 2RR
	36		FELIXSTOWE COURT	E16 2RR
	39		FELIXSTOWE COURT	E16 2RR
	40		FELIXSTOWE COURT	E16 2RR
	41		FELIXSTOWE COURT	E16 2RR
	42		FELIXSTOWE COURT	E16 2RR
	47		FELIXSTOWE COURT	E16 2RR
	48		FELIXSTOWE COURT	E16 2RR
	53		FELIXSTOWE COURT	E16 2RR
	54		FELIXSTOWE COURT	E16 2RR
	55		FELIXSTOWE COURT	E16 2RR
	56		FELIXSTOWE COURT	E16 2RR
	59		FELIXSTOWE COURT	E16 2RR
	62		FELIXSTOWE COURT	E16 2RR
	106		FELIXSTOWE COURT	E16 2RS
	107		FELIXSTOWE COURT	E16 2RS
	4		FERNHILL STREET	E16 2HZ
	5		FISHGUARD WAY	E16 2RG
BROCKLEBANK HOUSE		FLAT 13	GLENISTER STREET	E16 2LY
BROCKLEBANK HOUSE		FLAT 14	GLENISTER STREET	E16 2LY
BROCKLEBANK HOUSE		FLAT 21	GLENISTER STREET	E16 2LY
BROCKLEBANK HOUSE		FLAT 22	GLENISTER STREET	E16 2LY
BROCKLEBANK HOUSE		FLAT 17	GLENISTER STREET	E16 2LY
BROCKLEBANK HOUSE		FLAT 18	GLENISTER STREET	E16 2LY
BROCKLEBANK HOUSE		FLAT 29	GLENISTER STREET	E16 2LY
BROCKLEBANK HOUSE		FLAT 25	GLENISTER STREET	E16 2LY
BROCKLEBANK HOUSE		FLAT 26	GLENISTER STREET	E16 2LY
BROCKLEBANK HOUSE		FLAT 30	GLENISTER STREET	E16 2LY
	25		GRENADIER STREET	E16 2LD
	26		GRENADIER STREET	E16 2LD
	27		GRENADIER STREET	E16 2LD
	28		GRENADIER STREET	E16 2LD
	22		GRIMSBY GROVE	E16 2RJ
	24		GRIMSBY GROVE	E16 2RJ

	29		LEONARD STREET	E16 2DT
	31		LEONARD STREET	E16 2DT
	33		LEONARD STREET	E16 2DT
	35		LEONARD STREET	E16 2DT
	37		LEONARD STREET	E16 2DT
	2		LORD STREET	E16 2DZ
	10		LORD STREET	E16 2DZ
	12		LORD STREET	E16 2DZ
	14		LORD STREET	E16 2DZ
	16		LORD STREET	E16 2DZ
	18		LORD STREET	E16 2DZ
	20		LORD STREET	E16 2DZ
DUNEDIN HOUSE		FLAT 12	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 14	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 15	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 10	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 11	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 20	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 21	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 22	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 16	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 17	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 18	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 19	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 27	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 28	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 29	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 23	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 24	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 25	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 26	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 34	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 35	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 36	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 37	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 30	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 32	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 33	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 45	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 46	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 41	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 42	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 53	MANWOOD STREET	E16 2LB

DUNEDIN HOUSE		FLAT 54	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 49	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 50	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 61	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 62	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 57	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 58	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 69	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 70	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 65	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 66	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 7	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 8	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 38	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 73	MANWOOD STREET	E16 2LB
10B			NEWLAND STREET	E16 2DU
12B			NEWLAND STREET	E16 2DU
2A			NEWLAND STREET	E16 2DU
2B			NEWLAND STREET	E16 2DU
4A			NEWLAND STREET	E16 2DU
4B			NEWLAND STREET	E16 2DU
6A			NEWLAND STREET	E16 2DU
6B			NEWLAND STREET	E16 2DU
8A			NEWLAND STREET	E16 2DU
8B			NEWLAND STREET	E16 2DU
	2		NEWLAND STREET	E16 2DU
	4		NEWLAND STREET	E16 2DU
	6		NEWLAND STREET	E16 2DU
	8		NEWLAND STREET	E16 2DU
	18		NEWLAND STREET	E16 2HN
	20		NEWLAND STREET	E16 2HN
	22		NEWLAND STREET	E16 2HN
	24		NEWLAND STREET	E16 2HN
	30		NEWLAND STREET	E16 2HN
	32		NEWLAND STREET	E16 2HN
	34		NEWLAND STREET	E16 2HN
	36		NEWLAND STREET	E16 2HN
	80		NEWLAND STREET	E16 2HN
	82		NEWLAND STREET	E16 2HN
	86		NEWLAND STREET	E16 2HN
	88		NEWLAND STREET	E16 2HN
	92		NEWLAND STREET	E16 2HN
	94		NEWLAND STREET	E16 2HN

	96		NEWLAND STREET	E16 2NN
	43		PIER PARADE	E16 2LJ
	44		PIER PARADE	E16 2LJ
	45		PIER PARADE	E16 2LJ
	46		PIER PARADE	E16 2LJ
	3		RAWSTHORNE CLOSE	E16 2JR
	5		RAWSTHORNE CLOSE	E16 2JR
	14		RAWSTHORNE CLOSE	E16 2JR
SAVILLE HOUSE		FLAT 13	ROBERT STREET	E16 2NA
SAVILLE HOUSE		FLAT 14	ROBERT STREET	E16 2NA
SAVILLE HOUSE		FLAT 21	ROBERT STREET	E16 2NA
SAVILLE HOUSE		FLAT 22	ROBERT STREET	E16 2NA
SAVILLE HOUSE		FLAT 17	ROBERT STREET	E16 2NA
SAVILLE HOUSE		FLAT 18	ROBERT STREET	E16 2NA
SAVILLE HOUSE		FLAT 20	ROBERT STREET	E16 2NA
SAVILLE HOUSE		FLAT 25	ROBERT STREET	E16 2NA
SAVILLE HOUSE		FLAT 26	ROBERT STREET	E16 2NA
SAVILLE HOUSE		FLAT 30	ROBERT STREET	E16 2NA
QUEENSLAND HOUSE		FLAT 44	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 45	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 46	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 47	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 41	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 42	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 43	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 52	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 53	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 54	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 55	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 48	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 49	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 50	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 51	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 60	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 61	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 62	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 63	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 56	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 57	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 58	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 59	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 68	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE		FLAT 69	RYMILL STREET	E16 2LQ

QUEENSLAND HOUSE	FLAT 70	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE	FLAT 71	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE	FLAT 84	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE	FLAT 85	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE	FLAT 86	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE	FLAT 87	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE	FLAT 12	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 13	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 15	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 11	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 20	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 21	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 16	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 17	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 19	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 27	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 28	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 29	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 23	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 24	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 25	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 26	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 34	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 35	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 36	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 37	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 30	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 31	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 32	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 33	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 72	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE	FLAT 73	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE	FLAT 74	RYMILL STREET	E16 2LQ
QUEENSLAND HOUSE	FLAT 5	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 8	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 38	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 39	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 40	RYMILL STREET	E16 2LG
QUEENSLAND HOUSE	FLAT 9	RYMILL STREET	E16 2LG
WESTLAND HOUSE	FLAT 10	RYMILL STREET	E16 2LE
WESTLAND HOUSE	FLAT 17	RYMILL STREET	E16 2LE
WESTLAND HOUSE	FLAT 18	RYMILL STREET	E16 2LE
WESTLAND HOUSE	FLAT 14	RYMILL STREET	E16 2LE

WESTLAND HOUSE		FLAT 16	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 24	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 25	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 26	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 20	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 21	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 22	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 32	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 33	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 34	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 28	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 29	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 30	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 40	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 36	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 37	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 38	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 12	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 59	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 13	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 60	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 61	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 62	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 56	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 57	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 58	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 67	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 68	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 69	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 70	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 63	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 64	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 65	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 68	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 71	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 72	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 73	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 74	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 41	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 42	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 43	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 44	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 8	RYMILL STREET	E16 2LE

WESTLAND HOUSE		FLAT 9	RYMILL STREET	E16 2LE
WESTLAND HOUSE		FLAT 49	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 50	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 51	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 52	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 45	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 46	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 47	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 48	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 53	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 54	RYMILL STREET	E16 2LF
WESTLAND HOUSE		FLAT 55	RYMILL STREET	E16 2LF
	62		SHELDRAKE CLOSE	E16 2HT
	64		SHELDRAKE CLOSE	E16 2HT
	66		SHELDRAKE CLOSE	E16 2HT
	68		SHELDRAKE CLOSE	E16 2HT
	70		SHELDRAKE CLOSE	E16 2HT
	72		SHELDRAKE CLOSE	E16 2HT
	92		SHELDRAKE CLOSE	E16 2HT
	94		SHELDRAKE CLOSE	E16 2HT
	110		SHELDRAKE CLOSE	E16 2HT
	112		SHELDRAKE CLOSE	E16 2HT
	114		SHELDRAKE CLOSE	E16 2HT
	116		SHELDRAKE CLOSE	E16 2HT
	120		SHELDRAKE CLOSE	E16 2HT
GLEN HOUSE		FLAT 21	STOREY STREET	E16 2LJ
GLEN HOUSE		FLAT 22	STOREY STREET	E16 2LJ
GLEN HOUSE		FLAT 29	STOREY STREET	E16 2LJ
GLEN HOUSE		FLAT 30	STOREY STREET	E16 2LJ
GLEN HOUSE		FLAT 25	STOREY STREET	E16 2LJ
GLEN HOUSE		FLAT 26	STOREY STREET	E16 2LJ
	44		WINIFRED STREET	E16 2HX
	50		WINIFRED STREET	E16 2HX
	52		WINIFRED STREET	E16 2HX
	54		WINIFRED STREET	E16 2HX
	56		WINIFRED STREET	E16 2HX
	94		WINIFRED STREET	E16 2HX
	96		WINIFRED STREET	E16 2HX
	100		WINIFRED STREET	E16 2HX
	102		WINIFRED STREET	E16 2HX
	104		WINIFRED STREET	E16 2HX
	106		WINIFRED STREET	E16 2HX
16A			WOODMAN STREET	E16 2HF

20A			WOODMAN STREET	E16 2NF
26A			WOODMAN STREET	E16 2NF
28A			WOODMAN STREET	E16 2NF
34A			WOODMAN STREET	E16 2NF
36A			WOODMAN STREET	E16 2NF
44A			WOODMAN STREET	E16 2LS
52A			WOODMAN STREET	E16 2LS
58A			WOODMAN STREET	E16 2LS
60A			WOODMAN STREET	E16 2LS
68A			WOODMAN STREET	E16 2LS
76A			WOODMAN STREET	E16 2LS
	9		WOODMAN STREET	E16 2LN
	16		WOODMAN STREET	E16 2NF
	16		WOODMAN STREET	E16 2LL
	20		WOODMAN STREET	E16 2NF
	26		WOODMAN STREET	E16 2NF
	28		WOODMAN STREET	E16 2NF
	34		WOODMAN STREET	E16 2NF
	36		WOODMAN STREET	E16 2NF
	44		WOODMAN STREET	E16 2LS
	52		WOODMAN STREET	E16 2LS
	60		WOODMAN STREET	E16 2LS
	68		WOODMAN STREET	E16 2LS
	76		WOODMAN STREET	E16 2LS



	34		CLAREMONT CLOSE	E16 2LR
	64		CLAREMONT CLOSE	E16 2LR
	65	FLAT 6	CLAREMONT CLOSE	E16 2LR
	65	FLAT 8	CLAREMONT CLOSE	E16 2LR
	65	FLAT 9	CLAREMONT CLOSE	E16 2LR
	45		FELDKISTOWE COURT	E16 2RR
	46		FELDKISTOWE COURT	E16 2RR
	29		GRENADEIER STREET	E16 2LD
DUNEDIN HOUSE		FLAT 31	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 43	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 44	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 51	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 52	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 47	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 48	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 59	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 60	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 55	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 56	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 67	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 68	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 63	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 64	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 39	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 40	MANWOOD STREET	E16 2LA
DUNEDIN HOUSE		FLAT 71	MANWOOD STREET	E16 2LB
DUNEDIN HOUSE		FLAT 72	MANWOOD STREET	E16 2LB
	11B		SHELDRAKE CLOSE	E16 2HT
	10B		WINIFRED STREET	E16 2HX