Title: Validation Stage IA - Revision of Building Bulleting 93: "Acoustic Design of Schools" - DfE guidance in support of Requirement 4 of the Building Regulations **IA No:** RPC13-FT-DfE-1961 IA **Lead department or agency:** Education Funding Agency **Other departments or agencies:** Department for Education	**Impact Assessment (IA)** **Date:** 09/10/2014 **Stage:** Final **Source of intervention:** Domestic **Type of measure:** Secondary legislation **Contact for enquiries:** Richard Daniels, Education Funding Agency Tel: 07769143840 E-mail: Richard.Daniels@education.gsi.gov.uk

Summary: Intervention and Options

RPC Opinion: EANCB Validated

Cost of Preferred (or more likely) Option				
Total Net Present Value	**Business Net Present Value**	**Net cost to business per year** (EANCB on 2009 prices)	**In scope of One-In, Two-Out?**	**Measure qualifies as**
£m	£3.15m	-£0.29m	Yes	OUT

What is the problem under consideration? Why is government intervention necessary?

Current guidance on acoustic standards was introduced in 2003. Consultation with industry has highlighted where revision to the standards is required to make them easier to apply and less prescriptive, for example, including more relaxed standards for non-teaching areas such as sports halls.
The revision needs to include lower standards for refurbishments as the current standards are too onerous and hence, they are seldom applied. As the new guidance will be significiantly shorter than existing documents, it will reduce burdens.

What are the policy objectives and the intended effects?

To introduce consistency across all build types.
To make current guidance easier to understand and apply, while stripping out some of the unnecessary elements of current guidance.
To give industry a greater role in maintenance and design of acoustic standards.
To ensure more schools are accessible for hearing-impaired pupils and those with speech difficulties.
To increase the number of pupils who will benefit from improved acoustic conditions in classrooms.
To reduce the incidence of teacher absence due to voice loss.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

Option 1 (preferred option): Reduce and amend the acoustic standards to make them more reasonable and easier to understand and apply. Option 1 offers improvement of standards, greater equity for pupils with hearing impariments, and savings in overall cost.
Option 2: Do nothing – retain existing acoustic standards for schools and do not amend in light of feedback to reduce unnecessary burdens.
Option 3: Repeal all acoustic standards – whilst likely to have the largest impact on reducing the cost to schools, evidence shows minimum acoustic standards are necessary to protect children's and teacher's wellbeing and the quality of the learning environment.
Option 4: As option 1 but with mandatory testing. Option 4 would ensure all buildings meet minimum standards, but the resource costs (and risk of school closure) are too great.

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** 12/2018

Does implementation go beyond minimum EU requirements?			N/A		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	**Micro** Yes	**< 20** Yes	**Small** Yes	**Medium** Yes	**Large** Yes
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:** N/A	**Non-traded:** N/A	

I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) that the benefits justify the costs.

Signed by the responsible Minister: David Laws ***Date:*** 23/3/2015

Summary: Analysis & Evidence

Policy Option 1

Description: 11

FULL ECONOMIC ASSESSMENT

Price Base Year 2014	PV Base Year 2014	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	**High:** Optional	**Best Estimate:** £3.15m

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate	£258k		£254k	**£2.44m**

Description and scale of key monetised costs by 'main affected groups'

Other key non-monetised costs by 'main affected groups'

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate	-		£650k	**£5.59m**

Description and scale of key monetised benefits by 'main affected groups'

Other key non-monetised benefits by 'main affected groups'

Key assumptions/sensitivities/risks

Discount rate (%) 3.5%

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			In scope of OITO?	Measure qualifies as
Costs: £224k	**Benefits:** £513k	**Net:** £289k	Yes	OUT

Evidence Base (for summary sheets)

1. The policy issue and rationale for Government intervention

The Department has published guidelines on acoustics in schools since 1976. The guidance and standards reflect the acceptance that teaching and learning are acoustically demanding activities. Even with these guidelines, complaints from staff and pupils are common, particularly where hearing-impaired (HI) pupils are taught in mainstream schools; many schools need remedial acoustic work post-construction. Such remedial work is much more expensive than providing good acoustics as part of a new building – and is usually much less effective.

The Department introduced guidance in 2003 to ensure a minimum standard of acoustic design in schools (BB93).[1] Since their introduction, there is evidence that acoustic performance of new school buildings has significantly improved.[2]

BB93 supports both the School Premises Regulations and the Independent School Standards, which apply to all schools, and requirement E4 of the Building Regulations, which applies to both new schools and schools formed by change of use of existing buildings.

The proposed new standards:
(a) **Make the Building Regulations easier to apply** and remove the minor problems that have been identified during their 10 years of existence;
(b) **Revise effective minimum standards for refurbishment work**. These standards will also be compliance standards for changes of use, e.g. from an office to a school;
(c) **Reduce design time and make Building Control Approval (BCA) easier**, by setting refurbishment standards as a baseline for Alternative Performance Standards (APS) and removing the need for Building Control Bodies (BCBs) to make qualitative judgements about open-plan spaces.

Removal of the acoustic regulations for schools was considered by Ministers during the most recent revision of the Building Regulations and during the revision of the School Premises Regulations and Independent School Standards in 2013. In both cases, Ministers decided to retain regulations on school acoustics for efficiency and equity reasons:

- Poor acoustics have detrimental impacts on pupil attainment, particularly for HI pupils, and lead to higher rates of teacher absenteeism due to voice loss.[3]

- Before regulation, the benefits from implementing baseline standards were often ignored by school building designers and contractors. Reasonable acoustic standards enable equity of access to mainstream schools by making them fit for the purpose of teaching HI and SEN pupils.

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[1] Building Bulletin 93 "Acoustic Design of Schools" (BB93) and the Building Regulation Requirement E4 on acoustics in schools

[2] Reference 2: B Shield, R Conetta, T Cox, C Mydlarz, J Dockrell and D Connolly, "Acoustics and noise in English secondary schools," Proc. Internoise 2013 'Noise Control for Quality of Life', September 15-18 2013, Innsbruck (2013).

[3] Reference 3: *The effects of noise on children at school: a review. B M Shield and J E Dockrell. In 'Collected papers in Building Acoustics: Room Acoustics and Environmental Noise (ed B Gibbs, J Goodchild, C Hopkins and D Oldham), 159-182, 2010, ISBN 978-1-907132-14-8. J Dockrell and B Shield.*
Reference 4: Acoustical barriers in classrooms: the impact of noise on performance in the classroom. British Journal of Educational Research 32(3), 509-525, 2006. ISSN 0141-1926 (print) 1469-3518 (online).
Reference 5: Frequency of voice problems among teachers and other occupations, Smith, E., Lemke, J., Taylor, M., Kirchner, H.L. and Hoffman, H. Journal of Voice 12 n(4). 430-388 (1998).
Reference 6: Voice Disorders in Teachers and the General Population: Effects on Work Performance, Attendance, and Future Career Choices, Smith, E., et al, University of Iowa, Journal of Speech Language and Hearing Research, Vol. 47, pp542-551

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2. Policy objectives and intended effects

- To introduce consistency in the regulations and promote good acoustic standards in all build types;
- To produce standards which are less burdensome on builders, schools and BCBs;
- To retain regulations on acoustics, while streamlining and significantly reducing the volume of guidance produced by DfE; and
- To improve benefits for mainstream pupils by setting standards for refurbishment so that all existing schools can, in time, be improved to a good baseline standard; and so that all schools are aware of minimum standards for refurbishment that should be adopted where possible.

3. Summary of conclusions and reasons for preferred option

The preferred Option 1:

- Revises BB93 criteria correcting aspects of the standards that have been found lacking over the last 10 years;
- Addresses the need to streamline our guidance as required by the Department's response to the James Review (an external review of the Department's capital policies);
- Removes the requirement for BCBs to make decisions on speech intelligibility and the standard of open-plan teaching areas;
- Provides guidance on minimum baseline standards for refurbishment projects; and
- Uses refurbishment standards as the baseline for APS that are allowed in BB93. Experience since 2003 has shown that this safeguard is necessary to prevent the use of inadequate APS – usually to cut construction costs – that then require remedial work after the school has been open a few years.

4. Implementation

The revised standards will be published as soon as possible after RPC scrutiny of this Impact Assessment, and after RRC and HAC approval. The guidance will come into effect immediately.

5. Policy Options Considered

Option 1: Revise BB93
Option 2: Do nothing
Option 3: Repeal all acoustic standards
Option 4: Option 1 plus introduction of mandatory testing as part of Building Regulations

<u>Who will these options effect?</u>

The proposals considered affect both existing and new schools. They affect teachers and pupils (particularly HI pupils and those with speech, language and communication (SLC) difficulties). They also affect designers, contractors, BCBs, school trusts and local authorities.

<u>Option 1 (Preferred option) – revise BB93</u>

The costs and benefits of Option 1 are assessed against Option 2, the 'Do nothing' option.

Option 1 includes a set of 14 revisions to BB93. Support for these changes is evident in the responses to the DfE Public Consultation earlier this year.

The next section calculates the EANCB of this preferred option.

Option 1 will:

(a) Make the Building Regulations easier to apply and remove the problems that have been identified during the 10 years since their introduction;

(b) Introduce minimum standards for refurbishment work, for which there are currently none;

(c) Reduce design time and make BCA easier, by setting refurbishment standards as the baseline for APS. Design Teams are currently allowed to substitute any of the standards with their own APS. This has led to difficulty for BCBs in judging whether or not a proposed APS will be suitable for the teaching activities planned for different spaces in a school. The adoption of the refurbishment standard as the bottom line for new build APS will help prevent the use of ill-considered APS and make the BCBs' task easier; and

(d) Remove speech intelligibility from the BCA process. The current requirement – to achieve a predicted speech intelligibility in open-plan teaching spaces – is difficult for BCBs to apply. It involves a qualitative judgement on whether or not the speech intelligibility level is suitable for the teaching activities planned in that space. We propose to remove this requirement and make it the responsibility of the school or educational client to decide whether particular spaces will be suitable. This is subject only to compliance with the minimum standards in the Building Regulations. To help schools that wish to design open-plan spaces, supporting guidance has been produced by the Institute of Acoustics (IoA) and the Association of Noise (ANC) consultants. This guidance covers the benefits and limitations of open plan teaching spaces. It is an adequate replacement for what we propose to remove.

Option 2 – do nothing
This option was disregarded as it does not address any of the policy objectives.

Option 3 - Repeal all acoustic standards (Deregulation)
This option was considered by DfE and DCLG in 2012, but was discounted by Ministers as evidence shows that minimum acoustic standards are necessary to protect the quality of the learning environment. Experience from before acoustic guidance was first implemented, in 2003, suggests that acoustic standards will not be high enough in the absence of acoustic regulations. We have therefore not calculated costs for Option 3.

Removing guidance for acoustic standards entirely was also considered to be at odds with some of the objectives of the policy: (1) it wouldn't increase access to mainstream schools for HI pupils or those with SLC difficulties; (2) it wouldn't lead to increased attainment; and (3) it wouldn't help reduce the incidence of teacher absence due to voice loss.

Option 4 – Introduction of mandatory testing as part of Building Regulations
It has been proposed that mandatory testing should be included in Building Regulations in order to ensure that all schools comply with BB93. This option was therefore considered as an addition to Option 1. Our initial cost analysis indicated that the costs of this option outweighed the benefits of improved compliance.

6. Direct costs and benefits to business of Option 1 (following OITO methodology)

This section of the Impact Assessment calculates the Estimated Annual Net Cost to Business and the NPV to business. It considers the one-off transition and administration costs of production and familiarisation; the effects of the changes in standards on business in terms of compliance costs and monetisable savings. Table 1 summarises the monetisable costs and benefits to produce an annual estimated net cost to business.

Table 1: Net Costs (2014 values)

	Type	Cost/Benefits
A. Familiarisation and Admin Costs		
1. Familiarisation costs	One-off	£258k
2. Admin and publication annual cost	Annual	£15k
B. Compliance Costs		
3. Extra Cost of refurbishment	Annual	£113k
4. More onerous reverberation time in SEN classrooms	Annual	£64k
5. Changes to Alternative Performance Standards	Annual	£62k
C. Benefits		
6. Revising ventilation criteria	Annual	£43k
7. Attenuation of rain noise	Annual	£157k
8. Insulation between classrooms and corridors	Annual	£289k
9. Saving on sports halls	Annual	£48k
10. Sports Halls remedial work	Annual	not available[4]
11. Simpler Building Control Approval Process	Annual	£112k
Total		
One-Off Costs	-	£258k
Annual Gross Costs	-	£254k
Annual Gross Benefits	-	£650k[5]
Annual net costs per year (2014)		-£396k

From this table we see there is potential for a net reduction in costs to independent schools of £396k per year (excluding familiarisation costs). The following section presents details on how these net costs have been calculated.

Estimated Actual Net Cost to Businesses (EANCB)

Table 1 shows there will be total one-off costs of £258k (2014 prices) and annual net benefits of £396k (2014 prices) per year. Aggregating these figures over a 10 year appraisal period and discounting leads to a business NPV of £3.15m. Applying the total one-off costs estimate of £258k and annual recurring net benefits of £396k to the July BIS EANCB calculator leads to an estimated annualised net cost to business of -£289k.

OITO classification: OUT

It was agreed with the RPC when submitting the triage assessment that this measure was regulatory in nature, since it contains three changes that have the potential to increase costs to businesses (on top of the familiarisation and admin costs). However, the RPC accepted that the overall net impact of the changes proposed would be to reduce costs to businesses. Page 42 of the BRE framework manual states that a measure may be classed as OUT, for the purposes of One in Two OUT (OITO), where, "the change is deregulatory (in addition to the glossary definition, where Departments recast measures in order to reduce burdens on businesses will be included as deregulatory for the purposes of OITO); and, the direct incremental economic benefit to business exceeds the direct incremental economic cost to business." Following this definition we are classing this IA as OUT for the purposes of OITO. This is also consistent with RPC's comments on our original triage assessment.

[4] Given that we do not know how many remedial projects there are, we have not quantified this cost saving.

[5] Figures may not match due to rounding

7. Details on how the costs and benefits have been calculated

Assumptions behind expected impacts

Changes to these regulations will affect both state-funded and independent schools. For the purpose of this assessment, we consider the direct impacts on independent schools and the building standards industry only. We have not quantified the educational benefits from improved acoustic standards – although we expect them to be significant, as described in the Essex Study.[6] Nor do we quantify the benefits to teachers and schools due to the improved teaching environment.

Our estimates are based on high-level assumptions about the volume of future building and refurbishment in independent schools. As a starting point, we estimated the number of schools affected and the floor area of buildings works the new standards will apply to.

Number of new independent schools

Data from EduBase shows that between 2004 and 2013 an average of 30 schools opened each year, with an average capacity of 124 pupils. This data also shows that the total number of independent schools fell by a small amount in 2013 and 2014. However, given upward trends in pupil demographics, this could be a temporary reduction. We have therefore assumed that in future years, 30 new independent schools will open each year. This is an indicative, cautious estimate. No information was gained through consultation that would allow us to improve upon this estimate.

Floor area of new independent schools

From the Area guidelines the gross floor area per pupil for a school of 124 pupils would be 8.1m^2/pupil.[7] We have multiplied this by 25% to take account of the fact that independent schools may have more space per pupil, giving gross floor area per pupil of 10.1m^2/pupil.[8]

Applying this to the information on new schools above yields a total floor area created in new independent schools of 37,572m^2 /annum (30 schools x 124 pupils x 10.1).

Types of building works in newly formed independent schools

Not all newly opened independent schools will be in newly built premises. They are likely to be accommodated in a mixture of (a) existing schools, (b) changes of use of existing non-school buildings and (c) new builds.

The consultation provided no reliable information on which to base an estimate of what types of premises new independent schools will use. Similarly, there is no existing data source on which we can base such an estimate. Gathering new information for the purpose of this IA would be disproportionate, so we have made assumptions.

(a) Existing Schools: School turnover is small and existing schools are unlikely to have large amounts of under-utilised capacity. We therefore assume that no schools will form in existing school premises.

(b) Change of use*:* In the absence of reliable information, we assume 50% of the new school buildings will be formed by a change in use of existing non-school buildings, e.g. offices. The Change of Use requirements in the Building Regulations currently apply in these

[6] Reference 7: *The Essex Study, optimised classroom https://www.gov.uk/government/publications/mainstream-schools-area-guidelinesacoustics for all conducted at Sweyne Park School in Essex, May 2012, http://www.cipfaproperty.net/fileupload/upload/Final%20report%20V4_28_05_12.pdf*

[7] Reference 9: The Area Guidelines, 2014, https://www.gov.uk/government/publications/mainstream-schools-area-guidelines

[8] Listed buildings, which have the most space per pupil, are 25% larger than the area guidelines

cases. The types of adaptions required include improvements to fire escapes and improved access for the disabled. The floor area subject to change of use regulations is therefore 18,786m^2 (50% x 37,572m^2).

(c) New Facilities: We assume the other 50% of the 37,572m^2 floor area will be in new buildings. This is equivalent to 18,786 m^2 (50% x 37,572m^2).

Impacts on existing independent schools

Major refurbishments as well as new building work will need to take place in the existing 2,411 independent schools. The amended regulations will apply to these schools. Assuming a 60 year replacement cycle, this equates to a replacement of 40 schools a year (1/60 x 2,411 schools).

Data from *Schools, pupils and their characteristics: January 2014* tells us that the average size of all 2,411 independent schools is 235 pupils. The gross floor area per pupil for a maintained school of 235 pupils would be 5.7m^2/pupil.[9] Applying the 25% uplift gives a gross floor area of 7.2m^2/pupil.

This equates to a total floor area of 67,680m^2 (40 schools x 235 pupils x 7.2).

As with assumptions applied to new independent schools, we assume that half of this (or 33,840m^2) will be new buildings, to which the Building Regulations will apply, and the other half will be refurbishment works, to which the Building Regulations will not apply.

Total floor area of buildings works subject to Building Regulations requirements on acoustics

The total floor area subject to the revised standards for Building Regulations compliance is:

- 52,626m^2 of new buildings subject to Building Regulations – this is the sum of 18,786m^2 (new build area provided in new schools) and 33,840m^2 (which equates to the half of the existing independent school buildings that are replaced each year by new buildings).
- 18,786m^2 of refurbishments subject to Building Regulations (refurbishments in existing school premises that are subject to a change in use).

Costs of construction in independent schools

The RPC suggested that DfE would benefit from consulting on how the current base cost of construction of new independent school buildings may be slightly higher than for government funded schools. Evidence from an acoustician working on independent schools is that, although the base building cost of construction for independent schools is approximately 20% higher than for government funded schools, the amount spent on acoustic improvement work in independent schools is no higher than the cost per square metre in maintained schools.

The assumptions above are used below to derive the total estimated net costs and benefits resulting from the change in regulations.

A. Familiarisation and Admin Costs

1. Familiarisation costs

These costs correspond to the hours invested by BCB professionals and building design teams to become familiarised with the changes that are being introduced. **We estimate that there will be a total cost of £232k to the Building Industry.**

[9] Reference 9: The Area Guidelines, 2014, https://www.gov.uk/government/publications/mainstream-schools-area-guidelines

Building Control Bodies

Building professionals will need to spend some time reading and familiarising themselves with the changes to the standards. We have estimated the cost to private sector BCBs only.

There are currently 90 Approved Inspectors registered on the Construction Industry Council (CIC) website. These range from specialist individuals to very large businesses. Of these, around 60 are listed on the Association of Corporate Approved Inspectors (ACAI) website. School contractors are likely to use the 60 listed with ACAI rather than the 90 registered with CIC. We have assumed that these 60 practices will each need to train 5 of their staff for schools work. This estimate is likely to be an upper bound as not all the large corporates will do schools work, and some of the 90 registered practices consist of just 1 individual.

The familiarisation training would typically occur at a conference of the Association of Building Engineers (ABE) that would cover all changes to Building Regulations in one morning session. The usual ABE conference fee is £60 per delegate. The changes in Acoustic Regulations could be covered in one third of a 4 hour session. Cost of travel and attendance would be an average of £100. The hourly rate for this type of building professional, according to the OGC framework, is around £40/hour including wage costs and overheads. A reasonable estimate of the one-off cost per person for familiarisation is (£160 + £100)/3 = £260/3 giving a total cost for 5 staff per BCB of £433.

The total cost for BCBs is equivalent to one-off costs of £26k as shown in Table 2 below.

Building Design Teams

The designers of schools are already familiar with the new standards as they have been used in the Priority Schools Building Programme (PSBP) Facilities Output Specification since June 2013. Understanding what has changed following the Public Consultation will not be difficult, as the few changes make the standards clearer and simpler.

There are 110 consultancy practices registered with the ANC. Approximately 60% of these are involved in school design. Each practice has 2 to 3 people who will need to be familiar with the new standards. This amounts to about 160 people. We estimate that there are a further 40 people who are members of the IoA, but who are not members of ANC. This leads to a total of 200 acousticians who will need to be familiar with the new standards.

The hourly rate for this type of building professional, according to the OGC framework, is around £40/hour including wage costs and overheads.

The familiarisation would typically take place as a 2 hour session in a half day conference organised by the IoA and/or the ANC. The fee for this 4-hour conference is typically £100.

We believe a reasonable estimate of the one-off cost per acoustician for familiarisation is (£160 + £100)/2 = £130.

Other professions such as architects and engineers will also need to be familiar with the new standards. There are 26,355 architects registered with the Architects Registration Board (ARB) in England and 1,242 Building Services Consultancies listed on the Chartered Institute of Building Services Engineers (CIBSE) website for the education sector. We assume that a quarter of architects and 3 people in each Building Services Consultancy working in the education sector will need to be familiar with the new acoustic guidelines. Each could be expected to spend 30 minutes familiarising themselves with the new standards. There will be a cost of their time. The total cost for design teams is equivalent to one-off costs of £206k as shown in the table below.

Table 2: Familiarisation Costs

One-off costs (current prices)		Building Control Bodies	Acoustic Consultants	Building Design Teams	Method and data source
A	Number of staff in BCBs and acousticians needing to familiarise themselves with revised regulations	60 x 5 = 300	200	(26,355/4 + 1242 x 3) = 10,315 professionals	Internal data plus assumption Registers of Approved Inspectors (CIC and ACAI), Architects (RIBA) and Buidling Services Engineers (CIBSE)
B	Staff time	4 hours	4 hours	30 minutes each	0.5 days training each
C	Average Hourly Employee Cost	£40/hour	£40/hour	£40/hour	£40/hour taken from 2012 OGC Framework rates for Technical support consultancy
D	Travel and conference cost	£100	£100	No cost	Cost of attendance at regional conference of Association of Building Engineers
E	Proportion of conference cost for acoustics standards for schools	1/3	½	N/A	Past history of ABE and IoA/ANC conferences
	Total one-off resource costs paid by the independent school sector	**£26k A*(B*C+D)*E**	**£26k A*(B*C+D)*E**	**£206k A*(B*C)*E**	

The total familiarisation costs are equal to £258k (£26k + £26k + £206k).

Publication one-off costs (costs of producing supporting guidance)
The revised acoustics standards have already been written by the Education Funding Agency (EFA) for use in the PSBP. This incurred no cost to the private sector.

Supporting guidance has also already been drafted by the School Acoustics Committee of the IoA and the ANC and is an update of the existing guidance contained in BB93. The cost of the time of the industry acousticians who have produced the revised supporting guidance from the existing guidance published in BB93 has been estimated at £50k. However, consistent with *HMT Green Book* guidance, these costs have been excluded from the appraisal as they have already been incurred (they are a sunk cost). In fact, there was no charge made for their advice.

2. Admin and publication annual cost

Administration costs to maintain and support guidance
We estimate that £15k of this cost will be paid annually by the Acoustics sector of the Building Industry.
The on-going administrative cost from maintaining the supporting guidance through minor revisions is estimated at £15k per annum. This is calculated as shown in Table 3 below.

The RPC suggested in their Regulatory Triage Confirmation that DfE should consult on whether the cost to maintain supporting guidance would be covered through IoA and ANC fees.[10] We have consulted the acousticians on the review group. They advise that this work will be co-ordinated through the Schools Committees of the IoA and the ANC. The additional cost of £13.4k/annum will be absorbed by the acoustic consultancies themselves (i.e. donation of their time on a voluntary basis).

Acoustic consultancies work on standards and guidance on a voluntary basis as a means of progressing their knowledge and standing in the profession. Hence this activity is not reliant on funding from IoA or ANC. Administration costs of £1.5k per annum as shown in Table 3 would come from IoA and ANC fees. We have included these costs in the EANCB as these organisations are part of the Building Standards Industry.

Cost of publications

There will be no cost to acousticians, architects and designers in accessing the revised guidance as IoA and ANC will publish their guidance free in electronic format.

Table 3: Cost of Publications

		Annual recurrent costs (current prices)	**Method and data source**
A	Annual administration cost borne by Acoustic consultancies: 8 members of the IOA/ANC Schools Committee for 3 days each per annum	8 x £560/day x 3 days = £13,4k consultancy cost	Rate from current OGC framework for Director level staff
B	Administrative cost to IOA and ANC to maintain website and for administration of Committees, etc	£1.5k	Cost estimate for minor admin work
	Total annual cost	**£15k**	**A+B**

[10] RPC 13 –FT-DfE-1961(2) dated 6/2/14

B. Compliance costs of meeting improved school acoustics standards

3. Extra cost of refurbishment

The refurbishment standards will affect schools converting from other building types through changes of use. Change of use requirements in the Building Regulations apply to such projects as an office block being converted to a school. They do not apply to buildings that are currently schools that need to be refurbished, nor are they retrospective.

We estimate that £113k of this cost will be paid annually by the independent school sector.

At the moment, Building Regulations require refurbishment to an appropriate standard. However, the current BB93 does not contain any standards for refurbishment. Designers must infer the minimum standards for refurbishment from the new build standards in BB93 and from good practice and experience.

As new build standards are not realistically achievable on many refurbishment projects, BCBs do not know what standards should be applied. This means current guidance is sometimes ignored. The setting of a lower baseline for refurbishment and conversion projects than for new build will make compliance much more straight forward. This will mean that there are extra costs, as compliance with the new (lower) standards implies higher costs than ignoring the old standard. We have little evidence on the current standards being applied in buildings, so we are required to make assumptions based on the evidence available.

A recent survey[11] of schools built before and after the acoustic regulations were first introduced in 2003 showed that 50% more schools met the recommended standards after the introduction of the Building Regulation requirement on schools than before. On this basis, we have assumed in our costings in Table 4 that 50% of change of use refurbishments will experience additional costs. This is equivalent to a total floor area of 9,393m^2 (50% x 18,786m^2).

We have estimated costs for compliance from the new refurbishment standards in *The Essex Study.*[6] The increase in refurbishment costs will be around £12/m^2 (A-B in Table 3), assuming no acoustic standards were applied to these areas previously.

There is also a potential saving on some projects: if the new build standards in BB93 had been applied to a refurbishment, it would have cost approximately £40/m^2 and will now cost £12/m^2. This potential saving is, however, not quantified as we do not know the number of premises it will affect.

Table 3: Cost of refurbishment

A. Costs for elements to new standards	B. Current cost per m^2 of elements construction	C. Floor area changes will apply to	D. Change in costs (A-B)*C
New base building costs for refurbishment range from £979.5/m^2 to **£985/m^2** (See Reference 4 costs in the Essex School Study). This cost assumes no acoustic standards were applied to these changes of use previously.	Current base building cost for refurbishment is **£973/m^2**	**9,393m^2**	**Cost of £113k/annum** (£12/m^2 x 9,393m^2)

[11] Reference 1: B Shield, R Conetta, T Cox, C Mydlarz, J Dockrell and D Connolly, "Acoustics and noise in English secondary schools," Proc. Internoise 2013 'Noise Control for Quality of Life', September 15-18 2013, Innsbruck (2013).

4. More onerous reverberation time in SEN classrooms

This extra cost follows a change in reverberation times of teaching spaces for children with special hearing and communication needs. This will have a small cost impact mainly on maintained schools with special units.

We estimate that this measure will cost independent schools approximately £64k per annum.

We do not have any data on the proportion of independent schools with rooms specifically designed for these students. It is likely to be very low. To provide an indicative estimate we have assumed that 5% of classrooms in independent schools will need to be designed to these standards.

Two independent schools have recently commissioned upgrades to one classroom for each year group to the proposed new standards. We have counted this as a cost to the independent sector, although there will also be considerable benefits for these schools that we have not been able to quantify: extra fees for teaching HI pupils and those with SLC difficulties; small class sizes together with improved acoustics in these schools will benefit these pupils.

This change will affect all new build and major refurbishment projects not only those that involve changes of use. The total floor area of new build and refurbishment is 37,572m^2 in new schools and 67,680m^2 in existing schools. If the percentage of such classrooms were as high as 5% then it would equate to 5,262m^2 per year for new schools and refurbishments ((37,572 m^2 + 67,680 m^2)*5%).

Table 4: Cost of more onerous reverberation time in SEN classrooms

A. Costs for elements to new standards	B. Current cost per m^2 of elements construction	C. Floor area changes will apply to	D. Change in costs (A-B)*C
New cost of acoustic insulation in ceiling £37/m^2	Current Cost of ceiling treatment £24.9/m^2 The change in guidance results in **an increase in cost of £12.1/m^2** based on evidence from the Essex School Study, See Reference 4 and fact that classrooms are half the size in private schools Difference between current BB93 ceiling for HI pupils and ceiling type recommended by British Association of Teachers of the Deaf (BATOD)	**5,262m^2**	**Cost of £64k/annum** (£12.1m^2 x 5,262m^2)

5. Extra cost to new buildings due to changes to Alternative Performance Standards

Currently, Design Teams can propose their own APS for acoustics in place of the published standards. The APS have to be justified by an acoustician and signed off by the School Client Body.

This gives designers considerable design flexibility. However, it is difficult for BCBs to judge whether or not the APS proposed are suitable for the teaching activities planned for different spaces in a school. There are currently no lower bounds to the acoustic standards that can be proposed, and no guidance on what lower standards are acceptable in which situations. When the School Client Body lacks the necessary skills and understanding of a very technical area, it

can result in proposals with very poor acoustics standards. Designers also suffer uncertainty: acceptance by one BCB does not necessarily mean another BCB will have the same view.

We know that designers, contractors and other bodies involved in the building approval process find the current APS process unsatisfactory. We have made changes to address this problem and make the Building Control Approval process simpler and more effective.

We have:

1. Set the minimum standard for APS for new buildings at the lower refurbishment standard, whilst still allowing APS below the refurbishment standard under exceptional circumstances;

2. Introduced a small number of allowable exceptions to the recommended minimum acoustic standards. The allowable exceptions give the performance required in cases that have been the subject of frequent APS, and give the minimum standards that are acceptable for these situations based on experience of applying these solutions in practice; and

3. Removed the criteria for speech intelligibility from the scope of the Building Regulations. Speech intelligibility is difficult to model and test and due to its subjective nature has caused problems for BCBs where APS were proposed for open-plan teaching spaces.

These revisions mean it will now rarely be necessary for an acoustician to justify an APS of a lower standard and will ensure the APS process works more effectively than it currently does.

This may result in an increase in compliance costs for new schools that previously used APS to get acceptance of lower acoustic standards. We have estimated this cost increase to be £62k. (See Table 6)

Offsetting this, there will be reductions in compliance costs as:

1. More projects will now take advantage of the lower standards that are now being introduced through allowable exceptions. This saving has only been accounted for in the case of the allowable exception for ventilation in Section 6 “Revising the Ventilation Criteria”;

2. More schools will use the refurbishment standard as an APS in place of the new build standard where there are specific educational, environmental or health and safety grounds to do so; and

3. There will be savings in the time for acousticians to prepare submissions for Building Control Approval. This has been accounted for in Section 11 “Simpler Building Control Approval”.

An example of an allowable exception is:

- Interconnecting doors between teaching spaces no longer require an APS and most schools will now use 35 dB (sound insulation) doors in a 40 dB separating wall as the allowable exception.

An example of a lower refurbishment standard that can be used as an APS where it can be justified is:

- The sound insulation of separating walls can be reduced to the refurbishment standard where vision panels are desirable in practical subjects to improve visual connection between adjoining rooms.

Estimate of increase in compliance costs due to changes to Alternative Performance Standards

APS to the BB93 2003 standards have been used for specification of doors between teaching spaces and corridors; noise ratings of mechanical ventilation systems; speech intelligibility and reverberation time of open plan spaces; and sound insulation between classrooms and corridors. Table 5 below shows how the new standards compare with APS commonly applied between 2003 and 2014.

Table 5: Comparison of new standards with APS commonly applied between 2003 and 2014

		New standards higher than previous commonly applied APS	New standards equal or lower than previous commonly applied APS	Building elements affected
1	Doors between corridors and teaching spaces and between teaching spaces	✓		Doors
3	Sound insulation of operable walls	✓		Walls
4	Sound insulation of internal partitions	✓		Walls
5	Noise ratings of mechanical ventilation systems	✓		Mechanical ventilation systems
7	Ventilation criteria and attenuation of traffic noise		✓	Windows
8	Reverberation Time criteria for open plan spaces	✓		Ceilings
9	sound insulation between classrooms and between classrooms and corridors		✓	Walls Ventilators in Walls Doors

Table 5 shows that APS are commonly used for the building elements: mechanical ventilation systems, doors, walls, windows, and ceilings. They are rarely if ever used for roofs or floors or other building elements.

Table 6 estimates the costs of introducing new minimum standards for APS. It lists the building elements which APS can affect (Row A) and the estimated uplift cost from the worst case APS specification (Row B) to the proposed minimum specification (Row C). Estimated uplift costs (Row E) are based on the elemental uplift costs due to the introduction of BB93 into Building Regulations from a 2003 report for DfE and comparison with the current elemental costs for baseline designs developed for PSBP (Row D). The 2003 report gave the elemental uplift costs as a percentage of the Base Building Cost to minimise the effect of project variables such as demolition, abnormal ground conditions, etc.

We have estimated the proportion of work in independent schools that is subject to an APS of a standard lower than the refurbishment standard or the allowable exceptions for each of the building elements (Row F).

For example, internal doors are one of the most common uses of APS and the uplift cost in

Table 6 is calculated as follows:

A high estimate would be that 10% (Row F) of doors in independent schools are currently the subject of an APS of a lower standard than proposed. The uplift cost for a light weight door without an acoustic door seal is 0.33% of the DfE base building cost (Row E) from the 2003 report. The weighted uplift cost for doors is 10% x 0.33% (Row F x Row E) or 0.033% (Row G) of the base building cost.

The total uplift cost = Sum of Row G, the uplift costs for each of the building elements in Table 6 = 0.025 + 0.012 + 0.015 +0.033 = 0.085% of the base building capital cost.

The estimated total uplift cost is: 0.085% x annual new build area x Base building cost

The estimated base building cost for independent schools is £1,394 at 2Q 2014 with a Location Factor of 1.

The total annual new build area of independent schools is 52,626m^2.

The estimated total uplift cost = 0.085% x 1,394 £/m^2 x52,626 m^2 = £62k at 2Q 2014 prices.

Table 6: Estimated elemental uplift costs from a worst case APS specification to the proposed minimum specification, as a percentage of the base building cost

A	Building Element	Ventilation Systems	Reduced ceiling absorption	Internal Walls and partitions	Internal Doors	Data source
B	**Proposed minimum specification**	Mechanical Ventilation with sound attenuators and quiet fans	Acoustically absorbent ceiling to classrooms, Eg, compressed mineral fibre acoustically soft tiles	Partitions with no acoustic insulation and 6mm glazing	Acoustic Spec. 30dB, construction to suit (timber) with continuous acoustic seal, supplied as a door-set	Current Priority Schools Building Programme (PSBP) specification
C	**Worst case current APS specification**	Mechanical ventilation with no sound attenuators and noisier fans	Suspended ceilings with no acoustic absorption, 1 hour fire resistance	Partitions with acoustic insulation and 6 mm glazing	Softwood frame, flaxboard or cardboard core, timber veneer, - no acoustic spec, made up on site.	Pre-BB93 acoustic standards from 2003 Report on cost of introduction of acoustic standards in 2003
D	**Elemental percentage of Base Building Cost for proposed specification in 1**	3%	0.9%	4%	1.9%	Cost analyses of PSBP baseline designs, DfE 2012
E	**Uplift costs from current worst case to proposed minimum specification as percentage of Base Building Cost**	0.5%	0.4%	0.3%	0.33%	Current cost estimates and costs in 2003 Report on introduction of BB93
F	**Percentage of building projects where new standards are higher than previous worst case APS**	5% of ventilation systems	3% of ceilings (predominantly in open plan areas)	5% of internal walls and partitions	10% of internal doors	Assumption based on experience of projects since 2003
G	**Weighted percentage uplift cost**	0.025%	0.012%	0.015%	0.033%	**E x F**
H	**Elemental uplift costs**	£18340	£8803	£11004	£24209	**G x £1,394/m^2** base building cost x 52,626 m^2 (new build area)
I	**Total uplift cost = £62k**					**Sum of elemental costs in Row H**

C. Benefits

6. Revising the Ventilation Criteria

We expect there to be significant cost savings associated with revising the criteria for the sound insulation of openings that are used for ventilation. The savings are due to less onerous indoor ambient noise level criteria. In summer, teachers will now be able to open windows even where it leads to higher noise levels. BB93 2003 allowed natural ventilation (open windows) with external noise levels up to 49 dB(A); new standards will allow up to 55dB(A).

We estimate that the independent school sector will save £43k per year due to these revised criteria.

The Building Research Establishment carried out an analysis for DfE in 2004 of the National Noise Map data, which implied there are approximately 30% of rural residential and suburban sites and 18% of urban residential sites which are likely to have external noise levels between 49 and 55 dB(A). As we do not know the percentage split of urban, suburban and rural schools, we have conservatively assumed that at least 50% of schools are on rural or suburban sites. This means 24% of all schools are affected. This survey covered maintained schools only, so we have assumed that independent schools are similarly distributed.

This change applies to both new buildings and changes of use, which means it applies to 52,626m^2 in new builds and 18,786m^2 in changes of use – or a total of 71,412m^2 per annum. We expect 24% of these projects to require a lower standard of sound attenuation. It will not affect refurbishments of existing schools as Building Regulations do not apply in this case.

Table 7: Savings due to revising the ventilation criteria

A. Costs for elements to new standards	B. Current cost per m^2 of elements construction	C. Floor area changes will apply to	D. Change in costs (A-B)*C
New cost of external windows and ventilators £26.3/m^2	Current cost of external windows and ventilators £28.8/m^2 The changes result in a **reduction in cost of £2.5/m^2.**	24%x71,412 = 17,139m^2	**Saving of £43k/annum** (£2.5/m^2 x 17,139m^2)

7. Reduction of rain noise

We have reduced the requirement for sound reduction from rain noise for new roofs and for refurbishments where the roof or roof glazing is replaced. This leads to cost savings as the roof construction can be simpler. Table 8 shows the effect of this change.

We estimate that the independent school sector will save £157k per year due to these revised criteria.

Table 8: Savings due to Attenuation of Rain Noise

A. Costs for elements to new standards	C. Current cost per m^2 of elements construction	D. Floor area changes will apply to	D. Change in costs (B-C)*D
New cost of roofs £139.6/m^2	Current cost of roofs £144/m^2 The change in guidance results in **a reduction in cost of £4.4/m^2**.	Savings apply to both new buildings, and changes of use: 52,626 m^2 + 18,786 m^2 = 71,412 m^2 Applies to half the total floor area as most buildings are 2 storeys and the measure only applies to the roof: 71,412/2 = 35,706 m^2.	**Saving of £157k/annum** (£4.4/m^2 x 35,706m^2)

8. Insulation between classrooms and corridors

The changes mean that lower performance glazing and ventilators can now be used between teaching spaces and corridors. This will result in substantial cost savings.

We estimate that the independent school sector will save £289k per year due to these revised criteria.

Under the previous BB93 double glazed acoustic partitions (two layers of 6mm glass with an air gap) or 17mm laminated glass would have been required to meet the required sound insulation. However, it will now be possible to use 6mm glass in all but the most demanding situations, such as music and drama rooms.

A reduced specification of internal glazing can be used for 90% of rooms (all except music and drama). The cost of glazed elements of the partitions provided in the EFA baseline design for a 1,200 place secondary school is £22 (per m^2 of gross internal floor area). The extra cost of the higher performance glazing required to meet BB93 2003 would have been at least £11/m^2. We have assumed that new schools have on average 50% of the amount of internal glazing as was included in the baseline designs. The saving is therefore £5.5/m^2 times the new build floor area per year, which is estimated to be 52,626 square metres.

Table 9: Savings due to Insulation between Classrooms and Corridors

A. Costs for elements to new standards	B. Current cost per m^2 of elements construction	C. Floor area changes will apply to	D. Change in costs (A-B)*C
New cost of internal walls and partitions £88.5/m^2	Current cost of internal walls and partitions £94/m^2 The change in guidance results in **a reduction in cost of £5.5/m^2**.	Savings apply only to new buildings and not to changes of use: 52,626m^2.	**Saving of £289k/annum** (£5.5/m^2 x 52,626m^2)

9. Saving on sports halls

There will be cost savings for projects involving the building of new sports halls, due to the revision of the Reverberation Time (RT) standard from 1.5 seconds to 2 seconds for sports halls of 594m^2 and above. This is the size of a 4-court sports hall. We estimate that the vast majority (over 90%) of new sports halls are this size.

We estimate that the independent school sector will save £48k per year due to these revised criteria.

Data from past projects[12] suggests that there are around 100 new sports halls built each year, which are equal to or larger than 486m^2. The cost saving from adopting less stringent standards for 90% of these halls arises from needing a smaller surface area for absorption, and the cost of the surface finishes required for this absorption level. The cost of high impact Class A wall panels are typically £66 per m^2 and 90 m^2 fewer of these panels (173m^2 instead of 263m^2) are needed to achieve the higher RT, which saves approximately £5940 per hall. The total cost saving is therefore expected to be £534,600 per year.

We have assumed that 1 in 11, or 9 of the 100 new sports halls are in the independent school sector and apportioned costs accordingly.

Table 10: Savings on Sport Halls

A. Surface area for absorption according to new standards	B. Current surface area for absorption	C. Cost of class A panels	D. Change in costs (A-B)*C*9*90%
173m^2	263m^2 Difference is 90m^2	£66 per m^2	**Saving of £48k**

10. Sports Halls remedial work

Additionally, there is likely to be a reduction in the annual number of remedial projects that involve fitting of absorption to the walls of sports halls to reduce reverberation time measured while the sports hall was empty. We now know that reverberation times are lower when they are in use, so the remedial work is generally not required.

The remedial work usually consisted of adding wall absorbers and around 173m^2 of these would typically be required to balance the distribution of absorption in the space. This would cost approximately £11,400 per project. **We do not know how many remedial projects there are therefore we have not quantified this cost saving.**

11. Simpler Building Control Approval Process

We expect the proposals, which simplify the process, to lead to a reduction in the time needed for designers to produce Building Control submissions and to the time needed for BCBs to process BCAs. Data suggests that there are around 3,400 school building projects each year to which the proposal applies. As there are 2,300 independent schools and 23,000 maintained schools we might expect around 340 Building Control applications per year for major new build and refurbishment projects in the independent sector.

[12] Active Places Data, Sport England

We estimate the cost saving per BCA is £330 per application and Table 11 shows that we estimate that the independent school sector will save £112k per year due to the simpler BCA process.

Table 11: Savings on Simpler BCA process due to changes to Alternative Performance Standards

A. Costs for elements to new standards	B. Current cost per m^2 of elements construction	C. Number of schools changes will apply to	D. Change in costs (A-B)*C
New cost per Building Control application of £2,970.	Present cost of Building Control Process estimated at 0.3% of base building cost or £3.3/m^2 or £3300 per project. **Saving of £330 per application**	The easier Building Control Process affects 340 major building projects per year.	**Saving of £112k/annum** (340 x £330)

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