Department for Communities and Local Government

Further economic and analytical support for proposals to amend the Building Regulations in 2013

Report

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Department for Communities and Local Government

It should be noted that in preparing the Impact Assessments to support the 2013 changes to the Building Regulations, the Department used several different methodologies and information sources, with the EC Harris work being one source of information. Therefore the Impact Assessments do not fully match EC Harris' work.

As part of this contract EC Harris produced analysis of certain issues not directly relevant to the 2013 changes being taken forward. This information will be retained to inform potential changes to the Building Regulations in the future.

This document/publication is also available on our website at www.gov.uk/dclg

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1 Introduction

1.1 EC Harris was appointed by the Department for Communities and Local Government (DCLG) to provide specialist economic and analytical information to support evaluation work being carried out by DCLG on changes to the Building Regulations due to come into force in 2013.

1.2 The appointment was made under the Homes & Communities Agency Multidisciplinary Panel and as such provided for appropriate specialist input from EC Harris' partners, PRP Architects, Hyder Consulting and Adroit Economics.

1.3 The work under this research project was required to support the 2013 change programme by:

- Assessing and quantifying the impact of proposed changes.
- Carrying out economic analysis of the costs and benefits of suggested changes, in the form of identifying winners and losers, including equality issues, and generating broad ranges of values sufficient to inform further development of options.
- Preparing draft and final reports summarising the above.

1.4 A summary of the research carried out under this project on a number of separate issues is given in the following chapters of this document.

1.5 The summary reports contained in this document have been prepared to inform DCLG. However, other considerations may result in the DCLG final impact assessments for these areas of work differing from the output of this research.

1.6 The study is provided for use by DCLG. No third party shall have the right to rely on the report and EC Harris LLP accepts no liability to any third party.

2 Possible changes to Approved Document M

2.1 Purpose of task

The primary purpose of this task was to:

- Identify those areas of guidance where AD M currently requires higher levels of provision than BS8300.
- Assess the impact of aligning guidance within AD M with BS8300, including savings in construction and administration (reduction in duplication, reduced frequency of dispute and simplification).

2.2 Deliverables

The deliverables of this task were:

- Evaluate potential savings that can be achieved by:
  - Aligning guidance in BS8300 with revised lower levels of provision within AD M.
  - Incorporating FAQ's into core guidance in AD M.
- Consider whether there are any broader impacts in revising guidance as described above.

2.3 Approach

2.3.1 Quantifiable cost saving per building

Areas of guidance where AD M currently requires higher levels than BS8300 were identified, and commentary was given against each to highlight any potential benefits from amendment. This was further supported by sketches and design metrics to estimate the cost savings that could be achieved by aligning AD M with BS 8300. The cost savings were prepared for five building types representing typical non-domestic dwellings:

- Office: small / medium / large;
- Retail: small / large

These building types clearly do not cover all instances where a change to the regulations would have an impact. They are however considered to be the most significant building types in terms of impact / number of buildings impacted.

Table 2.1 sets out the estimated cost saving for each of the changes per project by building type.

Table 2.1: Cost saving by building type

Item number	Issue where ADM requirements are higher than BS8300	Small offices	Medium offices	Large offices	Small retail	Large retail
1	Width of flights (internal and external flights)	£2500	£5,000*	£2,500	£2,500	£2,500
2	Circular handrail (internal and external flights)	-	-	-	-	-
3	Clearance of handrail from wall (internal and external flights)	£100	£200	£100	£100	£100
4	Vision panel at side of entrance door	£150	£150	£150	£150	£150
5	Enlarged WC cubicle	£1,600	£1,600	£16,000**	£3,200	£6,400***
7	Door closing forces	-	-	-	-	-
9	Coldness to the touch	£250	£600	£650	£250	£350

Notes:

* Small offices include one flight rising one level. Large offices include one flight from ground to first floor only (lifts and secondary staircase not impacted by this change are used elsewhere). Medium office assumes three storeys and no lift, therefore all stair flights impacted.

** Assume 5-storey building with 2 extra-large WC per storey.

*** Assume 2 extra-large WC per floor on two floors within the store.

2.3.2 Estimated time savings

Architects' time savings were also assessed, based on an estimate of hours saved per project as a result of simplified regulation. This is presented in Table 2.2.

Table 2.2: Estimated Architects' time savings

Building Type	Architect time saving per project (hr)	Architect Charge-out Rate (£/hr)	Total Cost Saving per Building
small offices	1	£70	£70
medium offices	1.5	£70	£105
large offices	3	£70	£210
small retail	1	£70	£70
large retail	3	£70	£210

Building control time savings have been estimated at 20 minutes per project, using an hourly rate of £60, which resulted in a saving of £20 per project across all building types.

2.3.3 Number of new developments

As there is no definitive source of information on the number of office and retail developments built each year, historical information was used to give a range of scenarios of low, medium and high to test the cost savings. These numbers are shown in Table 2.3.

Table 2.3: Number of new developments

Building Type	Scenario 1 (2007 RIA data)	Scenario 2 (2009 construction order data)	Scenario 3 (2008 construction order data)
small offices	1,300	4,600	6,000
medium offices	300	400	700
large offices	100	200	300
small retail	2,300	3,700	3,200
large retail	1,100	500	600
Total	**5,100**	**9,400**	**10,800**

2.3.4 Proportion of buildings impacted

The cost impact of each issue where ADM requirements are higher than those in BS8300 is different for each building type. An estimate was been prepared with regard to the proportion of projects in each building type to which cost savings can be achieved through alignment of the two documents.

2.4 Key findings

2.4.1 The results of the cost and benefit analysis

Based on assessments and estimates made above, the annual cost savings was modelled for the construction industry in England. The estimate of annual savings ranges from £6.2m to £17.5m, with a mid-point of £8.8m. Around 90% of the savings are expected to be derived from a reduction in build costs under any of the development scenarios (the remaining savings are predominantly in terms of design time for architects). These cost savings are presented in table 2.4.

Table 2.4: Cost and benefit analysis results

New development Scenario	Scenario 1 (2007 RIA build estimates)	Scenario 2 (2009 construction order build estimates)	Scenario 3 (2008 construction order build estimates)
Low proportion impacted	£6,142,950	£5,122,400*	£6,595,500
Medium proportion impacted	£10,215,950	£8,728,800*	£11,347,850
High proportion impacted	£11,800,750	£13,359,250	£17,421,000

Note:

* Scenario 2 has less impacted numbers of large retail buildings compared with Scenario 1, thus resulted in smaller value.

Transition costs have been estimated by assuming that all architects (32,000) and building control officers (6,000) will require 1 hour of training for the new policy. Their time has been costed at £70 and £60 respectively. This one-off transition cost is estimated at £2.60m and is built up as shown in Table 2.5.

Table 2.5: Transition costs

Professional	Number	% impacted	Hours of training time	Cost Per Hour	Total Cost
Architects	32,000	100%	1	£70	£2,240,000
Building control officers	6,000	100%	1	£60	£360,000
Total	**38,000**				**£2,600,000**

Table 2.6 shows the assessment of the costs and benefits over a ten year period for the nine scenarios using a discount rate of 3.5%. The mid-point Net Present Value is £72.5m of net savings to business, within a range of £50.3m to £147.4m.

Table 2.6: 10-year period cost and benefit analysis

New development Scenario	Scenario 1 (2007 RIA build estimates)	Scenario 2 (2009 construction order build estimates)	Scenario 3 (2008 construction order build estimates)
Low Proportion Impacted	£50,276,588	£41,492,013	£54,171,996
Medium Proportion Impacted	£85,335,695	£72,534,774	£95,078,735
High Proportion Impacted	£98,977,157	£112,392,236	£147,354,507

2.5 Notes and key assumptions

2.5.1 Key assumptions

- Any reduction from AD M to BS8300 will not lead to a loss of accessibility for disabled / mobility impaired users (i.e. the BS represents a good standard whilst the current AD M over-specifies for no material benefit).
- The stair going was assumed as 250mm for cost saving estimates of all the staircase related items, as both AD M and BS8300 require a minimum of 250mm for the going of an internal stair. A dimension of 300mm is relatively commonly adopted and this would generate greater cost benefits.
- All costs are at UK mean base location, 4Q11.

2.6 Key risks and uncertainties

2.6.1 Source of information

As mentioned in 2.3, there is no definitive source for the number of office and retail developments built per annum. The economic climate has a major impact on the annual development; a scenario testing was therefore undertaken to consider a range of scenarios (low, medium and high) and the cost impact of each.

2.6.2 Proportion of buildings affected

It is difficult to predict the proportion of buildings that will be impacted by the potential changes to Part M, as this will depend on the building type and specific design requirements, and no hard data can be sourced on this.

Similarly to the annual development numbers, an internal review was undertaken with a number of experienced Architects to gain consensus on proportion of buildings affected.

2.7 Areas for further work

None identified.

2.8 Statement on specific impacts

Item	No impact anticipated	Potential impact – investigate further	Likely impact – details provided below
Economic / Financial			
Small Businesses	✓		
Micro Businesses	✓		
Proportionality	✓		
Wider Economy	✓		
Competition	✓		
Innovation	✓		
Other Departments	✓		
Social			
Social, Wellbeing or Health Inequalities	✓		
Safety at Work / Risk of Accidents in the Community		✓	
Crime Prevention	✓		
Level of Skills and Education	✓		
Quality of Life in the Local Community	✓		
Rural Areas	✓		
Human Rights	✓		
Equality Act 2010 – Disability, Race, Pregnancy etc		✓	
Environmental			
Emission of Greenhouse Gases	✓		
Climate Change	✓		
Waste Management	✓		

Note - Work to date has suggested that the changes under consideration would not have a material detrimental impact on safety or accessibility. However, it is suggested that further design studies be undertaken to verify this conclusion.

3 Access statements

3.1 Purpose of task

The purpose of this task is to:

- Gather robust evidence on the way in which Access Statements are used and assess associated costs and benefits of options for change.

3.2 Deliverables

The deliverables of this task were:

- Assess the impacts of the current Access Statement arrangements and the impacts of various simplification and streamlining options through a two-phase approach:
    - Phase 1 – to collect anecdotal evidence, refine and pilot the research methodology;
    - Phase 2 – to implement the refined and approved research processes based on an agreed sample frame and data collection methodology.

3.3 Approach

3.3.1 Phase 1 survey

The Phase 1 survey aimed to assess the effective use of Access Statements with the aid of building control bodies, as well as developing a feasible research methodology. The Phase 1 works comprised the following activities:

- Qualitative questionnaire – to seek the views on a number of issues related to Access Statements from representatives of building control bodies and volunteer local authorities / private sector providers.
- Methodology for detailed data extraction – building control bodies were invited to review and provide comments on the practicability of the methodology.
- Data logging – to gather some very basic information about every building control application received by the participating organizations over a period of about 2 months.

3.3.2 Phase 2

Phase 2 comprises three main elements:

CASE STUDY REVIEW

Phase 2 started with liaising with the participating building control bodies to collect a reasonable number of Access Statement case studies submitted with Building Control applications within the last four years. A thorough review of

each case was then undertaken to extract the key information to a standard pro-forma to enable the cost and benefit analysis.

CBA IMPACT ASSESSMENT AND OPTIONS MODELLING METHOD
In the 2012 consultation document, DCGL has advised that:

"We have explored the possibility of removing recommendations and guidance on demonstrating compliance from AD M completely. However, extensive engagement with external partners suggests that Industry as a whole does not favour this approach, noting that there are still significant gaps in skills and awareness where guidance on demonstrating compliance is of benefit."

Using the HM Treasury Green Book project appraisal guidance, a Cost-Benefit Analysis (CBA) using the latest data available, including evidence obtained in the Phase 1 survey, modelled the position for the following two options for changing the Access Statements regime following:

- Option 1 – Do nothing;
- Option 2 – Revise guidance to deliver a more efficient approach.

The benefit changes in the above options are considered as non-monetised benefits and are not quantified in the CBA framework. Instead, the benefits has been reviewed in qualitative terms via the Access Statement case studies.

IMPACT SCALE UP METHOD
The CBA analysis assessed the cost impacts to different groups of the field work sample, which was then scaled up to the level of the industry (England) for a typical year to project the impacts over subsequent years (the next 10 years)

3.4 Key findings

3.4.1 Phase 1 survey

Some recurring points emerged from the comments provided by the respondents to the Phase 1 survey on various subjects. These include:

- Access Statements are rarely received with building control applications.
- Access Statements are not generally used as intended, especially on smaller domestic projects where they tend to be used to deal with specific departures from AD M.
- The quality of submitted Access Statements tends to vary dependent on the size of projects, i.e. on larger projects, the statements are more comprehensive and consider inclusive design for all users.
- Clear and comprehensive guidance would be welcomed to ensure consistency in Access Statement submissions.

3.4.2 Data logging

The data logging form was issued to 26 volunteers and sought to gather some basic information about every building control application received between 10

October and 25 November 2011. 14 out of the 26 participants completed and returned the form.

A total number of 1,333 building control applications were submitted over the period. Among all the applications, 441 were expected by the building control bodies to submit an Access Statement, however, only 37 schemes actually made a submission.

The analysis of the logging form data correspond with the Phase 1 survey results, i.e. Access Statements are rarely received with building control applications. The schemes that should submit Access Statements do not normally do so in practice.

These findings were used to model the cost of preparing Access Statements in scenario 1 of both options. Due to the relatively small sample size other approaches were also utilised.

3.4.3 Case study review

The data collection process proved to be challenging, as most volunteer participants indicated that they received very few Access Statements over the last four years and could only track down a small number. However, a total number of 128 case studies were provided by the 11 participating building control bodies (comprising local authorities and approved inspectors).

A review of all the case studies was conducted and the key information was logged onto a pre-developed pro-forma.

The case studies consisted of a wide variation of building project types and the quality of content and presentation of Access Statements was highly variable. The desk study revealed that the Access Statements that were submitted overwhelmingly sought and set out a fully compliant design (in accordance with or better than ADM guidance) or justified a reasonable variation. However, very few Access Statements seemed to be prepared on the original rationale of evolving a strategy from project inception through to building use and management.

The qualitative benefits of each case was also analysed in terms of:

- improved compliance
- avoiding problems
- cost saving.

All cases were subjectively judged and the findings suggested that over 50% of the submitted Access Statements contributed only marginal benefits to the overall design and planning process.

The Phase 1 survey and case study analysis work suggests that applicants do not normally see the benefits of using Access Statements on projects, and hence do not spend resources to prepare them. Some other applicants that do submit Access Statements do not appear to gain much benefit, whilst only a fairly small proportion use them proactively in complex schemes and do see a real benefit. The evidence appears to show that the current system isn’t working

effectively and supports the proposal to amend the way in which Access Statements are used.

3.4.4 Cost-benefit analysis

The CBA framework estimates the costs of preparing Access Statements in England under three scenarios, based on the number of Access Statements of different types submitted per annum, over a 10 year period. There is no central record of the number of Access Statements submitted; the three scenarios therefore represent low, medium and high ranges based on the various data sources.

Three cost components are considered when estimating the cost of preparing Access Statements:

- Value of time to prepare Access Statements – cost to construction industry;
- Value of time to review Access Statements – cost to Building Control bodies;
- Value of time to consult on Access Statements – cost to other stakeholders.

Table 3.1 provides a breakdown of the costs for each of the three scenarios.

Table 3.1: Costs of preparing Access Statements

Cost items	Scenario 1 (8,000 p.a.)	Scenario 2 (10,000 p.a.)	Scenario 3 (20,000 p.a.)
Value of time to prepare Access Statements	£2,372,895	£2,931,672	£5,863,343
Value of time to review Access Statements	£640,962	£791,898	£1,583,795
Value of time to consult on Access Statements	£469,449	£579,996	£1,159,993
Total Annual Cost	**£3,483,306**	**£4,303,566**	**£8,607,131**
10 Year Net Present Cost	**£29,983,206**	**£37,043,744**	**£74,087,487**

Option 1 (do nothing) will not incur any additional costs and benefits as there are no changes to the current position.

Option 2 (the preferred option of revising the guidance) proposes a more flexible approach to Access Statements, encouraging early engagement between Building Control bodies and applicants and focusing efforts where risks / issues arise. A written statement, whilst continuing to be a useful option, is recognised as not being applicable in all cases. Verbal or drawing based approaches could also be taken.

A one-year transitional cost would be incurred, due to the cost of time required for familiarisation with the revised guidance. The calculation of transitional cost has used the following assumptions, as stated in the 2012 consultation

document on Access Statements:

- 80% of professionals (architects, building control, building surveyors and other) spend 15 minutes reading guidance
- 2.5% to 5% of professionals spend 8 hours revising their in-house approach to Access Statements
- 22.5% to 45% of professionals spend 30 mins being trained on new approach.

The costs and savings of implementing Option 2 are given in tale 3.2.

Table 2. Costs of preparing Access Statements for Option 2

Option 2: Review guidance to deliver a more efficient approach			
Cost Items	**Scenario 1 (8,000 p.a.)**	**Scenario 2 (10,000 p.a.)**	**Scenario 3 (20,000 p.a.)**
Value of time to prepare Access Statement	£1,723,113	£2,128,877	£4,257,754
Value of time to review Access Statement	£352,354	£435,327	£870,654
Value of time to consult on Access Statement	£245,646	£303,491	£606,983
Total Annual Cost	**£2,321,113**	**£2,867,695**	**£5,735,391**
10 year NPV	**£19,979,410**	**£24,684,222**	**£49,368,445**
Cost Saving of Preferred Option vs Current Option			
One Off Transition Costs - Year 1	£2,183,250	£2,183,250	£2,183,250
Cost savings (10 year NPV)	**£7,820,546**	**£10,176,271**	**£22,535,792**

3.5 Notes and key assumptions

3.5.1 Reduced number of access statements in Option 2

It is anticipated that the implementation of the preferred option would result in a reduction in the overall number of Access Statements submitted. Only the schemes where Access Statements are viewed as beneficial would continue to produce the documents. In the cost-benefit analysis, it is assumed that the preferred option would lead to a 60% reduction in the number of simple Access Statements submissions. This is based on an analysis of the likely qualitative benefits of the Access Statements. This analysis found that:

- All of the detailed access statements were likely to have a significant or strong impact on compliance, avoiding problems or reducing costs.

- In contrast, 60% of the simple access statements were found not to have a significant or strong impact on any of these potential benefits.

3.5.2 Comparison of previous and current studies

It has been identified that there are significant differences in the “Cost to prepare an Access Statement” per annum between the current work and previous work undertaken by EC Harris in 2011. A detailed comparison has been conducted between the two pieces of work and it is concluded that the following factors contribute the major cost difference:

- The number of Access Statements submitted per annum – This is the main factor that caused the cost difference. The previous works estimated the total number of Access Statements that SHOULD be submitted per annum (approx. 41,000 number) depending on the schemes size and complexity, while the current assessment are based on the number of Assess Statements that are ACTUALLY submitted (8,000 to 20,000 number). Data obtained from the returned data logging forms and DCLG’s recent online survey with Building Control officers formed the basis of calculating the actual number in the current assessment.

- Preparation time for each Access Statement – In the previous work, it was estimated a range of 1.125 - 45 hours to prepare Access Statements depending on the value and complexity of the scheme. The recent Access Statement case studies review suggested that simple Access Statements would need approximate 2 hours to prepare and 39 hours may be required to prepare detailed Access Statements.

- Proportion of the type of Access Statements submitted – In the previous work it was estimated that 37% of the submitted Access Statements would be simple ones, 58% medium and 5% detailed Access Statements. However, this study suggests that the majority of the submissions (92%) are simple ones that need less time and costs to prepare.

3.6 Key risks and uncertainties

The main risks and uncertainties identified in Phase 2 and the mitigation are summarized in table 3.3.

Table 3.3: Risks and uncertainties

1. Shortfall in details within Access Statement case studies	
Risk: The case study review commentary indicated that *"the quality of the Access Statement submissions and actions was of highly variable apparent quality… Quite a few cases were submitted in a manner so as not to disclose sources, hence there are gaps in some of the data sets".* All cases were subjectively judged both in terms of key information of Access Statements preparation and the extra over benefits to design and building control processes.	**Mitigation:** The majority of cases provided sufficient details for analysis whilst the analyst also have extensive experience of dealing with Access Statements and building control processes, the risk that the review results deviate from the original applicants' intention is therefore very low.
2. Uncertainty on number of Access Statement submitted per annum	
Risk: The "Number of Access Statements submitted per annum" is based on the data obtained in returned data logging forms and DCLG's online survey with building control bodies in England, i.e. the percentage of building control applications that are accompanied by Access Statements submissions. However, DCLG's survey results indicated data ranges that are higher than the logging forms data examined in this study.	**Mitigation:** Three scenarios were modelled to represent the low, medium and high ranges, based on different data sets: ▪ Low – circa 8,000 (based on the reported % of building control applications accompanied by an access statements from the logging forms survey) ▪ Medium – 10,000 (based on the mean response from the DCLG survey of Building Control officers) ▪ High – 20,000 (based on the median response from the DCLG online survey of Building Control officers)

3.7 Areas for further work

None identified.

3.8 Statement on specific impacts

Item	No Impact Anticipated	Potential Impact – Investigate Further	Likely Impact – Details Provided Below
Economic / Financial			
Small Businesses		✓	
Micro Businesses		✓	
Proportionality	✓		
Wider Economy	✓		
Competition	✓		
Innovation	✓		
Other Departments	✓		
Social			
Social, Wellbeing or Health Inequalities	✓		
Safety at Work / Risk of Accidents in the Community	✓		
Crime Prevention	✓		
Level of Skills and Education	✓		
Quality of Life in the Local Community	✓		
Rural Areas	✓		
Human Rights	✓		
Equality Act 2010 – Disability, Race, Pregnancy etc		✓	
Environmental			
Emission of Greenhouse Gases	✓		
Climate Change	✓		
Waste Management	✓		

Potential impacts to the above identified parties include:

- Small Business and Micro Business – The Access Statement case studies review suggested that the applicants for small works are currently incurring the worst costs/benefits and providing marginal value to the overall design and planning process. The preferred option aims to reduce administrative burden whilst improving the quality of compliance. A number of poor quality and ineffective Access Statements produced, particularly for smaller scale work, will be replaced by more effective and lower cost methods of communication. Overall any disproportionate impact on small/micro businesses should therefore be a positive one.

- Equality Act 2010 – The preferred option seeks to maintain the current benefits. Therefore it is not anticipated that any reduction in accessibility will occur.

4 Lighting diffusers: relaxing the provision of Part B2

4.1 Purpose of task

The primary purpose of this task is to test the proposition suggested by industry sources that allowing commercial lighting systems to use class TPb diffusers will offer savings of around 15% in terms of capital cost and energy consumption.

Note. It is understood that that there are no fire safety implications of the use of TPb diffusers and this point has not been investigated in this report.

4.2 Deliverables

The deliverables of this task are to:

- Undertake a number of case study designs following both the existing guidance and the proposed relaxed guidance.
- Evaluate the potential saving that can be achieved in both capital costs and energy consumption by using TPb diffusers in comparison with TPa diffusers.
- Provide input into a revised impact assessment.

4.3 Approach

4.3.1 Building types

The following five building types were selected on the basis of being most impacted by the proposed Part B2 change:

- Shallow commercial office (small/medium/large)
- Deep plan offices - government office (average size)
- Retail - supermarket (average size)
- Health - health care centre (average size)
- Education - secondary school (average size)

Other building types are not considered for one of the following reasons:

- The proposed regulatory change has little impact for the building type, e.g. industrial buildings and warehouses where suspended lights are normally used.
- The type of building is not frequently built each year, e.g. airports and railway stations.
- The light fitting design is architecture driven and a combination of different light fitting designs will be employed in one building, e.g. hotels and department stores.

4.3.2 Case study designs

Sample designs were prepared for the agreed building types. The designs compared the difference in light output of an installation of a polycarbonate (TPa) and Acrylic (TPb) diffuser for the same light fitting in both new build and refurbishment for each identified building type.

Lighting Industry Federation (LiF), manufacturers and M&E specialists were consulted to ensure the following criteria were met:

- Typical design templates of each building types were used.
- The luminaires selected for the calculations are all currently available in the UK market and are reasonably representative of their usage for the selected areas.

Table 4.1 summarises the headline design option for each of the agreed building types.

Table 4.1: Headline design option for each building types

Building Types	New Build	Refurbishment
Shallow plan commercial offices (Existing regulation - 49W T5 fluorescent polycarbonate diffuser) **Deep plan offices** (Existing regulation - 49W T5 fluorescent polycarbonate diffuser)	▪ Option 1 - Use same wattage acrylic diffusers ▪ Option 2 - Use lower wattage acrylic diffusers	▪ Option 1 - Keep original lighting layout with same wattage acrylic diffusers ▪ Option 2 - New design layout with lower wattage acrylic diffusers ▪ Option 3 - New design layout with same wattage acrylic diffusers
Retail (Existing regulation - 2x24W T5 fluorescent polycarbonate diffuser)	▪ Use same wattage acrylic diffusers	▪ Keep original lighting layout with same wattage acrylic diffusers
Health (Existing regulation - 4x14W fluorescent polycarbonate diffuser)	▪ Use same wattage acrylic diffusers	▪ Keep original lighting layout with same wattage acrylic diffusers
Education (Existing regulation - 1x35W and 2x35W fluorescent polycarbonate diffuser)	▪ Use same wattage acrylic diffusers	▪ Option 1 - Keep original lighting layout with same wattage acrylic diffusers ▪ Option 2 - New design layout with same wattage acrylic diffusers

4.3.3 Quantification of cost and energy savings

The case study designs of each building type were quantified and the capital cost of light fitting installations between the existing and proposed relaxed guidance was quantified. The capital cost calculation considered the following items:

- New build Installation:
    - Set out the lighting layouts.
    - Installation of light fittings.
- Refurbishment Installation:
    - Costs associated with changing the lighting layout if required.
    - Removal of current lighting fitting and replacement with a new one.

The cost comparison between existing and proposed guidance for each of the design options is given in Table 4.2 for new build and in Table 4.3 for refurbishment.

Table 4.2: Comparison of new build installation capital costs of design options for different building types

Building types / design options	Cost comparison				Energy comparison			
	Existing regulation (£/building)	Proposed regulation (£/building)	Difference (£/building)	% Difference	Existing regulation (kWh/blg /year)	Proposed regulation (kWh/blg/ year)	Difference (kWh/blg /year)	% Difference
Shallow offices (Average)								
Option 1 – Use same wattage Acrylic diffusers	£56,560	£47,880	-£8,680	-15%	24,770	20,969	-3,801	-15%
Option 2 – Use lower wattage Acrylic diffusers	£56,560	£63,000	£6,440	11%	24,770	19,744	-5,026	-20%
Deep plan offices – Government office								
Option 1 – Use same wattage Acrylic diffusers	£419,160	£314,440	-£104,720	-25%	183,570	137,708	45,862	-25%
Option 2 – Use lower wattage Acrylic diffusers	£419,160	£470,960	£51,800	12%	183,570	147,596	-35,974	-20%

Building types / design options	Cost comparison				Energy comparison			
	Existing regulation (£/building)	Proposed regulation (£/building)	Difference (£/building)	% Difference	Existing regulation (kWh/blg /year)	Proposed regulation (kWh/blg/ year)	Difference (kWh/blg /year)	% Difference
New build office lighting design summary: • As advised by manufactures, there is no unit price difference between the selected acrylic and polycarbonate luminaires that are used in office buildings. • Option 1 - less light fittings and energy are used to meet the required lux level, hence this achieves savings in both capital costs and energy consumptions. • Option 2 - more light fittings are used to meet the required lux level when lower wattage acrylic luminaires are selected, which results in higher capital costs. Changing the original lighting layouts also contributes to the increased costs. However energy savings are still generated.								

Building types / design options	Cost comparison				Energy comparison			
	Existing regulation (£/building)	Proposed regulation (£/building)	Difference (£/building)	% Difference	Existing regulation (kWh/blg /year)	Proposed regulation (kWh/blg/ year)	Difference (kWh/blg /year)	% Difference
Retail - Supermarket								
Use same wattage acrylic diffusers	£7,859	£8,735	£876	11%	4,889	4,889	0	0%
Health – Health care centre								
Use same wattage acrylic diffusers	£23,704	£28,274	£4,569	19%	10,602	10,602	0	0%

New build Retail/Health buildings lighting design summary:

- As advised by manufactures, the unit prices of selected acrylic luminaires used in retail//health buildings are higher than polycarbonate.
- Due to the predetermined ceiling layouts in these building types, it is not possible to either use less of the same wattage acrylic luminaires or alternatively to use lower wattage acrylic luminaires in the design. Hence no cost and energy savings can be achieved.

Building types / design options	Cost comparison				Energy comparison			
	Existing regulation (£/building)	Proposed regulation (£/building)	Difference (£/building)	% Difference	Existing regulation (kWh/blg /year)	Proposed regulation (kWh/blg/ year)	Difference (kWh/blg /year)	% Difference
Education – Secondary school								
Use same wattage acrylic diffusers	£25,709	£25,547	-£162	-1%	23,355	22,059	-1,296	-6%
New build education buildings lighting design summary: • As advised by manufactures, the unit prices of selected acrylic luminaires in education buildings are higher than polycarbonate. • Only a small reduction in light fitting numbers can be achieved when using the same wattage acrylic luminaires therefore the capital cost saving is minimal.								

Table 4.3: Comparison of refurbishment installation capital costs of design option for each building type

Building types / design options	Cost comparison				Energy Comparison			
	Existing regulation (£/building)	Proposed regulation (£/building)	Difference (£/building)	% Difference	Existing regulation (kWh/blg /year)	Proposed regulation (kWh/blg /year)	Difference (kWh/blg /year)	% Difference
Shallow offices (Average)								
Option 1 – Keep original lighting layout with same wattage Acrylic diffusers	£54,540	£54,540	£0	0%	24,770	24,770	0	0%
Option 2 – New design layout with lower wattage Acrylic diffusers	£54,540	£64,125	£9,585	18%	24,770	19,744	-5,026	-20%
Option 3 - New design layout with same wattage Acrylic diffusers	£54,540	£48,735	-£5,805	-11%	24,770	20,969	-3,801	-15%
Deep plan offices – Government office								
Option 1 – Keep original lighting layout with same wattage Acrylic diffrs	£404,190	£404,190	£0	0%	183,570	183,570	0	0%

Building types / design options	Cost comparison				Energy Comparison			
	Existing regulation (£/building)	Proposed regulation (£/building)	Difference (£/building)	% Difference	Existing regulation (kWh/blg /year)	Proposed regulation (kWh/blg /year)	Difference (kWh/blg /year)	% Difference
Option 2 – New design layout with lower wattage Acrylic diffusers	£404,190	£479,370	£75,180	19%	183,570	147,596	-35,974	-20%
Option 3 - New design layout with same wattage Acrylic diffusers	£404,190	£320,055	-£84,135	-21%	183,570	137,708	45,862	-25%

Refurbished office lighting design summary:

- Option 1 - no savings can be generated in either capital cost or energy consumption as there is no reduction in the number of light fittings.
- Option 2 - more light fittings are used to meet the required lux level when lower wattage acrylic luminaires are selected plus the additional costs associated with the lighting layout alteration, which result in higher capital costs. However energy savings are still generated.
- Option 3 - less light fittings and energy are used in new design layout to meet the required lux level, hence savings in both capital costs and energy consumption.

Building types / design options	Cost comparison				Energy Comparison			
	Existing regulation (£/building)	Proposed regulation (£/building)	Difference (£/building)	% Difference	Existing regulation (kWh/blg /year)	Proposed regulation (kWh/blg /year)	Difference (kWh/blg /year)	% Difference
Retail - Supermarket								
Keep original lighting layout with same wattage acrylic diffusers	£7,449	£8,325	£876	12%	4,889	4,889	0	0%
Health – Health care centres								
Keep original lighting layout with same wattage acrylic diffusers	£22,944	£27,514	£4,596	20%	10,602	10,602	0	0%

Refurbished Retail/Health buildings lighting design summary:

- Due to the predetermined ceiling layouts in these building types, it is not possible to alter the existing light layouts to use less of the same wattage acrylic luminaires or alternatively to select lower wattage acrylic luminaires and therefore no savings can be achieved in either capital costs or energy consumption.

Building types / design options	Cost comparison				Energy Comparison			
	Existing regulation (£/building)	Proposed regulation (£/building)	Difference (£/building)	% Difference	Existing regulation (kWh/blg /year)	Proposed regulation (kWh/blg /year)	Difference (kWh/blg /year)	% Difference
Education – Secondary school								
Option 1 – Keep original lighting layout with same wattage acrylic diffusers	£23,868	£24,495	£627	3%	23,355	23,355	0	0%
Option 2 – New design layout with same wattage acrylic diffusers	£23,868	£26,496	£2,628	11%	23,355	22,059	-1,296	-6%

Refurbished education buildings lighting design summary:

- Option 1 – the increase in capital costs results from the higher unit price of acrylic luminaires. No energy consumption savings can be achieved as there is no reduction in the number of acrylic luminaires used.
- Option 2 – even though it is possible to achieve a small reduction in the number of light fittings, the additional costs associated with the alteration of lighting layouts outweigh the savings therefore no overall savings can be achieved in capital costs. However a small percentage of energy savings can still be achieved through the reduced number of acrylic luminaires.

4.3.4 Estimate of transitional costs

Some transitional costs are likely to be associated with any changes to Building Regulations guidance.

In this particular case, transitional costs have been estimated by assuming that 30% of electrical engineers (58,020) and all building control officers (4,000) will lose one working hour to familiarise themselves with the new Part B2 changes. Their time has been costed at £64/hour and £60/hour respectively. This one-off transitional cost is estimated at £4.03million, summarised in Table 4.4.

Table 4.4: Transitional cost

Professional	Number	% impacted	Hours of training time	Cost Per Hour	Total Cost
Electrical engineers	193,400	30%*	1	£64	£3,713,280
Building control officers	4,000	100%	1	£60	£240,000
Total					**£4,030,080**
*Assume only 30% engineers specialise in lighting designs					

Due to the limited nature of the proposed changes to Part B2, additional continuing training is not anticipated to be required for the professionals, hence no further costs are incurred.

4.3.5 Impact assessment

The Cost Benefit Assessment framework draws on the cost data resulting from the above quantification exercises and models the potential position of changing Part B2 following HM Treasury Green Book project appraisal guidance. The analysis results are then scaled up to the level of industry (England) for a typical year and to project the impacts over the next 10 years.

As indicated in Tables 4.2 and 4.3, various design options can be considered in both new and refurbishment installations. However the impact assessment only considers design options that have significant cost impacts over a 10-year period. The following building types are modelled:

- Shallow offices (small/medium/large)
- Deep plan office (average size)
- Education building (average size)

The impact assessment also took into consideration the potential saving resulting in reduced carbon output, following the IAG toolkit.

4.3.6 Number of buildings impacted

Given that there is no definitive source of information on the number of non-dwelling developments built per annum, both low[1] and high[2] build rates scenarios were considered to test the cost savings. The build rate per annum for offices and education buildings in the next 10 years (from 2013 to 2022) is summarised in Table 4.5.

Table 4.5: Low and high build rate scenario

Building types	Low build scenario (Nr per annum)	High build scenario (Nr per annum)
Shallow office – small	1,227	2,819
Shallow office – medium	248	653
Shallow office – Large	38	139
Deep plan office	18	70
Education building	200	1,815

The following assumptions were used for the proportion of new buildings that would be impacted by the proposed regulatory change:

- 65% of the new developments would use TPb diffusers.
- 5% (low estimate) or 10% (high estimate) of existing office and education stocks would undertake light system refurbishment per annum.
- 65% of the above refurbishment would use TPb diffusers.

4.4 Key findings

4.4.1 Design conclusions

The energy consumption comparison resulting from the sample designs indicates that the efficiencies of TPb lighting diffusers would vary according to the building types and ceiling layouts.

The calculated results suggested that using TPb diffusers in open plan offices achieve greater efficiency compared with TPa diffusers and the efficiency level

[1] 2007 Regulatory Impact Assessment for Energy Performance of Building Directive – Article 7 – 10.

[2] 2010 ONS Number of new construction orders.

increases as the open plan office size increases, as indicated by the “energy quotient per 100lx”. For the chosen luminaires, the TPb diffuser will generally save between 11 to 25% per building on both capital installation costs and energy consumption costs depend on the lighting layouts and luminaire wattage.

However, the annual energy consumption comparison for retail, education and health buildings indicate minimal to zero savings by using TPb diffusers, as the predetermined ceiling layouts do not permit lower wattage acrylic luminaires to be used in retail and education buildings. For health care centres, even though a lower wattage acrylic luminaire could be pursued the resulting energy consumption savings are minimal.

4.4.2 Results of the impact assessment

The design output has suggested that limited capital cost and energy consumption savings can be achieved by using TPb diffusers in either new or refurbishment installations in both retail and health buildings. The Cost Benefit Assessment framework therefore only modelled the impacts in offices and education buildings and considers three design deployment options, as indicated in Table 4.6.

Table 4.6: Cost benefit assessment model options

Model options	Shallow and deep plan offices	Education buildings	
Option 1a	New installations	Use same wattage acrylic diffusers	
	Refurbishment	Retain existing lighting layout and replace with same wattage acrylic diffusers	
Option 2a	New installations	Use same wattage acrylic diffusers	
	Refurbishment	New design layout and replace with same wattage acrylic diffusers	
Option 2b	New installations	Use lower wattage acrylic diffusers	Use same wattage acrylic diffusers
	Refurbishment	New design layout with lower wattage acrylic diffusers	New design layout with same wattage acrylic diffusers

The impact assessment results range from cost saving of £49m to an increase of just over £200m, which are summarised in Table 4.7.

Table 4.7: Impact assessment results

Model Options	Low Build	High Build
Option 1a	-£48,934,040*	-£157,775,051*
Option 2a	-£225,532,815*	-£513,223,084*
Option 2b	£101,598,757*	£200,285,197*
* Total of cost impacts in new build, refurbishment and transitional costs.		

The results indicated that:

- For a large open plan space (e.g. offices), substantial savings can be achieved by using TPb diffusers as it's possible to use less light fittings to meet the required lux level.
- It is not financially viable to use lower wattage luminaries in refurbishment installations due to the increase capital costs resulted from the increase number of light fittings.

4.4.3 Summary

The proposed amendment to the regulations would allow additional options when specifying light fittings. Modelling has shown that two of the three anticipated options (1a and 2a) would deliver savings in capital / operational cost. It is therefore likely that users would adopt these options. The third option (2b) would not reduce cost, mainly due to the increase number of light fittings. However as there would be no obligation to adopt this option (users would still be free to specify all of the previously allowable light fittings) there will be no cost burden imposed by the change to the regulations. It is therefore concluded that the change is likely to generate significant net benefits as indicated by options 1a and 2a.

4.5 Key assumptions

4.5.1 Key assumptions

- All costs are at UK mean base location, 1Q12
- Key assumptions for design and impact assessment can be provided in separate reports if required.

4.6 Key risks and uncertainties

4.6.1 Savings in other building types

As mentioned in 4.3.1, this assessment only considers building types that would be significantly impacted by the proposed Part B2 change. However, it is recognised that smaller benefits in terms of capital cost and energy consumption savings resulting from the proposed regulatory change can also be realised in the other types of building, these savings will add to the total indicated benefits of the proposed change.

4.6.2 Sources of information

As mentioned in 4.3.6, there is no definitive source for the number of office and education developments built per annum. The economic climate has a major impact on the annual development, so scenario testing has been undertaken to consider a range of scenarios (low and high) and the cost impact of each.

4.6.3 Proportion of buildings affected

It is difficult to predict the proportion of buildings that will be impacted by the potential changes to Part B2, as this will depend on the building type and specific design requirements, and no hard data can be obtained on this.

The current impact assessment assumes that 65% of new office and education buildings will be impacted by this proposed regulatory change in the next 10 years. The assumption is based on knowledge of practical commercial lighting designs, as well as the consultation with lighting manufacturers and aims to exclude the buildings where other types of lighting systems are used.

It is understood that the proportion of buildings affected will also be influenced by changing technologies, such as LED, so the benefit may diminish as the current type of lighting becomes redundant. However it is anticipated that this may only happen at the later stage in the cashflow and therefore would have less impact on the Net Present Value.

4.6.4 Other environmental impacts

It is acknowledged that there is a potential for increased heating requirements in winter due to a reduction in energy consumed by lighting. The impact is hard to quantify and to some extent will also be offset by the reduced cooling loads in summer, therefore the net impact is considered to be minimal and not assessed in this study.

4.7 Areas for further work

The current study only focuses on the building types that are considered to be mostly impacted by the proposed Part B2 change. Further impact assessments can be undertaken to calculate the benefits that could be realised in other building types and hence enhance the overall saving position, however as discussed in 4.4.1 these benefits are considered to be very minimal.

4.8 Statement on specific impacts

Item	No impact anticipated	Potential impact – investigate further	Likely impact – details provided below
Economic / Financial			
Small Businesses	✓		
Micro Businesses	✓		
Proportionality	✓		
Wider Economy	✓		
Competition	✓		
Innovation		✓	
Other Departments	✓		
Social			
Social, Wellbeing or Health Inequalities	✓		
Safety at Work / Risk of Accidents in the Community	✓		
Crime Prevention	✓		

Level of Skills and Education	✓		
Quality of Life in the Local Community	✓		
Rural Areas	✓		
Human Rights	✓		
Equality Act 2010 – Disability, Race, Pregnancy etc	✓		
Environmental			
Emission of Greenhouse Gases		✓	
Climate Change	✓		
Waste Management	✓		

Note: There are likely positive impacts in relation to:

- Innovation – Amendment is likely to allow development of more energy efficient light fittings.
- Emission of greenhouse gases – Resultant energy savings will result in carbon saving.

5 Radon

5.1 Purpose of Task

The primary purpose of this task is to:

- Undertake further research and assessment to ensure the key assumptions used in the consultation stage impact assessment (Changes to Part C (Site preparation and resistance to contaminants and moisture) of the Building Regulation in England: Radon) are reasonable.
- Engage with SMEs with a view to improve the small firms impact test.

5.2 Deliverables

The deliverables of this task were to:

- Review and appraise the following assumptions in the consultation stage impact assessment:
  - The cost of radon protective measures to flats.
  - The proportion of new homes that will require basic/full protection.
  - The proportion of flats and houses in the new build housing.
  - The cost of radon protective measures for extensions.
  - Average size of extension and protection offered compared to new build.
  - Percentage of existing dwellings extended each year.
- Estimate the transitional costs include the likely cost of training required.
- Consult a selection of relevant small firms on the transitional cost findings.

5.3 Approach

5.3.1 Dwelling types

The following dwelling types and sizes were selected for the radon protection cost assessment based on the typologies used in the English Housing Survey 1999 and the Zero Carbon Hub Work[1].

New Build Houses:

- All terraced – 83m²

[1] Carbon compliance: setting an appropriate limit for zero carbon new homes, Feb 2011.

- Semi-detached – 93m²
- Detached – 148m²
- Bungalow – 76m²

The houses were also assessed by ground floor construction technologies, i.e. ground bearing slabs and suspended ground floor slabs, as the radon protection requirements and costs are different.

New Build Flats:

- Converted flat (3 storey, 1 flat per storey) – 67m² per dwelling
- PB low rise flat (3 storey, 4 flat per storey) – 56m² per dwelling
- PB high rise flat (7 storey, 4 flat per storey) – 58m² per dwelling

House extensions – 12m².

5.3.2 Radon protection design criteria

The minimum radon protection requirements were agreed with DCLG for flats and different house types based on BRE report BR211[2]. As outlined in the current (2004) edition of Approved Document C, either basic or full protection measures should be provided to the following radon action areas:

- 3-10% of homes at or above the action level – basic protection
- >10% of homes at or above the action level – full protection
- <3% of homes at or above the action level – no protection.

5.3.3 Radon protection cost per dwelling

Tables 5.1 to 5.3 set out the estimated cost per dwelling of basic and full radon protection for each dwelling type, taking into consideration the design criteria detailed in section 5.3.2.

[2] Radon: Guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment), 2007 edition.

Table 5.1: Radon protection cost estimate for house

House type	Average NIA (m^2)	Basic Protection (£/dwelling)	Full Protection (£/dwelling)
Ground Bearing Slabs			
All terrace	83	£270	£490
Semi-detached	93	£290	£520
Detached	148	£420	£650
Bungalow	76	£430	£660
Suspended Ground Floor Slabs			
All terrace	83	£350	£370
Semi-detached	93	£390	£400
Detached	148	£570	£590
Bungalow	76	£590	£600

Table 5.2: Radon protection cost estimate for flats

Flat Type	Average NIA per dwelling (m^2)	Basic Protection (£/dwelling)	Full Protection (£/dwelling)
Converted flat	67	£150	£220
PB Flat, low rise	56	£160	£230
PB Flat, high rise	58	£70	£100

Table 5.3: Radon protection cost estimate for house extensions

House Extension	Average NIA (m^2)	Basic Protection (£/dwelling)	Full Protection (£/dwelling)
Radon barrier already installed in existing building	12	£90	£210
No radon barrier in existing building	12	£90	£300

5.3.4 Estimate of transitional costs

It is usual that some transitional costs will be associated with any changes to Building Regulations' guidance.

In this particular case, transitional cost estimates consider the following items:

- Time lost by engineers, developers, contractors and building control due to the familiarizing themselves with the regulation/new radon maps.
- Time lost by small and medium sized contractors to attend training in order to top up their skills to undertake radon protection works (note that, due to changing map areas some local contractors who have never experienced radon will now be operating within an affected area).
- Training course charges.

The transitional costs only apply to those in the net additional radon map areas.

The estimated transitional costs of the above items are summarised in table 5.4 and 5.5.

Table 5.4: Transitional costs – familiarisation with regulation / new maps

Professionals	Time lost (Hr)	Rate (£/hr)	Total
Structural Engineers	0.5	£64	£32
Developers	0.5	£70	£35
Small/medium sized contractors	0.5	£21	£11
Large contractors	0.5	£21	£11
Building controls	0.5	£60	£30

Table 5.5: Transitional cost – training

Professionals	Time lost to attend training			Training charges
	Time lost (Hr)	Rate (£/hr)	Total	1-day course
Structural Engineers	0	£64	£0	£0
Developers	0	£70	£0	£0
Small/medium sized	8	£21	£168	£225

contractors				
Large contractors*	0	£21	£0	£0
Building controls	0	£60	£0	£0
* It is assumed that large firms have wider geographic coverage and therefore skills are already in place.				

5.3.5 Estimate of the number of new developments

To identify the net additional radon risk areas, GIS software was used to accurately identify the areas on the 2007 radon maps that were not shown on the 1999 maps.

As there is no definitive source on the number of new homes likely to be built in the net additional radon map area, the digitised post code data in 2001 and 2006 was used to estimate the numbers of existing dwellings in the relevant areas, categorised by medium (3-10%) and high (>10%) risk areas. This data formed the basis of the calculation of new developments in next 10 years. A further assessment was also made of the proportion of different dwelling types and the rates of new development, which are detailed in section 5.5.

5.3.6 Impact assessment

The potential impact of changing Approved Document C was assessed by following the HM Treasury Green Book appraisal guidance. The analysis results were then scaled up to the level of industry in England for a typical year and the impacts were projected over the next 10 years.

5.4 Key findings

5.4.1 The result of cost:benefit analysis

The cost:benefit analysis indicated a range of additional costs to provide radon protection in the net additional area from £6m to £15m net present value over 10 years at 3.5% discount rate. Table 5.6 shows the results of each scenario analyzed, with the transitional costs included.

Table 5.6: Cost:benefit analysis results

Cost Item	Low Scenario	Medium Scenario	High Scenario
New build homes	£5,020,209	£7,648,108	£13,118,543
Extensions	£842,024	£1,276,501	£1,720,186
Transitional Costs	£593,530	£593,530	£593,530
Total	**£6,455,764**	**£9,518,139**	**£15,432,259**

5.4.2 Small contractors consultation

A small scale consultation was undertaken with a number of small contractors with regard to the following:

- Cost of basic and full protection
- Transitional costs that may incur due to the regulatory change
- Training requirement to top up skills

The key messages arising from the consultation were:

- Generally a good level of awareness of radon issues regardless of geographical location (i.e. currently inside or outside a radon area). This included the fact that radon maps exist and can be accessed to check for the potential need for protection.
- Some awareness of potential training routes and some already had plans to roll out NVQ in gas membrane installation within their firms.
- Fairly wide range of views on installation training costs – some noted that the skills were already taught as part of their staff training / apprenticeships (eg. learning to install DPMs etc included a module on radon issues) whilst others expected a course of several days in length.
- General agreement on time to familiarise staff with the regulation / new maps (and some firms had already done this).
- A number of firms mentioned the Radon Council as a source of advice.

Given the feedback received, it did not appear that the new radon maps will represent an unexpected burden or technical challenge for most small firms. The cost of operative training (£225) has been set according to the most common view, with the addition of 0.5hrs of office time to review the new documents. As stated elsewhere within this report it appears that some firms have actually prepared ahead of the regulations, however no saving in this respect has been included.

5.5 Notes and key assumptions

5.5.1 Key cost assumptions

- All costs are at UK mean base location, 1Q12.

5.5.2 Mix of dwelling stock in England

There is no direct data source to show the dwelling mix in the net additional radon area. The following mix was derived from the English Housing Survey (EHS) 2009 (as shown in table 5.7), which was based on a sample of housing stock in England and covers all housing tenures.

Table 5.7: EHS 2009 dwelling mix

Dwelling Type	Nr. of Dwellings (000s)	Dwelling Mix
All terrace	6,450	36%
Semi-detached	5,727	32%
Detached	3,799	21%
Bungalow	2,052	11%
Converted flats	900	4%
Low rise flats	3,036	14%
High rise flats	371	2%
Total	**22,335**	**100%**

The estimated number of existing dwellings in the net additional radon map areas is based on the above data and the post code analysis, which is summarised in table 5.8.

Table 5.8: Number of existing dwellings in the new additional radon area

Dwelling Type	3-10% Risk Area (Nr)	>10% Risk Area (Nr)
All terrace	69,710	2,492
Semi-detached	61,894	2,212
Detached	41,059	1,468
Bungalow	22,183	793
Converted flats	9,726	348
Low rise flats	32,812	1,173
High rise flats	4,010	143
Total	**241,394**	**8,628**

5.5.3 Adjustment for greater proportion of flats

The EHS 2009 data indicates a 80/20 per cent split between existing houses and flats stock. However the latest DCLG house report[3] suggests there is an increase in the proportion of flats that have been built in recent years.

[3] House Building: March Quarter 2012, England

Adjustment was therefore made to account for this trend when projecting the new build homes in the next 10 years.

5.5.4 Rate of new development and extension

The following sources have been used to predict the rate of new dwellings and house extensions over the next 10 year period:

- New dwellings – past development rate identified in post code data in 2006 and 2011 in the net additional radon area, which provide an indication of the future development prediction.
- Extensions – based on DCLG's *Survey of building control*, 0.5% - 1% was used as a reasonable assumption. The consultation stage impact assessment also used a similar rate 0.57%.

Low, medium and high development rates were further considered for both new dwellings and extensions to test the sensitivity of IA results. Table 5.9 shows the various development rate assumptions used in the impact assessments.

Table 5.9: Rate of new development and extension assumptions

Radon Risk Area	Low Scenario	Medium Scenario	High Scenario
Rates of new dwelling development			
3-10% Area	0.70%	1.05%*	1.75%
>10% Area	0.98%	1.47%*	2.45%
Rates of new extensions			
3-10% Area	0.50%	0.75%	1.00%
>10% Area	0.50%	0.75%	1.00%
* From post code analysis			

5.6 Key risks and uncertainties

5.6.1 Sources of information

As mentioned in 5.3.5, there is no definitive source for the number dwelling developments built per annum. The economic climate has a major impact on the annual development; scenario testing was therefore undertaken to consider a range of scenarios (low, medium and high) felt to represent reasonably feasible housing delivery levels and the cost impact of each.

5.6.2 Radon protection costs

The current cost estimates were based on meeting the minimum radon protection requirement stipulated in building regulations and BRE report BR211.

The costs were market tested with both specialised radon contractors and housebuilders.

Where a high level of radon is detected, more comprehensive protection measures could also be pursued, which normally involves extension of ventilation pipes to eaves level and installation of a fan to further reduce radon levels. However this normally depends on the test of radon levels after occupancy and is not imposed by the regulation, hence is not considered in this cost assessment.

5.6.3 Transitional costs

The current transitional cost estimates took a conservative view and assumed that the proposed regulatory change would impact all the professionals, developers and contractors in the net additional radon map area. However it is noted that the latest version radon map has been available to the public since 2007; some construction firms in the new areas covered by the map may already be aware of the radon protection requirement and topped up their skills to meet the market demands. Therefore these firms will not incur any further transitional cost from the forthcoming regulatory change. The actual transitional cost impact may therefore be smaller than the current estimate.

5.7 Areas for further work

None identified.

5.8 Statement on Specific Impacts

Item	No impact anticipated	Potential impact – investigate further	Likely impact – details provided below
Economic / Financial			
Small businesses			See impact assessment – resultant training need / cost included
Micro businesses			
Proportionality	✓		
Wider economy	✓		
Competition	✓		
Innovation	✓		
Other Departments	✓		
Social			
Social, wellbeing or health inequalities	✓		
Safety at work / risk of accidents in the community	✓		
Crime prevention	✓		
Level of skills and education	✓		
Quality of life in the local community	✓		
Rural areas	✓		
Human rights	✓		
Equality Act 2010 – Disability, race, pregnancy etc	✓		
Environmental			
Emission of greenhouse gases	✓		
Climate change	✓		
Waste management	✓		

6 Referencing of Eurocodes in Approved Document A

6.1 Purpose of task

The purpose of this task was to:

- Gather data on the cost and benefit of referencing Eurocodes in Approved Document A.

6.2 Deliverables

This task was split into four phases, with the deliverables of each phase being:

- An enquiry form to be used on a range of different sized structural engineering practices to establish the potential costs of calling up Eurocodes in Approved Document A (AD A) and the implication of not referring Eurocodes in AD A.
- A list of structural engineering practices that could be interviewed to give reasonably meaningful results.
- An investigation of the assumption that the use of Eurocodes does not change build costs and, if possible, obtain case studies by contacting representatives of the various structural engineering trade bodies (e.g. BCSA, SCI, Concrete Centre, TRADA, Brick Development Association).
- Informing an implementation-stage impact assessment (IA) by making enquiries of structural engineering practices based on the enquiry form and list of consultees developed earlier and using the responses to establish the transitional costs attributable to referencing Eurocodes in AD A.

6.3 Approach

6.3.1 Qualitative questionnaire

A comprehensive questionnaire was developed to collect data from various sized structural engineering firms in order to understand their progress and attitudes towards the adoption of Eurocodes, as well as the potential cost and benefit implications. The questionnaire was split into the following four sections:

- Section 1 - Respondent details
- Section 2 – Progress in adopting Eurocodes
- Section 3 – Implications of not referencing Eurocodes in AD A
- Section 4 – Potential costs and benefits of calling up Eurocodes in AD A

A shortened version of the questionnaire was also prepared for use as a web-based survey.

6.3.2 List of consultees

Consultants listing structural engineering as a specialism on the website of the Association for Consultancy & Engineering (ACE) were identified and collated by region based on head offices. A number of small, medium and large sized firms were then selected from each region to compile a list of consultees.

6.3.3 Consultation with trade bodies

The following trade associations were consulted with regard to the difference in build cost between designs to Eurocodes and to British Standards:

- The Timber Research and Development Association (TRADA)
- British Constructional Steelwork Association Ltd (BCSA)
- British Precast Concrete Federation (BPCF)
- British Research Establishment (BRE)
- The Transport Research Laboratory (TRL)
- The Highways Agency (HA)
- Brick Development Association

The results of the consultation details are given in section 6.4.1.

6.3.4 Survey implementation

Two survey methods were used:

- Web-based survey – the shortened questionnaire was posted on Survey Monkey and the link was emailed to ACE and ICE member firms;
- Telephone interview – undertaken by a senior consultant amongst a sample of 34 selected structural engineering design firms.

A summary of the findings of the survey are given in sections 6.4.2 to 6.4.6.

6.4 Key findings

6.4.1 Build cost comparisons undertaken by trade bodies

Trada have published *Eurocode 5 (EC5): Design of Timber Structures An Overview & Comparison with the BS 5268-2 Method* as part of their *Construction Briefings*, which looked more at the technical variations rather than the commercial and economic impacts and listed the following advantages and disadvantages of Eurocode 5.

TRADA reported that advantages include:

- The same design basis is used for all materials including timber.
- The safety factors are transparent.
- The levels of reliability are more logical and consistent.
- Some aspects are handled in a better way.
- EC5 Part 2 is the first design code for timber bridges in the UK.

TRADA reported that disadvantages include:

- It is more complicated to use than BS 5268.
- More additional documents are required.
- No tables are given for permissible fastener loads.
- Some areas lack practical guidance.
- Some subjects are missing.

A few trade bodies have undertaken build cost comparisons between sample designs based on Eurocodes and British Standards. The general conclusion corresponds with the assumption that the use of Eurocodes has minimal impact on the build costs compared to British Standards. Table 6.1 summarises the outcome from each design comparison.

Table 6.1: Build cost comparison studies: Eurocodes and British Standards

Trade Body	Design undertaken to both BS and Eurocodes	Cost Difference	Comments
BCSA	Typical bay of a steel framed composite slabbed building	Minimal	The designs to both standards were largely similar and produce similar structural sizes although some differences were also found.
BRE	Reinforced concrete structure[1]	-0.3%	Comparison undertaken between slabs, beams, columns, shear walls, retaining walls and foundation bases. The sample building design considered Eurocodes offered a saving of 0.3%.
TRL/HA	Embedded and conventional retaining wall[2]	Minimal	The designs to both standards were similar although the complexity of Eurocodes makes its use much more difficult and prone to error.

Notes:
1 Reinforced concrete framed structure: comparative design study to EC2 and BS8110, R. Webster, 2003
2 Comparison of embedded and conventional retaining wall design using EuroCode and existing UK design methods, D.R. Carder, 1999

6.4.2 Progress in adopting Eurocodes

A total number of 43 organisations completed the survey over an 8-week survey period, either fully or to a sufficient extent to justify analysis. This comprised 17 completed telephone interviews and 26 completed web survey responses.

All the responding firms are SMEs, with over 50% of the firms having less than 5 employees and a turnover of not more than £0.5 million. The key points are summarized in table 6.2.

Table 6.2: Survey response key findings

Survey Section	Responses Summary
Progress in adopting Eurocodes	▪ Over two thirds of the respondents (29/43) were aware that AD A is likely to be revised to in 2013 to reference Eurocodes and that the withdrawn British Standards are no longer being maintained and may be declared obsolete after 2015. ▪ One third of the respondents (13/43) have already adopted Eurocodes, another 10 firms were starting or in the process of adopting Eurocodes. ▪ Over 40% (18/39) of the respondents have purchased Eurocodes ▪ Client's requirement has a major influence over the firms' decisions to adopt Eurocodes.
Implications of not referencing Eurocodes in AD A	▪ 85% (35/41) of the respondents suggested that they would continue using unsupported British Standards if Eurocodes are not referenced in AD A. ▪ Approximately 60% (10/16) of the respondents would delay the adoption of Eurocodes if they are not referenced in AD A.

6.4.3 Cost of adopting Eurocodes

Very few firms provided actual cost spent in relation to adopting Eurocodes. The cost information provided for each component varies significantly and is very much dependant on the size of the organisation and the extent of the investment. For example, the software update could range from updating certain sections on selected computers to a complete and comprehensive update throughout the organisation. Table 6.3 summarises the range of costs for each component.

Table 2.3: Cost of adopting Eurocodes

Cost Component	Total Nr. Of Respondents	Cost Range (£ / per firm)
The cost of purchasing Eurocodes	4	£500 to £5,000*
The cost of guidance documentation	10	£225 to £5,000*
Eurocodes software costs	4	£300 to £20,000*
Training costs	16	£300 to £15,000*
* Cost varies according to the size of the firm		

Other costs identified by the respondents include:

- Loss of productivity such as client education and increase in internal checking and peer review;
- Dealing with other parties;
- Cost associated with manufacturers' literature, etc.

Most organisations that responded to the survey anticipated that their designers would take longer to complete a task as a result of the adoption of Eurocodes, with 17 out of the 25 respondents suggesting that the design time would be increased by at least 20%.

6.4.4 The impact on business of adopting Eurocodes

The majority of firms that responded indicated that the adoption of Eurocodes would have limited, or even negative, impact in safeguarding their current market share and increase annual turnover. The main points are summarised in table 6.4.

Table 6.4: Impact on business of adopting Eurocodes

Impact on Business	Responses Summary
Market share	▪ Only 18% respondents (7/39) indicated that the adoption of Eurocodes would have medium or high impact on safeguarding the firms' current market share in England. ▪ Only 11% respondents (4/35) indicated that the adoption of Eurocodes would have medium or high impact on safeguarding the firms' current market share in the rest of UK and Europe. ▪ Over 50% respondents indicated that the adoption of Eurocodes would have low or even negative impact on safeguarding the firms' current market share in either England (24/39) or the rest of UK and Europe (19/35).
Annual turnover	▪ Only 5% respondents (2/39) indicated that the adoption of Eurocodes would increase the firms' turnover by 15% plus in England. ▪ Only 3% respondents (1/36) indicated that the adoption of Eurocodes would increase the firms' turnover by 10% in the rest of UK or Europe. ▪ 70% respondents indicated that the adoption of Eurocodes would have low or even negative impact on the firms' turnover in either England (27/39) or the rest of UK and Europe (25/36).
Design liability risk	▪ Over 60% (27/42) respondents suggested that the dual design approach should not increase the design risk for the organisation. ▪ 58% (22/38) of respondents suggested that the adoption of Eurocodes rather than unsupported British Standards would have low impact with regard to reducing design liability risk for the business. ▪ 2 respondents commented that British Standards have been tried and tested over time and therefore pose less risk than the newer Eurocodes.

6.4.5 Additional comments made by respondents

Mixed comments were received towards the implementation of Eurocodes. A few firms suggested the following key benefits of adopting Eurocodes:

- One coherent set of design principles across materials.
- Eurocodes may provide more clarity.

However, the majority of respondents, especially smaller firms and sole traders, were more reluctant to adopt the new design codes for the following reasons:

- Additional training costs and costs to update software will become a financial burden to small firms.
- The withdrawn British Standards are still viewed as an acceptable design process.
- Eurocodes are complex to use and a longer transitional period should be allowed as an upgrade cycle for Eurocodes to take account of the economic recession.

6.4.6 Interpretation of the survey findings

The survey findings suggested that majority of the firms were aware that AD A is to be revised in 2013 to reference Eurocodes and that withdrawn British Standards may be significantly technically outdated by 2015. However, only one third of the firms have actually adopted Eurocodes, with their main reason being to keep up with design standards and clients' requirements.

The respondents' comments indicated that their perception was that the introduction of Eurocodes would have a major impact on small businesses. Their comments indicated that firms' productivity will be reduced at the initial stage of adopting Eurocodes because of the expected learning curve. Very few clients will be willing to pay for the additional design time caused by using a new set of codes, so firms will have to absorb the cost. As a result, the change may possibly come as more of a shock for smaller firms than the large organisations. The responses also imply that many companies will need to set up a quality management system that includes design review procedures to ensure that mistakes are not made.

However it should be noted that the firms that responded to the survey are only a minority of the total of 600 structural engineering firms that received the survey, which is statistically insignificant to conclude that their views are representative of the industry.

6.5 Key risks and uncertainties

6.5.1 Number of respondents

Encouraging firms to participate in the survey proved to be challenging, with most organisations showing little interest in completing the questionnaire, either as a telephone interview or a web-based survey.

The web-based survey was initially promoted by ACE to approximately 300 – 350 firms through a link within the monthly newsletter, followed up by a separate email and various reminders. Similar support was also provided by ICE. In order to improve the total sample size, the number of telephone interviews with structural engineering firms was increased.

Eventually a total number of 43 organisations completed the survey. Although this is not statistically significant, it is considered to be sufficient for high level assessment.

6.5.2 Quality of cost data

As indicated in section 6.4.3, very few firms provided actual cost information of calling up Eurocodes and the cost data provided could only be used to draw up high level conclusions. This could be caused by one of the following reasons:

- Most firms do not yet have a plan in place about the adoption of Eurocodes, so no budget/cost estimate has been put into place.
- The consultees who responded to the survey were normally at senior management level, who would have a good understanding of the high level progress of implementation of Eurocodes rather than detailed transitional cost information.
- The consultees were generally not keen to spend much time participating in the survey and had even less interest in making extra effort to find out detailed cost data from relevant departments. Even though various reminders were sent, very few firms have provided further responses.

The cost data received varied significantly depending on the size of the firm and the extent of its investment towards Eurocodes. To complete the implementation-stage impact assessment, it is suggested that the cost data should be checked against the transitional cost assumptions made in the consultation stage impact assessment.

6.6 Areas for further work

As indicated above, the current cost data received from the survey is poor and the following areas for further work have been identified:

- Identify the outstanding cost components and estimate the likely costs using relevant experience and professional judgement.

6.7 Statement on specific impacts

Item	No impact anticipated	Potential impact – investigate further	Likely impact – details provided below
Economic / Financial			
Small businesses		✓	
Micro businesses		✓	
Proportionality	✓		
Wider economy	✓		
Competition	✓		
Innovation	✓		
Other Departments	✓		
Social			
Social, wellbeing or health inequalities	✓		
Safety at work / risk of accidents in the community	✓		
Crime prevention	✓		
Level of skills and education	✓		
Quality of life in the local community	✓		
Rural areas	✓		
Human rights	✓		
Equality Act 2010 – disability, race, pregnancy etc	✓		
Environmental			
Emission of greenhouse gases	✓		
Climate change	✓		
Waste management	✓		

7 Building control system

The primary purpose of this task is to collect data in order to fill the gaps in the evidence for the following proposed changes in the building control system:

- Warranty Link Rule
- Enforcement
- Completion certificates
- Risk based inspections
- Appointed Persons.

7.1 Issues Investigated

Table 7.1 summarises the methodologies and approaches that have been used for each proposed change. Details of the findings of each subject can be found in the relevant appendix.

Table 7.1: Summary of issues investigated

Issues investigated	Approach
Appendix 7A: Warranty Link Rule	
The frequency of works that has already started on site revert to local authority due to the Warranty Link Rule	• Consultations were undertaken with a small sample (4 of each) of local authorities, Approved Inspectors and developers to identify how often the issue arises and what the impacts are.
Value of work lost from approved inspectors to local authorities because of the Warranty Link Rule	• Consultations were undertaken with a small sample (4 of each) of local authorities, approved inspectors and developers to identify the quantity of projects which fall into this category (or the one above). • High level estimate of the potential work lost to local authorities by approved inspectors due to the Warranty Link Rule.
Appendix 7B: Enforcement	
Current impact assessment review	• High level commentaries were provided to the cost / benefits identified within the current IA and the approach.

Issues investigated	Approach
	• Suggestions have been provided on the potential ways to improve the IA and data sources.
Potential benefits from the use of various enforcement options	• An initial desk study of the existing findings from previous DCLG research has been conducted in order to establish an overview of the potential outcomes of the various enforcement options.
Appendix 7C: Completion Certificates	
The frequency of a Completion Certificate not issued and the associated impacts	The following consultation were undertaken: • 4 local authorities to identify the proportion of cases in which a Completion Certificate is not issued. • 4 residential agency staff to gather experience on the proportion of sales experiencing problems from this issue. • Legal firm that undertakes conveyance work to identify how often the issue occurs.
Appendix 7D: Risk Based Inspection	
Potential savings resulted from the application of the risk based system rather than the current statutory notification stages	• Utilised 11 live projects that are near completion stages as case studies to compare the actual inspection regime against the inspections that are theoretically needed under the proposed regulations. • High level commentaries in the difference in the cost of inspections and avoided standing time.
Appendix 7E: Appointed Persons	
What powers and responsibilities should an Appointed Person be given	The consultations were undertaken with professionals in the construction industry to determine the power and responsibilities that should be given to an Appointed Person, the consultees included: • Architect • Engineers • Project manager • Clerk of works
What qualification / professional membership	• Same as above and also consulted a selection of major contractors as to

Issues investigated	Approach
should an Appointed Person have	interest in the proposals / perceived benefits.

7.2 Notes and Key Assumptions

This initial work is undertaken with the purpose of informing thinking on each issue. It is likely that further work will be required after review of these early data, for example larger scale survey works.

All costs are at UK mean base location, 1Q12.

7.3 Statement on specific impacts

Item	No impact anticipated	Potential impact – investigate further	Likely impact – details provided below
Economic / Financial			
Small Businesses		✓	
Micro Businesses		✓	
Proportionality	✓		
Wider Economy	✓		
Competition		✓	
Innovation	✓		
Other Departments	✓		
Social			
Social, Wellbeing or Health Inequalities	✓		
Safety at Work / Risk of Accidents in the Community	✓		
Crime Prevention	✓		
Level of Skills and Education	✓		
Quality of Life in the Local Community	✓		
Rural Areas	✓		

Human Rights	✓		
Equality Act 2010 – Disability, Race, Pregnancy etc	✓		
Environmental			
Emission of Greenhouse Gases	✓		
Climate Change	✓		
Waste Management	✓		

Note – The changes under consideration in relation to the Warranty Link Rule are likely to tend to level the playing field for smaller independent firms and larger firms / building control bodies. There is therefore a potential positive impact in relation to competition and for smaller firms.

Appendix 7A: Warranty Link Rule

7A.1 The issues

Initial data collection was undertaken in relation to two issues associated with the Warranty Link Rule. Table 7A.1 below shows the issue under consideration and the initial data collection approach. It is noted that this initial work is undertaken with the purpose of informing thinking on the issue and further work may be required, for example larger scale survey work.

Table 7A.1: Data collection approach

No.	Issue	Initial data collection approach
1	How often does work which has already started need to change from an Approved Inspector to local authority building control due to the Warranty Link Rule (e.g. because the warranty provider decides they cannot provide cover and therefore the Approved Inspector cannot continue)?	Consult a small sample of consultants, developers, Approved Inspector bodies and local authorities to identify how often the issue arises and what the impacts are. Put a cost estimate to the impact using in-house data.
2	How much work is lost from Approved Inspectors to local authorities because a housebuilder does not want to pay for a warranty or the housebuilder does not meet all of the requirements of the warranty provider?	Consult a small sample of Approved Inspector bodies, housebuilders and local authorities to identify the quantity of projects which fall into this category (or the one above). Sensitivity test the potential savings arising from increased competition and the number of projects affected. Also commentary on wider examples of the impact of competition on prices.
Note:	Issues associated with potential changes to contaminated land cover are not included.	

7A.2 Summary findings

- Issue 1 – Based on the consultation undertaken it appears very unusual that works revert to local authority building control part way through the project duration. The feedback suggests that this may occur in around 850 to 2,550 cases per year with a cost impact of between £300,000 and £900,000 (but probably towards the lower figure).

- Issue 2 – The majority of residential projects adopt building warranties for reasons other than the Warranty Link Rule. However, it appears that a material number of projects do not require a warranty, the largest groups being stock for private rent (a rapidly expanding market) and luxury homes for cash purchasers. Given this point there may be in the region of 17,000 homes constructed each year for which the local authority currently undertake building control services but Approved Inspector services would be considered if the Warranty Link Rule were to be removed. There is no firm evidence that this increased competition would result in reduced costs but the market in question is worth around £6,000,000 per year so even a small reduction (say 5%) would result in a material saving (say £300,000).

Appendix 7B: Enforcement

7B.1 Background

This study comprises further work, as a follow on from Impact Assessment No: DCLG/0089. This is in the way of general comment, a phased further review of the impacts highlighted in the IA and a build up towards more precisely identifying and quantifying the costs and benefits associated with potential revised forms of enforcement.

7B.2 Methodology

No further survey work was undertaken. A desk study of existing findings from previous DCLG research was conducted in order to establish an overview and to proffer potential road mapping for the more detailed analysis of the possible outcomes of the various enforcement options.

This paper helps to identify:

- Some of the more critical aspects of the proposals.
- Gives a focus to those topics that would benefit from further survey and evaluation.
- Begins to predict the possible numeric range of application.
- A possible spectrum of increased costs associated with various enforcement options.

7B.3 Enforcement culture

The building control enforcement landscape is one of extremes. On the one hand there is an extremely, perhaps unduly, low level of formal enforcement applied. Against this there is a massive (5million p.a.) portfolio of informal compliance interventions being conducted. Commendation is due to the service's dedication and reliance upon rolling customer/industry friendly light touch enforcement to produce a high level of compliance effectiveness. This no doubt emanates from the service's self-belief in proactive working and adherence to past initiatives for good enforcement. It has also been shaped by the particular unwieldiness of building control law and the constraints of its formal enforcement procedures.

Building control practice is very strongly embedded, maybe even entrenched, in its current doctrine. Whilst initiatives to bring forward other simpler forms of formal enforcement are widely welcomed there is no doubt that a cultural shift is required (both in building control and the construction industry) to encourage and bring about their best implementation and that this need will probably exert a backwards influence on the shaping of the proposals and the formation of best options.

7B.4 Summary of findings

- Further research is needed to try to more precisely establish an estimate of the probable number of enforcement cases under any new regime.
- More detailed modelling of the necessary administration actions of local authority building control in processing the various enforcement options, and their attendant costs, should be conducted. This is probably best done in conjunction with LABC.
- Modelling of the various scenarios that could give rise to additional construction industry costs should be conducted.
- No one local authority will conduct much volume of formal enforcement activity therefore some support, process and monitoring systems might benefit from a centralized focus.
- A programme of learned papers, debates and training should be triggered and encouraged within building control, together with construction links, in order to address and ease into practice new forms and philosophies of enforcement together with other methods of intervention and monitoring suitable for take up by the building control function.

7B.5 References

IA No: DCLG/0089

DCLG BD2776 'The use of civil sanctions to enforce Building Regulations - final report'

DCLG 'Future of Building Control'

DCLG FOBC - Responses

Building Control Alliance - Compliance Actions Survey

7B.6 Cost of enforcement action

7B.6.1 A summary of costs of different enforcement option is given in table 7B.1

Table 7B.1: Draft prediction of possible enforcement activity and costs

Enforcement option		**Building control costs**		**Client/contractor costs**
Fixed monetary penalty		Take up of 1%	Take up of 2%	Penalty fine + rectification of defects + administration + liaison
Likelihood of use	12%			
No. of cases p.a.		360	720	

Enforcement option		Building control costs		Client/contractor costs
Set up costs	high			
Low input	@ £30	£10,800	£21,600	
Higher input	@£250	£90,000	£180,000	
Variable monetary penalty				Penalty fine + rectification of defects +administration +liaison
Likelihood of use	12%			
No. of cases p.a.		360	720	
Set up costs	high			
Low input	@ £60	£21,600	£43,200	
Higher input	@ £250	£90,000	£180,000	
Compliance notices				Rectification of defects + administration +liaison
Likelihood of use	22%			
No. of cases p.a.		660	1320	
Set up costs	low			
Low input	@ £120	£79,200	£158,400	
High input	@ £250	£165,000	£330,000	
Restoration notices				Rectification of defects + administration + liaison
Likelihood of use	20%			
No. of cases p.a.		600	1200	
Set up costs	low			
Low input	@ £120	£72,000	£144,000	
Higher input	@ £250	£150,000	£300,000	
Stop notices				Rectification of defects + lost time + administration +liaison +contractual penalties
Likelihood of use	20%			
No. of cases p.a.		600	1200	
Set up costs	low			
Low input	@ £60	£36,000	£72,000	
Higher input	@ £300	£180,000	£360,000	
Enforcement undertakings				Rectification of defects + liaison meetings with BC + training + ongoing monitoring
Likelihood of use	14%			
No. of cases p.a.		420	840	
Set up costs	high			

Enforcement option		Building control costs		Client/contractor costs
Low input	@ £100	£42,000	£84,000	
Higher input	@ £250	£105,000	£210,00	
TOTAL p.a.	Low input	£261,000	£522,000	
	Higher input	£780,000	£1,560,000	

7B.7 Notes regarding table 7B.1

7B.7.1 Total number of building control applications

Following from recent research reports the total number of building control applications has been taken as 300,000 p.a

7B.7.2 Rate of enforcement

Previous DCLG research found that there was a viewpoint that an extra 2% of applications p.a. might be suitable for further formal enforcement activity extra over that low level which is conducted at present, if suitable new forms of enforcement were enacted.

Predictions have therefore been made on the increased level of 2% nationally however as this level may not be reached, for a number of inherent reasons, predictions have also been made at a 1% rate of take up.

7B.7.3 Probability of the use of any particular enforcement option

The options have been proportioned as to their likely respective degree of take up from the levels of support shown for particular forms of enforcement process in the survey work undertaken in DCLG report BD 2776 (probably best summarised in Table 32).

It should be noted that this is not precise and may stand to be substantially moulded by future favour, government direction or best industry application in use.

7B.7.4 Building control costs

IA No: DCLG/0089 gives early stage outline impact costs. However some of these seem to be low in their estimation and only allow for 0.5 - 1 hour of building control input time/costs for actioning various enforcement modes. Whilst the intent is to create enforcement forms that are simple to implement and of a light touch, reality has it that any form of formal enforcement becomes contentious, subject of appeal, litigious and hence heavy on time and administration for all involved parties.

For instance the issue of a fixed penalty charge may be a simple action up front but it would need a sophisticated back office system, monitoring, follow up and even, and quite likely, further enforcement to recover the charge let alone any normal consequential building control functions.

Accordingly unit costs per enforcement action have been evaluated at 'low input' level, which tend to follow the DCLG figures mentioned above, and a 'higher input' level which elevates the unit cost.

No doubt the spread of enforcement cases would display a range of unit cost between the two. Also building control costs would possibly be offset by the recovery of penalties and the fact that some of the more formal enforcement activity is being undertaken informally at present.

7B.7.5 Client / contractor costs

No survey was made of the impact costs for this sector.

Appendix 7C: Completion Certificates

7C.1 The issues

Initial data collection was undertaken in relation to two issues associated with completion certificates. Table 7C.1 shows the issue under consideration and the initial data collection approach. It is noted that this initial work is undertaken with the purpose of informing thinking on the issue and further work may be required, for example larger scale survey work or case studies.

Table 7C.1: Data collection approach

Issue	Initial data collection
Local authorities do not always issue completion certificates. The absence of these documents can cause delays or additional costs when a homeowner comes to sell their home.	(i) Small scale survey of circa six of each of the following: • Estate agents • Conveyance solicitors • Building control teams (ii) Identification of appropriate data set for scale up.
Completion certificates can be (incorrectly) taken as representing proof that the works are in accordance with the Building Regulations. This can make it more difficult for a homeowner when disputes arise.	(iii) Small scale survey to identify experience of this issue.

7C.2 Initial findings

Key messages arising from the responses of estate agents are as follows:

- Frequency of conveyance issues – All respondents indicated that it is relatively rare to encounter problems due to the absence of completion certificates. Firm statistics were not provided but it appeared that less than 5% of transactions would have some sort of issue.
- Impact of completion certificate related problems – Of the above percentage of transactions encountering a problem, respondents indicated that the majority were resolved either by confirming the works did comply or purchasers deciding not to pursue the issue.

- Solutions to problems – It was reported as being very rare for an insurance policy to be taken out in relation to building control compliance. Where this did occur the cost appeared to be around £500.

- Wider comments

    - In more buoyant housing markets purchasers can be forced to “take a view” on the absence of a completion certificate to avoid losing an in demand property. Essentially this means that the situation in London is different to that in other areas.

    - There is some concern that local authorities can slow down the process whilst buyers and sellers are keen to move things forward quickly. This again causes people to tend to accept the absence of certificates.

    - There is awareness that completion certificates do not guarantee that the works complied, this leads to concern as to their value and whether it is therefore worth ensuring that one is in place.

Key messages arising from local authority building control teams are as follows:

- General approach to issuing completion certificates – All teams surveyed have a policy to issue completion certificates unless there is a reason not to (e.g. works not in compliance, certificates not provided etc).

- Frequency of non-issue of completion certificates – Most teams felt that certificates are issued for between 90 and 99% of domestic works however one team felt that the figure could be as low as 70%.

- Reasons for non-issue of completion certificates – The most common reason for certificates not being issued was the absence of required documentation and within this the most common document was electrical certificates. Other reasons included general non-compliant work, SAP calculations, absence of extract fans, non-payment of building control fees and no final inspection being undertaken. It was felt that there is an issue with homeowners not being aware of the need for a final inspection / completion certificate and therefore not pushing their builders to obtain this.

- Completion certificates in disputes – Most respondents did not have experience of a completion certificate being used as a defence for non-compliant work in a dispute. Most did however note that there is widespread misunderstanding amongst homeowners with many feeling the building control system is akin to a clerk of works service ensuring quality. One respondent did give the example of an extension which had been insulated on only 2 of 3 walls which the building control team had not been able to see and later caused problems / a dispute (even though a completion certificate was in place).

- Wider comments

    - The biggest single reason that problems occur is that a building control application was never made in the first place.

- Most respondents now hold fully electronic records which enable them to respond to enquiries cheaply and quickly.
- The Competent Persons Schemes are helping to reduce issues as more and more people use them rather than the alternative of needing separate inspection / certification.
- Where safety issues exist inspectors will pursue builders diligently to ensure the works are rectified and a certificate can be issued. For more minor matters it may be left to the homeowner / builder to respond or they will not receive a certificate.

To date legal firms have been slow to respond to the consultation. Key messages arising from the firm which has responded are as follows:

- Frequency of problems – It was indicated that the issue of alterations / extensions without evidence of approval occurs very commonly, being reported by the surveyor and passed to the solicitor to deal with.
- Solutions adopted – Generally appeared that purchasers take a pragmatic view on this issue and don't usually resort to taking out insurance or aborting the purchase. Where a real problem does occur it is usually the case that the vendor has had works without any permission (planning or building control) which can be enough to cause the purchaser to withdraw.

7C.3 Scale up data

The key data sets required to gauge the scale of any problems for England as a whole have been identified as shown in table 7C.2.

Table 7C.2: Key data sets

Data	Source
Number of dwelling sales per year	DCLG summary of housing market property sales sourced from land registry data. This data set indicates that in the region of 600,000 dwelling sales are currently being completed each year in England (down from a peak of over one million).
Number of building control applications per year	DCLG estimate that circa 210,000 building control applications are made each year for residential works. The vast majority of these applications (circa 200,000) relate to refurbishment and alteration works (rather than new build).

Responses from agents indicate that less than 5% of transactions have some sort of completion certificate related issue. 5% would amount to 30,000 transactions per year, however in the majority of cases the issue appears to be resolved without material time or cost impact. If 10% of these transactions did

have a more significant issue this would still amount to 3,000 transactions per year. Potential impacts would include:

- The cost of insurance (around £500)
- Additional legal fees
- Other professional fees associated with delay
- Costs to building control bodies of dealing with the issue

However, when considering the above it is also important to note the responses from building control teams. These responses indicated that the number of works not being issued with a completion certificate without a valid reason (i.e. non-compliant works / certification) is virtually zero. Given this point the impact of proposed changes to the building control system on reducing the above 3,000 transactions may be limited (i.e. in reality these represent non-compliant works or those which never had a building control application).

Appendix 7D: Risk based inspection

7D.1 The issues

Initial data collection was undertaken in relation to the potential savings in terms of reduced inspection costs and avoided standing time associated with the risk based inspection. Although further research is still required to quantify the costs, the following sections provide high level commentary on the construction stages that may attract a modified approach and the estimated saving impact for small, medium and large projects.

7D.2 Statutory notification stages

Current stages covered by statutory notification are as follows, together with some commentary on likely future practice:

- **Commencement** – will necessarily continue in its current role – does not accrue any waiting time or construction delay for the contractor.
- **Foundation excavations** – a vital inspection that will need to be fully embraced by risk based assessments – sometimes constitutes a single inspection - but often, especially on larger projects gets split into phases, and also often necessitates re-inspection so multi inspection visits are common – does this accrue delay to the construction process? – Probably not as the building control inspection is timed into the window between excavation and concrete placement and it is in every interest for such an inspection to be conducted – any ground works can throw up unknown problems and should be viewed as a necessary part of quality control and should be planned in.
- **Foundation concrete** – this is not generally separately inspected and is picked up via oversite or other substructure inspections – so no savings here.
- **Oversite** – an increasingly important stage given attention needed to dpm, radon, ground insulation etc – often carried out in phases on larger projects – there is tolerance as to what particular sub stage this is inspected at – there is some scope for risk assessed sampling of this stage on larger projects - does not occasion any waiting time for contractor.
- **Damp proof course** – perhaps not such a vital stage nowadays – sufficient control and inspection can be achieved through both before and after inspections e.g. oversite and first lift superstructure – also this is an inspection that could easily cause construction delay within traditional masonry construction by virtue of bricklaying having to wait until laid out dpc had been inspected – this is a stage that risk assessment may relegate in importance to being entirely omitted or made subject to random sampling inspection – savings can be allocated against this stage.
- **Drains laid** – a numerically large inspection tranche and one that is important – so should continue to nearly the same magnitude, there is scope

on large schemes to sample inspect only (if confidence has been gained as to the quality of installation and approach) – whilst it could be, drainage is not normally backfilled immediately upon laying – building control inspect within this natural construction gap so it is believed that there isn't a valid waiting time claim on the part of contractors – however some savings may emanate from the proposals so best to allow for a degree of saving.

- **Drains backfilled and tested** – this should continue under risk assessment (drains should be tested whether building control inspected or not) – contractors should plan this testing regime in and there is therefore no building control waiting time.
- **Occupancy** – not often necessary in its own right – usually absorbed into Completion.
- **Completion** – will continue on the same basis – has to be allowed for in construction planning – can be time consuming and often difficult to facilitate timely access etc – but this is not a building control waiting situation.
- **Intermediate** – not a statutory notification – however is a vital component of effective building control inspection and forms a substantially role in existing Inspection/Service Plans – at present it is informally conducted on the volition of building control or sometimes at the request of the contractor/client – at present there is no wait time involved as bulding control inspect when they choose at appropriate stages – however it should be noted that under the proposals many of these intermediate stages will become formal stages of the Inspection/Service Plan and the contractor will have to inform building control in instances he may not do at present – they are however likely to have some flexibility about the precise timing of the inspection so would not generate wait time.

7D.3Avoided standing time and reduced inspection costs

Applying the above to small, medium and large projects leads to the following allocation of possible savings:

7D.3.1Small

1 less inspection – by virtue the omission of the dpc inspection, potential savings in avoided standing time and inspection fee include:

- 1 less inspection waiting time (£21/hr x 4hr x 2 skilled labourer = £168)
- 1 less administrative unit (£51/hr x 0.25hr = £12.75)
- 1 less building control inspection (£60/hr x 1hr = £60)

7D.3.2Medium

2 less inspection - by virtue of probably omission of dpc inspection and some adjustment to drain and oversite inspections, potential savings in avoided standing time and inspection fee include:

- 2 less inspection waiting times ((£21/hr x 8hr x 4 skilled labourer = £672)

- Equalisation of administrative time as any omissions offset by notification of additional stages
- 2 less building control inspections (£60/hr x 2hr = £120)

7D.3.3 Large

It is impossible to evaluate as will vary according to typology and construction form and wider research is required.

Savings could accrue as likely that sampling inspections may be valid on for instance large new build housing developments.

However this sector will be more dependent upon ‘intermediate’ type inspections which do not produce a saving.

The potential savings resulted from per reduced building control inspection is estimated as: £60/hr x 4hr = £240.

7D.4 Inspection plans - summary of findings

The principle of inspection planning is already practiced widely by building control.

Formalising the position will help bring about an improved and more regular approach.

There is a reasonably close fit between existing practice and the new guidance.

A summary of some of the effects of a formal shift to a risk assessed basis of building control inspection are given in table 7D.1.

Evidence from this study suggests that a possibly significant difference in inspection numbers could result from a risk assessment based approach.

Benefits should accrue to the construction industry process, but they will need to understand and adhere to any new regime.

Table 7D.1: Comparison of risk assessed inspection plans with current inspection activity										
Case Ref	**Typology**	**Description**	**Purpose Group**	**Location**	**Common**	**Complex**	**(A) Inspections Conducted**	**Applicable Notifications**	**(B) Risk Based Allocation**	**Difference (B ±A)**
1	House	Demolition of existing two storey flat roof side extension and replacement with new two storey extension together with new single storey at the rear	1c	South East (rural)	✓		10	9	6 - 8 (mean 7)	+4 to + 2 (mean +3)
2	Apartment Block	New four storey block of 20 flats	1a	South East (urban)	✓		24	9	30	- 6
3	Apartment Block	New4,5 and 6 storey block of 41 flats with undercroft car park	1a	London		✓	28	9	26	+2
4	House	Loft Conversion	1c	South East (urban)	✓		6	3	4 - 6 (mean 5)	+2 to 0 (mean +1)
5	House	Two storey extension and internal alterations	1c	South East (urban)	✓		10	9	6 -8 (mean 7)	+ 4 to +2 (mean +3)
6	House	Small single storey extension	1c	South East (urban)	✓		6	7	6 - 8 (mean 7)	0 to -2 (mean -1)
7	Bungalow	Large single storey extension	1c	South East (rural)	✓		9	9	6 - 8 (mean 7)	+3 to +1 (mean +2)
8	Office	Alterations and change of use of large medieval structure(Grade 1 Listed Building) from research centre to a design office	3	South East (urban)		✓	12	9	19	- 7
9	Nursing Home	New three storey nursing home for dementia care	2a	South East (urban)		✓	85 (Note 1)	9	35	+50
10	New housing estate	Demolition of existing factory and erection of 28 dwellings and 1 office	1c	South East (rural)	✓		277	9 (x 29) = 261	7 - 10 (x29) = 203 - 290 (mean 8.5 = 247)	+ 74 to - 13 (mean +30)
11	Public Building	Alterations to large multi-purpose public building used for events, offices, retail and community facilities (Grade 1 Listed Building)	5	South East (urban)		✓	26	9	19	+ 7
Totals							**493**	**343**	**409** (Note 2)	**+84** (Note 3)
										+ 66 (Note 4)

Notes:

1. This is an unusual case (see commentary) and produces a skew from the norm.
2. This total is based on the mean recommendation of inspection numbers for 'common' schemes and individual specific risk assessed predictions for 'complex' schemes.
3. This difference, which would indicate 84 less inspections being conducted under the risk assessment recommendations against current practice, is predicated by Notes 1 and 2.
4. This difference indicates that adoption of the risk assessment guidance would induce 66 more inspections than would apply if strict adherence to statutory notifications only was followed.

Appendix 7E: Appointed persons

7E.1 Summary of results

Consultation of a range of professional disciplines and a small selection of contractors was undertaken with respect to the Appointed Persons proposals. Specifically the discussion has focused on the powers and responsibilities the role holder should have and potential professional qualifications.

Key views arising from the work are as follows:

- The role is seen as being beneficial to a relatively small amount of projects, for example larger / more complex ones and repetitive roll-out type programmes. Even larger contractors undertaking complex projects saw it as beneficial to only a small proportion of their schemes.
- Where the role is appropriate the main benefit is seen as the timely resolution of queries, particularly in more unusual circumstances.
- There is also seen to be the potential for reduced building control fees, where an element of the inspection is carried out by the Appointed Person. The effectiveness of the current building control market is however seen as reducing the potential for cost savings; fees are felt to be cost effective and the service tailored to assist where necessary in more complex projects.
- A key concern is seen as achieving a balance between a role with authority and real powers, and one which is within and working closely with the contractor team. There is seen to be the potential for a conflict of interest here.
- Recognising the potentially important role of an Appointed Person, a further concern is that of liability for inadequate / incorrect advice and, where persons are external to a company, potential difficulty in obtaining professional indemnity insurance for a new service.
- It is seen as being important that the Appointed Person has the following powers / responsibilities:
    - Some level of authority to “sign off” works without the need for reference to building control. This could relate to the consultation proposals regarding risk based inspection (i.e. an Appointed Person may be able to approve some stages and a building control officer others).
    - An obligation to report non-compliant work and / or conflicts to building control if a resolution on site cannot be reached.
    - The authority to confirm non-compliance and possibly stop works until rectification is made.
- It is felt that extension or modification of existing schemes is appropriate for qualification. The Royal Institution of Chartered Surveyors (RICS) is seen as offering the most respected route with a level of quality control. However, there is some concern as to whether a single person can be knowledgeable in all of the required disciplines, particularly given increasingly specialist areas such as

energy. It is felt that either a corporate qualification is required or the ability for a network of Appointed Persons with specialist knowledge areas.

8 Possible changes to Part P

8.1 Purpose of task

The purpose of this work was to:

- Undertake cost:benefit analyses of options for changing Part P Electrical safety – dwellings.

8.2 Options for change

The options for change are in line with the DCLG consultation document published in January 2012 but also include a refined set of sub-options to the intermediate position termed "retain Part P with changes". The set of options investigated were:

- Do nothing
  - Option 0 –The base case of retaining Part P as it currently stands
- Retain Part P with changes
  - Options 1a to 2b – These options for amendment to Part P are summarised in table 8.1.

Table 8.1: Amendment options

	Allow 3rd party inspection, testing and certification*	**Remove the need to notify new installations**	**Remove the need to notify alterations to installations**			
		Control wiring incl fire / security / heating / ventilation	**Lighting / power outdoors**	**Electric floor / ceiling heating**	**Generator / solar voltaic systems**	**Works to a kitchen or bathroom outside of the zones**
Option 1a		X	X	X	X	
Option 1b	X	X	X	X	X	
Option 2a		X	X	X	X	X
Option 2b	X	X	X	X	X	X

* Allow third-party inspection, testing and (if the third party is registered) certification of compliance with the Building Regulations where work is carried out by someone who is not a member of a competent person scheme

- Revoke Part P
  - Option 3 – Revoke Part P (i.e. the situation prior to introduction of Part P).

8.3 Approach

8.3.1 As far as is possible, all costs and benefits of each option have been quantified and monetised. Much of the effort has focused on the impact Part P has had since its introduction as this is relevant to all of the options considered (i.e. these benefits / costs will either be retained, retained in part or lost). The key data sources reviewed are provided in table 8.2.

Table 8.2: Key data sources

Source	Summary
Office for National Statistics	• Electrical fatalities appear to have fallen from 13.6 per annum during 2001-05 to 8.2 per annum during 2006-10. However there is also a long term trend of falling fatalities and, given the relatively short period, it is difficult to identify the scale of the additional impact of Part P. Given this point, the cost / benefit assessment ascribes 50% of the fall during the period to Part P. • There is no data on electrical injuries in the period following introduction of Part P.
Electrical Safety Council	• Estimated 2.5million mains voltage electrical shocks per year resulting in 350,000 injuries. However no further information so difficult to use information for analysis.
BRE	• No information available.
NHS (accident cause and statistics)	• Electric shock hospital admissions fell from 4,021 in 2008/09 to 3,341 in 20010/11. However no detail on cause of shock so difficult to attribute to Part P.
DCLG fire statistics	• Accidental electrical fires indicated an increasing trend up to 2004 and a levelling from 2005 onwards which may be due to Part P. • All wiring fires (including plugs, sockets etc) continued to show an increasing trend after 2005 which also needs to be considered against the context of increasing amounts of electrical equipment in use. • There is insufficient data to understand whether the picture in Scotland differs from that in England to estimate current position without Part P. • The data shows that 1 in 411 electrical fires causes a fatality, 1 in 118 causes a serious injury and 1 in 15 a slight injury. • The assumption for the purposes of this report is that Part P has caused a reduction in the level of mains wiring fires of 138 per year (30% of the total) and in other electrical fires of 1,021 per year (15% of the total).

8.3.2 The cost benefit model quantifies the impacts of each option in the following main areas:

- Annual membership costs of competent person schemes

- Building control fees – for carrying out inspection and testing or receiving certificates from a qualified electrician
- Costs of inspection and testing by a third party
- Changes to the number of deaths and injuries
- Changes to the quantity of property damaged and fire brigade attendances
- Transition costs (to move from the current situation to a new one – e.g. training to familiarise staff)

8.3.3 Table 8.3 provides details of the main cost and benefit items.

Table 8.3: Cost:benefit model items

Item	Details
Costs	
Costs for installers who are members of a competent person scheme	• The current average cost of £381 per year per firm is applied to the number of registered firms, allowing for this number to increase by 1,000 firms per year. Given trends to date it is also assumed that the cost of membership will continue to fall slightly over the 10 year period. In the revoke option the number of firms decreases gradually, reverting to pre-Part P levels within 5 years. • A sum of £3.50 is allowed for completing online forms to notify competent person scheme operators of each job undertaken. The number of jobs varies from the current level for option 0 (do nothing), through reduced numbers for the amendment options, to zero for the revoke option.
Costs for installers who are not members of a competent person scheme and who have work certified by a building control body	• £246 is allowed as the average building control charge where building control bodies carry out the inspection and testing. • Where electricians do their own inspection and testing, £60 is allowed as the charge by building control to spend 1hr reviewing completed BS 7671 forms. • £10 is allowed for installers to complete the form notifying building control bodies of their intention to carry out notifiable work.
Costs for installers who are not members of a competent person scheme and who have work certified by a registered third party	• £150 is allowed as the charge by a registered third party to produce a Part P condition report and certify compliance with the Building Regulations. • (We have assumed that installers will always use a registered third party to do the inspection and testing. Although a third party who is not registered might charge only £120, the additional building control charge would make this a more expensive route.)

Item	Details
Benefits	
Electrical injuries	• The value of each avoided injury is £49,964, which is based on the Department for Transport approach assuming a mix of serious and slight injuries. In the current situation it is assumed that 421 injuries are avoided each year due to Part P (i.e. 50% of the total reduction as set out above) and that the size of this benefit continues to increase by 5% per year. • For the amendment options a number of jobs will no longer need to be notified and the benefit will therefore be reduced. The reduction is calculated by splitting job types into 12 main categories and assigning each a rating based on the risk of problems and the current level of compliance; this is then applied to the number of jobs falling into this category. For example floor / ceiling heating installations have a medium risk, a high current level of compliance and account for only a small proportion of all jobs; their removal from the need to notify therefore causes a very small reduction in the overall electrical injury benefit. • For the option to revoke, the same methodology as above is used. This is combined with the fact that the number of firms which are members of competent person schemes is forecast to reduce back to pre-Part P levels and the benefit to reduce at 10% per year.
Fire injuries and fatalities	• The values of each avoided fatality, serious injury and minor injury are £1,668,817, £187,521 and £14,462 respectively in line with the Department for Transport approach. The quantity of injuries and changes to this under the various options are calculated via a similar methodology as that used for electrical injuries.
Fire damage	• The value of each fire avoided is £5,820, which is based on DCLG figures sourced from fire brigades and is comprised of £3,186 response cost and £2,634 property damage cost.

8.4 Key findings

8.4.1 The cost:benefit appraisal model indicates the benefits for each option over a 10 year period using a 3.5% discount rate (i.e. in accordance with the standard government assessment method). This information is summarised in table 8.4.

Table 8.4: Cost/benefit model outputs

	Option 0	Option 1a	Option 1b	Option 2a	Option 2b	Option 3
Transition costs	-	-£3,889,770	-£3,889,770	-£3,889,770	-£3,889,770	-£3,889,770
On-going costs	-£362,104,821	-£292,088,629	-£190,235,123	-£244,174,115	-£167,358,610	-£19,215,375
Benefits (health & safety only)	£352,994,514	£350,879,383	£350,879,383	£349,631,496	£349,631,496	£177,834,017
Benefits (total)	£425,016,838	£422,470,151	£422,470,151	£420,967,656	£420,967,656	£214,117,921
Net benefits (health & safety only)	-£9,110,307	£54,900,983	£156,754,490	£101,567,611	£178,383,116	£154,728,871
Final benefit with respect to 'do nothing'	**-**	**£64,011,291**	**£165,864,797**	**£110,677,918**	**£187,493,423**	**£163,839,179**

8.4.2 Table 8.4 indicates that:

- Option 0 (do nothing) has a net cost of £9m
- All of the options to amend Part P show a net benefit ranging from £64m to £187m
- Option 3 (revoke Part P) shows a net benefit of £164m
- Option 2b which allows for 3rd party inspection and testing/ certification and removes the need to notify a number of additional work types shows the greatest benefit of all options

8.5 Conclusions

On the basis of the cost:benefit analysis, it can be concluded:

- All of the options for amendment to Part P (rather than revocation) retain the majority of the benefits but reduce the costs to varying degrees.
- Though the option to revoke Part P offers the third greatest net benefit, this is achieved via a significant reduction in both costs and benefits. Due to the relatively recent introduction of Part P, data on its effectiveness in improving safety is limited. Anecdotal evidence from numerous sources suggests a greater benefit than that currently indicated by the data. There is therefore a risk that revoking Part P would in fact cause a greater loss of benefits and therefore a reduced net benefit.
- Given the above it appears that an option to modify Part P offers greater certainty of benefits than one to revoke it.
- Option 2b would therefore appear to be the preferred course of action based on the data available.