Regulatory Impact Assessment

Sound

Proposed amendments to Building Regulations Part E and Technical Guidance Document E
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1.0 Introduction

Noise is unwanted sound. A large number of noise complaints are reported\(^1\) each year from members of the public of which a significant portion arise from domestic complaints.

Current standards of sound insulation in dwellings can be traced back to surveys carried out in the UK in the 1950s which indicated that 225mm thick solid brick walls and solid concrete floors provided reasonable standards of sound insulation at that time. Values derived from the performance of these constructions became the basis for selecting constructions for the Building Regulations in the UK in the 1980s and 90s. Ireland’s current Technical Guidance Document E (1997) is largely based on the England & Wales Approved Document E (1992).

In 2003, the Building Regulations Advisory Body (BRAB) identified the need to conduct a full review of Part E of the Second Schedule to Ireland’s Building Regulations 1997. In October 2003, the BRAB were advised that HomeBond had engaged a consultant to carry out a study of this area to investigate sound insulation in party walls and floors in houses and apartments. The report\(^2\) titled “Sound Insulation in Dwellings” was finalised, having taken longer than expected, in December 2008. A review of Part E of Building Regulations and the related Technical Guidance Document E was duly initiated in 2009 in the light of the results of the HomeBond study and in consultation with the Building Regulations Advisory Body and industry experts (see Section 5.0).

2.0 Context

2.1 Policy Context

2.1.1 Noise pollution

Noise nuisance is considered to be a noise that is so loud, so continuous, so repeated, of such duration or pitch or occurring at such times that it gives reasonable cause for annoyance. Under the current Programme for Government there is a commitment to address general noise pollution through the introduction of fixed payment notices (or ‘on the spot fines’). It is expected that the General Scheme for a Noise Nuisance Bill will be submitted to the Government for approval in 2014. There will be a further round of consultation in advance of this.

2.1.2 Sustainable development

The Department of the Environment, Community and Local Government (DECLG) has published a number of documents relating to sustainable development in the urban environment primarily, but which also recognise and advise on noise pollution. They are as follows:

- Sustainable Urban Housing: Design Standards for New Apartments (Guidelines for Planning Authorities), September 2007;
- Sustainable Residential Development in Urban Areas: Cities, Towns and Villages (Guidelines for Planning Authorities), May 2009;
- Quality Housing for Sustainable Communities: Best Practice Guidelines for Delivering Homes Sustaining Communities, 2007.

The document dealing with ‘Design Standards for New Apartments’ calls for “attention at the design and construction stages to prevent undue noise transmission between units”. There is no mention of

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1 See Appendix A – Extent of Reported Problem.
appropriate design goals or the methodology to be employed, other than reference to Part E of the Building Regulations (see subsection 2.2.3 below).

The guidelines for ‘Sustainable Residential Development in Urban Areas’ highlight the need to “Deliver a quality of life which residents and visitors are entitled to expect, in terms of amenity, safety and convenience” and further states that “Privacy is an important element of residential amenity”. Noise transfer between dwellings is a key consideration in respect of amenity and privacy.

The ‘Urban Design Manual’ lists privacy and amenity as one of twelve key issues, with specific reference to the need to prevent sound transmission in homes by way of appropriate acoustic insulation or layout. There is some comment in relation to the use of appropriate building materials and also the zoning of dwellings to minimize the potential for excessive noise transfer.

The ‘Quality Housing for Sustainable Communities’ guidelines state that particular consideration be given to apartment design measures to minimise visual and acoustic intrusion e.g. “…ensure that noisier living areas are remote from the quieter bedrooms areas in adjoining dwellings”.

2.2 Regulatory Context

2.2.1 The Environmental Protection Agency Act 1992

Section 107 and 108 of the Environmental Protection Agency Act 1992 allow local authorities or individuals to make a formal complaint to the District Court seeking an Order to deal with noise nuisance. The Environmental Protection Agency Act 1992 (Noise) Regulations 1994 (S.I. No. 179 of 1994) further sets out the process to be followed. The Regulations are intended to allow straightforward access to the Courts by individuals or groups concerned about excessive noise without the need for legal representation. The Regulations cover general neighbourhood type noise problems, such as continual noise from other houses, home workshops, local businesses etc. The Regulations do not cover noise from airports, which should be directed to the Irish Aviation Authority, or noise from barking dogs, which falls under the remit of earlier legislation – the Control of Dogs Acts 1986 and 1992.

In practice, local authorities are unlikely to become involved in disputes between neighbours (unless a complaint involves a local authority tenant) but will investigate and consider serving a notice against noise from industrial or commercial activities.


2.2.2 Environmental Noise Regulations

Ireland has transposed the Environmental Noise Directive (END) (2002/49/EC). The Environmental Noise Regulations 2006 (S.I. No. 140 of 2006) require certain designated noise mapping bodies, including local authorities, the National Roads Authority, Iarnród Éireann and the Railway Procurement Agency, to undertake noise mapping of major infrastructure (roads, railways, airports, etc.) every 5 years. The 2nd round of noise mapping was completed in 2012.

Arising from the findings of the noise mapping exercise, local authorities prepare noise action plans to reduce noise where necessary and maintain the environmental acoustic quality where it is good. The Regulations do not set any limit value, nor does it prescribe the measures to be used in the action plans, which remain at the discretion of the competent authorities (see example below http://www.dublincity.ie/WATERWASTEENVIRONMENT/NOISEMAPSANDACTIONPLANS/Pages/Dublin%20Agglomeration%20Noise%20Action%20Plan.aspx).

2.2.3 The Building Regulations

The Irish Building Regulations are divided into 12 Parts (A to M) each covering a certain subject. Each Part is accompanied by a Technical Guidance Document (TGD) which contains guidance which
if followed is considered *prima facie* evidence of compliance with the relevant requirements of the Regulations.

Any reference to a technical specification in the TGDs is a reference to so much of the specification as is relevant in the context in which it arises. A reference to a technical specification is to the latest edition (including any amendments, supplements or addenda) current at the date of publication of the relevant TGD. However, if this version of the technical specification is subsequently revised or updated by the issuing body, the new version may be used as a source of guidance provided that it continues to address the relevant requirements of the Regulations.

Part E (Sound) of the Building Regulations sets out the legal requirements in relation to sound insulation in dwellings and apartment blocks. The related ‘Technical Guidance Document E’ provides guidance on how to comply with the requirements of Part E. Part E calls for certain constructions to offer *“reasonable resistance”* to both airborne and impact sound. In the absence of any form of objective criterion, reference is often made to the guidance values put forward in the “Similar Construction” method described in Technical Guidance Document E.

Responsibility for compliance with the Regulations is a matter for the builder or owner. Enforcement is the responsibility of the local building Control Authorities, who carry out inspections on a proportion of valid commencement notices.

### 2.3 Statement of Objectives

The proposed amendments have the overall objective of securing reasonable standards of health, safety and welfare for persons in and about buildings in respect to the resistance to the passage of sound, without imposing disproportionate bureaucracy and costs. The key objectives of the proposed amendments are as follows:

- a) improve standards of sound insulation between dwellings;
- b) improve compliance with the Regulations;
- c) improve the usefulness of the Technical Guidance Document;
- d) identify changes in standards and practice; and
- e) further the achievement of sustainable development.

It is intended that the amended Regulations and guidance will come into force on 1 January 2015.

### 2.4 Overview of the Proposed Amendments

#### 2.4.1 Current requirement of Part E

There are currently three requirements under Part E of the Second Schedule to the Building Regulations:

- E1: Airborne sound (walls);
- E2: Airborne sound (floors); and
- E3: Impact sound (floors).

These three requirements apply to separating walls and floors:

- between dwellings;
- between dwellings and other buildings; and
between a habitable room within a dwelling from another part of the same building which is not used exclusively as part of the dwelling.

Part E does not apply to walls which separate a habitable room within a dwelling from another part of the same building if such part is used only occasionally for the inspection, maintenance or repair of the building, or of its services, fixed plant or machinery.

Essentially, the objective of Part E, currently, is for certain walls to provide reasonable resistance to airborne sound, and certain floors to provide reasonable resistance to both airborne and impact sound. Technical Guidance Document E (1997) provides guidance on achieving this resistance to the passage of sound and if followed is considered *prima facie* evidence of compliance with the relevant requirements of the Regulations.

### 2.4.2 Summary of proposed amendments to Part E

This section of the RIA summarises and explains the nature of the proposed amendment to the requirements of Part E and the guidance in Technical Guidance Document E.

The amendments to the Building Regulations and to Technical Guidance Document E in support of requirements of Parts E fall into three main categories:

1. changes resulting from the extended scope of the requirements to Part E;
2. measures to improve sound insulation; and
3. measures that improve compliance with the requirements of Part E.

These three main changes are explained in subsections 2.4.3 to 2.4.5 below.

### 2.4.3 Changes resulting from the extended scope of requirement of Part E

The scope of the current Part E (1997) is restricted to sound transmission between dwellings, and between dwellings and other buildings but restricts the current application to a self-contained living space containing its own cooking, washing and sanitary facilities.

The proposed amendment to Regulation E1 extends the scope of the current requirement to ensure that reasonable resistance to sound is provided where walls and floors separate any part of a dwelling from other parts of the same building, such as when a bathroom or kitchen adjoins a common circulation space in a block of apartments. It also extends the scope to include parts used occasionally for the inspection, maintenance or repair of the building, or its services, fixed plant or machinery.

The proposed amendment to Regulation E2 aims to control the level of unwanted sound in the common areas of apartment blocks. Reverberation describes how long sound takes to decay after the source has stopped. By paying attention to the control of reverberation in the common internal parts of apartment blocks it is possible to prevent excessive build-up of sound in corridors, stairwells and hallways and so reduce the noise transmitted to adjoining dwellings. This proposed new requirement is based on good practice.

The proposal also amends Article 13(1)(a) of the Building Regulations 1997 (i.e. the 'principal regulations') to require Part E to apply to an existing building or part of a building which undergoes a material change of use to a dwelling. This regularises current practice.

### 2.4.4 Measures to improve sound insulation

A proposed change to Technical Guidance Document E is to improve individual minimum performance levels. Currently where sound insulation tests are conducted, the $D_{NTw}$ sound measurement index is averaged over four readings. A satisfactory average may therefore contain a low performance without affecting compliance. In effect, the proposal improves the minimum
airborne sound insulation for separating walls by 4 dB and removes the requirement for a mean value. The benefit of specifying an explicit minimum performance level is best demonstrated by example as follows:

**TGD E 1997 Table 1  Airborne sound (Walls)**

Requirement: Individual (minimum value) of $D_{nT,w}$ 49 dB and a mean (minimum value) of $D_{nT,w}$ 53 dB.
Therefore four tests which gave 49, 49, 52 and 62 = 53 would meet the requirement of Table 1.

**Draft TGD E 2014 Table 1  Airborne sound (Walls)**

Requirement: Individual (minimum value) of $D_{nT,w}$ 53 dB
Therefore two tests which give 52 and 62 = would not meet the required performance level as any separating wall that gets less than $D_{nT,w}$ 53 dB is a fail.

For separating floors, the proposed change is to increase the minimum individual value for airborne sound by 5 dB; this removes the need for a mean minimum value. The proposed change to the standard for resistance to the transmission of impact sound for new dwellings is to improve the maximum value by 7 dB which again removes the need for a mean maximum value. However, in effect the mean improves by 3 dB.

These performance levels are generally in line with most other European Member States.

2.4.5 Measures that improve compliance with the requirement of Part E

2.4.5.1 Completion testing

Greater compliance with the required standards of sound insulation will be secured through the proposed introduction of a completion testing regime.

The proposed completion testing regime does not require 100% testing of all new attached residential properties but is based on a testing frequency in accordance with Table 3 of the proposed draft Technical Guidance Document E on a proportion of the dwellings on the site.

In summary, the proposal requires initial tests to be conducted on the first four dwellings due for completion. This will help to identify any problems as early as possible and provide an opportunity to take corrective action where necessary. Thereafter completion testing should be conducted on a proportion of dwellings throughout the construction process.

The proposed guidance requires the builder to take corrective action to improve the sound insulation when failures are detected. This is crucial to the system and is seen as being the main stimulus to the general achievement of the minimum performance requirements through the adoption of improved quality control procedures on site.

2.4.5.2 Improved usefulness of Technical Guidance Document E

Changes are proposed to the structure and content of Technical Guidance Document E. These changes are in response to changes in good construction practice and feedback from users.

Technical Guidance Document E details have been updated to reflect those construction types commonly used. Opportunity has also been taken to remove construction types where there is limited data to substantiate their performance. Additional detail has been provided especially on flanking details.

Constructions included in the draft Technical Guidance Document E should meet the required standards provided that there is sufficient attention to detail and that a good standard of workmanship is employed.

There is no restriction on the use of other types of building construction provided that the required performance is met when the dwellings are tested. However where alternative constructions are used the performance and repeatability must be proven, through assessment by third party or more
frequent testing at the initial stages of completion of units. Overall the guidance provides greater freedom to the industry and a transparent vehicle for innovation.

Proposed guidance has been provided to mitigate against excessive noise build-up in the common internal parts of apartments blocks. By paying attention to the control of reverberation it is possible to prevent excessive build-up of sound in corridors, stairwells and hallways and so reduce the noise transmitted to adjoining residential rooms.

All these proposed changes should contribute to improved compliance with the requirements.

3.0 Impact Analysis

3.1 Identification & Description of Options

In considering how to address the objectives identified in subsection 2.3, three options were identified:

Option 1  **Do nothing.** Retain the current requirements and the current version of Technical Guidance Document E.

Option 2  **Promote good practice.** Continue to rely on the current controls but promote good practice through increased education, with the hope that those involved in design and construction of buildings adopt it.

Option 3  **Adopt the proposed amendments to Part E and TGD E.** These will apply to new dwellings whether purpose built or created as a result of material change of use.

3.2 Sectors and Groups Affected

Aside from potential owners and occupiers, the proposals discussed are wide ranging and would affect several sectors of the building industry including:

a) all those involved with building design, construction and compliance certification would have to familiarise themselves with the new guidance through training, e.g. builders, developers, architects, engineers, acousticians / sound testers;

b) building materials and component manufacturers may need to make changes to their products and literature to suit;

c) persons procuring new buildings or building work; and

d) building control authorities.

3.3 Impact Analysis of Options

3.3.1 Option 1 - Do nothing

This will have no positive impact and no additional benefits are expected. It is considered that to continue with the current requirements and Technical Guidance Document is unsustainable and will do nothing to stem the rising trend in reported noise problems.

3.3.2 Option 2 - Promote good practice

Implementation of this option would only be on a voluntary basis. Continual education would be the driving force for this option’s implementation and success. Experience would suggest that the development of good practice guidance in this field for many years has only a limited effect in improving compliance. Voluntary guidance is likely to be applied only to a small proportion of houses. This will probably be limited to those developers and procurers of buildings that acknowledge that
there is room for improvement in current noise standards and is likely to be ignored by those who will continue to develop to the “minimum” standards.

3.3.3 Option 3 - Adopt the proposed amendments to Part E and TGD E
With the proposed improved mandatory standards this option should reduce noise complaints generated by neighbours and improve overall consumer satisfaction. However, there will be increases in the costs of construction due to better workmanship and improved quality (see subsection 4.2.3).

3.4 Other Impacts
3.4.1 Competition assessment
There are no significant areas where issues of competition, restriction or imbalance have been identified. There appears to be a sufficient number of competent sound testers in Ireland to meet future housing demand.

3.4.2 Small / micro firms impact test
The Department considers that the proposed amendments to Part E would have no significant effect on competition in any markets. It is considered that the proposals to change the Regulations apply in a proportional and equitable way.

The majority of micro-businesses in the construction industry deal with the domestic alteration and extension market. The proposed changes may have an impact on extensions where they are attached to an adjoining dwelling.

3.4.3 Regulatory burden
Building control staff will need to familiarise themselves with the new Requirements and guidance. It is generally accepted in the industry that Building Standards and Codes of Practice evolve over time. This should not have any major impact on design and supervision fees.

3.4.4 Enforcement and compliance
Under the Building Control Act 1990, enforcement of the Building Regulations is primarily the responsibility of the local building control authorities, each of whom has a designated building control officer. Responsibility for compliance with the Building Regulations is primarily a matter for the owner and builder of a building. The position in this regard remains unchanged.

4.0 Benefits and Costs
This section examines the benefits and costs associated with each option.

4.1 Benefits
4.1.1 Option 1 - Do nothing
There are no additional benefits associated with this option.

4.1.2 Option 2 - Promote good practice
This would incur promotional and training costs, which may or may not be successful in sensitising people to the design and construction characteristics of sound insulation.
There are many existing BRE Reports, Digests and Information Papers available that provide good practice advice. A better resourced dissemination of good practice guidance might help to increase take up. However, experience with sound insulation codes of practice that have been more widely adopted shows that enforcement problems still remain.

While some developers have voluntarily adopted higher standards of sound insulation in the specification of new housing developments, there is little evidence available to demonstrate widespread application of good practice guidance. It appears that the guidance is only used by certain sectors of the industry and that this approach would ultimately have the effect of preaching to the converted.

4.1.3 **Option 3 - Adopt the proposed amendments to Part E and TGD E**

Adopting the proposed amended requirements of Part E and draft Technical Guidance Document E would improve sound insulation in a socially equitable manner, which in turn will help to address the issues associated with exposure to noise and the level of reported noise problems.

The new performance standard and the measures to improve compliance with the Regulations together will improve the overall sound insulation performance of dwellings and the introduction of the completion testing regime will ensure these minimum standards are met.

The requirement of Regulation E2 involves the provision of acoustically absorbent material in the common areas that give access to apartments. The benefits are:

- the build-up of reverberant sound in these common access areas will be reduced;
- noise transmitted from common areas to adjoining residential rooms will be reduced, requirements for absorption will be uniform across the country; and
- accessible technical guidance will be available on this subject for the first time.

The amendment helps Part E to address current policy initiatives on planning and housing and brings Part E more into line with European building standards.

4.2 **Costs**

4.2.1 **Option 1 - Do nothing**

There are no additional costs associated with Option 1.

4.2.2 **Option 2 - Promote good practice**

Any investment to promote similar design guidance to that envisaged in the revised draft Technical Guidance Document without the need for completion testing would likely to prove unsuccessful due to a low rate of take-up and is therefore not considered to be a viable option.

4.2.3 **Option 3 - Adopt the proposed amendments to Part E and TGD E**

This subsection presents an estimate of the additional costs of Option 3 under the following headings:

- Potential future demand for housing;
- Cost of completion testing;
- Cost of improvement to flanking construction details; and
- Cost of training and up-skilling (where necessary).
4.2.3.1 Potential future demand for housing

In order to estimate the potential impact of the proposed amendments it is necessary to understand the potential demand for new housing in Ireland for the coming years.

The Irish construction industry is currently in its sixth year of recession. Output of the industry has fallen sharply from a height of €38bn and employment in the sector has halved since peak output. Reports produced over the course of the first six-months of 2013 suggest that actual construction output is not likely to exceed €7.5bn this year and from the CSO Production in Building and Construction Index, it can be seen that the bulk of this decline has been in the new residential property sector. In recent years, the number of new house guarantee registrations and completions has decreased significantly since the downturn in the construction industry (see Table B.1).

Economists have made various predictions regarding potential demand based on Ireland’s demographic structure, i.e. large number of young people at the age where they might form their own household, general aging population and increasing life expectancy etc. Some economists\(^3\) predict that potential household formations (be it as owner occupiers or in the rental market) imply a potential demand for around 25,000 additional housing units per annum over the next few years. Others\(^4\) believe that the supply of any new housing and a normalisation of market activity is heavily reliant on the clearance of insolvent properties from the market by way of personal insolvency regimes, receivership processes, NAMA etc.

Rather than fuelling speculation on future housing demand this regulatory impact assessment represents the associated costs of the proposed amendments per 10,000 new dwellings built. A summary of the anticipated costs associated with Option 3 is given in Table 1.

4.2.3.2 Cost of completion testing

The estimated range of costs for completion tests to be conducted by a competent tester are as follows:

- 2 no airborne tests (walls) are estimated to be between €500 and €750;
- 2 no airborne and 2 no impact tests on floors are estimated to be between €650 and €850; and
- 2 no airborne tests on walls and 2 no airborne and 2 no impact tests on floors is estimated to be between €800 and €1,050.

These costs are generally comparable to the UK, perhaps a little more expensive as it is not a commodity market at present (See Table 1). These figures have also been used to assess the impact of the proposals on a range of small sites (see Appendix C).

4.2.3.3 Cost of improvement to flanking construction details

Draft TGD E 2014 provides more construction details than the current version and proposes some additional measures to reduce flanking sound transmission around separating walls, e.g. the inclusion of a cavity stop at the separating wall / flanking wall junction on semi-detached dwellings.\(^5\) These additional cost associated with this measure were obtained from a quantity surveyor and are included in Table 1. The cost of this proposal applied to a range of small sites is assessed in Appendix C.

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\(^5\) The proposed introduction of a cavity stop should not affect apartment dwellings as the cavity barrier (Fire Safety) will achieve the desired result of minimising sound transmission across the cavity.
4.2.3.4 Cost of improvement to common areas in blocks of apartments

A typical block of apartments will generally have common internal circulation space, e.g. entrance halls, corridors, hallways, stairwells and stair enclosures in the order of 10 - 15% of the net floor area. However, the proposed requirement of Regulation E2 only applies to the common areas where a dwelling opens directly which will therefore be a fraction of the total common circulation space. An absorptive material, e.g. a proprietary acoustic ceiling board, could be applied in the applicable areas to control reverberation. The following assumptions have been made in order to estimate the associated costs:

- acoustic ceiling applicable to 75% of the total common area;
- labour costs associated with the provision of such a ceiling are assumed to be cost neutral; and
- additional material costs for the acoustic ceiling were established from the market.

Applying the above criteria to a range of apartment layouts, it is estimated that this amendment will typically increase building costs by up to €200 per apartment (see Table 1).

4.2.3.5 Cost of training and up-skilling

Those who are affected by implementation of the amendments will have, as a non-recurring cost, to acquaint themselves with the new provisions and where necessary to invest in appropriate professional and technical up-skilling.

It is estimated that there are some 20 to 25 people available to conduct sound testing in the Republic of Ireland with a further 10 or so are available in Northern Ireland. The majority of these should already have the necessary skillsets. It is generally accepted in the industry that Building Standards and Codes of Practice evolve over time.

4.2.3.6 Summary of costs

Table 1 below summarises the costs associated with Option 3.

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Application</th>
<th>Cost per 10,000 new build dwellings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completion testing (refer 4.2.3.2)</td>
<td>Apartments</td>
<td>€152,000</td>
</tr>
<tr>
<td></td>
<td>Attached houses</td>
<td>€213,750</td>
</tr>
<tr>
<td></td>
<td>Single houses</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>TOTAL (Excl. VAT)</td>
<td>€472,000</td>
</tr>
<tr>
<td>Improve flanking details in dwellings (refer 4.2.3.3)</td>
<td>N/A</td>
<td>€205,200</td>
</tr>
<tr>
<td>Reverberation Control (refer 4.2.3.4)</td>
<td>€320,000</td>
<td></td>
</tr>
<tr>
<td>TOTAL (Excl. VAT)</td>
<td>€890,950 or €89 / dwelling</td>
<td></td>
</tr>
</tbody>
</table>

NOTES:
1. Completion testing costs are attributed to the various dwelling types and are based on the assumption that 10% of dwellings will require to be tested.
2. Appendix B of this document estimates that:
   - Apartments represent 16% of new dwellings or 1,600 apartments per 10,000 new dwellings;
   - Scheme houses represent 38% of new dwellings. Assuming 90% of which are semi-detached, this represents 3,420 attached houses per 10,000 new dwellings built;
   - Single houses represent 46% of new dwellings or 4,600 per 10,000 new dwellings built.
3. The proposed requirement of Regulation E2 applies to all apartments (whether tested or not), i.e. 1,600 per 10,000 new dwellings built.
4. The proposed introduction of a cavity stop should not affect apartment dwellings as the cavity barrier (Fire Safety) will achieve the desired result of minimising sound transmission across the cavity.
5.0 Consultation
A sub group was established within the Building Regulations Advisory Body (BRAB). The sub-group’s aim was to identify critical areas that needed to be addressed, and prepare an agreed draft Part E document. The sub-group met four times during the 2007 - 2012 BRAB session. The 2007 - 2012 BRAB session ended in October 2012. A further meeting of the sub-group members was held to finalise the draft for public consultation.

The final draft Part E / TGD E documentation is now being published by the Minister of the Environment, Community and Local Government in draft format for a public consultation period of three months. This regulatory impact assessment forms part of the documentation to be issued under the public consultation process.

The public consultation seeks both general and specific comments / observations on proposals and will be issued to a list of individuals and organisations previously identified as having an interest in Building Regulations and standards. It will also be made available for general release on the Department’s website at www.environ.ie.

The sub-group for the review of Part E included the following BRAB members and other industry experts:

Mr. Noel Carroll  BRAB Member (2007 – 2012)
Dr. Eugene Farrell  BRAB Member (2007 – 2011)
Mr. Gerard Grogan  BRAB Member (2007 – 2012)
Mr. Brian McKeon  BRAB Member (2007 – 2012)
Mr. Conor Taaffe  BRAB Member (2011 – 2012)
Mr. Gary Treanor  BRAB Member (2007 – 2012)
Mr. Chris Dilworth AWN Consulting Ltd
Mr. Gary Duffy  Institute of Acoustics Ireland
Mr. Gary O Sullivan  National Standards Authority of Ireland
Mr. Liam Smyth  Irish Concrete Federation
Mr. Declan Wallace Evolusion Innovation Ltd

We sincerely thank them for their effort and contribution during the review process.

The Department also wishes to acknowledge the assistance and contributions of Professor Sean Smith & John Wood from the Building Performance Centre, Institute for Sustainable Construction, Edinburgh Napier University and Dr. Dave Baker OBE, CEO of Robust Details Ltd.

6.0 Review
Amendments to Building Regulations are reviewed on an ongoing basis but not until at least two years following full implementation. This is to allow for a sufficient number of building works to have been carried out in accordance with the new Regulations in order to make evaluation meaningful.

7.0 Summary and Recommendations
It is clear that there is dissatisfaction with the current sound insulation performance in new dwellings. In this context, the key objectives of the proposed amendments are to:

a) improve standards of sound insulation between dwellings;

b) improve compliance with the Regulations;

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6 The BRAB is a statutory body appointed by the Minister to advise him on matters relating to the Building Regulations. Membership of the body includes representatives from the construction industry and regulators at national and local level.
c) improve the usefulness of the Technical Guidance Document;

d) identify changes in standards and practice; and

e) further the achievement of sustainable development.

It is considered that changing Part E of the Building Regulations and its associated guidance meets the overall objective of securing reasonable standards of health and safety for persons in or about buildings in respect of the passage of sound, without imposing disproportionate bureaucracy and costs.

The proposed amendment helps address current policy initiatives on planning and housing and brings Part E more into line with European building standards.
Appendix A – Extent of Reported Problem

A.1.0 Introduction

This Appendix outlines recent evidence of noise nuisance complaints, feedback from stakeholders and a summary of the findings of the HomeBond Study.

A.1.1 Noise Issues

A.1.1.1 Complaints to local authorities

Local authorities are obliged to report to the Environmental Protection Agency each year on the number of complaints and enforcements relating to air and noise issues. The majority of local authorities submit total figures per annum and do not give a breakdown of the nature of the complaints received. The Air and Noise Control Unit in Dublin City Council however, does give further information. An analysis of the Unit’s Annual Reports (2008 – 2012) reveals that despite the overall number of noise complaints has reduced in recent year coinciding with the downturn in the economy, domestic noise still accounts for up to 20% of all complaints received (see Table A.1 below for more details). However, only a fraction of these are addressed by Building Regulations.

Table A.1 Air and Noise Control Unit - Dublin City Council 2008 - 2012

<table>
<thead>
<tr>
<th>Year</th>
<th>Total No. of noise complaints received</th>
<th>Total No. of Domestic (General) noise complaints</th>
<th>Total No. of Domestic (Other) noise complaints</th>
<th>Domestic (General) as a % of Total complaints</th>
<th>Domestic (Other) as a % of Total complaints</th>
<th>Total Domestic (General) + (Other) as a % of Total complaints</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>531</td>
<td>47</td>
<td>36</td>
<td>9%</td>
<td>7%</td>
<td>16%</td>
</tr>
<tr>
<td>2009</td>
<td>491</td>
<td>60</td>
<td>30</td>
<td>12%</td>
<td>6%</td>
<td>18%</td>
</tr>
<tr>
<td>2010</td>
<td>482</td>
<td>74</td>
<td>18</td>
<td>15%</td>
<td>4%</td>
<td>19%</td>
</tr>
<tr>
<td>2011</td>
<td>447</td>
<td>73</td>
<td>18</td>
<td>16%</td>
<td>4%</td>
<td>20%</td>
</tr>
<tr>
<td>2012</td>
<td>510</td>
<td>40</td>
<td>61</td>
<td>8%</td>
<td>12%</td>
<td>20%</td>
</tr>
</tbody>
</table>

NOTES:
1. Domestic noise complaints cover all dwelling types, i.e. private & social.
2. Domestic (General) complaints range from noise relating to buildings services, lifts, banging doors or security gates, noisy neighbours; building fabric. A large proportion of domestic complaints relate to multi occupancy dwellings, i.e. apartment blocks.
3. Domestic (Other) noise relate primarily to loud music, DIY and heating systems.

Distribution of noise complaints per type (2008 - 2012)

Source: Air and Noise Control Unit - Dublin City Council
A.1.1.2 Actions taken under Section 107 & 108 of the EPA Act 1992

A review of actions taken under Section 107 and 108 of the EPA Act 1992 revealed that the majority of cases were a result of environmental noise which is outside the scope of the Building Regulations. This is summarised in Table A.2 below.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of actions taken</th>
<th>General description of circumstances which led to action</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>84</td>
<td>Loud music / barking dogs / noisy neighbours / plant and machinery.</td>
</tr>
<tr>
<td>2009</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>109</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>58</td>
<td></td>
</tr>
</tbody>
</table>

Source: The Courts Service of Ireland

A.1.2 Feedback from Key Stakeholders

A.1.2.1 Submission from Noise Issues Consultation Paper 2008

The 2008 Programme for Government (at that time) contained a commitment to ‘publish comprehensive legislation on noise pollution’. As an initial step in developing and progressing these commitments, the views of key stakeholders was sought on the effectiveness of existing legislation in addressing noise pollution and how it might be improved. A document titled “Noise Issues Consultation Paper” was prepared to assist and inform those who wish to make a submission on the issue of noise nuisance.

Of the 235 submissions received from the Noise Issues Consultation Paper, 10% of submissions raised an issue with building sound insulation / Building Regulations. Respondents were of the view that there should be specific building standards in relation to noise insulation for apartments. It was also suggested that it should be mandatory for the construction company to test buildings for noise insulation to make sure they meet the current sound insulation standards and the results of such a test to be held by the local authority. Other suggestions included the creation of a mandatory requirement for all houses to be tested for sound insulation and the development of a sound insulation rating system.

Some of the responses identified the following issues:

- “Until there is more enforcement of Building Regulations relating to sound transmission, (Part E) residents in multi-unit buildings will continue to suffer from noise pollution from adjoining units.” – Chartered Institute of Architectural Technologists.

- “It is probably a fact that noise complaints due to poor construction of partition walls and floors in our housing stock, provide the largest number of noise complaints from our citizens. It is therefore an important area to be addressed and if improved minimum standards of sound insulation are to be adopted, it would represent a significant improvement in the quality of the lives of our citizens - Irish branch of the Institute of Acoustics.

- “A key element in relation to sound insulation performance is the quality of the workmanship. Slight flaws in either materials or construction can dramatically affect the sound insulation performance of walls and floors. Responsibility for compliance lies with the developer while enforcement is a matter for the local authority” – Dublin City Council.

- “…it is considered relevant to extend the reach of the Regulations under any future revision to include the noise insulation performance of the building envelope. It would also be desirable
for the Regulations to be extended to cover other noise sensitive premises, such as schools, hospitals, nursing homes etc., or for there to be complementary guidance or regulation to cover such premises” – Environmental Protection Agency.

- The Institute recommends that the current building regulations and associated technical guidance pertaining to sound insulation particularly with respect to party walls. Technical Guidance Document E currently identifies specifications for masonry wall constructions capable of providing suitable insulation against direct sound. However no guidance exists with respect to alternative forms of construction commonly used today such as timber frame walls. The Department should consider the introduction of appropriate sound insulation values in order to provide for adequate sound insulation where alternative forms of construction are proposed” – Irish Planning Institute.

A.1.2.2 Complaints made to Warranty / Guarantee scheme providers

The HomeBond Warranty (pre-November 2008) did not cover sound insulation and therefore sound related complaints received were not recorded. However, in 2007 HomeBond carried out an exercise whereby they logged ‘all’ complaints notified by telephone and for that calendar year they logged a total of 94 individual ‘Part E’ complaints (irrespective of year of construction). In all cases the complainant was referred to the original builder.

The HomeBond Insurance Policy (from November 2008) does not cover sound insulation either and they do not hold any records of logged complaints relevant to Part E.

A.1.3 HomeBond Report

A.1.3.1 Purpose of Study
This HomeBond study investigated and tested sound insulation in party walls and floors in existing houses and apartments across Ireland. There was also limited investigation and testing of separating floors between dwellings.

A.1.3.2 Method
The following methodology was used:

- Obtain results of field tests in dwellings built with 215 block work party walls, examine results, examine construction methods used, compare these with Irish Agrément Board (IAB) Certificates, TGD Guidance. Extend investigation by inspecting on sites.

- Obtain results of field tests on separating floors between apartment dwellings, examine results, examine construction methods used, compare these with IAB Certificates, TGD Guidance. Extend investigation by inspecting on sites.

- Investigate sound insulation regulations in other EU countries, particularly the UK, and countries where good standards might be expected. Compare with TGD Guidance and performance requirements.

- Investigate construction methods in the same countries to determine the differences between such construction and the methods used in Ireland.

- Interview key players including IAB staff, product manufacturers, Department of the Environment officials, and UK players.

- Inspect houses under construction to identify realistic levels of short fall between real life practice and paper standards.

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A.1.3.3 Summary of Key Findings: Wall Construction

- “About 520 individual measurements were made of sound performance across separating walls in about 125 pairs of dwellings at 100 sites. About 64 measurements were obtained from 16 test reports provided by third parties. These results are incorporated into the findings.”

- “The number of different construction types encountered was larger than had been anticipated.

- The sound insulation performance of most types of wall construction currently in use in Ireland is higher than the figures in TGD E table 1.”

- “All test results from walls built of 215 mm solid block-on-flat and finished with wet plaster finish, were higher than the figures in TGD E table 1.”

- “The test results from 65% of walls finished in gypsum boards were higher than the figures shown in TGD E table 1. This construction was found on some sites throughout the test period, although the detail specifications changed after third party test certificates were withdrawn or placed under review”.

- “Many of the walls finished in gypsum boards were to certified construction and not as TGD specifications.”

- “All test results from steel frame walls were higher than the figures in TGD E table 1. Only a small number of sites employed this construction method.”

- “There was little difference in performance between the results obtained from concrete blockwork walls and concrete walls finished similarly. The number of concrete walls tested, however was small.”

- “The lightweight blockwork walls tested performed better than their mass might lead one to believe.”

- “The average test result of an unrendered 215 medium density concrete block walls was 31 dB reduction. This was consistent across six pair of houses on two separate sites and seems realistic. The implication is that the contribution of the finishes to the overall performance of this wall type is larger than expected.”

A.1.3.3 Summary of Key Findings: Floor Construction

- “About 250 individual measurements were made of sound performance across separating floors in about 35 pairs of dwellings at 20 sites”.

- “Separating floors of both concrete and of timber were encountered. The concrete floor constructions were usually simple. The timber floor build-ups, on the other hand were in many cases quite complex with many differences of detail. Hence, direct comparison of results is not always possible between all the results in each set.”

- “About equal numbers of concrete floors and timber floors were encountered”.

- “The sound insulation performance of most types of floor construction currently in use in Ireland were higher than the figures in TGD E table 1.”

- “… The results from all tests conducted for airborne sound on concrete floors were equal to or higher than the figures in TGD E table 1.”

- “Of the 20 timber floors tested, all were on floors similar to TGD E floor type 3A – platform floor with absorbent material. No type 3B – ribbed floor with absorbent blanket – or type 3C floors – ribbed floor with heavy pugging were encountered. There is a difference between the TGD E
floors and those tested, in that every case floors tested had a cavity below the TGD E “Ceiling”...

- “As for walls, many variables influence acoustic performance, including floor build-up opes near floors; wall construction and ventilators in walls; fire stopping; workmanship...”.

- “Of the 16 sets of tests conducted for airborne sound on timber floors, the results from 13 were equal to or higher than the figures in TGD E. It is not possible to identify any single reason why the other 3 did not meet those values. A number of possible factors have been identified, including workmanship or inadequate specification, in particular the absence of gypsum layers of the thicknesses or at the locations set out in the relevant TGD E diagrams”.

- “Of the 20 sets of tests conducted for impact sound on timber floors, 16 were equal to or lower than the figures in TGD E table 1...”.

- “The use of resilient battens on ceiling soffits seems to contribute materially to the performance...”.

- “The guidance on floors might be extended to give guidance where timber separating floors are equipped with voids in the soffites for fire safety reasons.

A.1.3.3 Summary of Key Findings: Documentation and standards

- “The $D_{n,TE}$ sound measurement index is averaged over many reading. A satisfactory average may contain within it, low performance at particular sound frequencies. This would explain why, occasionally, constructions which meet the required standards may yet give rise to user dissatisfaction...”.
Appendix B – Estimated Costs of Completion Testing

This section estimates the additional annual costs due to the new proposals. Table B.1 outlines construction activity in Ireland since 2005.

<table>
<thead>
<tr>
<th>Year</th>
<th>New house guarantee registrations (State)</th>
<th>New Dwelling completions (State)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Apartment</td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td>62,284</td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td>66,649</td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td>38,351</td>
</tr>
<tr>
<td>2008</td>
<td></td>
<td>12,676</td>
</tr>
<tr>
<td>2009</td>
<td></td>
<td>3,743</td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td>1,680</td>
</tr>
<tr>
<td>2011</td>
<td></td>
<td>834</td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td>627</td>
</tr>
<tr>
<td>2013* (up to end of June 2013)</td>
<td>627</td>
<td></td>
</tr>
</tbody>
</table>

Source: Central Statistics Office

Taking the last full 4 years of data (2009 to 2012 inclusive) the average number of completions per dwelling type is as follows:

- 16% were apartments;
- 38% were scheme houses: (Assume 90% of which are semi-detached); and
- 46% were single houses.

The Draft TGD E requirement for completion testing will apply to attached dwellings only. Therefore for every 10,000 new dwellings completed approximately 5,020 units, i.e. 10,000 x (0.16 + 0.38 x 0.9) would fall under the scope of the requirement of Part E1.

Therefore the total number of dwelling types affected for every 10,000 new dwellings constructed of which:

- Apartments = 1,600 Units
- Scheme Houses = 3,420 Units

Draft TGD E proposes a testing frequency of on average 10% of completed attached units. Based on this figure the cost per annum to the construction industry due to the proposed amendment of Part E would be as follows:

\[
(160 \times €950) + (342 \times €625) = 152,000 + 213,750 = €365,750
\]

per 10,000 new dwellings constructed or €37 per dwelling.
Appendix C – Typical Costs of the Proposals on Small Developments

C.1 Impact of proposals on small developments

The range of costs for completion tests to be conducted by a competent tester are given below:

- 2 no airborne tests (walls) is estimated to be between €500 and €750 (median = €625);
- 2 no airborne and 2 no impact tests on floors is estimated to be between €650 and €850 (median = €750); and
- 2 no airborne tests on walls and 2 no airborne and 2 no impact tests on floors is estimated to be between €800 and €1,050 (median = €950).

Taking the median of the above figures, the examples below illustrate how the additional cost of the changes in construction practice and the introduction of completion testing will affect small sites.

Example 1 - Small site with two pair of semi-detached dwelling houses

Requires 1 No. set of tests i.e. 2 airborne tests (walls only) = €625
Increased cost of separating construction = €240
Total increased cost for site = €865 (Excl. VAT)
Total increased cost per dwelling = €432.50 (Excl. VAT)

Example 2 - Site with 1 terrace of 5 dwelling houses and 3 pairs of semi-detached dwellings

Requires 2 No. set of tests i.e. 2 airborne tests (walls only) = €1,250
Increased cost of separating construction = €840
Total increased cost for site = €2,090 (Excl. VAT)
Total increased cost per dwelling = €418 (Excl. VAT)

Example 3 - Block of apartments having 2 ground floor apartments and 2 first floor apartments

Requires 1 No. set of tests (walls and floors) i.e. 4 No. airborne & 2 No. impact = €950
Increased cost due to reverberation control = €800
Total increased cost for site = €1,750 (Excl. VAT)
Total increased cost per dwelling = €437.50 (Excl. VAT)

Example 4 - Block of apartments containing 50 apartments

Requires 5 sets of tests (walls and floors) = €950 x 5 = €4,750
Increased cost due to reverberation control = €10,000
Total increased cost for site = €14,750 (Excl. VAT)
Total increased cost per dwelling = €295 (Excl. VAT)

C.2 Build Costs

To put the above examples in perspective, a construction cost consultant’s study of the construction costs of a 3 bedroomed semi-detached house (Floor area 110.5m²) prepared on behalf of Irish Home Builders Association reveal an estimated construction cost of €197,080 (excluding VAT) which excludes land costs. These costs reflect a unit which would be built at current construction costs (May 2012) and to a standard that complies with all current and relevant building regulations.

For other comparisons refer to the publication titled ‘Are you fully insured? Guide to house rebuilding costs 2013’ published by the Society of Chartered Surveyors of Ireland.8

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8 Are you fully insured? Guide to house rebuilding costs 2013 – Society of Chartered Surveyors Ireland
http://www.scsi.ie/digital_publications/get_tob?id=33&field=publication