THE BUILDING (AMENDMENT) REGULATIONS 2004

THE BUILDING (APPROVED INSPECTORS ETC.) (AMENDMENT) REGULATIONS 2004

REGULATORY IMPACT ASSESSMENT

Buildings Division
Office of the Deputy Prime Minister

May 2004

SECTION 1 - INTRODUCTION

This Regulatory Impact Assessment (RIA) relates to the following two sets of Amendment Regulations:

The Building (Amendment) Regulations 2004

The Building (Amendment) Regulations 2004 amend Schedule 1 to the Building Regulations 2000, as follows:

- In Part A (Structure), the Limit on Application relating to paragraph A3 (disproportionate collapse) is removed
- The existing Part C (Site Preparation and Resistance to Moisture) is replaced by a revised Part C (Site Preparation and Resistance to Contaminants and Moisture)
- In Part F (Ventilation) paragraph F2 (Condensation in roofs) is removed, as this matter is dealt with in the revised Part C

These Amendment Regulations also clarify the definition, in Regulation 2 (Interpretation) of "Room for residential purposes"; amend Regulation 6 (Requirements relating to material change of use); and amend Regulation 20A (Sound insulation testing).

The Building (Approved Inspectors etc.) (Amendment) Regulations 2004

The Building (Approved Inspectors etc.) (Amendment) Regulations 2004 amend Regulation 12A (Sound insulation testing) in the Building (Approved Inspectors etc.) Regulations 2000. Regulation 12A corresponds to Regulation 20A in the Building Regulations 2000, for cases where building control is being carried out by an approved inspector.

Outline of this RIA

Sections 2 and 3 of this RIA address the changes to Parts A and C of schedule 1 to the Building Regulations 2000 and to the guidance given in the relevant Approved Documents. Section 3 also explains the changes in Regulation 6, which relate to the review of Part C. Section 4 of this RIA relates to the new option of using "robust details" to ensure compliance with paragraph E1 in Part E (Resistance to the Passage of Sound), as an alternative to sound insulation testing under Regulation 20A or 12A.

Section 5 contains the Minister's declaration.

SECTION 2: AMENDMENT OF PART A (STRUCTURE) IN SCHEDULE 1 TO THE BUILDING REGULATIONS 2000; REVISION OF APPROVED DOCUMENT A

1 Introduction

1. This Regulatory Impact Assessment (RIA) estimates the costs and benefits of the proposed amendments to the Requirements of the Approved Document associated with the Requirements of Part A of Schedule 1 of the Building Regulations 2000 (SI No. 2531 of 2000), with relation to structural safety in England and Wales. The last substantial review of the Requirements and the Approved Document occurred in 1991, although Requirement A4 was revoked in 1994.

2. This RIA addresses the proposed amendments to the requirements of Part A and the guidance within Approved Document A. It only focuses on those proposed changes that are considered significant.

2 Purpose and Intended Effect

Requirement A3

3. **Issue:** The application of the Disproportionate Collapse Requirement to long span public buildings, shops and shopping malls was developed in 1991 into a new Requirement A4. However, a subsequent review by the Department of those building failures occurring in the 60s and 70s that had generated the case for introducing the new requirement concluded that the failures had resulted from construction shortcomings associated with Requirement A1 and Regulation 7 rather than Requirement A4.

4. It had been considered that considerable improvement in the quality of the guidance material relating to Requirement A1 and Regulation 7 over the past 30 years, or so, had resulted in a corresponding enhancement of structural safety of the building stock and had rendered the A4 Requirement superfluous.

5. In view of this finding, together with numerous reports of difficulties being experienced with the interpretation of the Approved Document guidance on Requirement A4, the Requirement was consequently revoked in 1994. The result was that public buildings of less than 5 storeys became exempted from the regulatory measures aimed at preventing progressive collapse in the event of an accident. This omission was described by the Standing Committee on Structural Safety as "a gap in the regulations" and detailed comments were given in the Committee's reports published in October 1994 and January 1997.

6. **Objective:** The purpose of the proposed amendment to the Requirement A3 and Approved Document A associated with Requirement A3, is to bring all buildings within the compass of the Requirements. This would include not just public buildings previously exempted but other buildings of less than 5 storeys. At the same time it becomes appropriate to ensure conformity of the Approved Document with Eurocode EN 1991-1-7, yet to be published, in the interests of achieving conformity throughout the European community.

Requirements A1 and A2

7.**Issue:** In view of the extensive period since the last occasion when the Approved Document A guidance material was reviewed it was considered that some of the recommendations have become obsolete or were otherwise deemed to be no longer appropriate.

8.**Objective:** The purpose of the proposed amendments to the Approved Document A associated with Requirements A1 and A2 is to:

- remove any guidance that is readily available in alternative documents with the aim of avoiding duplication of other published guidance. Whilst such approved guidance will be referred to in the Approved Document the latter will be shortened and its cost of production and sale reduced
- update references to British and European Standards and other sources of advice on structural design, materials and construction and to bring guidance generally in line with advice given elsewhere in current external documents. It is necessary that such references be subject to update to retain relevance to current practice
- reflect changes in building technology and construction practice. It is appropriate that the Approved Document reflects current practice to retain relevance and avoid discouraging beneficial developments in technology and practice.
- reflect the desirability of recognising minor changes made from time to time in the complementary suite of Approved Documents so that all relevant advice and information may be brought together in a single primary source document.

The nature and background to these proposed changes is given in Appendix B.

3 Risk Assessment

Requirement A3

9. **Disproportionate collapse.**The risk that an extreme event will occur, be it explosion or other incident, is not of itself decreased simply by these measures. Nor can they ensure that demolition or building alteration will be carried out in accordance with good and wise practice. However, it is intended that the consequence of such an incident will be considerably reduced. It is thereby envisaged that the number of fatalities and serious injuries might be reduced by one half. This is of course no more than an informed estimate and statistical evidence will emerge only over a period of 50 or more years corresponding to the life cycle of typical building stock.

10. It is estimated that incidents of major uncontrolled collapse of buildings leading to death or injury take place on average at a rate of roughly one per annum. More common are instances of limited uncontrolled collapse not necessarily leading to death or injury, the extent and consequences of which remain influenced by lack of robustness. Such incidents cover a wide range of buildings.

Requirements A1 and A2

11. **House longhorn beetle attack.** An assessment of instances of reported infestation of house longhorn beetle attack over the past 10 years has been carried out by Building Research Establishment and they have advised that it is reasonable to reduce the area over which there are controls (BRE Client Report No. 77266). If the guidance on protection against infestation of longhorn beetle is not included in

Approved Document A, then awareness of the need for preservative treated timber in the controlled area will diminish with time and structural timbers installed in the area will be put at risk.

12. **Concrete foundations** There is concern that in practice, on many building sites, standards of control are such that the intended properties of grade ST1 concrete recommended in Approved Document A may not be achieved when it is used in foundations. The advice given in the Approved Document applies to foundations on non-aggressive soils including soils with levels of sulphate concentration below a stated limit. Concrete is attacked by acidic or sulphate solutions, often resulting from sulphates occurring in the soil. There is a risk on many small building sites that without appropriate care and understanding by operatives suitable durability is not achieved if ST1 concrete is used.

13.**Cavity wall ties.** Experience has shown that in a limited number of cases galvanised mild steel wall ties are subject to significant corrosion within a 50 year period. Climate change is predicted potentially to result in increased incidence of driving rain which is the primary cause of corrosion of galvanised mild steel wall ties. Such corrosion could place at risk the stability of masonry walls.

4 Options

14. The following options have been considered.

Option 1 - Do Nothing

15. With regard to material relating to Requirements A1 and A2 there are no perceived benefits in adopting Option 1. This would not be sensible because it ignores the technical and other changes made to British Standards and other authoritative documents and inhibits developments in technology and practice. Confusion would inevitably arise and the intended purpose of the Approved Document would be negated.

16.With regard to the revised material relating to Requirement A3, ODPM recognises the strong representations made by expert outside bodies that there are serious omissions in the current advice given in the Approved Document which could impact on safety and that this can only be addressed by positive action.

17. Although Option 1 is not considered acceptable, its inclusion in this RIA serves as a benchmark against which the costs and benefits may be assessed.

Option 2 - Adopt the proposed Amendments to the Approved Document

18. It is considered that adoption of the proposed amendments is the only satisfactory way of ensuring that the Approved Document will continue to be useful in giving up to date advice. In the case of the guidance on Regulation A3 it is believed that such revisions could not readily be brought about by any other means.

19. A third option of "Good Practice" was also considered but subsequently deleted from the RIA as it does not directly fall within the remit of the regulations. However, the process of updating the guidance on meeting the functional Requirements will inevitably incorporate "Good Practice".

5 The Benefits

20. Option 1. As explained above, 13 no benefit arises from the option of doing nothing.

21. Option 2 is considered to be the only sensible way forward in procuring beneficial change and to avoid. continuing use of a document which is outdated in its references, fails to recognise European Standards, and tends to inhibit advances in practice. Further detailed analysis of cost and benefit appears within Table 1.

22. It will be noted that none of the benefits identified in this RIA are readily amenable to costing. In fact the benefits of having a document which is updated to reflect current best and proper practice are obvious but do not readily lend themselves to financial analysis. Whilst it is possible to place costs upon compliance with new elements dealing with disproportional collapse of buildings (Regulation A3), there are difficulties in predicting the costs which may be avoided in the future.

23.The figures at first sight appear to be broadly balanced in terms of cost (which is definable with reasonable accuracy) and direct financial benefit which is not so robustly definable. However, the benefits which arise are far wider than matters amenable to financial analysis, and may reasonably be seen as overriding in nature.

24. It is unfortunately very difficult to extract from published figures the commercial costs of building works in England and Wales. They are partly submerged in general figures for construction and in any event include the costs of matters lying outside the scope of Building Regulations control. However, if one considers the housing sector alone, 200000 units built per year at an average cost of the structure of £40000 equates to an annual cost of £8 billion for new houses. Even if one considers all building work and assumes this figure is doubled, then the effect of the proposed changes given in the Approved Document on construction cost is minute by comparison in percentage terms.

Business Sectors Affected

25. The proposals are wide ranging and would directly affect all sectors of the building industry including builders, designers, developers, manufacturers and Building Control bodies. Indirectly they immediately affect all who procure new buildings or alterations to buildings. This effectively, in the long term, means all sectors of business and the public as private individuals. Immediate costs are in practice shared across business as a whole, since use of new buildings is not subject to major sectorial basis, and with individual members of the public. Consultation with small businesses (the 'Litmus Test') has been addressed.

26. The Small Business Service is amongst those specifically invited to comment during the earlier consultation. They expressed no serious objection to the proposals. The Consultation Document lists those from whom comment was specifically sought. The construction industry, through a process of sub-contracting, contains very large numbers of small and medium sized businesses, and many consultees represent their interests. The vast majority of building designers are small businesses, and consultation was made through professional institutions and other representative bodies. All responses were carefully considered by the Technical Working Party and none was thought to raise meaningful objection as to impact upon small businesses. In particular, those consultees representing the design professions were mindful that

their members role, encouraged through continuing professional development, is to advance their professional practice. Whilst offering useful technical observations they were uniformly supportive of the need for a revised Approved Document.

Issues of Equity and Fairness

27. The immediate impacts of benefit (and indeed cost) fall upon such a wide and numerous section of businesses, public bodies and (through housing) private individuals that they are self-evidently widely distorted. Since buildings are a requirement of all, private, public and commercial, and the costs involved are relatively very small it is thought possible to say no more than that issues of inequality or unfairness do not emerge.

28. Charities and voluntary organisations would be affected only in the role of the commissioning of the construction of new building works and alterations to existing buildings. Because such bodies are disproportionately associated with activities involving the young, elderly and people with disabilities, who may be less well able to take action for their own safety in the event of incident, no consideration of broad public interest clearly emerges in considering the limited financial effects upon them. Consultation has not resulted in attention being drawn to any perceived disbenefit to Charities and Voluntary Organisations, nor yet indeed to any general section of the public.

6 Compliance Costs

29. Option 1 of Do Nothing has been discounted, but clearly has no compliance costs. Moreover, in the case of Option 2, the changes which would be introduced by adoption of the revised Approved Document are very minor in the context of Building Control as a whole. The additional burden to be placed upon Building Control is so minor as to have little discernible cost. To a significant extent changes are merely updates recognising externally generated developments in practice. It is a matter of public policy that beneficial developments in technology and practice be adopted, and it is a necessary feature of professional and commercial life that all concerned participate in the acquisition of appropriate knowledge and understanding. To this extent no useful identification of normal changes in development of these matters arises as a compliance cost.

30. The cost of the proposals are summarised in Table 1 and detailed in Appendix C.

31. It should be noted that Appendix C does not address the direct cost of dissemination of information, and perhaps this is not readily quantifiable with precision. However Option 2 will involve the printing and sale of the new revised Approved Document. Because the document will be freely available on the Department's web-site, it is difficult to predict how many hard copy documents will be sold. Perhaps a guess of 10,000 copies at a cost of £12, or £120000 falls widely upon interested parties.

32. It is further emphasised that the purposes of the proposed revised Approved Document are technical and societal. Cost is clearly very widely spread and not falling either heavily or disproportionately upon identifiable sectors of the population or business. For the designer and the enforcement authority the additional burden arising from the increased number of buildings captured by control due to the removal of the A3 Application Limit will commonly be negligible. This also applies to the

statutory inspections at site. Exceptionally, however, there will be additional compliance burden in instances where the collapse of a building will have grave consequences eg. stadia structures. In such cases the risk assessment involved will be costly but such costs will clearly be compensated by the impact of any safety measures incorporated in the construction should a serious accidental event occur.

Table 1	**Summary of Annual Costs and Benefits of the proposed changes to Approved Document associated with the Requirements A1, A2 and A3**		
	Unit Cost	Annual Notional Cost	Benefits
Amendment to the wording		Cost neutral	Non quantifiable benefit arises through improving clarity of expression and maintaining the document in a form which does not inhibit advances in construction and technology.
Removal of advice to be placed in alternative Approved Documents		Cost neutral	Non quantifiable benefit arises through avoidance of proliferation of documentation and reducing production cost of the Approved Document
Introduction of guidance in Section 1B	Saving of £120 per house (Range 80 to 160 houses)		Estimated saving approximately £10000 to £20000 per annum. The reduced use of preservative will benefit the environment, but this is non quantifiable.
Technical change to Section 1E	£7.50 per house (Range 2600 to 8000 houses)	Additional cost £20,000 to £60,000p.a	Decrease in risk of substandard construction and consequent effect on health and safety. Indirect benefits will accrue through conformity with other standards and long term performance.
Removal of the application limit of Requirement A3	£200 per building (concrete) £500 per building (steel) £1000 per building (masonry/timber)	£0.1 million p.a. £0.5 million p.a. £2.0 million p.a.	Increase in robustness of building structures will reduce deaths and injuries to persons, the cost of repair to industry and the scale of disruption and consequential loss following an accident.
Total cost/benefit		Range from £2.62 million to £2.66 million p.a.	Material saving £10000 to £20000. In avoidance of death and injury, £1.2 m p.a. Avoidance of damage to buildings and consequential

			loss, £1.3 m p.a. Total range £2.51 m to £2.52 m p.a. plus other non-quantifiable benefit of substantial extent.

7 Consultation

33. Following the submission of an initial RIA to the Cabinet Office in 2001, these proposals have been subject to initial consultation of draft proposals outlining intended change on a list of specific invitation to consultees. Approximately 120 individual responses have been received, many from private individuals. A substantial number of specific consultees did not respond, but in each such case, it is doubted that they had either explicit interest or appropriate detailed technical understanding, or that some individual consultees would have effective input through larger consultee bodies. The Technical Working Party has been careful to involve principal consultees to attend its meetings as observers and to have a wide range of direct representation. An exact number of responses cannot usefully be stated since there is a certain overlap of response from individuals, their authority to respond on behalf of specific consultee bodies, the potential overlap between private individual response and that of bodies whom they explicitly represented, and the fact that responses lay between a simple expression of support, a simple expression of having no wish to comment, and lengthy detailed submission covering many points. It is however thought that BRAC is in contact with all parties reasonably to be expected to give advice in terms of professional, commercial and business sector interests. In so far as nearly half of those invited to comment may not have done so the Technical Working Party feels it to be safe to think that its formal invitation to respond has been cast so widely as to include many who have no special degree of interest of expertise. In particular, it is noted that it is not believed that proposed revisions place any significant additional burden upon local authorities, nor introduce any other crucial sanction for non-compliance.

8 Impact on Businesses

34. The very clear answer to the nine questions of the Competition Filter Test is "no", in each instance. Thus only a Simple Assessment is required.

35. The effect of the revised Approved Document is very marginal indeed in terms of cost upon firms involved in construction. Three kinds of firm who may be seen as affected may be identified :-

a) Building Contractors

There are tens of thousands of firms of contractors within the building industry. None has a market share which is significant in percentage terms.

b) Suppliers of Building Materials and Components

This is a widely drawn category containing many companies with varied products. There is considerable international trade within the European Community. However

the proposed revisions to the Approved Document do not favour one type or sector of construction or companies as against another.

c) Providers of Professional Services

As with contractors, there are many thousands of such firms within the industry. However again none has a market share which is significant in percentage terms.

36. In each of the foregoing categories changes in the Approved Document seem to fall equally upon all firms. It is believed that the relatively small changes in requirements in the revised Approved Document, the fact that many such changes are merely recognising ongoing alterations in commercial practice, and the very small (in relative terms) effect upon costs allow it to be seen without deep analysis that there would be no adverse effect upon competition.

9 Summary and Conclusions

37. These proposals have been developed from a review of the Approved Document, together with the need to ensure compatibility of the rules on disproportionate collapse with the recommendations of the forthcoming Eurocode EN1991-1-7.

38. ODPM believes that very clear benefit arises from the periodic update of Approved Documents by reference to external sources and current practice. It also thinks that it must be mindful of the need to reconcile public policy with that of identifiable interest groups, but at the same time to clearly promote conformity with European Standards.

39. The following table emerges, with reference to Table 1.

Option	**Total Cost Per Annum**	**Total Benefit Per Annum**
1	None	Clear disbenefit
2	Not more than £2.66 million	£2.52 million together with overriding non-quantifiable but overriding cost benefit

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APPENDIX A to Section 2: Advice on Requirement A3 - Disproportionate Collapse

A1. Careful consideration has been given to the need for amendment to Requirement A3. It is concluded that no beneficial or helpful result might emerge from changes as follows.

Changes resulting from removal of the present application limit to Requirement A3

A2. Requirement A3 is defined in the present Approved Document as applying only to a building having five or more storeys. Removal of the application limit will require all buildings to comply with Requirement A3 including the present notable exception of buildings of less than five storeys. However, at the same time the amendment reflects the forthcoming standard EN 1991-1-7. In this, basement levels are not regarded as contributing to the number of storeys in view of the necessarily robust construction of such levels to comply more generally with the Approved Document. This is believed to be a justifiable change.

Measures to improve compliance with Requirement A3 particularly with regard to buildings allowing access to substantial numbers of the general public.

A3. The present guidance given in Approved Document A in support of Requirement A3 deals with the means of reducing the sensitivity of the building to disproportionate collapse in the event of an accident. It gives advice on the need adequately to tie together horizontal and vertical components of the building. The removal of the present application limit to the Requirement will expand the range of buildings brought under control. Moreover, the means of meeting compliance will vary according to building type and use. For example, high rise apartment buildings and public assembly buildings with large floor areas clearly require a different degree of protection to other low rise buildings or storage warehouses.

A4. The Guidance to Regulation A3 has therefore been rewritten adopting the principles of risk analysis such that designers can categorise buildings, taking into account both the risk of the hazard and its consequences. Considerable research lies behind this. A report was commissioned by The Department (Allott & Lomax Contract No C1/21/2/60) for development of a model for risk analysis. This was further developed in a calibration study by Building Research Establishment (Client Report 200682) into the application of this model. However, this has indicated that rather than adopt a risk assessment process for every building, the outcome of such assessment is predictable and may be tabulated in terms of building height and use. The results of this research carried out in the UK have largely guided the production of EN 1991-1-7 with which the Guidance will conform. Thus clarity and ease of application is achieved.

A5. The amended Guidance involves dividing buildings into four classes , namely Class 1, Class 2A (lower risk group) and Class 2B (upper risk group) and Class 3. Buildings in Class 1 would require no special measures to be taken. These would include traditional houses not exceeding 4 storeys, and most single storey warehouse or storage buildings. Buildings in Class 2A would require a measure of tying together members horizontally while those in Class 2B would require both horizontal and vertical ties. These buildings would typically include high rise flats, many low rise

shops and hotels and car parks. Buildings in the highest Class 3 would require to be assessed to systematically identify the hazards and the risks which may arise. The structural form is then to be designed to resist excessive damage should an incident occur. Such buildings would include hospitals (over 3 storeys high), many public assembly buildings and some educational and work place buildings.

APPENDIX B to Section 2: Changes to Recommendations in Support of Requirements A1, A2 and A3

1 The proposals

B1. The following changes are proposed to Approved Document A in respect of Requirements A1 and A2. Except where otherwise indicated the changes are made with the aim of providing clearer guidance. The effect of these changes is broadly cost-neutral.

Minor editorial rewording with the intention of improving clarity without change in meaning.

Changes to wording in the Introduction to the Guidance to Requirements A1 and A2.

The present Section 4, Codes and Standards, is updated in line with current British Standards and other references for structural design and construction, and is relocated as Section 1 since it may be regarded as the primary source of advice within the Approved Document.

The present Sections 1, 2 and 3 are consequently re-numbered as Sections 2, 3 and 4.

The present Section 1A, Basic Requirement for Stability, Clause 1A2 is expanded and re-written.

The present Section 1B, Guidance on the sizes of certain timber members is to be deleted and reference made to the availability of similar advice in other approved published guidance.

The present Section 1C, clause 1C5 giving guidance on bay window construction is to be deleted.

Section 1C, the Table giving Maximum Spacing of Cavity Wall Ties, is revised.

Section 1C, Small single storey non-residential Building and Annexes, is revised.

Section 1C, the diagram giving maximum enclosed floor area, is re-drafted.

Section 1C, the tables and diagram relating to Maximum Height of Buildings are revised.

Section 1C, the materials requirement for cavity wall ties is revised.

Section 1C, the tables giving guidance on wall heights and strength of bricks and blocks are revised.

Section 1C, the diagram giving guidance on differences in ground level is revised.

Section 1C, the clauses and diagrams giving guidance on restraint to walls and to buttressing walls, piers and chimneys are re-drafted.

Section 1C, the clauses and diagram giving guidance on openings and recesses are re-drafted.

The present Section 1E, Strip Foundations of Plain Concrete, is revised to give clearer advice on differing ground conditions. New advice on the Minimum Depth of Strip Foundations consistent with current British Standards has been given.

The present Section 2, External Wall Cladding, is revised to take account of up-to-date source material, (and is re-numbered Section 3).

The present Section 3, Re-covering of Roofs, is redrafted with the intention to clarify advice, most particularly as to when reroofing is to be regarded as a material alteration attracting Building Control, (and is re-numbered Section 4).

Appendix A, Tables of Sizes of Timber Members, is deleted and reference made in Section 1B to approved guidance published elsewhere.

These changes are explained in detail in paragraph B6 of this document.

B2. The following changes are made with which significant additional costs and benefits may be associated.

The present Section 1B, Guidance is given on the geographical area considered at risk from House Longhorn Beetle. Such advice has been withdrawn from the 1999 edition of the Approved Document to support Regulation 7, Materials and Workmanship, on the premise that it would be incorporated in the revised Approved Document A. The affected geographical area is reduced in size and reference to authoritative guidance on suitable preservative treatment is now included.

The present Section 1E, Strip Footings of Plain Concrete. Change is made to the advice given on the strength grade of concrete to be used, with a view to both reflecting the need to achieve appropriate serviceability and safety, and to reflect current practice.

B3. The proposed changes are summarised in Table B1.

Table B1	**Summary of proposed new changes in Approved Document associated with Requirements A1 and A2**
(a)	Changes are made to the existing wording with the aim of providing clearer advice. Generally these changes impose no, or negligible, additional costs. Benefit arises through greater clarity of expression, and through avoidance of inhibition of beneficial developments in practice and technology.
(b)	Change is made to remove advice essentially of a data-oriented nature which can be found in alternative documents. This change imposes no or negligible additional costs or savings as designers and Building Control bodies should be fully aware of alternative documentation.
(c)	Guidance formerly given in the Approved Document to support Regulation 7 is introduced into the present Section 1B (to be re-numbered Section 2B), and its scope revised with saving in cost.
(d)	Technical changes are made to the advice given regarding concrete in the present Section 1E Strip Footings of Plain Concrete (to be renumbered Section 2E), reflecting understanding of good practice and demonstrable current practical application.

2 Nature of proposed amendment

B4. This section of the RIA further explains the nature of the changes in the proposed Guidance in Approved Document A.

Requirement A1 and A2: loading and ground movement

B5. Certain changes are proposed to the Approved Document A including those which will have no, or negligible, compliance costs or savings. The purpose of the changes may be grouped into the following types:-

Added guidance given, or changes made to existing wording. These changes are made with the aim of providing clearer or additional guidance with the intention of obvious benefit and avoidance of inhibition of beneficial development in practice and technology and of clarity of meaning.

The removal of advice essentially of a data-orientated nature given in documents drawn up by other bodies. The aim is to avoid duplication of other published data.

Changes made to update references to the current British and European Standards, referring to new Standards where introduced by or through the BSI and removing reference to obsolete or withdrawn standards. The purpose is to avoid the necessity of designers and Building Control bodies needing to refer to a multiplicity of documentation in determining the current position, the avoidance of confusion, and inhibition of application of best practice.

B6. The changes are as follows:

a) *The following changes are not likely to have associated significant costs*

(i) Changes to the wording of the Introduction to the Guidance, and in general neutral rewording in the interests of clarity.

Clause 0.2 has been expanded to include clearer advice as to the basis upon which structures should be designed. The changes are essentially of a clarifying nature, not intended to result in an increase in cost.

Clause 0.3 has been added giving new advice as to the basis upon which structures such as grandstands should be designed. It is essentially a statement of good practice but is also consistent with the present licensing requirements for sports stadia under the Safety of Sports Grounds Act 1975. In that such requirements already exist in practice other than in the Approved Document no general cost arises.

(ii) The present Section 4, Codes and Standards

The section has been updated to take account of current British Standards and other references for structural design. It is re-numbered Section 1.

(iii) The present Section 1A, Basic Requirements for Stability

The present clauses 1A2 and 1A3 currently give advice on the bracing and fixings of roof structures. The advice in these two clauses has been re-written as one clause 2A2 to encompass all parts of a building and to give clearer advice regarding the requirements for stability. The former Clause 1A3 has been consequently deleted. The section is re-numbered Section 2A.

(iv) The present Section 1B, Sizes of Certain Timber Members

The section currently gives guidance on the sizing of certain timber members for floor and roof construction. The guidance is also published in British Standard BS8103: Part 3 and part of the guidance relating to intermediate floors is also published as part of the more extensive TRADA Approved Document (Timber Intermediate Floors for Dwellings). To avoid unnecessary duplication the current guidance in Approved Document A on timber members has therefore been removed on the understanding that a new TTL guide is to be published . Reference has accordingly been made in the proposed Section 2B to these sources of guidance.

(v) The present Section 1C, deletion of Clause 1C5

This clause gives guidance on a form of bay window construction which is exempt from the requirements of Part A. This form of construction is now obsolete in practice since it is effectively incompatible with the requirements of Part L and the consequent requirements dealing with energy conservation. Guidance is therefore no longer required. The clause has been deleted. Section 1C is re-numbered Section 2C.

(vi) Section 1C, Maximum Spacing of Wall Ties

The present Table 6 gives guidance on the maximum spacing of cavity wall ties. The table has been revised to give additional and clearer guidance on the type and spacing of cavity wall ties, bringing the requirements into line with current British and European Standards and to reflect the likelihood of increased cavity widths following the changes to Part L of the Building Regulations.

(vii) Section 1C, Small Single-Storey Non-Residential Buildings and Annexes

The present clause 1C14 and diagrams 7 and 8 give advice on the limitations in size of these buildings. The advice has been revised to give clearer guidance on the limitations in building size and to reflect current practice.

(viii) Section 1C, Maximum Enclosed Floor Area

The diagram giving guidance on the maximum area of floor to be enclosed by walls covered by the section has been revised to give improved clarity. It has been observed by Building Control bodies that the current diagram has given rise to misinterpretation and misunderstanding of purpose.

(ix) Section 1C, Maximum Height of Buildings

The present clause 1C17, Tables 8, 9 and Diagram 10 give advice on the maximum height of buildings covered by Section 1C for a range of basic wind speeds. The tables and diagrams are redrafted to give advice consistent with the current British Standard on wind loading for buildings, (BS 6399 pt 2). Changes have small practical impact since the vast majority of buildings in England and Wales will fall within the allowable heights. The effect of changes upon affected buildings is largely restricted to highland areas and coastal areas in Tyne and Wear, and may result in slight cost saving.

(x) Section 1C, Materials Specification for Wall Ties

The present clause 1C20 gives advice on the material of cavity wall ties. In cases of severe exposure stainless steel or suitable non-ferrous ties are currently required by British Standards. The clause has been re-written to require stainless steel wall ties in all situations and the grade of stainless steel is to be explicitly identified in conformity with appropriate Standards. NHBC Design Standards allow only stainless steel (or other corrosion resistant materials) for wall ties. In normal commercial practice there is an increasing tendency to use stainless steel in all buildings to the extent that alternative galvanised materials are increasingly unavailable 'off the shelf'. A sample of 82 recent Building Regulations applications for low rise buildings shows that 68 explicitly require stainless steel ties and 14 are not explicit as to type. It is believed that the change is largely cost-neutral in that it reflects current practice, whilst its adoption results in beneficial effect in the light of anticipated climate change.

(xi) Section 1C, Heights of Walls and Storeys

The present diagram 11 defines the heights of walls and storeys covered by the section. The diagram is amended to give advice consistent with current British Standards. The changes are essentially of a nature amplifying present advice in accordance with current good practice and should not give rise to increased cost.

(xii) Section 1C, Compressive strength of bricks and blocks

The present diagram 12 gives advice on the compressive strength of masonry. The guidance has been extensively revised to facilitate the dual British and European specifications for masonry units during the co-existance period when either specification is permitted. The amended guidance, however, should not give rise to increased cost.

(xiii) Section 1C, Differences in ground level

The present diagram 14 gives advice on wall thicknesses in situations of differing ground levels. The diagram is amended to give advice consistent with current British Standards. The changes are matters of clarification and consideration of a wider range of circumstances. They should not give rise to increased cost.

(xiv) Section 1C, Restraint to walls and buttressing walls, piers and chimneys

The present clause 1C25, 1C27 and 1C28 and diagrams 15 and 16 give guidance on the restraints to walls by buttresses etc and the size of the buttresses. The clauses and diagram 15 are revised to give clearer guidance. No change in meaning is made and no cost arises.

(xv) Section 1C, Openings and recesses etc

The present clause 1C29, 1C30 and diagram 17 give advice on the sizes of openings and recesses. The clauses and diagram are revised to give clearer advice consistent with current British Standards. No significant change in meaning is made and no cost arises.

(xvi) Section 1C, Single storey non-residential buildings and annexes

The advice presently given in clause 1C39 is amended to reflect the stability requirements relevant to the amended sizes and forms of these buildings and annexes referred to in paragraph (vii) above.

(xvii) Section 1E, Foundations of plain concrete

The present section 1E gives advice regarding the construction of foundations. The section is re-numbered Section 2E. Revisions are proposed as follows:-

(a) Minor changes to wording, tables and diagrams which are made with the intention of clarifying existing advice. For example, the wording "made ground" is replaced by the wording "non-engineered fill" as being a more precise term, consistent with wording in other documents to which reference is made.

(b) Clause 2E4 is introduced giving recommendations on the minimum depth of foundations below ground level. This revision is made because there was seen to be a clear lack of advice in this regard. The recommendations are in line with advice given elsewhere in NHBC Standards and British Standards, and are intended to be a clearer statement of how compliance may be achieved, but in accordance with recognised normal practice. No additional costs arise.

(xviii) Section 2, External Wall Cladding

The section gives guidance on the support and fixing of external wall cladding. It is revised to take account of the guidance on use of materials and associated fixings that has been published in recent years. The title and other reference is made to change wording from "External Wall Cladding" to "Wall Cladding". This reflects the fact that developments in technology and current trends in design make it inappropriate to differentiate between external walls and large panel walls which form internal surfaces. The section is re-numbered Section 3.

(xix) Section 3 Re-covering of roofs

The section currently gives guidance on the effect of new roof coverings on the structure. It has been the subject of comments received from designers and Building Control bodies. The guidance has been re-written taking account of these comments and giving clearer advice on the limits of application. The effect will be cost neutral, or may give rise to small savings by eliminating the need for unnecessary Building Regulations application. The section is re-titled Section 4 Roof Covering.

(xx) Appendix A, Tables of sizes of timber members

The present Appendix A gives sizes of timber members referred to in Section 1B. As indicated earlier, equivalent advice is, or will shortly, be given elsewhere in other documents. It is proposed to add references to such other documents and remove the advice given in the section. Appendix A is therefore deleted. No additional cost arises, but in regard to the cost of production of documents, saving is made. In that such alternative documentation should be in the possession of all relevant parties, and is more extensive in scope, no need to obtain additional advice emerges .

(b) *The following changes are likely to have associated significant additional costs or benefits.*

(xxi) The present Section 1B, Timber members in detached, semi-detached and terraced houses.

It is proposed to reintroduce in Approved Document A guidance on measures to control the spread of House Longhorn Beetle. Such guidance was formerly given in the Approved Document to support Regulation 7 Materials and Workmanship. However, the geographical area affected has, on the advice of the Building Research Establishment, been reduced and there are associated cost/benefit implications assessed in Appendix C.

(xxii) The present Section 1E, Strip Foundations of plain concrete

This section includes advice on the strength grade of concrete which may be used in certain circumstances. The present section advises that the concrete strength should be British Standard Grade ST1. The concrete strength is revised to a choice of British Standard Grades ST2 or GEN1. The cost/benefit implications of this are assessed in Appendix C. The section is re-titled Section 2E Foundations of Plain Concrete.

APPENDIX C to Section 2: Risk Assessment and Cost/Benefit Analysis

C Risk Assessment

C1. The majority of the proposed changes to the Approved Document guidance relating to Requirements A1 and A2 are cost-neutral and are therefore not considered further in this section. The removal of the current limit of application to Requirement A3 and certain changes in recommendations relative to Requirements A1 and A2 have a cost compliance implication. This section focuses on those proposed amendments that address areas where the current requirements or guidance are now thought to be inadequate and which have a cost compliance implication.

C2 Amended Approved Document guidance on Requirements A1 and A2

Section 2B - Timber Members in detached, semi-detached and terraced housing

Included in the amended Approved Document A is advice on protection against the house longhorn beetle. Such advice was formerly given in the Approved Document to Regulation 7. This consists of a description of the geographical area affected and advice on measures which can be taken to prevent attack.

The potential risk of damage posed to structural timber in housing by the actual presence of the house longhorn beetle is great but the geographical limits of distribution of the beetle are localised. Incidences of infestation external to those limits are believed to be traceable to materials sourced from within the area in which infestation is present. Infestation is confined mainly to north Surrey and adjoining parts of Hampshire and Berkshire. The Approved Document recommends that softwood roof timbers in the corresponding local authority areas should be protected against attack.

There have been no recent reports of significant damage having been caused to timber by the beetle outside the above-mentioned geographic area and not sourced from within it. This suggests that the monitoring of incidences and the preventative treatment recommended to new timber are effective in achieving the purpose of the advice.

The house longhorn beetle is a wood boring insect which attacks the sapwood of softwood, almost exclusively in roof structures where the localised environmental conditions render the timber members susceptible to attack. If left untreated the timber can be damaged to the extent that replacement is necessary and in extreme cases collapse might occur. No such incidence of collapse has been identified. The aim of the advice is the prevention both of damage to timber, and the spread of infestation within the regulated areas and beyond into areas as yet unaffected.

(ii) If the size of the controlled area is not reduced, as proposed, then the potential reduction in the use of timber preservative and attendant benefit to the environment may be limited.

C3 Section 2E - Strip Foundations of Plain Concrete

This section gives advice on the strength grade of concrete to be used in footings in non-aggressive soils. The option of choosing either strength grade ST2 or strength

grade GEN1 is substituted for the present grade ST1 given in the guidance. The change has been made in the substantial interests of conformity with other documents. For example, NHBC guidelines and current British Standards. Concrete grades ST1 and ST2 are so prescribed that they can, if necessary, be batched by hand on site. The slightly higher proportion of cement to aggregate specified in mix ST2 compared to mix ST1 will result in the characteristic compressive strength of the concrete increasing from 7.5 N/mm2 to 10 N/mm2. Concrete grade GEN1 also has a characteristic compressive strength of 10 N/mm2 but it is not site batched, being produced by ready mix concrete suppliers.

Amendment to the application of Requirement A3

C4. Buildings are designed to withstand normal dead and imposed loads with given minimum factors of safety. These allow for uncertainties in the magnitude and application of the loads and for the variability in material properties. Extreme or accidental loads are resisted by a combination of reduced factors of safety, and beneficial secondary effects such as catenary action together with the redundancy inherent in building structures where there may be more than one load path to carry the applied forces. The defects in such an approach to safety may not be demonstrated, except by anecdotal evidence and informed perception. The occurrence of accidental damage or even major tragic accident is commonly the result of more than one causal factor, and reliant upon a combination of factors. The methodology of compilation of statistics commonly requires that cause be singly attributed whilst the reality is that the causal factors are disparate and not directly connected. Thus, for example, an air or rail crash may be attributed to failure on the part of an immediately involved person, to a failure in technology or a failure in maintenance procedures. Yet, in reality, whilst one cause may be seen as immediately dominant it is the combination of more than one which must commonly occur to enable an accident. Thus, there may be a tendency within compilation of available statistics towards a single cause and to avoid blaming more general technological facts whilst perhaps making fair attribution of a narrower and potentially personal blame. For example, blame for damage from a gas explosion may become narrowly focused upon the cause of such an explosion whilst neglecting the necessary contributory factor of lack of structural robustness towards the extent of resulting damage. Subsequent record of statistics reliant upon single attribution of cause is liable to focus upon attribution of personal or corporate blame rather than consideration of further factors contributing to the extent of loss.

C5. In the event that an extreme incident caused the collapse of a large occupied building of several storeys in height of a category presently not covered by the disproportionate collapse requirements, a large number of people would be at risk of death or serious injury. The probability of such occurrence is difficult to estimate. Serious fire, impact or explosion incidents causing collapse are rare but when they occur may be attributed to an immediate causal effect rather than the contributory factor of lack of structural robustness. Less rare may be the incident where large buildings suffer uncontrolled collapse during alteration or demolition. However, if one considers as seems reasonable that all such events might over a twenty year period result in the death of fifty persons, 100 serious injuries and 200 minor injuries, the risk may be estimated to be at least 2 deaths, 4 serious injuries and 8 minor injuries a year. These figures are derived upon grounds which are intuitive, but influenced by accidents which receive wide publicity. Unfortunately, statistics kept by

the Health and Safety Executive do not explicitly identify accidents in which disproportionate collapse is a factor. It is known that over a ten year period approximately six deaths per year are categorised as primarily due to collapse of a structure during construction operations. However, such categorisation seems potentially to exclude circumstances where collapse has been precipitated by causes attributable to construction operations such as accidental impact during lifting operations. There is no statistical source allowing a clear view to be taken of incidents arising from damage to buildings where disproportionate collapse is a causal factor. Such statistics may be effectively collected only in terms of immediate causation (explosion, fire, impact etc).

C6. Buildings of 5 or more storeys in height are presently required to be sufficiently robust so that the damage caused by an extreme event is not disproportionate to that event. For example, an explosion on one floor should not cause the collapse of all the floors both above and below in the proximity of the explosion. However, buildings of less than 5 storeys are at present excluded from these requirements.

C7. Removal of the application limit brings buildings of less than 5 storeys under control with regard to Requirement A3. Furthermore, the Guidance in Approved Document A has been rewritten to give clearer advice as to what measures are required to achieve appropriate robustness for various categories of buildings. Obviously, the risk that an extreme event will occur, be it explosion or other incident, is not of itself decreased simply by these measures. Nor can they ensure that demolition or building alteration will be carried out in accordance with good and wise practice. However, it is intended that the consequence of such an incident will be considerably reduced. It is thereby envisaged that the number of fatalities and serious injuries might be reduced by one half. This is of course no more than an informed estimate and statistical evidence will emerge only over a period of 50 or more years corresponding to the life cycle of typical building stock.

C8. It is estimated that incidents of major uncontrolled collapse of buildings leading to death or injury take place on average at a rate of approximately one per annum. More common are instances of limited uncontrolled collapse not necessarily leading to death or injury, the extent and consequences of which remain influenced by lack of robustness. Such incidents cover a wide range of buildings. Over a period of twenty years the cost of damage to buildings is estimated to be in the region of £2 million per annum.

C9. By bringing all buildings within control with regard to Requirement A3 and by providing clearer guidance on measures to be taken, it is estimated that in reducing the risk of disproportionate collapse the costs to property and buildings might be reduced by 50%.

Costs

In regard to the amendments to the Approved Document guidance relating to Requirement A1 and A2

C10 (a) Changes made to the existing wording with the aim of providing clearer advice and updating references.

It is considered that there will be no costs resulting from this change or partially even slight benefit.

(b) Changes made to remove advice essentially of a data oriented nature which can be found in alternative Approved Documents.

It is considered that there will be no costs resulting from this change. Alternative Approved Documents expand upon advice given in the present Approved Document A. It is necessary that they be held by all those concerned with administering Building Regulations and most professional designers will hold copies. The cost of the new Approved Document A will be reduced by omitting duplicate material. Any cost in purchasing alternative Approved Document will in broad terms be overwhelmingly saved by access to simple rules not requiring the provision of detailed supporting calculation.

(c) The introduction into the present Section 1B of guidance formerly given in the Approved Document to support Regulation 7.

The guidance defines a geographical area within which buildings are affected by measures to be taken to control House Longhorn Beetle. The proposals include a reduction in the limits of the geographical area. Because the effects of the proposals will be to exempt certain areas hitherto complying with the requirements there will be no additional compliance costs. Indeed costs will be reduced, but not to an extent justifying analysis within sub-areas of District Councils.

(d) Technical changes made to the advice given in the present Section 1E Strip Foundations of Plain Concrete.

It is proposed that the British Standard Grade of concrete given in the guidance is changed from grade ST1 to a choice of either grade ST2 or grade GEN 1.

The ST mixes are so prescribed that they can, if necessary, be batched by hand on site. Furthermore the mixes are prescribed to a fixed recipe such that strength testing is not required to assess conformity with the British Standard. In the past there has been pressure from industry to draft the Approved Document in terms relating to such mixes. In contrast the GEN mixes are produced only by ready mix concrete suppliers (who can also supply ST mixes). Furthermore it is observed that UK compliance with European Standards for concrete results effectively in reduction of quality from foregoing British Standards. In consequence to maintain standards in respect of strip foundations necessitates upgrading of the Approved Document.

The proposal brings the Approved Document into line with the advice given in both the NHBC Design Standards (Standards 2 and 4) and British Standard BS 8500 , Concrete, Parts 1 and 2. Both these documents give a choice of grades ST2 or GEN 1 for foundations of plain concrete.

In changing the guidance in the Approved Document from grade ST1 to ST2 there is an increase in the strength of concrete. This is achieved by a small increase in the cement content and a reduction in the aggregate content. Because the unit cost of cement is much greater than aggregate (sand or stone) mix ST2 costs typically about £1.50 per cubic metre more than mix ST1. (£66.76 to £65.21) per cubic metre for ST1 and ST2 mixes, from Spons Architects and Builders Price Guide, edition 2004). However, in practice very few buildings are constructed with strip foundations of concrete grade ST1. Some 90% of new build housing is thought to be constructed

under NHBC or Zurich Building Guarantee guidelines which already require the use of grade ST2. Of the remaining housing approximately half may be expected to have simple strip footing foundations on non-aggressive soil. Based on 160000 new houses constructed per annum approximately 8000 may be affected by the proposed changes. A typical house might use some 5 cubic metres of concrete in strip footings. The compliance cost on this basis therefore would amount to £7.50 per unit, a total of £60,000 per annum.

In practice the cost is likely to be far less for two reasons. Firstly, the designers of many houses built under other than NHBC or Zurich approvals adopt those guidelines. These rules for foundation work are simple to apply, follow, and will readily obtain the approval of a Building Control body. Secondly, as described above, both NHBC Standards and British Standards allow for the use of the alternative mix to mix ST2, namely GEN1 mix. However GEN mixes are significantly cheaper to supply. Spons Architects and Builders Price Guide book 2002 indicates that whereas ST1 mix costs £ £65.21 per cubic metre GEN1 mix costs only £ £63.93 per cubic metre. The conclusion can be made that if house builders were previously faced with the choice of mix ST1 (Approved Document A) or ST2 and GEN1 (NHBC Standards and British Standards) common-sense would suggest that the cheaper mix i.e. GEN 1 would commonly have been used. All the evidence is that upon very good authority Building Control organisations commonly accept such substitution. One may conclude that in practice very few buildings used mix ST1 and that the cost of compliance calculated above at £60,000 per annum will in practice be far less, probably not exceeding £20,000.

Change resulting from the removal of the application limit to Requirement A3.

C11. The proposal aims to include within Requirement A3 buildings of less than 5 storeys. It will require of these that buildings at risk are made sufficiently robust by providing ties in the floors or in the floors and columns, between members. In most buildings vertical ties in the columns may be omitted if the damage consequent upon an extreme incident can be shown to be less than $70m^2$ in the floors of 2 adjacent storeys . In a large number of commercial and residential buildings, for example, hotels containing relatively small rooms repeated on each floor, the damage following the incident may by virtue of the small structural compartments be clearly less than $70m^2$, obviating the need for vertical ties and reducing the measures necessary.

C12. Both reinforced concrete buildings and steel framed buildings usually have sufficient ties without requiring additional significant cost in design or construction if the structures are well detailed and comply with current Building Standards or projected Eurocodes. However, masonry and timber frame buildings in the medium rise category (i.e. above four storeys) may require the provision of specific vertical ties for meeting compliance. Such buildings will constitute a majority amongst those which are newly brought within the scope of regulations. An audit has been carried out on samples of new buildings taken as a result of analysis of Building Regulation Applications received by eight authorities (two London Boroughs, two Metropolitan Boroughs and five District Councils) to determine the likely number of buildings affected.

C13. The additional annual building costs incurred are therefore estimated within the limits of current practice to be as follows. It will be appreciated that such analysis

could be susceptible to variation arising from economic factors and from technical developments.

Concrete frame	£200 per building	500 buildings	£0.1 million
Steel frame	£500 per building	1000 buildings	£0.5 million
Masonry/timber	£1000 per building	2000 buildings	£2.0 million
			£2.6 million

Summary and conclusion

C14. Table 1 contains a summary of the costs and benefits associated with the proposals.

In regard to the amendments to the Approved Document guidance associated with Requirements A1,A2

C15. It is elsewhere argued that Option 1 "Do Nothing" would result in no perceived benefit. This option does not best serve the public interest as it does not address the issue of the technical improvements arising from changes made to British Standards and other references and would inhibit technical advances.

C16. It is considered that Option 2 meets the overall objective of giving clear advice to building designer and bringing guidance generally in line with advice given elsewhere in current documentation without imposing disproportionate bureaucracy and costs. Although there may appear to be a small net cost arising from the proposals it is considered that the benefits to the public interest will far outweigh costs expressed in monetary terms.

In particular regard to the Approved Document associated with Requirement A3, together with the removal of the application limit.

C17. It is elsewhere argued that Option 1 "Do Nothing" would result in no perceived benefit. The situation is likely to deteriorate with an increasing likelihood that an event would occur to a newly constructed building which in terms of loss and damage to human life would become unacceptable to public opinion.

C18. It is considered that Option 2 meets the overall objective of limiting the spread of damage to life and property to socially acceptable levels in the event of an untoward incident occurring without imposing disproportionate costs. Although there may appear to be a small net cost arising from the proposals it is considered that the social benefits arising in terms of public perception will substantially outweigh costs expressed in monetary terms. Moreover the U.K. may be fortunate in having escaped any incident of disproportionate collapse leading to multiple deaths such as has been reported from other countries in Western Europe and North America. Moreover the lack of effective statutory control upon building work in other parts of the world means that precise comparison is not possible, yet that perception from anecdotal evidence is clear One single such incident would have caused the basis of computation of benefit to be very different from that contained herein. It has frequently been observed that the Ronan Point explosion of 1968 caused the collapse of kitchen areas of the full height of a block of flats. It was that incident which caused

regulations to be brought in, primarily for England and Wales, but also in Scotland and Northern Ireland. The incident occurred due to lighting of a gas cooker, at 5.30 a.m. by a person who immediately left the room. 4 persons were killed and 17 injured. Had the explosion occurred two or three hours later many more casualties might reasonably have been involved. Other major collapses leading to introduction of Requirement A3 similarly, and to some degree fortuitously, occurred in unoccupied buildings. Single incidences of major disaster have substantial effect upon statistical analysis. For evidence of this, one may look no further than the effects upon both public perception and statistical analysis of the safety of passenger travel by rail of the Paddington and Hatfield rail crashes. It needs there to be only one major incident of a rare nature to provide justification for what are in practice very small unit increases in cost per building. The effect of changes will predictably address this situation in a way not amenable to the purely objective perception that damage, injury or loss of life has constant value regardless of circumstances.

However the BRAC Working Party also offer the following observation. The UK has been fortunate in escaping major loss of life or injury due to collapse of any building falling within the scope of Building Regulations as a whole, and in particular circumstances controlled by Part A. International statistical analysis is open to many objections. Yet without engagement in lengthy argument or presentation of evidence it may be apparent that Building Regulations as a whole, and Part A in particular, have had the effect in their operation of reducing loss below that of most or all countries of comparable size and population in Western Europe, North America or Australasia.

SECTION 3: REVISION OF PART C IN SCHEDULE 1 TO THE BUILDING REGULATIONS 2000: PREVIOUSLY "SITE PREPARATION AND RESISTENCE TO MOISTURE", NEW TITLE "SITE PREPARATION AND RESISTANCE TO CONTAMINANTS AND MOISTURE"

Purpose and Intended Effect

1. This final Regulatory Impact Assessment (RIA) addresses the proposal to amend the Building Regulations with respect to site preparation and resistance to moisture. The relevant Approved Document (Part C) was last reviewed during the period 1989 to 1991 with the latest edition coming into force on 1st June 1992. The proposed amendments to Approved Document C together with a draft RIA were submitted to public consultation from 10th December 2002 to 10th March 2003. The first point to note is that the new Approved Document has a new title: Site preparation and resistance to contaminants and moisture. In the light of this consultation exercise Approved Document C has been revised and the draft RIA has been developed into a final RIA.

2. This RIA is intended to support the proposed revision to Approved Document C and deals with:

   - the objective and intended effect of the proposals,
   - the options that have been considered,
   - the benefits that will result,
   - the compliance costs for builders, building owners, developers, and,
   - other costs that may accrue.

3. A summary of costs and recommendations on which option to choose is given on page 34.

The issue

4. The Building Regulations 2000 apply to most building work in England and Wales and are made principally to ensure the health, safety, welfare and convenience of people in and around buildings. They also deal with energy conservation. The guidance given in Approved Documents has been approved by the Secretary of State as being one method that, if followed, will tend to show compliance with the statutory functional requirement. The current edition of Approved Document C provides guidance on site preparation and resistance to moisture as well as precautions for dealing with dangerous and offensive substances in the ground.

5. There are currently four Requirements under Part C of Schedule 1 to the Building Regulations 2000:

   - C1: Preparation of site.
   - C2: Dangerous and offensive substances.
   - C3: Subsoil drainage.
   - C4: Resistance to weather and ground moisture.

6. A number of strategic technical and policy issues have necessitated a review of the Approved Document. Some of these, for example condensation issues, have been well understood for many years but have been brought into focus by the requirements of the new Approved Documents L1 *Conservation of fuel and power in dwelling*[1]*s* and L2 *Conservation of fuel and power in buildings other than dwellings*[2] which came into effect on 1st April 2002. The need to take better account of the risks and consequences of flooding, on the other hand, has been given recent prominence by the unusually severe flooding experienced in England & Wales in the autumn of 2000. Some of these factors have been addressed by specific guidance; others have been dealt with by reference to other publications. The main issues that have driven this review are discussed in Annex A.

Objective

7. Part C was last revised over ten years ago and in that time there have been considerable strategic developments in the areas covered by the Approved Document, specifically those relating to resistance to moisture, land affected by contaminants and radon. The key objective is that the Approved Document is updated to take account of these issues and to ensure that it is line with current guidance and practice.

Proposed amendments

8. The proposed changes to Approved Document C and the Regulations fall into two categories:
   (i) Measures that bring the guidance into line with current construction practice and guidance, or other legislation. As such they are considered cost-neutral or perhaps offering a cost saving.
   (ii) Measures that upgrade current guidance to address specific risks. These changes will have a cost implication.

The nature of the proposed changes are given in Annex B.

Risk Assessment

9. The hazards that Approved Document C addresses are moisture, flooding, land affected by contaminants and radon. These issues are expanded on and, described in Annex C.

Options

10. Three options have been identified:
    Option 1. Do nothing.
    Option 2. Minimal changes involving a simple update of the references in Approved Document C and publicise good practice.
    Option 3. Amend the Building Regulations as proposed and adopt the technical guidance in the draft Approved Document C.

11. Option 1 is self-explanatory.

[1] Can be inspected at: http://www.odpm.gov.uk/approved-documents

[2] Can be inspected at: http://www.odpm.gov.uk/approved-documents

12. Option 2 would mean retaining the existing Requirements (C1 to C4) and, in the Approved Document, simply taking the existing technical guidance and, together with minor editorial changes, updating the references to standards and guidance many of which are referred to above. Specifically, though there would be no requirement to consider surface or interstitial condensation, and existing Requirement C2 would not apply to material changes of use. A publicity campaign would encourage the industry to adopt good practice in the areas covered by Part C, particularly remediation of land affected by contaminants, as this is the area where there would be the most changes.
13. Option 3 involves all of the proposed changes to the requirements and technical guidance as set out in Annex B.

Issues of Equity and Fairness

14. Option 3 would impose some burdens on builders and developers who will have to meet higher standards in respect of those proposed amendments that will have a cost impact. However, private warranty schemes mean, that for two of these amendments, most new-build houses already comply.

15. Building control bodies, along with the rest of the industry will have to bear the cost of learning the changes brought about by the amended regulations and guidance.

16. Overall though most of the proposed amendments will not have a cost impact since they are simply bringing the current Approved Document C into line with other government policy and guidance as well as British Standards and other Approved Documents.

17. The proposed changes are unlikely to have an adverse effect on the industry, particularly the building materials sector. See Competition Assessment in Annex E.

The Benefits

Option 1

18. There are no benefits in adopting Option 1. This would leave the Approved Document unchanged and it would ignore the considerable body of policy and technical guidance that has been produced over the last ten years, particularly in relation to building on land affected by contaminants. Some sections provide little guidance and need to reference more comprehensive guidance.
19. It might be claimed that not making changes to the Building Regulations and the associated guidance in the Approved Document would be a benefit to industry. There might be cost savings in not having to gain familiarity with the changes proposed in Option 3 but the consequence would be an absence of information on changes in good practice. As a result of this practitioners would have to spend time searching for new information in an unstructured manner. In some sectors covered by Part C, for example land affected by contaminants, there have been significant changes in techniques and legal processes. Many small firms do not subscribe to information services so would

be completely lacking in direction. The first indication that their proposals are inadequate would be when plans are rejected. This would impose costs on the designers and delays on their clients. The provision of adequate information in the Approved Document more than offsets the cost of becoming acquainted with new guidance.

Option 2

20. Option 2 would still leave the Approved Document largely unchanged and the four existing requirements would be retained. In such a situation benefits will not accrue to builders or the occupants of the buildings. Although it could be argued that not having any changes would save builders the burden of having to learn the new regulations and comply with them the reality is that they could be providing new buildings which could prove to be defective and thereby generate costs for rectification. Even if the buildings do not have gross defects they may become less attractive due to poor initial specification, for example lacking protection from radon or landfill gas; the eventual expenditure on improvement will fall to the building owners.

21. The Approved Documents provide a "route map" through relevant codes of practice and statutory guidance. If practitioners do not have official guidance they will have the on going burden of identifying which codes and standards are relevant.

22. A simple updating of references and minor editorial changes would not properly address the changes that have taken place since the last revision of Part C. In particular there is a need to consider the framework in which all the changes have occurred to understand them properly. This is particularly the case with the developments in the management of risks associated with land affected by contaminants. There have been significant changes which cannot be addressed through simple updating of standards etc. without explaining the context in which they should be used.

23. A publicity campaign aimed to promote good practice in all areas covered by Part C is unlikely to have a significant long-lasting effect given the wide range of topics covered by the Approved Document, i.e. moisture, flooding, contaminants, radon etc.

Option 3

24. Option 3 will ensure that the Approved Document is brought up to date with all the associated policy and technical guidance in respect of the management of land affected by contaminants. It will ensure that builders, developers and other construction professionals are clear on their responsibilities when developing such land. Given the significant changes it is likely that not all of the construction industry is aware of them. Approved Documents are disseminated very widely; the new Approved Document C should provide industry with comprehensive guidance. This should help to ensure that, for instance, any residual risk of sites being developed without proper attention being paid to contaminants is minimised. If contamination is not adequately addressed when a site is developed then this could lead to expensive remedial works. The changes propose that buildings are protected when they are

constructed. Not having to take remedial action is a benefit as it will eliminate potential expenditure later in the life of the building.

25. The proposed new Document will also help to reduce uncertainty in the development of 'brownfield' sites. It is in line with government's overall housing policy of alleviating pressure on 'greenfield' sites. The proposal to apply the amended requirement C1(2) to material changes of use will ensure that the risks of contaminants are properly managed. The impact of this proposal with respect to radon is set out in Annex A. In terms of avoiding the need to install radon remedial measures after the conversion is completed it is calculated that there could be benefits of £210,000 to £280,000 per year. It is also estimated that it could save some 2-4[1] lives per year but these would not be realised for a considerable number of years given that the risks from radon are assessed over an individual's lifetime, nominally 70 years with a notional value of £1 million per life.

26. In respect of moisture, the new guidance on driving rain and window/wall opening interfaces will clarify the protective measures that are required to deal with possible future problems associated with increased risk of interstitial condensation and driving rain, which could arise from Climate Change. Some ways to address the increased risk of flooding are also proposed. Overall, with respect to moisture and flooding the proposed changes will bring Part C into line with other Approved Documents (notably Parts H, L and M), British Standards and other guidance and thereby eliminate inconsistencies.

27. The proposed changes with respect to moisture will help to minimise incidences of floor failures and replacements. The costs and benefits of this are set out in Annex D. It should help householders to avoid paying replacement costs for damaged floors and possibly also expensive fixtures and fittings (this is often the case in kitchens and bathrooms) which can amount to hundreds and even thousands of pounds. It should also help householders avoid the disturbance associated with repair.

28. There are further non-tangible benefits such as greater confidence that such issues as rising groundwater and the risk of dampness from increased winter rainfall have been considered in the building design.

29. The construction industry is very fragmented yet covers a vast range of technical subjects. The Approved Documents are often a prime source of basic information to designers and builders. Given the large number of changes to the guidance material it is very difficult for practitioners to keep up to date. The draft Approved Document pulls all of this information together and explains it in simple terms. Providing up to date information can improve value for money and reduce defects.

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[1] It is estimated that radon induces about 2,500 deaths from lung cancer per year. One would expect that, without radon protective measures, 20 to 25 of these deaths would be associated with new construction. Houses that most need radon reduction levels have the highest exposure and thereby the highest risk. Statistical adjustment that takes account of potential radon levels in such homes indicates that 2 to 4 lives might be saved by radon reduction measures for conversion. (NRPB Health Risk from Radon, 2000).

The costs

Option 1

30. Option 1 would impose no costs.

Option 2

31. Option 2 would impose some costs on Government to fund publicity campaigns. Past experience from comparable dissemination programmes run by Government (e.g. Energy Efficiency Best Practice Programme provided information to building owners and energy managers on how to reduce energy consumption in support of regulations and environmental policies) suggests that this might be up to £100k per annum.

32. Since existing Requirement C2 does not apply to changes of use there are potential costs to householders living in dwellings formed by a conversion which are subsequently found to be above the radon action level. These householders may wish to pay for remedial measures to reduce their indoor radon level, and this is calculated to be £210,000 to £280,000 per annum (see Annex D). As this is a voluntary action that mirrors the cost of the same measure in Option 3 this cost is not included in Table 1. Although these costs are voluntary, purchasers or their solicitors are increasingly pressing householders to state if conversions have radon protection, or deduct the cost from the sale price. The key issue, however, is the potential loss of life.

33. There may also be costs to householders following failure of floors due to moisture problems although serious failures are comparatively rare (see Annex D). These are difficult to quantify but could amount to several hundreds, and often thousands of pounds per householder affected.

Option 3

34. As discussed in detail in Annex B it is felt that many of the proposed changes – even though some of them are extensive – will have little or no cost impact since they are simply bringing Approved Document C into line with current policy and technical guidance as well as current practice.

35. One amendment that will have a cost impact is the proposal to include amended Requirement C1(2) in the requirements in Regulation 6 of the Building Regulations 2000 which should be complied with when there is a material change of use of the building to the permanent residential purposes listed in Annex B, paragraph B27. This will probably only have an impact in respect of changes of use in radon affected areas. Most other changes of use in areas affected by contaminants are already captured through planning procedures and there will be requirements in environmental legislation that the 'new' building incorporates remedial measures to deal with contaminants.

36. The calculation for the likely cost impact for radon affected areas is given in Annex D. Overall, it is estimated that the proposal will result in an annual cost of £405,000 to cover the installation of protective measures when buildings are converted.

37. The other amendments that are likely to have a cost impact are the proposals to use moisture resistant flooring in sanitary areas and provide ventilation beneath suspended concrete floors. The calculation of these costs is given in Annex D. it is estimated that respectively these two proposals will result in annual costs of £174,000 and £300,000.

38. Option 3 would also impose a non-recurring cost on builders, building control bodies, designers etc. as they would have to acquaint themselves with the new provisions and where necessary to invest in appropriate professional and technical training. A cost of £3.5 million is likely to occur in the first year. This allows for key personnel attending training events. However this should be considered as a general business expense in keeping staff up to date to avoid liability for defective work and to maintain the ability to deliver a quality product.

Extent of consultation

39. The proposed amendments to the Building Regulations (Option 3) have already been subject to consultation with the Building Regulations Advisory Committee (BRAC) appointed by the Secretary of State as advisers on matters affecting construction. The RIA has also been scrutinised by the Better Regulation Unit. The proposals and the draft RIA have also been subject to wide public consultation with interested groups, including organisations representing building owners and occupiers, building developers, designers, contractors and building control bodies[2].

40. The majority of consultees were in favour of the proposals including key organisations such as the Environment Agency, National House Building Council, Defra as well as a number of building control bodies. A number of changes were made to the guidance in the Approved Document in the light of comments made. The main ones were:

- A new section on material change of use to clarify how the amended requirement C1(2) applies to existing buildings and this was supplemented by guidance on the need to treat historic buildings sympathetically.
- An additional section on flood risk to clarify the role of Building Regulations.
- Further discussion on the roles of the various parts of local authorities (i.e. planning, environmental health and building regulation) to clarify their responsibilities with regard to land affected by contaminants.
- Revision of the definition for 'building and land associated with the building' and associated text to ensure users of the AD were clear on the extent of their responsibilities with regard to remediating land affected by contaminants.
- Removal of the summary of the provisions of BS 5250:2002 with regard to the design and construction of roofs to resist damage from interstitial condensation. The references to the Standard and supporting guidance documents were retained though.

[2] The consultation document can be inspected at: http://www.odpm.gov.uk/br/consult

- The option of using third party assessment to assess the suitable of cavity fill materials in existing housing.

41. The remaining changes were mostly in respect of clarification and additional detail as well as corrections to some of the technical content. These though were relatively minor and no fundamental changes were required.

42. A small business litmus-test has also been undertaken. The main aim of the litmus test was to determine to what extent the proposed legislation might adversely affect small firms' costs and competitiveness. The test comprised a survey of a cross-section of small firms involved in application of the technical guidance covered by Part C as well as local authority building control bodies who will be required to confirm compliance. The focus was particularly on those areas which had already been identified as having cost implications for business (see Annex B). The firms, which ranged in size from under 5 persons to over 100, were:

a) Small builder working in domestic sector which included new-build, extensions and conversions as well as radon protection.
b) Local authority building control body (BCB) operating in a radon affected area.
c) Architect working in a radon affected area.
d) Local authority BCB with experience of dealing with contaminated land.
e) Structural and civil engineering firm.
f) Building product manufacturer.

43. The results of the survey are contained in Annex F. In summary, all the respondents broadly welcomed the proposed changes and felt that there would not have any significant cost impacts and, in fact, some felt that there could be potential benefits to them. In many cases the businesses felt that they were already meeting the requirements and where costs were identified they were small. One of the main issues was training and familiarisation particularly because of the large number of additions to the Approved Document and the extra referenced documents. However, respondents felt that keeping abreast of these was part of their job and could be considered as CPD.

Summary of costs and recommendations

44. Option 1 imposes no direct costs but provides no benefits; it also carries the risk that building defects may have to be remedied at a later date. This is not a viable option since it will perpetuate guidance that is known to be out of date with a whole raft of other policy and technical guidance.

45. Option 2 imposes some costs on Government and possible voluntary costs on householders. It is anticipated that there would be some very marginal benefits but these are unlikely to outweigh the costs. However, lives could be lost as the benefits of Option 3 would not be realised.

46. The recommended course of action is to adopt Option 3. Most of the proposed amendments will have no cost impact since they are simply bringing Approved Document C into line with other government policy and guidance,

British Standards and other current practice. The proposed amendment relating to change of use will impose an overall annual cost of £125,000 to £195,000, but it will eventually result in saving some 2-4 lives per year. It is felt that this justifies the net annual cost. The two proposed amendments relating to floors together will impose an annual cost of £474,000 but they will reduce incidences of floor failures and associated replacement costs of fixtures and fittings for householders who are affected; this can amount to thousands of pounds.

The annual costs and benefits of the three options are summarised in Table 1.

	Option 1		**Option 2**		**Option 3**	
	Costs	Benefits	Costs	Benefits	Costs	Benefits
National totals	0	Negative [a]	£0.05m (Government)[b]	Marginal benefit	£0.41m (radon protection) £0.47m (Prevention of decay/failure of floors) Training/implement-ation costs will occur but only in first year[d]	£0.21-£0.28m & 2-4 lives saved Avoiding costs to replace damaged floors[c]

	Notes to Table 1
A	The "Do nothing" option carries the risk of building defects occurring. Cost cannot be readily quantified as this is dependent on defects being found and building owners taking action to rectify them.
B	There could be a voluntary cost of £210k to £280k for remedial action on building with excess levels of radon. This has not been included in the table as it equates to the benefits in option 3.
C	Repair costs are substantial but there is no firm data on rate of failure. See Annex D.
D	The cost of £3.5 million should be accommodated by the industry's basic training budget. It is a business expense rather than a burden. See Annex D.

Table 1. Summary of annual costs and benefits in England & Wales arising from implementation of proposed amendments to Part C (£ million)

Enforcement, sanctions, monitoring and review

47. Intended building work that is subject to the provisions of Part C, or of any other Part of Schedule 1 to the Building Regulations 2000, must be notified to the local authority. However, certain work, such as the replacement of boilers, heating controls and windows, may be carried out by an approved person without prior notice being given to the local authority. Notice is given to the local authority on completion of such work. The work is subject to inspection by the local authority's building control department, or, at the election of the person carrying out the work, by an approved private sector building inspector.

48. Failure to comply with the requirements of Schedule 1 to the Building Regulations 2000 is a criminal offence. Local authorities also have powers to require the removal or alteration of work that does not comply with the requirements of Schedule 1. The local authority's enforcement powers are suspended in a case where building control is being carried out by an approved inspector. However, if a person carrying out building work fails to comply with instructions from an approved inspector to rectify non-compliant work, the approved inspector must cancel the 'initial notice' which brought the project under his supervision. Building control then reverts to the local authority.

49. In the event of implementation of the proposals unchanged or in an amended form, it is the ODPM's practice to investigate experience after a reasonable time to monitor how the regulations are working in practice.

50. Contact point

Enquiries and comments regarding this final Regulatory Impact Assessment should be addressed to Michael Johnson at: Office of the Deputy Prime Minister, Buildings Division, 18A. Portland House, Stag Place, London, SW1E 5LP (Fax: 020 7944 5739. e-mail: mike.johnson@odpm.gsi.gov.uk)

ANNEX A to Section 3: Issues that have led to the Part C review

Climate Change

A1. The review commenced with a study of what might need to be addressed in Part C should the UK Climate Impacts Programme (UKCIP) 1998 scenarios come to pass. It was concluded that the most likely effects with respect to Part C are:

- increased risk of flooding,
- increased risk of summer drought (which in turn may cause shrinkage or cracks in buildings),
- greater risk of rain penetration as a result of increased driving rain, and,
- possible mobilisation of ground contaminants (due to increased surface run off or raised ground water levels).

A2. These findings were reviewed following the publication of the new scenarios by UKCIP in April 2002. If the 2002 scenarios come to pass there are likely to be more hot summers, winter precipitation will increase and there will be more very wet winters. The greatest effects are likely to arise from more frequent flooding and increased driving rain; guidance in these areas has been improved and clarified.

Moisture

A3. Currently, the sections of Approved Document C that deal with moisture are oriented towards external sources, e.g. the ground, driving rain, etc. Interstitial condensation from the water vapour produced within buildings is becoming more important as insulation levels rise and novel constructions with impermeable claddings are introduced. Also, the rise in external vapour pressure expected under climate change will reduce the effectiveness of ventilation.

A4. Since the last review of Part C, the need for accessible housing has been recognised and formalised in Part M *Access to and Use of Buildings*[2]. Details such as level access have implications for the design of both floors and walls. Guidance for level thresholds was published in 1999. It is important that water does not penetrate the building fabric at door openings as it could in turn cause dampness. The need for careful design and construction is reiterated in the revised guidance to Part C.

Flooding

[2] Can be inspected at: http://www.odpm/gov.uk/approved-documents

A5. The widespread flooding in England & Wales in the autumn of 2000, with severe property damage, has focussed attention on the various associated issues. These include:

- siting of buildings to avoid flood risk,
- protection of buildings by embankments, etc.,
- appropriate design and use of materials to minimise damage from flooding, and,
- methods of rapid drying and reinstatement of flooded buildings.

A6. Some of these issues, especially guidance on siting buildings to prevent flooding and appropriate embankments are covered in planning guidance (e.g. the new PPG 25[3]) and Environment Agency publications, and so are not pertinent to Building Regulations. However, there is still a need to consider appropriate construction techniques for use in areas with a high flood risk. It should be noted that Building Regulations can only address health, safety, welfare and convenience of people. They cannot be made for property protection.

Land affected by contaminants

A7. The regulatory and technical frameworks dealing with land affected by contaminants have changed significantly since the last revision of Part C.

A8. New planning advice *Development of land affected by contamination* is currently out for consultation. In due course it will replace the existing guidance on contaminated land in PPG 23[4] and will apply in England. This planning advice will complement the contaminated land regime introduced under Part IIA of the Environmental Protection Act 1990 (EPA), which came into force in April 2000. The regime provides a framework to identify and remove unacceptable risks due to contamination and to bring damaged land back into beneficial use. The EPA contaminated land regime applies to existing land use whereas much of the remediation of land affected by contamination (even that identified under the EPA) will be through the planning system. This reflects the fact that the best means of paying for remediation is often by redevelopment. Despite this, the raft of policy and technical guidance that supports the EPA regime needs to be acknowledged not only in planning advice but also in Building Regulations. Therefore, the guidance in support of Part C needs to be extended to take account of this.

A9. In order to meet future housing needs and to alleviate the pressure on greenfield sites the Government's planning policy guidance is proposing that 60% of the required additional housing be built on land that has seen a previous use, and this includes sites that have been subject to a contaminative use[5].

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[3] DTLR *Development and flood risk* Planning Policy Guidance PPG No.25, 2001.

[4] *Planning and Pollution Control* Planning and Policy Guidance PPG 23, 1994.

[5] Planning Policy Guidance Note PPG No.3: Housing, March 2000.

Radon

A10. At the time the last edition of Part C was published (1992) radon protective measures were only required in Cornwall, Devon and parts of Derbyshire, Northamptonshire and Somerset. This reflected the findings of surveys of radon measurements in existing dwellings undertaken by the National Radiological Protection Board (NRPB) at that time. Since 1992 NRPB has carried out further surveys including completing national surveys of England & Wales[6,7,8]. Results of these studies were published between 1996 and 1998, and the resulting maps show that most counties in England & Wales have some areas that can be described as 'Radon Affected Areas'.

A11. The new areas identified by NRPB's findings are used to delineate places where radon protection is required in new dwellings. This was published in BR 211 Radon: guidance on protective for new dwellings[9]. This publication includes both technical guidance and maps showing where protection is required. The amended guidance was not a result of an amended requirement it was simply bringing the guidance into line with current practice.

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6 NRPB *Radon in dwellings in England: 1997 review*. NRPB-R293, 1997.

7 NRPB *Radon atlas of England*. NRPB-R290, 1996.

8 NRPB *Radon in dwellings in Wales: Atlas and 1998 review*. NRPB-R303, 1998.

9 BRE *BR 211 Radon: guidance on protective measures for new dwellings,* 1999

ANNEX B to Section 3: Nature of proposed amendments to Part C

B1. As stated in paragraph 8 above, the proposed amendments fall into two categories: those that bring the Approved Document into line with current practice and other legislation and as such do not have a cost impact, and those that improve the guidance to address specific risks and which will have a cost impact. This section considers each of the proposed amendments in each of these two categories.

Amendments with no cost impact

Structure and requirements of Part C

B2. As a first step it is proposed to amend the title of Approved Document C to reflect the fact that it covers land affected by contaminants, a topic that has received a great deal of attention in the years since the last revision. The draft Approved Document is therefore entitled *Site preparation and resistance to contaminants and moisture*.

B3. Given the increased concern over interstitial condensation as mentioned in Annex A paragraph A3, it is proposed to add a new requirement that the floors, walls and roof of a building should not be adversely affected by interstitial condensation. As roofs are so vulnerable to condensation, it is proposed to move the second requirement under Part F of Schedule 1 to the Building Regulations 2000, F2 *Condensation in roofs,* from Approved Document F *Ventilation*[10], to Approved Document C.

B4. As a consequence it is proposed that the existing four requirements and the new requirement on interstitial condensation are combined into two amended requirements as follows:

C1. S*ite preparation and resistance to contaminants.*
(1) Clearance of unsuitable material including vegetable matter, topsoil, existing foundations and other hazardous sub-surface obstacles.
(2) Resistance to contaminants.
(3) Sub-soil drainage.

C2. *Resistance to moisture.*
(a) Moisture rising from the ground.
(b) Precipitation and wind driven spray.
(c) Interstitial and surface condensation.
(d) Spillage of water from or associated with sanitary fittings or fixed appliances.

[10] Can be inspected at: http://www.odpm.gov.uk/approved-documents

Table B1 below shows how the four existing Requirements map on to the two amended Requirements.

Existing Requirement		Amended Requirement	
Number	**Title**	**Number**	**Title**
C1	Preparation of site	C1 (1)	Clearance of unsuitable material
C2	Dangerous and offensive substances	C1 (2)	Resistance to contaminants
C3	Subsoil drainage	C1 (3)	Subsoil drainage
C4	Resistance to weather and ground moisture	C2 (a)	Moisture rising from the ground
		C2 (b)	Precipitation and wind driven spray
F2	Condensation in roofs	C2 (c)	Interstitial and surface condensation
		C2 (d)	Spillage of water

Table B1. Proposed amended Requirements to Part C and their relationship to the existing Requirements

B5. The proposed Requirement C2 (c) will contain all the technical guidance relevant to roofs from Approved Document F; it will also contain additional guidance for floors and walls.

B6. Sections 1 to 3 of the draft Approved Document respectively contain the technical guidance on ways of meeting each part of amended Requirement C1.

B7. Sections 4, 5 and 6 of the draft Approved Document contain the supporting technical guidance in relation to each part of amended C2 but these are structured under the headings: floors, walls and roofs respectively. This is because the guidance is most clearly presented in this way, and the fact that not all forms of moisture affect all three elements of the building envelope.

Extent of Building Regulations control

B8. The current edition of the Approved Document to Part C only provides guidance for the ground covered by the building and does not offer guidance on the treatment of land not covered by the building. There are concerns about migrating contaminants (e.g. landfill gas migrating from adjacent waste disposal sites) and other parts of the site. Other Approved Documents use controls beyond the footprint of the building, e.g. Part B *Fire Safety*[11] requires adequate access to buildings for fire service, and Part H *Drainage and Waste Disposal*[12] has provisions for drainage of rainwater and foul water from the building. Also Part M *Access to and Use of Buildings*[13] includes the provision

[11] Can be inspected at: http://www.odpm.gov.uk/approved-documents

[12] Can be inspected at: http://www.odpm.gov.uk/approve-documents

[13] Can be inspected at: http://www.odpm.gov.uk/approved-documents

of ramps to facilitate access. This supports the case for considering all relevant parts of the land associated with the building.

B9. Consequently, in respect of land affected by contaminants, proposed amended Requirement C1 (2), the definition of 'contaminant' and the supporting technical guidance in the draft Approved Document all refer to the need to consider the ground covered, or to be covered, by the building and any land associated with the building.

B10. As this change is simply confirming existing controls and is bringing the Document into line with current practice, see C1 (2) below, it is felt that this will have no cost impact.

Proposed changes to the technical guidance

B11. This section summarises all of the proposed changes to the technical guidance in the Approved Document for the two proposed amended requirements: C1 and C2 which it is felt will not have a cost impact. This is primarily because they are simply bringing Approved Document C into line with current policy and other technical guidance as well as current practice. More detailed discussion of this is given below.

Requirement C1(1)

B12. This proposed amended requirement is concerned with removal of unsuitable material such as vegetable matter, existing foundations and other sub-surface obstacles. The changes are relatively modest and include greater discussion of site investigation with references to guidance documents unavailable at the time of the last revision to Part C. It also now mentions tree roots and how they can affect building services, floor slabs and oversite concrete and references relevant guidance.

B13. It is felt that although the guidance in the amended Approved Document refers to new documents and mentions new hazards it is simply bringing the Approved Document up to date with current practice. As such there should be little or no cost implications (this of course assumes that people are already complying with the existing guidance, which is usually imposed through planning and pollution control regimes). There are likely to be some benefits arising from avoiding expensive remedial works should problems be subsequently identified.

Requirement C1(2)

B14. This proposed amended requirement is concerned with reducing the risk posed by land affected by contaminants. Overall, the technical guidance in the proposed Approved Document that describes ways in which the requirement can be met differs considerably from that contained in the existing version of the Approved Document. Revised guidance now advocates the principles of risk assessment in the management of land affected by contaminants and in so doing is aligned with the approach used by the contaminated land regime

introduced under Part IIA of the EPA. The revised guidance uses the 'source-pathway-receptor' relationship, or pollutant linkage thereby following the risk assessment process advocated by the guidance to Part IIA of the Environmental Protection Act 1990.

B15. A significant body of technical guidance including British Standards for site investigation has been produced in the ten years since the last revision of Part C and much of it has been referenced. In terms of remedial measures the Document now refers to treatment technologies which have gained a foothold and which offer a more sustainable solution for dealing with land contamination.

B16. In terms of dealing with hazardous soil gases such as methane the draft Approved Document refers to, amongst other documents, BRE Report 414[14] which gives advice on constructing protective measures against gas ingress and so replaces BRE Report 212[15]. Greater prominence is given to naturally occurring methane and carbon dioxide, as well as volatile organic compounds (VOCs) which may originate from petrol and solvent spillage.

B17. Again the proposed amendments are simply concerned with bringing the Approved Document up to date with current practice for managing the risks of hazardous soil gases on sites and, indeed, the referenced publications give more detailed and clearer guidance on the construction of gas control measures for buildings.

B18. Finally, the sections on radon have been updated to include the new areas of the country where radon protective measures are now required. The draft Approved Document now references the latest edition of BRE Report 211[16] which was published in 1999 and which includes these new areas.

B19. Builders and Building Control Bodies already use the new 'Radon Affected Areas'[7,8,9] published in map form by the NRPB and the supporting BRE guidance. The proposed changes are bringing the Approved Document into line with this.

B20. Although there have been significant changes to the guidance in the Approved Document in respect of dealing with contaminants these are all focussed on bringing it up to date with the policy and technical guidance published since the last revision. Builders and developers should already be adopting the

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[7] NRPB *Radon in dwellings in England: 1997 review*. NRPB-R293, 1997.

[8] NRPB *Radon atlas of England*, NRPB-R290, 1996.

[9] NRPB *Radon in dwellings in Wales and 1998 review*, NRPB-R303, 1998.

[14] BRE *Protective measures for housing on gas-contaminated land*. BRE Report 414, CRC, 2001.

[15] BRE *Construction of new buildings on gas contaminated land*. BRE Report 212, CRC, 1991.

[16] BRE *Radon: guidance on protective measures for new dwellings*. BRE Report 211, CRC, 1999.

principles of risk assessment when managing land contamination and as such there should be no cost implications.

Requirement C1(3)

B21. This proposed amended requirement is concerned with the provision of sub-soil drainage principally to reduce the risk of: (i) the passage of ground moisture to the interior of the building and (ii) damage to the fabric of the building. One change is that reference is made to the guidance in the new (2002) edition of Part H concerning the protection of low lying buildings or basements from flooding where foul water drainage also receives rainwater. It also mentions that consideration should be given to the use of non-return valves and anti-flooding devices to prevent backflow of sewage when flooding occurs. The new guidance also references a DTLR publication on minimising flood damage to susceptible buildings[17].

B22. Overall, the proposed changes are relatively minor and are mostly concerned with bringing Part C into line with Part H. As such they will have no cost implications.

Requirement C2

B23. Although there are a large number of proposed changes to the technical guidance in respect of resistance to moisture, most of them are simply bringing Approved Document C into line with British Standards and other Approved Documents. In addition, many of the proposed changes match specifications contained in house warranty schemes operated by the NHBC (National House Building Council) and Zurich Insurance Company Building Guarantees[18], and together the two schemes cover the majority of new build house construction. Overall therefore there will be little or no impact. Each of the proposed changes to C2 are listed and discussed below.

B24. The proposed change with respect to floors relates to surface and interstitial condensation. The proposed Requirement C2(c) requires that surface and interstitial condensation should not adversely affect floors. This brings intermediate floors and floors exposed from below into the scope of the Approved Document. However, the surface condensation requirements are already covered by Part L, *Conservation of fuel and power*. In fact, NHBC Standards refer designers of floors to BRE Report 262[19] for detailing floor insulation (5.1 - D14 for ground bearing floors and 5.2 - D7 for suspended

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[17] DTLR. *Preparing for floods: Interim guidance for improving the flood resistance of domestic and small business properties.* DTLR report, February 2002. Can be inspected at: http://www.odpm.gov.uk/construction-guidance

[18] *Solid Foundation: Building guarantees technical manual*. Zurich Insurance Company Building Guarantees, Portsmouth.

[19] BRE *Thermal insulation: avoiding risks*. BRE Report 262, CRC, 2002.

floors) and this covers all the interstitial condensation requirements from BS 5250[20].

Walls

B25. Guidance on the construction of internal and external walls to resist moisture from the ground is unchanged, as is the guidance on the construction of external walls to resist precipitation. Proposed changes to guidance are as follows:

(i) **Cavity external walls**. Mostly unchanged, except for the replacement of the reference to BS 8208[21] for assessing the suitability of walls for filling, with the map and table that are in BRE Report 262. This makes the assessment procedure much more explicit and will require people to think more carefully about what they are building in different areas of the country. This guidance has been in BRE Report 262 for about five years and should be followed as good practice. Also, any changes in practice and restrictions on what should be built will apply only in exposed areas, where local building practice will already adopt suitable constructions. Cavity external walls suitable for different exposure categories are in Appendix 6.1B of NHBC Standards (1999) and a simplified version of the table in BRE Report 262 is in the Zurich technical manual and so the impact is expected to be minimal.

(ii) **Cracking of external walls.** This is a new section, which tells people to consider cracking from thermal movement, frost attack and desiccation as a possibility when they are designing buildings since cracking can reduce weather resistance. However, builders should be doing this anyway specifically under Regulation 7 *Materials and workmanship*[22].

(iii) **Detailing around doors and windows.** This is a new section recommending more attention to the detailing around doors and windows, and, in the most exposed areas of the country, redesigning the rebates etc. to prevent rain penetration. However, rebated doors and windows in exposed areas are referred to in section 6.1 – D4b of NHBC Standards (1999) and the Zurich technical manual also refers to rebated frames in severely exposed locations. As a consequence, most new houses in exposed areas should already be following the new requirements of AD C.

(iv) **Door thresholds.** Part M, *Access to and Use of Buildings*, requires that reasonable provision be made for access. Given the concerns about moisture ingress from driving rain in exposed areas a DETR/NHBC publication[23] was produced which gives guidance on the construction of a

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[20] BSI. *Code of practice for the control of condensation in buildings*. BS 5250: 2002.

[21] BSI *Guide to assessment of suitability of external cavity walls for filling with thermal insulants - Part 1: Existing traditional cavity construction.* BS 8208.

[22] Can be inspected at: http://www.odpm.gov.uk/approved-documents

[23] DETR *Accessible thresholds in new buildings: guidance for house builders and designers*. Stationery Office, 1999.

drainage channel in front of a doorway with a clear threshold. This guidance is also given in GBG47[24] and the Zurich technical manual. A new section in the draft Approved Document re-iterates the guidance on the drainage channel and references both GBG47 and the DETR/NHBC publication. Given the requirement in Part M and the supporting guidance it is felt that this new section will have no impact as local building practice is likely to require this already.

(v) **External walls (resistance to damage from interstitial condensation).** The proposed Requirement C2(c) requires that interstitial condensation should not adversely affect walls. A new section gives guidance to designers to assess the risk of interstitial condensation within walls. This has been a requirement in NHBC Standards and BS5250 for some years, so is not introducing a novel concept into the industry and will therefore have no impact.

(vi) **External walls (resistance to surface condensation and mould growth).** The proposed Requirement C2(c) requires that surface condensation should not adversely affect walls, and so guidance is given accordingly. The new guidance section effectively repeats the requirements of the new Part L as regards thermal bridging and will have no impact.

Roofs

B26. Guidance on the construction of roofs to resist moisture from the outside is unchanged. The material relevant to roofs is from the existing Section 5 of the Approved Document, *"Cladding for external walls and roofs"*. The proposed changes with respect to roofs are as follows:

(i) **Roofs (resistance to damage from interstitial condensation).** As mentioned above (paragraph B4 and Table 1) the proposed Requirement C2(c) incorporates the existing Requirement F2 and so the new guidance section contains all the material, unchanged, from Part F.

(ii) **Roofs (resistance to surface condensation and mould growth).** This new section effectively repeats the guidance of the new Part L as regards thermal bridging and so there will be no impact.

(iii) **Profiled metal roofs.** This formalises guidance which is currently standard practice within the industry and widely quoted in, for example, MCRMA[25] guidance documents and so there will be no impact.

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[24] BRE *Level external thresholds: reducing moisture penetration and thermal bridging.* BRE Good Building Guide GBG 47, CRC, 2001.

[25] Metal Cladding and Roofing Manufacturers Association

Amendments with a cost impact

Material change of use

B27. It is proposed that the Requirement C1(2), which addresses resistance to contaminants, be added to the requirements in Regulation 6 of the Building Regulations 2000 which should be complied with when there are certain material changes of use of buildings. Regulation 6 sets out which parts of Schedule 1 should be complied with when there is a material change of use of the building as defined in Regulation 5.

B28. The absence of a requirement that deals with contaminants (which includes radon and landfill gas) means that occupiers of buildings in areas at risk from contamination may remain unprotected after the building work to effect the change of use is complete. A particular concern here is the conversion of barns and warehouses for residential purposes in radon affected areas.

B29. It is proposed that the amended Requirement C2 (which replaces the existing Requirement C4) should continue to be listed as one of the requirements in Regulation 6, but that, in addition, the amended Requirement C1(2) be applied to all changes of use which have sleeping accommodation including hotels. In other words as defined by Regulation 5(a) to 5(g) with the exception of 5(e) public buildings.

B30. Other types of buildings are covered by Health and Safety legislation so do not need addressing through the Building Regulations, for example workplace assessment, including radon measurements.

B31. This proposal on material change of use is likely to have a cost impact, and this is discussed in more detail in the Costs section and in Annex D.

Proposed changes to the technical guidance

B32. There are two proposed changes to the technical guidance with respect to the amended Requirement C2 which will have a cost impact and these are:

(i) **Moisture resistant timber floors.** Special precautions should be taken for timber floors in rooms such as kitchens or bathrooms where leaks or spillage of water is likely. The concern here is that this water could result in decay and collapse of timber floors and possibly even sanitary units such as washbasins and baths falling through the floor. Such occurrences, although infrequent, can have severe health consequences. Moisture resistant chipboard flooring (Type 5 to BS EN 312) throughout the dwelling is a requirement under NHBC Standards and as such most new houses already incorporate it, but there will be a proportion, approximately 15%, that do not. This proposed change will also impact on those buildings undergoing material changes of use that have a permanent residential purpose. The cost impact is discussed in more detail in the Costs section and in Annex D.

(ii) **Ventilation beneath suspended concrete floors.** These floors should now be ventilated - regardless of the presence of hazardous soil gases (including radon) - in order to deal with ground moisture. Although this has been in NHBC Standards for some years - and it now brings Part C into line with BS 5250 – there will be instances of some houses requiring additional or larger air bricks to meet the levels of ventilation specified. Although such failure of suspended concrete floors due to moisture induced corrosion is rare but the consequences in terms of cost and inconvenience are considerable. A more frequently encountered failure is build up of soil gas. It is prudent to ensure adequate ventilation beneath such floors in case any hazardous gases or vapours are present. The cost impact is discussed in more detail in the Costs section and in Annex D.

ANNEX C to Section 3: Risk Assessment

Moisture

C1. Surface condensation, leading to mould growth, is one of the most widespread problems in UK housing, affecting some 15% of households[26]. The most important factors are:

- ventilation within the house to remove the water vapour generated by the normal activities of the occupants (as discussed in Approved Document F *Ventilation*), and,
- surface temperatures of the external walls, which depend on the level of insulation and the presence of thermal bridges (as discussed in Approved Documents L1 and L2).

C2. The guide to Robust Construction Details[27], recently developed to accompany the recently revised Approved Documents L1 and L2, is specifically aimed at reducing the risk of mould growth.

C3. Allergy to mould spores is the major health risk related to fungi in buildings. Other health effects to be considered are carcinogenic, toxic and psychological effects, and fungal infections. Of those reporting problems with mould some 16% (equivalent to some 470,000 households) said that it was 'distressing'.

C4. The existing Approved Document currently refers only to resistance to precipitation and ground moisture, but there is increasing evidence that many more moisture problems are due to interstitial condensation caused by water vapour generated within the building. This can lead to:

- Rot of timber components or corrosion of steel, potentially leading to structural failure.
- Wetting of insulation, thus reducing the energy efficiency of the building element, leading to increased energy usage and therefore increased CO_2 production from the building.
- Growth of potentially pathogenic fungi within wall or roof cavities.

C5. It is expected that these problems will get worse in future because:

- More highly insulated structures leave the outside of the fabric colder in winter, increasing the risk of condensation.
- There is increased use of impermeable cladding systems that do not allow the structure to breathe.
- If the increasing atmospheric humidities in the UKCIP climate change scenarios come about then, humidities within buildings may rise.

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[26] DETR English House Condition Survey: 1996 Energy Report. Stationery Office, 2000.

[27] BRE *Limiting thermal bridging and air leakage: robust construction details for dwellings and similar buildings.* Stationery Office, October 2001.

Flooding[28]

C6. As stated in Annex A, flood damage is mainly a problem of property protection so does not currently fall within the scope of the Building Regulations. However, certain effects such as water trapped beneath floors, backflow of sewage and flooding of low-lying buildings is covered in the proposals.

C7. Despite the long history of flooding in the UK, experience in recent years suggests that the situation is getting worse. If the climate change scenarios published by the UKCIP in April 2002 come about, then extreme winter precipitation may become more frequent; this could increase the incidence and severity of flooding.

Land affected by contaminants[29]

C8. Contamination of land and pollution of waters arises principally from various previous industrial practices. These have led to deposition in, on or under land of substances such as oils and tars, heavy metals, organic compounds and soluble salts, and mining materials; and from the landfilling of waste without adequate precautions against leaching or the escape of landfill gases. The Environment Agency estimates that there may be some 100,000 sites in England and Wales which are affected by contaminants[30]. Some agricultural land may also be contaminated due to spillages and deposition of pesticides, fuel, oil and decayed biological matter.

C9. Land contamination can create risks where contaminants in, on or under land reach a receptor (i.e. a pollutant could harm a vulnerable object) through a number of pathways (routes) including:

- vapours or gases emitted directly or via adjacent land,
- direct ingestion of material containing contaminants,
- absorption of contaminants through the skin, and,
- ingestion of plant material that has taken up contaminants.

C10. In respect of built development there can be harm to the health of users and occupiers of land, for example because of the presence of asbestos fibres, toxic metals or carcinogenic compounds. Although the potential for harm from many other substances exists, little is known of any actual adverse effects on health among people living on or near land affected by contaminants.

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[28] DTLR. *Preparing for floods: Interim guidance for improving the flood resistance of domestic and small business properties*. DTLR report, February 2002. Can be inspected at: http://www.odpm.gov.uk/construction-guidance

[29] DEFRA *Contaminated Land (England) Regulations 2000 & Statutory Guidance: Regulatory Impact Assessment (Final)*. Can be inspected at: http://www.defra.gov.uk/environment/landliability/ria/index.htm

[30] Environment Agency *Dealing with contaminated land in England, 2002*. Can be inspected at: http://www.environment-agency.gov.uk/subjects/landquality/113813/356737/?version=1&lang=_e

C11. There can be direct physical harm to people, for example through explosion of landfill gas. Explosions and fires have occurred under houses built close to former landfill sites at Loscoe (Derbyshire) in 1986, and Kenilworth (Warwickshire) in 1989. There can also be harm to structures, for example through chemical attack on building materials.

C12. Under the contaminated land regime introduced by Part IIA (see Annex A, paragraph A8) the risks on each site are assessed and the controls triggered only where there is significant harm, or a significant possibility of it. The extent of the risk on any particular land depends upon a number of factors including:

- characteristics of the substances in the land,
- local geology and hydrogeology,
- nature and presence of receptors,
- use of the land, or of adjacent land, and,
- nature of the land, in terms of whether pathways might exist or be created.

Radon[31]

C13. Radon is a natural, odourless and colourless gas which is formed by the radioactive decay of uranium and radium. There are small quantities of uranium and radium in soil and masonry materials, so radon is created continuously under and within buildings. The most important property of radon is that it forms radioactive decay products with short half-lifes. These products become attached to microscopic particles and liquid droplets in the air to form a radioactive aerosol which can be inhaled.

C14. The average concentration of radon in homes in the UK is about 20 Bq/m^3, but it is at least ten times higher in some areas. Radon is the largest contributor to public exposure to radiation, and risk estimates suggest that it is responsible for 2,500 lung cancer deaths per year in the UK (about 5% of all lung cancers)[32]. The UK has a co-ordinated programme for the reduction of radon in homes. The key elements of the programme are an 'Action Level' of 200 Bq/m^3 guidance on reducing radon levels in existing homes, and construction requirements for new homes to achieve radon levels as low as reasonably practicable.

[31] BRE Section 15 of *Building Regulation, Health and Safety*. BRE Report 417, CRC, 2001.

[32] National Radiological Protection Board *Health Risk from Radon*, 2000.

ANNEX D to Section 3: Estimated cost of proposed amendments

Compliance Costs

Effect of applying Regulation 6 to residential conversions

Proposal

D1. It is proposed that the amended Requirement C1(2) should be listed as one of the requirements in Regulation 6 that apply to changes of use that have a permanent residential purpose. Specifically, this is to be applied to all changes of use which have sleeping accommodation including hotels, i.e. as defined by Regulation 5(a) to 5(g) with the exception of 5(e) public buildings. As stated in Annex B paragraph B28 the main concern is the conversion of barns and warehouses into dwellings in radon affected areas. Most other changes of use in areas affected by contaminants are already captured through planning and there will be requirements that the 'new' building incorporate remedial measures to deal with the contamination.

Costs

D2. The numbers of such conversions is difficult to determine, but inspection of planning data suggests that there are approximately 2,500 conversions per year in radon affected areas in England & Wales.

D3. Data from NRPB suggests that nearly 70% of conversions are currently in radon affected areas where there is a 3-10% risk that the radon action level is exceeded, with the balance being in areas with a greater than 10% risk.

D4. Therefore, there are just over 800 conversions in the high risk areas and nearly 1,700 in the lower risk areas. Those conversions in the high risk areas will be required to install both a membrane and radon sump, but the membrane would be required anyway because the existing Requirement C4 (to be replaced by proposed amended Requirement C2) is already in Regulation 6. Therefore, the only extra requirement will be for additional sealing (around service entries etc.).

D5. The remaining 1,700 in the lower risk areas will not require a radon sump (although this is recommended) but will have to have the additional sealing (membrane already required as explained above).

D6. Many years of experience in installing radon measures into buildings indicate that the cost of a sump is about £350 (this is more than the cost for a sump for a new-build house which is about £200) and that for additional sealing is £50 per conversion.

D7. The total annual cost of installing these measures would therefore be:

[800 x (£350+£50)] + [1,700 x £50] = £320,000 + £85,000 = £405,000

It is felt that because of the finite number of barns, warehouses etc., suitable for conversion the number of conversions (and hence the cost) will fall. Although conversions of other building types (e.g. shops and offices) will remain significant they tend to have heavy floors with robust membranes so will generally not require radon protection.

Benefits

D8. If the proposal is not implemented then radon protective measures may not be installed when conversion work takes place. If it is subsequently established that the radon concentration in the conversion exceeds the action level then the householder may decide to install remedial measures (usually a sump). This is more expensive than installing a sump when the conversion work is undertaken. Costs are typically £750-£1,000. Some of the benefits of the proposal therefore are the costs avoided by installing protective measures at the conversion stage.

D9. If the conversions in the two radon risk areas did not have protective measures installed then subsequently there would be approximately 280 new housing units without adequate radon protection.

D10. Due to individual site conditions the actual number of buildings with elevated radon levels will be less than the number of houses indicated as at risk on maps showing the outcome of sample surveys. Adjustment of statistical data indicates that there will be 170 buildings with radon levels above the action level in the high risk area, and about 110 in the lower radon risk area. (Total 280).

D11. The annual total cost of installing remedial measures in these conversions could range from:

280 x £750 = £210,000

to:

280 x £1,000 = £280,000

Cost-benefit

D12. At first sight the difference between the two figures means that the proposal could have a net annual cost of some £125,000 to £195,000, although this would fall as the number of barns, warehouses etc. is used up.

D13. However, there is a further benefit in that the proposal will probably save lives because householders are not obliged to install remedial measures if the radon level in their home exceeds the action level. Therefore, those householders

living in conversions without protective measures will be at risk from radon. Given the scale on the conversions market and the overall risks from radon it is estimated that the proposal will save some 2-4 lives per year. The risks from radon are estimated over an individual's lifetime so these benefits would not be realised for a considerable number of years but it is felt that they justify the proposal.

Moisture resistant timber floors

Proposal

D14. It is proposed that moisture resistant floorboards be used in sanitary areas (e.g. bathrooms and kitchens) where spillage and leaks of water is likely.

Cost

D15. As stated in Annex B, most warranty company and housing specifications, including NHBC Standards, already specify moisture resistant particle board. Consequently, the majority (some 85%) of new-build housing already incorporate such floorboards. On average the floor area to be treated is likely to be about $4m^2$ in the case of bathrooms. This will result in an additional cost of some £5 which includes the cost of supervision and control. The impact in kitchens will be more limited in that a solid or suspended concrete floor will often be used. On average therefore the additional cost per unit is likely to be about £6. About 160,000 new housing units are built each year. Given that NHBC Standards and other schemes already specify such floors in houses for which they provide warranties approximately 24,000 houses may not be using such boards. A further 5,000 units per annum are created by conversions; most of these will have bathrooms on intermediate floors. The total annual cost is likely to be about £174,000 (i.e. 29,000 x £6). This is the worst case figure and makes no allowance for builders who currently install higher specifications voluntarily.

Benefit

D16. There are no firm data on actual failures but surveyors working for the warranty scheme insurers estimate the risk at about 0.5%. In serious cases the cost of floor replacement could be considerable amounting to several hundreds of pounds. Sanitary units may also need replacing which will add to the cost. The average cost per house is probably in the order of £1,400. This is the total cost of work including replacement of some fittings and repair of damage to adjoining areas, e.g. ceilings below bathrooms. These produce an indicative cost of £193,000 (i.e. 145 x 1,400). If these indicators prove valid the implementation costs roughly equal the cost of consequential repairs so would appear to be justifiable.

Ventilation beneath suspended concrete floors

Proposal

D17. The void beneath suspended concrete floors is usually ventilated to prevent the build up of hazardous gases including radon. As it is difficult to predict the risk of gas entering the void beneath the floor it is prudent to ventilate this void. In areas where the ground beneath the floor is permanently or frequently saturated there is a further risk of corrosion of the reinforcement in the beam units of the floor system. This can lead to serious structural failure but is rare.

Cost

D18. For some years most housing specifications and warranty providers standards have required a rate of sub-floor ventilation similar to that proposed in Annex B. Consequently most (circa 85%) new build homes will comply with this proposal. Suspended concrete floors are not the most common form of ground floor construction; it is estimated that about 15,000 buildings may have inadequate sub-floor ventilation. The additional cost of providing air bricks is about £20 per unit. The national annual cost for about 15,000 homes that do not have sub-floor ventilation is £300,000 (i.e. 15,000 x £20).

Benefit

D19. The most likely problem associated with inadequate sub-floor ventilation is gas build up. This can be simply odours due to the floor void being wet on occasions or there could be a build up of ground gases such as methane. Action to deal with odours would be a matter of choice for the householder but controlling the accumulation of gases such as methane is a safety issue. Installing extra air bricks would cost at least £150 per house. In some cases natural ventilation may be insufficient and some form of air movement or dispersal stack may be needed. This could increase the cost to about £700. The incidence of failure is not known but is sufficient to justify adding guidance on gas reduction measures to Government publications on housing on gas contaminated land.

D20. The most serious, and thankfully rare, failure of suspended concrete floors is corrosion of reinforcement leading to the collapse of the floor. The resultant repairs are very disruptive as occupiers usually have to move out of their homes to allow work to proceed. The cost of repair failed floors could amount to thousands of pounds particularly if fixtures and fittings are damaged and have to be replaced. Due to the cost of the work and possible impacts on structural safety either the building owner or his insurers will tend to appoint a surveyor or engineer to manage the work.

D21. An average repair cost for replacing a failed floor is approximately £4,000 plus £1,500 temporary accommodation. Surveyor’s fees and loss adjuster’s charges £1,000. Total cost £6,500.

D22. Unexpected build up of gas beneath buildings can quickly create a serious safety hazard. The cost of repair of collapsed floor is very expensive and disruptive. Due to the combination of cost and unpredictability these measures are probably justified.

Implementation Costs

Training

D23. Based on attendance levels at training seminars for the changes to the Building Regulations that came into effect in April 2002 the cost of training related to one part of the Building Regulations has been estimated at £3.5 million. This cost will tend to occur in year one and includes both external training and in house training often using materials from seminars and workshops.

D24. This cost is considered to be a general business expense rather than a burden. Good employment practices recommend that at least 1% of the employer's wage bill should be spent on training. Professional institutions that include designers, building control surveyors and project managers in their membership require that at least 20 hours per year are spent on continuing professional development. This indicates that employers in the construction industry should be spending at least £7.5 million on training. Building Regulations are a core skill for all building designers and supervisors. Spending half the minimum training expenditure target on awareness of changes to the Building Regulations is not considered to be excessive.

ANNEX E to Section 3: Competition Assessment

E1. ODPM considers that the proposed amendments to the regulations would have no significant effect on competition in any markets. The majority of the changes are intended to bring legislation into line with current practice, and as such should not significantly alter the current situation.

E2. Water resistant particle board for floors tends to be a niche market with restricted demand. The proposal that all wood particle based floor materials for use in bathrooms, kitchens etc., should be water resistant should increase the demand for water resistant boards and make it a more viable product for manufacturers.

E3. The requirement to install radon protective measures should not have a negative impact upon competition as it is an extension of a similar existing requirement.

E4. The supply of materials for gas resistant barriers is shared between large companies and Small and Medium Enterprises (SMEs). The smaller firms tend to serve the more specialised sector and have benefited from the evolution of requirements related to soil gas protection for buildings.

ANNEX F to Section 3: Small firms impact test

F1. Six companies were interviewed over the telephone. One group was identified through their response to the Part C consultation exercise and stating that they were willing to partake in the exercise. Another group were contacted as a result of having relevant knowledge of issues thought likely to have a cost impact. For example, the proposal that Requirement C1(2) be added to the requirements in Regulation 6 of the Building Regulations 2000 would mean that builders and architects operating in radon affected areas would need to install radon protective measures when buildings undergo a change of use.

(a) Small builder operating in a radon affected area

F2. The company consists of an owner plus 6 builders. It is a general building firm operating in the domestic market and undertakes new-build, conversions, extensions as well as installing radon protective measures. The turnover is estimated to be in excess of £100k per year. The owner had not seen the Part C consultation.

F3. Overall, the owner felt that the proposals would have little impact on him as he feels he works to good practice already. Being a long standing experienced builder he is keen to avoid problems with clients since his work is focussed in a local area. With regard to radon they already install radon protective measures in conversions which includes sumps and barriers. Often the sump is constructed and can then be activated if measurements show indoor radon levels exceed the action level. With regard to the changes concerning moisture:

- The company already uses moisture resistant board in kitchens and bathrooms.
- It does not ventilate suspended concrete floors but felt costs would be negligible if constructed (under £100 per unit).
- Already installs drainage channels to deal with moisture from doorways with level access.
- Installs rebates and check reveals where appropriate.

F4. Given that the company already works to the required level he felt that there would not be any costs for familiarisation and training, although he is happy to attend seminars provided that they were provided locally. He mentioned that such seminars had been run locally by building control departments in the past and had provided very useful, but these had not taken place in recent years.

(b) Local authority building control body operating in a radon affected area

F5. This local authority BCB has 6 technical staff and 2 administrative staff. Although the respondent did not know the turnover (in terms of income from building control fees) he said that the department had some 800 applications each year together with about 100 AIs and initial notices. The respondent had not seen the consultation.

F6. Overall, he felt that the impact would be small. The key ones discussed were:

- Protective measures for building conversions. The department already require appropriate measures to be provided, and these conform to new-build requirements.
- Land affected by contaminants. The staff rely on the expertise of consultants making recommendations but they may employ a third party (as they currently do to check structural engineering calculations) on some occasions to provide additional independent and expert advice.

F7. Training was also felt to be an issue and as such staff would need to spend some time familiarising themselves with the new provisions and improving their professional knowledge. This was felt to be only a few hours of their time and could be considered as part of their job and CPD. They may attend seminars as staff had recently done with respect to the recent changes to Part E.

(c) Architect working in a radon affected area

F8. The company is a relatively small domestic and planning architectural practice with 3 technical staff and 1 administrative person. The turnover is about £120k per year with the company receiving about 150 commissions per year (new build, conversions and extensions). He had not seen the consultation exercise.

F9. The impact of the proposed changes was judged to be small. The company already installs radon barriers and sumps in its conversion work so is already meeting the proposed requirement in this area. On the proposals with regard to the moisture the company already uses moisture resistant floor boards, but does not routinely ventilate beneath suspended pre-cast concrete floors so there would be a cost implication. The respondent did not have knowledge about the specification of other areas (e.g. changes with respect to cavity walls) to say whether there would be an impact.

F10. Training was an issue which would need to be addressed but this would be done by attending local seminars. This activity was regarded as CPD so would not necessarily be considered a cost impact.

(d) Local authority BCB with experience of dealing with contaminated land

F11. The BCB department has 10 staff in total (1 operational manger, 1 principal, 4 area inspectors, 2 assistants and 2 administrative staff). It has an annual turnover of some £0.3m (based on income from building control fees) and deals with about 1,300 applications per year (from a population of 140,000). The respondent had not seen the Part C consultation exercise.

F12. The department has a lot of experience of contaminated land re-development particularly petrol sites (the local authority has a petroleum officer), dockland areas and railway sidings. The building control staff make extensive use of the local environmental health department as it has extensive knowledge and experience of dealing with contamination (the local authority has actually produced its own contaminated land guide).

F13. Overall, the respondent felt that in this respect the proposals will have limited impact as the environmental health department is very well up to date with current legislation and guidance. The department has experience of conversions (particularly of shops/retail units) and it often requires installation of remedial measures to deal with contaminants including radon. The respondent felt that the department's use of Barbour index and internet meant that staff were reasonably up to date already so training would not be excessive, but this could be provided by the environmental health department and invited guest speakers (which have included building product manufacturers in the past). He felt that such training is effectively part of staff CPD.

F14. The respondent suggested that it was helpful to have all of the guidance drawn together in one document that is now up to date. He felt that the proposed changes with regard to change of use would help BCBs enforce the need for protective measures.

(e) Structural and civil engineering firm

F15. The company is a structural and civil engineering business (mostly structural though) undertaking a wide range of projects such as small extension to housing to large multi-storey office blocks. The firm does a lot of work for local authority BCBs by checking Building Regulation submissions for compliance with structural requirements, although this is only about 5-10% of their total work. It employs some 12 engineers/technicians as well as administrative staff, and has an annual turnover of some £0.75m. The respondent had seen the consultation exercise.

F16 The respondent's main concerns were that:

- Development to Building Regulations generally could undermine structural stability. He is concerned about the conflicting aims of a number

of regulations, and cited the particular example of the new Part E and the new requirements for party walls.

- Extent of clean-up required for contaminated sites. Given that Part C confirmed that building regulation control extended beyond the footprint of the building to include more of the surrounding site he was concerned that an over zealous local authority might require onerous clean-up of a whole site when only a small building was being constructed. This would have major cost implications if pragmatic judgements were not made.

F17. Overall though the respondent welcomed all of the proposed changes to Part C (although he was not that familiar with those regarding moisture as this was not necessarily an area of concern for his company) but did express the concern that there had been a huge expansion in the number of referenced documents.

F18. The main costs identified were those for training. There would be a cost to purchase and become familiar with all the new documents (e.g. British Standards, Environment Agency reports etc.). He was concerned that the amount of material was excessive and would take a great deal of effort to review which was far greater than in the past. Company staff may go to seminars if felt necessary, but alternatively they might buy in external advice for areas they felt they could not cover adequately. The respondent agreed that such costs could be considered as CPD but was still concerned that cost/effort was excessive.

F19. The main benefit identified by the respondent would be to the client who would have better performing buildings.

(f) Building product manufacturer

F20. The company has four core areas in which it makes and sells products: thermal insulation, geomembranes, vapour control and acoustics. It has about 100 staff which includes a sales force of 15 to cover the UK. Its annual turnover is some £13-14m. The respondent had seen the consultation.

F21. The main company interest in Part C is on the moisture and gas barrier side. The respondent is particularly interested in the potential use of vapour permeable underlay in roofs as opposed to the more traditional roofing felt. Research suggests that use of such underlay negates the need for roof space ventilation. If Part C were to include use of such underlays then it would boost the market share for this product from its current basis of 20% (the balance being traditional roofing felt).

F22. This would actually be a benefit to the company. As guidance on gas resistant membranes remains effectively unaltered there would be no impacts on the company, although he suggested that should reinforced membranes be specified in such circumstances (as opposed to the generic 1200 gauge polyethylene), then this of course would increase the company's market share.

F23. Training costs would be small since changes to Part C were minimal and that any training for staff (particularly the sales force) would be delivered internally. As a model though, the changes to Part E were presented to staff as part of their CPD through a series of seminars. These presentations were prepared internally as were then adapted for the sales force so that they could present to clients such as architects and local authorities. If necessary this would be done for Part C. Product literature would need to be updated in due course but he did not envisage that major changes would be required and could be accommodated in the usual cycle of literature updates.

F24. As the contaminated land (including gas) part of the guidance had been expanded from the previous edition the respondent felt that this greater prominence might boost sales of products.

Declaration

The Small Business service have been consulted and they agreed with our view that apart from training costs there appears to be no significant impact on small businesses.

SECTION 4. "ROBUST DETAILS": AN ALTERNATIVE TO SOUND INSULATION TESTING IN SUPPORT OF PART E - RESISTANCE TO THE PASSAGE OF SOUND

Objective

1. To assess the costs and benefits of a new option for demonstrating compliance with Requirement E1 of Part E of the Building Regulations - *Resistance to the passage of sound.* This was known as the Robust Standard Detail (RSD) option, but for brevity it is now called the Robust Detail (RD) option.

2. As use of the RD option will be an alternative to the existing pre-completion testing method for new houses and flats, it will mainly affect those builders who choose to use it, and acoustic consultants who carry out testing. Builders will entirely free to choose between RDs and testing, as they judge most cost effective, on each job. There may be some implications for manufacturers of building materials and products.

3. The Building Regulations apply in England and Wales.

Background

4. Part E of the Building Regulations has recently been reviewed, and the new 2003 edition came into force on 1 July 2003. It deals mainly with sound insulation between dwellings. The aims of the review were to broaden the scope of Part E, to raise standards of sound insulation, and of particular importance - to improve compliance with the performance standards in order to reduce the potential for complaints about noise from neighbours.

5. The method adopted in Part E to improve compliance is to introduce Pre-Completion Testing (PCT). This is a quality control procedure that will require the builder to have the sound insulation of a proportion of dwellings tested on each development - and apply remedial treatment to any that do not meet the performance standards. For dwellings formed by conversion of other types of building and rooms for residential purposes (i.e. hostel types of accommodation) PCT came into force on 1 July 2003. However, for new houses and flats PCT was to be delayed until 1 January 2004, but has been postponed to 1 July 2004.

6. The reason for the delay to 1 January 2004 was that at the request of the House Builders Federation (HBF), ODPM Minister's agreed that HBF should have extra time to develop the RD option as an alternative to PCT. RDs will be high performance constructions that are expected to give consistently good performance - and so not need regular quality control testing by PCT. The HBF proposals were the subject of a public consultation from 18 August to 10 November 2003. The subsequent postponement to 1 July 2004 was to allow the results of the consultation to be fully assessed. The Building Regulations could be amended to introduce this RD option from 1 July 2004, when PCT comes into force.

7. A final RIA relating to the 2003 edition of Part E, including PCT, was published on 19 December 2002. It is available on the ODPM website at: http://www.odpm.gov.uk/buildingregsrias. As this new RIA only describes an additional option that was not considered in the previous final RIA, much of the content of the previous final RIA is applicable, and will be referred to where appropriate.

8. A partial RIA was included in the public consultation on the RD proposal, and this RIA is based on the partial RIA with revisions in the light of the public consultation. An outline of the consultation follows.

Consultation

9. As the RDs have been developed by the HBF, there has been very wide consultation and active participation and support from the house building and construction products industries.

10. For formal public consultations, Buildings Division of ODPM holds lists of organisations with interests in each Part of the Building Regulations, and for this consultation the normal Part E list of about 170 organisations was used. The consultation was also put on the ODPM website.

11. Eighty-six responses were received, which break down by respondent type as follows:

Total responses by respondent type			**No responses were received from:**
Acoustic Consultant	8	9%	• Architects • Civil/Structural Engineer • Commercial Developers • Fire Authority • Journal/media • Property funder • Property Manager (Energy Manager)
Approved Inspector	2	2%	
Consultancy	2	2%	
House or property developer	11	13%	
Housing Assoc. (RSL)	2	2%	
Individual in practice, trade or profession	1	1%	
Local authority - building control	9	10%	
Local authority - environmental health	1	1%	
Local authority - other (please specify)	1	1%	
Manufacturer	13	15%	
Other non-governmental organisation	3	3%	
Private individual (non-affiliated)	1	1%	
Professional body or institution	10	12%	
Property Management (Facility Manager)	1	1%	
Research/academic organisation	2	2%	
Specific interest or lobby group	1	1%	
Trade body or association	14	16%	
Other	4	5%	

12. The consultation was generally favourable to RDs, although there were concerns, particularly about standards of workmanship. Officials have therefore continued to work with the HBF to develop detailed proposals on the way the RD system could operate to allay these concerns. These are incorporated in the next section. Other points arising from the consultation are discussed at appropriate points in the text.

The HBF RD proposal

13. The HBF project has led to a set of RD specification sheets for separating wall and floor constructions for use in new houses and flats. These cover masonry, timber and steel constructions, and are generic as far as possible. If the scheme is accepted, the intention is to set up a limited company to run it called Robust Details Ltd. A Management Board, supported by a Secretariat, would control this. The Management Board would include representatives from all relevant sectors of the industry, including: Construction Products Association; house builders; Housing Corporation; building control; warranty providers; a consumer representative; and an ODPM observer.

14. The Management Board would set-up four subgroups. Two of these would be technical, working to agreed protocols. One technical subgroup would be responsible for assessing performance evidence and recommending approval of other generic or proprietary systems which are candidates to achieve RD status; while the other technical subgroup would be responsible for monitoring the performance of the RD constructions on site, so any poor performing designs could be identified and removed or redesigned. If any developments monitored were found not to be using the RDs correctly, these sites would revert to control by

PCT. Of the two other non-technical subgroups, one would be responsible for recommending nominations to the Management Board, and the other responsible for the financial probity of the company.

15. The essence of the way the scheme could operate is as follows. The RD specification sheets would be contained in a book that is in the public domain, and which would be referred to in Approved Document E. The Regulations would also be amended to allow use of an RD as an alternative to PCT. To participate in the RD scheme, a builder would have to pay a small charge each time he used a RD (to cover the cost of operating the scheme - mainly the costs of the Secretariat and monitoring), and the resulting construction would be given a unique reference number. This would appear on a site checklist of key details, and another document that could be given to the building control body as evidence of compliance (of that particular construction) with the Regulations.

16. The above is only an outline of the way the scheme could operate. The fine details of its operation have not been established yet. For example, other Certification bodies could have a role in the candidate RD assessment procedure.

The risk

17. Planning guidance set out in Planning Policy Guidance note 3 (PPG 3) advocates building dwellings to a higher density - which means fewer detached houses and more attached houses and flats. This increases the potential for complaints about noise from neighbours and hence the need for action. Therefore, the main aim of the Part E review was to reduce the potential for complaints about poor sound insulation by improving compliance with the performance standards. This is set out in more detail in the attached Final RIA.

18. The risk of not introducing the RD option is that PCT will be the only method of demonstrating compliance available, with the attendant potential delays and costs.

The options

19. **Option 1** is to do nothing - that is retain PCT as the only means of demonstrating compliance.

20. The main risks with PCT are:

a. Builders will not know if their dwellings meet the performance standard until they are tested - and this cannot be done until they are near completion. If any fail there will be a delay of unknown duration while the fault is identified and remedial treatment developed and applied. This delay will affect the builder (in particular his cash flow) and also the purchaser who may not be able to move in on the desired date.

b. Currently there are not enough testing organisations to meet the expected demand for PCT, but a survey of members of the Association of Noise Consultants (ANC) has indicated that the industry will expand to the required size. However, this will take time, and may not be achieved by 1 July 2004 because of the hiatus while RDs were developed. Further, as house completions are somewhat cyclic, peaking in the summer and December, it may be that there will be times when sufficient testers are not available at short notice. This could be particularly important in sparsely populated areas such as Cumbria or Norfolk, and will contribute to further delays.

c. As PCT is a sampling approach, the majority of new dwellings will not be tested. The rational behind PCT is that the threat of testing will encourage builders to focus on the details that are important for sound insulation, and to aim for higher standards than the minima required to just pass the test, in order to compensate for workmanship defects on site. A Risk is that some builders will aim to just pass the test and so not achieve the higher level of performance anticipated, as the new standards are not very much higher than the current standards. A further risk may be that some builders will try to anticipate which dwellings building control will choose to have tested and concentrate resources on them, to the detriment of the others.

21. **Option 2** is to adopt the RD approach as an alternative to PCT for new houses and flats.

22. The risk here is that the RD approach may not be fully effective because, even with well designed RD constructions, it may be difficult to ensure that builders follow them in every important detail. There will be a range of RDs, and this risk will be exacerbated if builders favour the less reliable examples.

23. To counter workmanship faults, each RD will have a site checklist, which must be completed for each dwelling that uses an RD.

24. On the positive side, all dwellings on a site will use RD designs and there will be no benefit in concentrating resources on particular examples.

25. As neither PCT nor RDs are in full operation these risks cannot be quantified yet, although the performance of the proposed RD constructions have been established, as far as possible, under realistic site conditions, and without the additional control provided by the site checklist.

26. **Option 3** combines Options 1 and 2 for new houses and flats, to provide additional safeguards to counter the risk of Option 2, by applying pre-completion testing to RDs. This would be in addition to the monitoring already described in paragraph 8. It could be done by following the specified pre-completion testing procedures but with a lower rate of testing;

27. The risk here is that as the main objective of the RD scheme is to remove the uncertainty, delays and costs introduced by pre-completion testing it is possible that the introduction of testing (other than monitoring) will make the RD scheme unattractive to builders. The RD designs are generally more expensive than the constructions described in the Approved Document E, and the cost of testing will have to be added to this.

Benefits

28. **Option 1**. The benefits are set out in the previous Final RIA (section 7).

29. **Options 2 and 3**. As the RD approach is expected to give results that are comparable to PCT, the benefits to occupants of new homes will be similar.

30. The RD option also has benefits for builders and house purchasers in avoiding the delays to the construction process described in paragraph 20 above. As PCT is not operating yet the cost of these delays cannot be quantified reliably, but a rough estimate can be obtained as follows. Of the 125 000 dwellings with separating walls and floors that are built per annum, up to 25 000 may be tested. The average value of the capital locked in land and work in progress is about £80 000 per dwelling. Without testing, a hand-over date to the purchaser can be arranged before practical completion so there is minimal delay. With PCT, arranging testing, carrying out the tests, and then agreeing a hand-over date could take up to, say, 17 days. The cost of this delay in interest on the capital is £5 to £6 million. If the test is failed there could also be delays to the sale of other dwellings while the problem is resolved.

Business sectors affected

31. This is as discussed in the previous final RIA (section 8.1), in relation to the introduction of the new Part E (2003), and it should apply equally to PCT and RDs. For convenience it is reproduced below.

> 8.1 Business sectors affected
>
> The proposals discussed are wide ranging and would affect several sectors of the building industry including builders, developers, designers, manufacturers, and building control bodies. Some sectors would be affected by national sound insulation requirements for the first time, particularly those sectors covered by the definition of rooms for residential purposes (which include hotels, boarding houses, hostels, student accommodation, nurses' homes and elderly persons' homes). Charities would be affected in their role as social landlords and the effect of the new Requirements on the social housing sector has been specifically examined during the consultation period (see Appendix C).

32. It should be noted that the above extract applies to the introduction of the whole of Part E (2003), and the sectors affected by the RD option of will be mainly limited to builders and the testing industry.

Equity and fairness

33. This is as discussed in the previous final RIA (section 6.1) in relation to the introduction of the new Part E (2003). For convenience it is reproduced below. The improvements should apply equally to PCT and RDs.

> 6.1 Issues of equity and fairness
>
> 1. The current arrangement by which occupants and building owners seek to obtain redress for poor sound insulation is recognised to be unsatisfactory. It is difficult to retrospectively apportion blame for sound insulation defects that only become apparent once the dwelling is occupied. It is also difficult, and more expensive, to apply retrospective remedial treatment in an occupied property.
>
> 2. There is some evidence to suggest that the current arrangements are socially inequitable with improved standards of sound insulation only being available to those who complain, or who take legal action, or those who are fortunate enough to have responsible landlords or to be living at the luxury end of the market. The current lack of sound insulation testing means that little performance information is available, even to informed prospective occupants.

Costs

34. The increase in costs for the PCT and RD (option 2) options, both compared with the current situation, has been estimated by calculating the additional cost of improving the performance of each of the more common types of construction and considering a realistic mix of their use. The mix of dwelling types is changing (with a trend to fewer detached houses) and a scenario for 2005 has been adopted, with about 15% detached homes and the remainder split roughly equally between attached houses and flats. This scenario was set out and used in the previous final RIA (Section 8.5).

35. Table 1 below indicates the cost of improving construction types and adopting PCT, and is based on figures in the previous final RIA. Table 2 indicated the cost of improving constructions to the RD standard - which is higher than the minimum standard accepted when enforced by PCT.

Table 1. Cost of improving construction types and adopting PCT		
	Unit Cost	**Annual National Cost**
(a) Separating Walls	£0 (flats) £100 (attached)	£5.9 m
(b) Separating Floors	£1500 (range: £500 - £3000)	£83.9 m
(c) Subtotal (a) +(b)		£89.8 m
(d) Cost of PCT		£17.3 m
TOTAL (c) +(d)		**£107.1 million**

Table 2. Cost of improving constructions to RD standard		
	Unit Cost	**Annual National Cost**
(a) Separating Walls	£0 (flats); £135 (semi detached); £270 (mid-terrace)	£22.5 m
(b) Separating Floors	£1650 (range: £500 - £3300)	£95.3 m
Total (a) + (b)		**£117.8 million**

36. The above figures indicate an additional cost to industry of £10.7 million per annum by using RD constructions instead of cheaper constructions with enforcement by PCT. **However, there could be a net saving if RDs are used and the cost of delays to hand-over is taken into account as discussed in paragraph 40.**

37. Option 3 would combine the cost of using RDs with a proportion of the cost of PCT. The current guidance for PCT is to carry out one set of tests for every ten dwellings. If this were reduced to one set of tests for every twenty dwellings, for example, the cost would not be halved because there is a significant proportion of small sites with ten or fewer dwellings that would still have to be tested. Testing will always fall most heavily on small sites, whatever the rate of testing, although a lower rate of testing would reduce the costs on large sites.

38. The previous final RIA included estimates of the increase in cost of a range of developments, taking account of the increased cost of the constructions and the cost of PCT. These examples have been reworked to illustrate the cost of using RDs (option 2) instead of PCT, and this is shown in Annex 1. Although the overall cost of the RD approach is higher than PCT (excluding the cost of delays), the Summary indicates that for small sites the RD approach can be cheaper than PCT.

39. Under PCT it is likely that there will be constructions that fail to meet the performance targets. This will necessitate remedial work, and a delay while it is carried out. Both the remedial work and the delay have a cost, the latter being due to the builder having to service any loan for longer. These costs have not been taken into account in the cost of PCT on the grounds that it is the builder's responsibility to comply with the Regulations, and the fact that PCT has revealed shortcomings in the construction that he has to remedy, is not an additional burden.

40. There will also be delays to constructions that are tested and pass, and possibly to constructions not chosen for testing, while the building control body decides which ones to designate. All these costs are real to the builder, although they are difficult to estimate as there is no precedent. The House Builders Federation has estimated that the cost of the delay to those tested and passed could be up to £5 to £6 million p.a (see paragraph 30), but if there is a

delay to those not tested as well, the figure could rise to about £15 million per annum to the industry - which may decrease as builders and building control get used to the system. If this figure is added to the cost of the PCT option (£107.1 m) the cost becomes £122.1 million p.a. The RD option at £117.8 million p.a. then shows a saving of £4.3 million p.a. compared with PCT.

41. Several consultees commented on the costs set out above. However, comments tended to conflict, with some respondents saying the cost of PCT had been overestimated and others saying it had been underestimated. No alternative figures or calculations were offered, and no consistent view emerged. Therefore, the estimates given in the partial RIA have been used here.

Consultation with small businesses

42. The Small Business Service of DTI has also been consulted, and has asked for it to noted that firms spend a significant amount of time keeping up to date with revised and new regulations. The cost of this is likely to be proportionately higher for small firms than large ones. The specific impact of the proposals on small businesses was assessed during the public consultation.

43. Small builders and acoustic consultants were contacted, as these are most likely to be affected by the proposed amendments. All contacts were by e-mail, and the views expressed are summarised below.

44. The builders felt that pre-completion testing would introduce delays to completion, even where the tests were passed. The likely adverse effects of delays on their cash flow outweighed any extra cost of using RD constructions. They all expressed a preference for using RDs. They also said that over the next five years they expected to build fewer detached houses and more attached houses and flats. This would result in more testing, with the potential for more delays, unless RDs were introduced.

45. The acoustic consultants saw the proposed introduction of PCT for new houses and flats as an opportunity to expand their businesses, although not all wanted their businesses to go in this direction. The introduction of PCT (from 1 July 2003) for conversions and rooms for residential purposes had, or was expected to have, a beneficial effect on their businesses. Although the introduction of PCT was expected to greatly increase business for those who wanted it, the introduction of RDs instead, was expected to either result in a further small increase in business or to have no effect on business. There was no suggestion that introducing RDs would have an adverse effect on business at its current level.

46. To summarise, the builders clearly favoured the introduction of RDs, while the acoustic consultants saw their introduction as having a small beneficial effect, or no effect, on their current level of business.

Competition assessment

47. The proposal to adopt RDs affects house builders, building material/product suppliers, and the acoustic testing industry and so the competition filter approach has been used to assess the effect on competition for these three stakeholders. Representatives from the three sectors completed the filter and all indicated that effects on competition are minimal, so detailed analysis has not been undertaken.

Enforcement and sanctions

48. The Building Regulations are enforced by building control bodies, which may be local authorities or private companies. At the present time the National House-Building

Council (NHBC) is the only private company that can provide full building control services to house builders.

49. Builder's use of RDs will be subject to the same building control assessment as any other aspect of building that is controlled under the Building Regulations. However, it is likely that checking RDs will require less work than operating the PCT alternative.

50. It will still be the builder's responsibility to comply with the Building Regulations whether he opts for PCT or a RD solution. The sanctions for not complying with the Building Regulations will be the same in either case.

Monitoring and review

51. The effects of all amendments to the Building Regulations are monitored. In the case of the new Part E, its operation will be assessed by field measurements of the sound insulation between dwellings, and appropriate measurements to check the other Requirements. This will take place regardless of whether or not RDs are introduced. However, if RDs are introduced, the RD monitoring programme will cover 2% or 3% of constructions every year, which is far more than normal ODPM monitoring could check.

52. It will take some time for homes approved under the current Part E to be completed. ODPM monitoring will start after a reasonable number of new homes have been built to comply with the new Part E requirements, and this is likely to be about a year after Part E is introduced. Monitoring by RD Ltd would start sooner than this.

Guidance

53. Robust Details Ltd will publish a book containing the RD specifications, and this will be made available as soon as possible. These specifications will be based on those in the public consultation, but with improvements derived from the public comments. In effect this guidance has been available since August 2003. There will also be roadshow seminars on the subject held by the industry and professional bodies to disseminate the necessary information.

Summary and recommendation

54. The purpose of this RIA is to set out the case for introducing RDs as an alternative to PCT to demonstrate compliance with Requirement E1 of the Building Regulations for new houses and flats. PCT will remain for builder's who prefer to use it. The RD option was not considered in the previous final RIA, and so this RIA should be considered as an addition to the former.

55. The HBF have undertaken a major project to develop and test the RD specifications. If RDs are accepted a limited company will be set-up, controlled by a Management Board with four subcommittees, with a Secretariat to run the scheme. The scheme will be extended so that proprietary systems can be assessed, and to monitor performance of the RDs on site. Any development that is found not to be using RDs correctly would revert to PCT.

56. The main risk of adopting RDs is that performance may not be maintained on site, and so a checklist is included to focus the builder's attention on important details. This would be backed-up by the on site monitoring.

57. PCT is not without risks. The main ones are: only a sample of constructions will be tested; there may be a shortage of test organisations at certain times; there may be delays caused by the need for remedial treatment that will inconvenience the purchaser and increase the builder's costs.

58. The cost of using RDs is generally greater than the cost of using constructions from Approved Document E combined with PCT, except on small sites. The cost of delays has not

been considered under PCT because the builder is required to satisfy the Building Regulations, regardless of the enforcement regime. However, if the cost of these delays is considered, then the RD approach could be cheaper.

59. The main organisations affected are the house builders, and they clearly favour the RD approach, as they would prefer to spend extra money on the constructions rather than on testing. Acoustic consultants would also be affected, as adoption of RDs will lead to less work for them than testing. However, adoption of RDs will not reduce their workload compared with its current level.

60. It is recommended that the RD (option 2) is accepted as it is likely to give similar benefits to PCT, with less potential for disrupting housing completion schedules. If all costs are considered the RD option is likely to be cheaper than the PCT approach. If there are any shortcomings, they will be revealed by the monitoring programme and corrected.

ANNEX 1 to Section 4: Comparison of costs for seven developments using PCT and RD approaches

Example 1. A small site with one pair of semi-detached dwelling houses.

Original RIA figures, including costs of PCT
Requires 1 set of tests (walls only)
2 airborne tests @ £240 per test = £480
Thus cost of tests per dwelling is 480÷2 = £240
Increased cost of separating construction per dwelling = £50
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £285
Total increase in cost is £583 per dwelling

RD approach instead of PCT
Increased cost of separating construction per dwelling = £135
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £285
Total increase in cost is £428 per dwelling

Example 2. A site with 2 terraces each having 5 dwelling houses.

Original RIA figures, including costs of PCT
Requires 1 set of tests (walls only)
2 airborne tests @ £240 per test = £480
Thus cost of tests per dwelling is 480÷10 = £48
Increased cost of separating construction per dwelling = £50
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £285
Total increase in cost is £391 per dwelling

RD approach instead of PCT
Increased cost of separating construction per dwelling = £216
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £285
Total increase in cost is £509 per dwelling

Example 3. A site with 1 terrace of 5 dwelling houses and 3 pairs of semi-detached dwellings

Original RIA figures, including costs of PCT
Requires 2 sets of tests (walls only)
4 airborne tests @ £240 per test = £960
Thus cost of tests per dwelling is 960÷11 = £87
Increased cost of separating construction per dwelling = £50
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £285
Total increase in cost is £430 per dwelling

RD approach instead of PCT
Increased cost of separating construction per dwelling = £149
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £285
Total increase in cost is £442 per dwelling

Example 4. A small site with 1 block of flats having 1 ground floor flat and 1 first floor flat.

Original RIA figures, including costs of PCT
Requires 1 set of tests (floors only)
2 airborne tests @ £240 per test = £480
2 impact tests @ £300 per test = £600
Thus cost of tests per dwelling is 1080÷2 = £540
Increased cost of separating construction per dwelling = £750
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £0
Total increase in cost is £1298 per dwelling

RD approach instead of PCT
Increased cost of separating construction per dwelling = £825
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £0
Total increase in cost is £833 per dwelling

Example 5. A site with 5 blocks of flats each block having 1 ground floor flat and 1 first floor flat

Original RIA figures, including costs of PCT
Requires 1 set of tests (floors only)
2 airborne tests @ £240 per test = £480
2 impact tests @ £300 per test = £600
Thus cost of tests per dwelling is 1080÷10 = £108
Increased cost of separating construction per dwelling = £750
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £0
Total increase in cost is £866 per dwelling

RD approach instead of PCT
Requires 1 set of tests (floors only)
2 airborne tests @ £240 per test = £480
2 impact tests @ £300 per test = £600
Thus cost of tests per dwelling is 1080÷10 = £108
Increased cost of separating construction per dwelling = £825
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £0
Total increase in cost is £833 per dwelling

Example 6. A site with 1 block of flats having 2 ground floor flats and 2 first floor flats

Original RIA figures, including costs of PCT
Requires 1 set of tests (walls and floors)
4 airborne tests @ £165 per test = £660
2 impact tests @ £300 per test = £600
Thus cost of tests per dwelling is 1260÷4 = £315
Increased cost of separating construction per dwelling = £750
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £0
Total increase in cost is £1073 per dwelling

RD approach instead of PCT
Increased cost of separating construction per dwelling = £960
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £0
Total increase in cost is £968 per dwelling

Example 7. A site with 1 block of flats containing 78 flats

Original RIA figures, including costs of PCT
Requires 8 sets of tests (walls and floors)
32 airborne tests @ £105 per test = £3360
16 impact tests @ £200 per test = £3200
Thus cost of tests per dwelling is 6560÷78 = £84
Increased cost of separating construction per dwelling = £750
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £0
Total increase in cost is £842 per dwelling

RD approach instead of PCT
Increased cost of separating construction per dwelling = £1027
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £0
Total increase in cost is £1035 per dwelling

SUMMARY OF COSTS FOR SEVEN SITES

Example	Description	Original RIA £/dwelling	RD Estimate £/dwelling	Difference £/dwelling
1	*A small site with one pair of semi-detached dwelling houses*	583	428	155 RD less costly
2	*A site with 2 terraces each having 5 dwelling houses*	391	509	118 RD more costly
3	*A site with 1 terrace of 5 dwelling houses and 3 pairs of semi-detached*	430	442	12 RD more costly

	dwellings			
4	*A small site with 1 block of flats having 1 ground floor flat and 1 first floor flat*	1298	833	465 RD less costly
5	*A site with 5 blocks of flats each block having 1 ground floor flat and 1 first floor flat*	866	833	33 RD less costly
6	*A site with 1 block of flats having 2 ground floor flats and 2 first floor flats*	1073	968	113 RD less costly
7	*A site with 1 block of flats containing 78 flats*	842	1035	193 RD more costly

SECTION 5

DECLARATION

I have read the Regulatory Impact Assessments contained in this document, and I am satisfied that the balance of cost and benefit is the right one in the circumstances.

Signed by the responsible Minster, **Phil Hope (***Parliamentary Under Secretary of State at the Office of the Deputy Prime Minister) on 28 May 2004.*