adroit economics ltd

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Building Safety (Wales) Bill - Benefits Model Report

Prepared by Adroit Economics

For and on behalf of

Welsh Government

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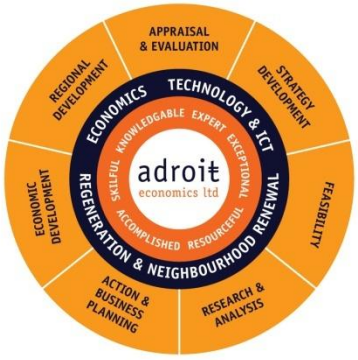
Contents



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1. Introduction

1.1 This document sets out the approach, method, assumptions and the results of an assessment of the costs of the two proposed policy options for the occupation phase of the new building safety regime in Wales, which will be provided for in the Building Safety (Wales) Bill. The assessment is based on HM Treasury Green Book principles.

1.2 The new building safety regime is intended to improve the safety of existing multi-occupied residential buildings in Wales, from purpose built high rise residential blocks to converted houses providing two or more residential units and relevant HMOs.

1.3 Specifically, the new building safety regime is intended to contribute to fire safety outcomes in multi-occupied residential buildings including fire prevention, fire protection, escape and firefighting. In category 1 and category 2 buildings, the new building safety regime is intended to contribute to the risk of structural safety incidents being as low as possible.

1.4 The occupation phase regime focuses on occupied buildings in scope (i.e. after the building is constructed and is occupied). This analysis therefore only assesses the benefits attributable to occupation phase measures.

1.5 The analysis draws in large part on the methodology, data sources and assumptions used in the analysis for the UK Government's Building Safety Act 2022 (hereinafter referred to as the England analysis). However, this analysis also reflects the different policy in Wales and draws on data reflecting the specific conditions and circumstances in Wales. The analysis builds on the Economic Impact Assessment published alongside the White Paper Safer Buildings in Wales.

Abbreviations

BCR	Benefit Cost Ratio
DfT	Department for Transport
FRS	Fire & Rescue Service(s)
HMO	House(s) in Multiple Occupation

2. Executive summary

Summary

2.1 Table 2.1 shows the estimated benefits set against the costs of the two policy options. In both cases the costs are significantly greater than the benefits, with a break-even shortfall of £84.52m for option 2 and £82.31m for option 3 (a gap of £27 and £26 per resident)

Table 2.1: Summary of benefits, costs, net benefits and annual non-monetised benefits per resident required to break even		
	Option 2	Option 3
Benefits	**£55.00m**	**£62.60m**
Costs	£139.52m	£144.91m
Net Benefits	-£84.52m	-£82.31m
Annual non-monetised benefits per resident required to break even	**£27**	**£26**

2.2 These figures do not tell the whole story however. It has not been possible to monetise some of the benefits, particularly the wider reduced anxiety and increased well-being of residents knowing that their buildings are safe. If it had been possible to monetise these, the additional benefit would have gone some way toward narrowing the benefit gap.

2.3 It can be instructive to consider how great the monetised value of this benefit would need to be for the benefits of the policy to equal its costs (i.e., to achieve a NPV of zero). This can be done by calculating a switching value representing the required valuation of this benefit per resident of in-scope buildings. Table 6 shows that the switching value for the Bill (option 3) would be £26 per resident per year.

2.4 In practice, the reassurance benefit would be unlikely to be experienced equally across the population of residents. Some residents would experience no or only a small benefit (for example, because they already feel safe in their home, or because they do not believe the Bill and consequent actions will make their households safer). This would mean that other residents would need to experience greater reassurance for these averages to be achieved.

2.5 To put the switching value in context, Department for Transport's TAG data book[1] values the human cost of a slight casualty at £15,606 (2023-24 prices and values), which is substantially higher than the £26 calculated for the Bill. This is based on a stated preference study and reflects the willingness of an individual to pay to avoid the pain, grief and suffering of a slight accident to the casualty, their relatives and friends.

2.6 Moreover, one of the objectives of the Bill, alongside other measures, is to ensure that another catastrophic disaster similar to the Grenfell Tower fire, never happens again. The full financial cost of the Grenfell Tower fire is estimated to be over £1 billion[2]. Since the chain of failures that led to the Grenfell fire involved repeated non-compliance with the law as it then stood, it may be impossible to legislate the risk out of existence entirely. Nonetheless, the avoided cost of reducing the likelihood of this happening again is significantly greater than the policy cost. But because of the protocols governing the methods of a Green Book compliant cost benefit analysis, it has not been fully possible to attribute £1 billion of benefits to the policy options:

- Firstly, because a proportion of the avoided costs need to be attributed to some of the other measures over and above those in the Bill, such as changed Fire and Rescue Service evacuation policy, and to interim measures such as waking watch and removal of flammable cladding;
- Secondly, even without the Bill and other measures, the probability of a Grenfell Tower type incident occurring in Wales in the near future is small, hence the likelihood of a similar incident occurring in the policy appraisal period under the counterfactual is small, meaning that only a proportion of the benefit of avoiding such an incident can be taken into account in the benefit analysis. Such is the nature of probability methodology. But, even though the probability of a similar event happening in the policy appraisal period is small, it could do, and if it did happen because of the absence of the Bill and other measures, then all of the £1 billion could have been avoided because of the Bill.

2.7 Therefore, when considering the costs and benefits of the Bill, it is suggested that two approaches are used:

[1] TAG data book - GOV.UK
[2] Cost of Grenfell Tower disaster soars to nearly £1.2bn | Grenfell Tower fire | The Guardian

- The first of which is the Green Book compliant cost benefit analysis approach set out in this document, which shows a monetised benefits gap, but one which may be significantly reduced if it had been possible to monetise those benefits it was not possible to monetise;
- and to balance against this, an approach that says that the current risk of an incident similar to the Grenfell Tower fire, although small, is still higher than is tolerable. The priority is to undertake measures (irrespective of the cost) that will reduce the risk, as far as reasonably possible, to a level that will prevent such an incident from happening again, because if it did, the loss/cost would more than outweigh the costs of the Bill.

2.8 The remainder of this chapter summarises the approach and method used to estimate the benefits and sets out the results in more detail.

Buildings in scope

2.9 The Bill focusses on buildings in occupation (buildings under construction are regulated by the Building Act 1984).

2.10 All multi-occupied residential buildings in Wales are in scope, from 18m+ high rise residential buildings, to a two storey maisonette/converted house. HMOs will be subject to the fire safety duties but will be excluded from scope of the other duties in the regime.

2.11 We have chosen the following archetypes as typical of the buildings in scope of the new regime:

- 18m+ buildings containing 2 or more residential units;
- 11-18m buildings containing 2 or more residential units;
- Large blocks of flats under 11m with more than 25 residential units;
- Small blocks of flats under 11m with between 6 and 25 residential units;
- Other buildings under 11m containing flats including converted houses and flats over shops (between 2 and 5 residential units);
- Sheltered accommodation;
- Student accommodation; and
- Relevant HMOs.

Two new policy options are considered

2.12 The analysis assesses the costs and benefits of two new policy options, over and above the counterfactual:

- **Option 1: Business as usual** (the counterfactual);
- **Option 2: Do minimum**: Legislate to introduce a new regime in Wales focusing on the occupation phase of a building's life cycle. The regime would cover the regulation of building safety risks in multi-occupied residential buildings of at least 18m. Multi-occupied residential buildings under 18m and certain Houses in Multiple Occupation (HMOs) would be subject to the fire safety duties, including resident fire safety duties, but would be excluded from scope of the other duties in the regime;
- **Option 3: Preferred option (the Bill)**: Legislate to introduce a new regime in Wales focusing on the occupation phase of a building's life cycle. It would cover the regulation of building safety risks in multi-occupied residential buildings. There would be three categories of building in scope of the regime as follows. Certain Houses in Multiple Occupation (HMOs) would be subject to the fire safety duties but would be excluded from scope of the other duties in the regime.

In option 3, the categories of regulated building would be:

- Category 1: Multi-occupied residential buildings of at least 18m tall or at least 7 storeys;
- Category 2: Multi-occupied residential buildings of less than 18m tall and fewer than 7 storeys and at least 11m tall or at least 5 storeys. These buildings would be subject to some but not all of the requirements that would apply to category 1 buildings;
- Category 3: Multi-occupied residential buildings of less than 11m tall and fewer than 5 storeys. These buildings would be subject to some but not all of the requirements that will apply to category 2 buildings, including fire safety duties but not structural safety duties.

Types of additional requirement considered

2.13 The additional requirements proposed under the policy options include:

- Preparation of the fire safety position;
- Preparation of safety cases;
- Creation of the golden thread;
- Creation of the key dataset;
- Occurrence recording and reporting;
- Engaging residents;
- Providing systems to receive building safety complaints;
- Duties on residents;
- Sanctions and enforcement;
- Building registration;

- Building Certificate;
- Familiarisation costs.

Types of benefit taken into account

Benefits that have been monetised

2.14 Benefits that have been monetised are:

- Avoided fatalities and injuries as a result of (i) reduced fires (and the spread of these) in common areas and (ii) reduced fires (and the spread of these) that start in a residential unit;
- Avoided mental health/well-being impacts on those that would have been directly and indirectly affected by avoided fires/fire spread (but not the mental health/well-being benefits to residents of all multi occupied residential buildings as a result of feeling safer in their homes);
- Avoided structural safety incidents;
- Avoided property loss.

Non-monetised benefits

2.15 A number of identified types of benefits have however not been monetised, because of lack of sufficient evidence to allow reliable estimates or because it was not considered proportionate to carry out the analysis. It may be possible to monetise some or all of these at a future date, when sufficient evidence is available.

- Making residents feel safer in their homes – a significant non-monetised benefit of the new regime is expected to be the improved well-being of residents of multi-occupied dwellings as a result of a reduced fear of the risk of fires spreading within their buildings (irrespective of whether a fire happens in their building or not). This would mitigate negative mental health and well-being impacts arising from any existing uncertainty or concerns as to the safety of people's homes. This could be achieved by the cumulative impact of mandating a proactive approach to building safety, the provision of information to residents to help

develop more transparent and collaborative relationships over building safety, and a more effective system of handling complaints, whereby residents have an increased confidence that issues are raised and resolved faster. Similarly, the introduction of building safety authorities, would give further confidence to residents that dedicated action is being taken to ensure that the fire and structural safety risks in their homes are minimised. At this point, it has not been possible to obtain a sufficiently accurate estimate regarding the extent to which people value feeling safer in their own homes as a result of the proposed regime. Gathering evidence to do so, for example through a stated preference study, would be challenging and costly. Para 2.3 provides an estimate of the level of improvement required to make the policy cost neutral (switching value).

- Providing greater confidence to mortgage and insurance providers that in-scope buildings represent adequate collateral for loans – the new regime is also expected to improve the functioning of the mortgage and insurance markets by allowing lenders to borrow against flats that they are currently unable to, thus increasing the availability and value of these products to leaseholders and residents. Similarly, the new regime should help reduce the tendency for insurers to ask for higher premiums for building insurance because of the difficulties insurers face in differentiating between safe and unsafe buildings. Evidence on building insurance costs has however been mixed to date – whilst there is evidence that insurance rates have increased when risks are identified; also that the process of remediation work is seen as introducing additional short-term risks, but evidence is less clear that upon remediation, rates reduce. The increase in confidence may also help to encourage further investment in the buildings, generating additional benefits for residents.
- Reduced firefighting costs (time and materials): Fewer fires would result in lower costs for Fire and Rescue Services responding to them. Time saved would not be a cashable benefit for wholetime crews, but it would for retained firefighters (most of whom are paid only for the time that they respond to incidents). The minimum initial response to any dwelling fire would normally be 2 vehicles crewed by 10 firefighters at a salary cost of around £200 per hour in total. Larger or more serious incidents naturally mean a greater deployment of resources. (The response to the fire at Grenfell Tower involved over 60 vehicles at its peak). All avoided fires would result in avoided costs for fuel, firefighting materials, and wear and tear on vehicles and equipment.
- Avoided environmental contamination: Related to the avoided use of firefighting materials, above, would be avoided environmental contamination and related health hazards.
- Reduced enforcement costs for Fire and Rescue Authorities: Two factors may be expected to contribute. The requirement for fire risk assessors to be competent should yield a higher standard of assessments, which will in turn facilitate effective

inspection. And for buildings at least 11m tall, the register will clearly indicate who is accountable for building safety thus avoiding the difficulties that can currently occur in identifying the responsible person.

- The non-monetised benefits of occurrence recording and reporting include increasing awareness and shared knowledge of building safety concerns, and providing building safety authorities with an informed intelligence picture of the safety issues within the sector.

Appraisal period etc

2.16 The following appraisal periods are used in the analysis:

- Costs – a 10 year policy appraisal period is modelled
- Benefits – a 70 year appraisal period is used.

The 10 year appraisal period for costs is long enough for the new regime to achieve a steady state. However, recurrent costs will continue to be incurred after the end of the 10 year appraisal period.

The 70-year appraisal period used to assess benefits captures those benefits that accrue during the 10-year policy appraisal period (equal to that used to estimate costs) and benefits that may persist over the life-span of a building, assumed to be 60 years. This is to best capture all the benefits and reflects the Green Book guidance on 'persistence' of benefits.

It is likely to take 10-15 years before all of the improvements to building safety are actioned following safety cases. Therefore, we expect the benefits of reduced impact of fires and structural damage to be experienced between years 14/15 and years 19/20. Following that we expect benefits to reduce but with longer lasting benefits on building safety continuing to be realised throughout the life of the building.

Start year and price year

2.17 The analysis uses a start year of 2027-28 and a price year of 2023-24

Phase in and transition

2.18 18m+ buildings in Year 1 and other buildings under 18m in Year 2.

2.19 This is our working assumption for the purpose of this analysis. Further implementation planning will be undertaken, co-designed with partners.

Methodology

2.20 The steps undertaken in the analysis are as follows:

- Step 1: Categorising buildings in scope
- Step 2: Identifying common types of fire spread incident
- Step 3: Estimating the number and scale of casualties, property and other losses associated with each type of fire incident
- Step 4: Monetising the losses associated with each type of fire incident
- Step 5: Scaling up - estimating the number of such incidents (and associated value of loss) across Wales, in buildings in scope, over the 10-year appraisal period, without and with the new building safety regime

Uncertainties

2.21 The estimates of costs and benefits rely on high-level or provisional working assumptions about the precise nature of the regime in operation. We have attempted to validate our assumptions in collaboration with industry, UK Government, the Health and Safety Executive, Community Housing Cymru, Welsh local authorities, the Welsh Local Government Association and Welsh fire and rescue authorities. Nonetheless, our assumptions are subject to uncertainties. For instance, our assumptions about the risks associated with particular building archetypes, potential losses and the costs associated with certain requirements of the new regime are inherently uncertain. The degree of uncertainty varies from one assumption to another, but the overall effect is to create uncertainty into our estimates of costs and benefits.

Results – central estimate

2.22 Table 2.2 shows the total costs of the two policy options.

Table 2.2: Costs PV (£)		
	Option 2	Option 3
7 storeys+ (18m+ with 2 or more residential units)	£26,987,222	£26,987,222
4-6 storeys (11-18m with 2 or more residential units)	£5,747,606	£8,306,496
under 4 storeys (under 11m with 2 or more residential units)	£72,314,979	£73,402,134
HMO	£10,426,328	£10,426,328
Other costs	£24,045,198	£25,787,477
Total costs	**£139,521,334**	**£144,909,658**

2.23 Table 2.3 shows the estimated total benefits that will derive from each policy option.

Table 2.3: Benefits_PV (£)		
	Option 2	Option 3
7 storeys+ (18m+ with 2 or more residential units)	£19,820,068	£19,820,068
4-6 storeys (11-18m with 2 or more residential units)	£3,228,855	£6,809,985
under 4 storeys (under 11m with 2 or more residential units)	£30,307,711	£34,328,225
HMO	£1,645,106	£1,645,106
Total benefits	**£55,001,740**	**£62,603,384**

2.24 Table 2.4 shows the total net costs (the costs minus the benefits)

Table 2.4: Net Costs (NPC), PV (£)		
	Option 2	Option 3
7 storeys+ (18m+ with 2 or more residential units)	£7,167,154	£7,167,154
4-6 storeys (11-18m with 2 or more residential units)	£2,518,751	£1,496,511
under 4 storeys (under 11m with 2 or more residential units)	£42,007,268	£39,073,909
HMO	£8,781,223	£8,781,223
Other costs	£24,045,198	£25,787,477
Total net costs	**£84,519,594**	**£82,306,274**

2.25 The costs are estimated to be greater than the benefits for both policy options.

2.26 As noted, some of the identified benefits have not been monetised. If it had been possible to monetise these, table 2.5 shows the annual non-monetised benefits per resident required to break even and table 2.6 provides a breakdown by building type.

Table 2.5: Summary of benefits, costs, net benefits and annual non-monetised benefits per resident required to break even		
	Option 2	Option 3
Benefits	£55,001,740	£62,603,384
Costs	£139,521,334	£144,909,658
Net Benefits	**- £84,519,594**	**- £82,306,274**
Annual non-monetised benefits per resident required to break even	**£27**	**£26**

Table 2.6: Breakeven additional annual benefit required per resident by building type		
	Option 2	Option 3
7 storeys+ (18m+ with 2 or more residential units)	£55	£55
4-6 storeys (11-18m with 2 or more residential units)	£11	£6
under 4 storeys (under 11m with 2 or more residential units)	£20	£18
HMO	£13	£13
Total	**£27**	**£26**

2.27 Table 2.7 shows the Benefits Cost Ratio (BCR) for Option 2 and table 2.8 for Option 3

Table 2.7: BCR – Option 2							
	Benefits (PV)	Costs (PV)	BCR	Number of residents	Net Cost (costs minus monetised benefits)	Net Additional Benefits per resident required to break even (10yr NPV)	Average Annual benefit per resident
7 storeys+ (18m+ with 2 or more residential units)	£19,820,068	£26,987,222	73%	15,120	£7,167,154	£474	£55
4-6 storeys (11-18m with 2 or more residential units)	£3,228,855	£5,747,606	56%	26,940	£2,518,751	£93	£11
under 4 storeys (under 11m with 2 or more residential units)	£30,307,711	£72,314,979	42%	248,909	£42,007,268	£169	£20
HMO	£1,645,106	£10,426,328	16%	78,348	£8,781,223	£112	£13
Other costs		£24,045,198			£24,045,198		
Total	**£55,001,740**	**£139,521,334**	**39%**	**369,317**	**£84,519,594**	**£229**	**£27**

Table 2.8: BCR – Option 3							
	Benefits (PV)	Costs (PV)	BCR	Number of residents	Net Cost (costs minus monetised benefits)	Net Additional Benefits per resident required to break even (10yr NPV)	Average Annual benefit per resident
7 storeys+ (18m+ with 2 or more residential units)	£19,820,068	£26,987,222	73%		£7,167,154	£474	£55
4-6 storeys (11-18m with 2 or more residential units)	£ 6,809,985	£8,306,496	82%		£1,496,511	£56	£6
under 4 storeys (under 11m with 2 or more residential units)	£34,328,225	£73,402,134	47%		£39,073,909	£157	£18
HMO	£ 1,645,106	£10,426,328	16%		£8,781,223	£112	£13
Other costs		£25,787,477			£25,787,477		
Total	**£62,603,384**	**£144,909,658**	**43%**		**£82,306,274**	**£223**	**£26**

3. Methodology

3.1 The steps in the analysis are as follows:

- **Step 1: Categorising buildings in scope -** the new building safety regime is intended to improve the safety of existing multi-occupied residential buildings in Wales, from purpose built high rise residential buildings to converted houses containing two or more residential units. For the purposes of the analysis, buildings in scope have been categorised by height/size as follows. First buildings were divided into four broad groups (i) category 1 buildings – at least 18 metres tall or at least 7 storeys, (ii) category 2 buildings – less than 18 metres tall and fewer than 7 storeys and at least 11 metres or at least 5 storeys, (iii) category 3 buildings – less than 11 metres tall and fewer than 5 storeys, and (iv) relevant HMOs. By far the largest number of buildings fall under the category 3 definition, and for the purpose of the analysis, these were subdivided, again based on height/size into the following 3 sub categories (ii) large block of flats (with more than 25 flats); small block of flats (with 6 to 25 flats) and converted houses (with 2 to 5 flats). Differentiating by height and size was important because these have an impact on the number of people and dwellings that could be directly affected by a fire.
- **Step 2: Identifying common types of fire incident** – the measures proposed under the new regime are designed to reduce fire ignitions in residential units and in common areas and for those fires that do start, to prevent the spread of either type of fire in buildings in scope (externally and/or within the building).
  - = Fires that spread will tend to result in the biggest cost/losses, so a major focus of the analysis is on calculating the value of avoided fire spread
  - = Fires that start in residential units but are contained in the room of origin or the residential unit, and fires that start in common areas (such as corridors, bin stores and lobbies), but that don't spread to another floor, will be more numerous but the cost/loss associated with each will be less than those that spread
- Clearly, within these, there are/will be many different types of fire ignition and spread incident but for the purposes of the analysis it was important to identify a small number of types of fire ignition and fire spread incidents that can be taken to represent the majority of fire incidents. This is an essential simplification required to enable the analysis. Identifying types of fire ignition and fire spread incidents to focus the analysis on also needs to take account of the sources of available data and data limitations.

- Regarding identifying and monetising types of fire spread to focus the analysis on - the analysis adopts the fire spread types used in the England analysis and adds more types to reflect the wider range of buildings in scope in the Welsh regime. The analysis then uses the same basis for monetising these as in the England analysis (using HMT green book methodology for monetising avoided health impacts such as avoided injuries and fatalities, avoided property costs such as damage to buildings and possessions and avoided wider costs such as rehousing costs).
  - The regime in England only focussed on buildings of 18m and above, whereas the Welsh regime will capture all multi-occupied residential buildings regardless of height. Hence, this analysis adds some additional fire-spread incident types reflecting lower height/smaller buildings;
  - The fire spread incident types adopted in this analysis therefore are:
    - Major incidents - which apply to large category 1 and 2 buildings where the fire affects the whole building and there are a large number of casualties;
    - Medium incidents – which apply to all buildings (including category 3 buildings and HMOs) where the fire affects the whole building, but where there are a limited number of casualties, and
    - Minor incidents – which apply to all buildings where the fire spreads beyond the room of origin but is limited to 1 or 2 floors
- Regarding identify and monetising fire types that start but don't spread – the analysis relies on the Welsh Fire Statistics' categories[3] used to report number and cost of fires and in addition on the Home Office's 'cost of fire report'
- Regarding fire ignitions in residential units - data are only available on the number of fire ignitions contained in the room of origin (not the residential unit of origin). The analysis therefore cannot distinguish between the number of fires that spread from the room of origin but are contained within the residential unit and fires that spread beyond the residential unit to one floor or more. The analysis therefore assumes an average cost for fires that spread beyond the room of origin and are contained on one floor. The cost of these fires is based on the analysis undertaken in England which estimates the costs of fires that spread beyond the flat of origin

[3] StatsWales Fire incidents

and are contained on one floor. This may over-estimate the cost of some of the fires avoided however as a proportion that are reported in the Welsh fire statistics to spread beyond the room of origin, will be contained with the residential unit. The limitations in the statistics allow no other modelling option though. However, it is expected that the provisions in the Bill will mainly result in improvements that will reduce the spread of fires. The analysis therefore assumes that fires that spread beyond the room of origin are captured within the minor incident fire spready type noted above

- Regarding fire ignitions in common areas – data are available on the number of ignitions and also on the number that do/don't spread beyond the floor of origin, hence it is possible to model these. Those that spread beyond the floor of origin are assumed to be captured by the major/medium and minor incident types above. Those that don't spread are added as a fourth and final fire type category to the above.
- **Step 3: Estimating the extent and scale of casualties and other losses associated with each type of fire spread incident** – Regarding a major fire incident in a large multi-occupied residential building, this analysis adopts the same assumptions about the extent of damage and nature of casualties associated with different types of incident identified in the England analysis. Unpublished research by Adroit Economics Ltd shows that the design of multi-occupied residential buildings in Wales is similar to those in England and moreover, that similar cladding and other construction defects, giving rise to the potential for rapid fire spread, are also found in buildings in Wales, hence it is assumed that similar types of fire spread could occur in Wales. The England analysis identified a full list of the types of losses associated with a major fire spread incident through reviewing a number of recent fire-spread incidents in multi-occupied residential buildings along with drawing on findings from the Grenfell Inquiry, as they emerged. As with the England analysis, this analysis then assumes that only a proportion of the casualties are likely to occur in future fire spread incidents, because of changed Fire and Rescue Service strategy and changed residents' evacuation behaviours. The size of the proportion of losses is then further adjusted to reflect the size of the building (and number of flats) and on the extent of fire spread.
- Regarding medium, minor fire incidents and fires in common areas in all multi-occupied residential buildings and HMOs, this analysis also draws on the incident level fire statistics for Wales which provide data on the number of casualties associated with different types of fires. The extent of damage is estimated in the analysis based on the size of the building (and number of flats) and on the extent of fire spread.

- **Step 4: Monetising the losses** – again, this analysis draws on work undertaken for the England analysis, which drew on a combination of published statistics; evidence from the Grenfell Tower fire, coupled with research and analysis of a number of recent major fires. The analysis also draws on other metrics such as the average cost of a fire and the cost to rebuild.
- **Step 5: Scaling up** – the final step in the analysis is to estimate the number of such incidents (and associated value of loss) across Wales, in buildings in scope, over the 10-year policy period, without and with the new building safety regime.

3.2 Similar steps were used to estimate the costs of structural incidents.

- The same categories of building were used, although the duties to manage structural safety only extend to category 1 and category 2 buildings.
- Types of structural incidents that could be avoided by the policy were identified:
  - Major structural incidents – e.g. partial building collapse; and
  - Medium structural incidents – e.g. elements falling from a building, such as parts of cladding, windows, balconies etc.
- An estimate was made of the likelihood of an incident:
  - Major incidents - Partial building collapse – literature review identified one incident in the last 10 years affecting buildings containing flats. As a result, we are assuming one incident occurring every 10 years across buildings in scope;
  - Medium incidents – Elements falling from building – literature review identified 3 incidents in the last 10 years affecting buildings containing flats. As a result, we are assuming one incident every 3 years across the buildings in scope.
- An estimate was made of the cost of an incident:
  - Major structural incident costed at £400,000 per flat within buildings:
  - for > 18m buildings this equates to £22.4m;
  - for 11-18m this equates to £16m;

  - for small blocks of flats it equates to £3.6m; and
  - for converted buildings it equates to £0.8m per building.
  - Medium structural incident costed at 10% of a major incident.
- Scaling up:
  - Category 1 – assume risk reduction of 80% as a result of policy.
  - Category 2 – assume 40% risk reduction as a result of policy.

4. Step 1: Categorising buildings in scope

4.1 The assessment divides buildings in scope into four main categories, reflecting the height of the building and HMOS, and then further divides buildings under 11m into sub categories, again reflecting the height and size of buildings, as follows:

- (18m+) residential buildings in Wales, and
- (11-18m) buildings with two or more residence in Wales.
- (sub 11m) buildings containing 2 or more residential units are further broken down into 3 sub sets, reflecting height/size of building, as follows
  - = large block of flats – with more than 25 flats
  - = small block of flats – with 6 to 25 flats
  - = converted houses – with 2 to 5 flats
- HMOs (not included in the buildings above)

5. Step 2: Identifying common types of fire incident

5.1 The measures proposed under the new regime are designed to reduce fire ignitions in residential units and in common areas and for those fires that do start, to prevent the spread of either type of fire in buildings in scope (externally and/or within the building).

- Fires that spread will tend to result in the biggest cost/losses, so a major focus of the analysis is on calculating the value of avoided fire spread
- Fires that start in residential units but are contained in the room of origin or the residential unit, and fires that start in common areas (such as corridors, bin stores and lobbies), but that don't spread to another floor, will be more numerous but the cost/loss associated with each will be less than those that spread

5.2 Clearly, within these, there are/will be many different types of fire ignition and spread incident but for the purposes of the analysis it was important to identify a small number of types of fire ignition and fire spread incidents that can be taken to represent the majority of fire incidents. This is an essential simplification required to enable the analysis. Identifying types of fire ignition and fire spread incidents to focus the analysis on also needs to take account of the sources of available data and data limitations.

5.3 Regarding identifying and monetising types of fire spread to focus the analysis on - the analysis adopts the fire spread types used in the England analysis and adds more types to reflect the wider range of buildings in scope in the Welsh regime. The analysis then uses the same basis for monetising these as in the England analysis (using HMT green book methodology for monetising avoided health impacts such as avoided injuries and fatalities, avoided property costs such as damage to buildings and possessions and avoided wider costs such as rehousing costs)

- The regime in England only focussed on buildings of 18m and above, whereas the Welsh regime will capture all multi-occupied residential buildings regardless of height. Hence, this analysis adds some additional fire-spread incident types reflecting lower height/smaller buildings;
- The fire spread incident types adopted in this analysis therefore are:
  - = Major incidents - which apply to large category 1 and 2 buildings where the fire affects the whole building and there are a large number of casualties;

- Medium incidents – which apply to all buildings (including category 3 buildings and HMOs) where the fire affects the whole building, but where there are a limited number of casualties, and
- Minor incidents – which apply to all buildings where the fire spreads beyond the room of origin but is limited to 1 or 2 floors

5.4 Regarding identify and monetising fire types that start but don't spread – the analysis relies on the Welsh Fire Statistics' categories used to report number and cost of fires and in addition on the Home Office's 'cost of fire report'

5.5 Regarding fire ignitions in residential units - data are only available on the number of fire ignitions in the room of origin (not the residential unit of origin). The analysis therefore cannot distinguish between the number of fires that spread from the room of origin but are contained within the residential unit and fires that spread beyond the residential unit to one floor or more. The analysis therefore assumes an average cost for fires that spread beyond the room of origin and are contained on one floor. The cost of these fires is based on the analysis undertaken in England which estimates the costs of fires that spread beyond the flat of origin and are contained on one floor. This may over-estimate the cost of some of the fires avoided however as a proportion that are reported in the Welsh fire statistics to spread beyond the room of origin, will be contained with the residential unit. The limitations in the statistics allow no other modelling option though. However, it is expected that the provisions in the Bill will mainly result in improvements that will reduce the spread of fires. The analysis therefore assumes that fires that spread beyond the room of origin are captured within the minor incident fire spready type noted above

5.6 Regarding fire ignitions in common areas – data are available on the number of ignitions and also on the number that do/don't spread beyond the floor or origin, hence it is possible to model these. Those that spread beyond the floor of origin are assumed to be captured by the major/medium and minor incident types above. Those that don't spread are added as a fourth and final fire type category to the above

6. Step 3: Estimating the number and scale of casualties and other losses associated with each type of fire spread incident

6.1 The principal benefits of the proposed Bill are that it will reduce the number of fires and the number and extent of fire spread incidents, beyond the residential unit of origin in multi-occupied residential buildings. It is also expected that the policy will result in reduced structural failures in buildings through early detection of issues.

Types of loss

6.2 This assessment draws on the research and assumptions undertake to support the England analysis.

6.3 To identify a full list of the types of losses associated with a major fire spread incident, the England analysis reviewed a number of recent fire-spread incidents in high rise residential buildings[4] along with drawing on findings from the Grenfell Tragedy, as they emerged.

6.4 The following types of loss were identified. This analysis assumes that same types of loss are assumed to occur in similar fire spread incidents in Wales. Research shows that the design of residential high rise buildings in Wales is similar to those in England and moreover, that similar cladding and other construction defects, giving rise to the potential for rapid fire spread, are found in buildings in Wales, hence it is assumed that similar types of fire spread incident will occur in high rise buildings Wales

6.5 In addition, it is anticipated that residents living in flats, even where no fire would have occurred will also feel safer as a result of the proposed policy.

<u>Types of loss quantified and monetised in the England Analysis</u>

- Health Impacts
  - = Fatalities – residents
  - = Serious Injuries – residents

[4] Reports were reviewed of earlier incidents, but the consultant team were also on-sight, dealing with some very recent incidents involving whole building loss and so were able to draw on actual events first hand.

- = Slight Injuries – residents
- = Injuries - rescue services
- = Mental health - depression – residents/non-residents
- = Mental health – screening costs
- = Mental health - treatment – residents
- = Mental health - treatment – non-residents

- Non-Health Impacts
  - = Lost personal possessions
  - = Temporary accommodation
  - = Residents' meetings
  - = Demolition of building
  - = Rebuilding /renovating cost
  - = Legal fees
  - = Specialist recovery
  - = Experts' investigation
  - = Lost rent from commercial space

<u>Types of loss not monetised in the England analysis – because of insufficient data</u>

6.6 The following types of loss were identified, but not quantified or monetised in the England analysis:

- Minor Fires Community Mental Health impacts - In discussion with a University College London academic with a special interest in disaster mental health, it was advised that the community mental health impact of minor fires would be significant.

- Emergency Services Mental Health Impact. This is not a direct objective of the programme however it would represent indirect benefits to other government bodies and the wider public who avoid the health costs.
- Providing greater confidence to mortgage and insurance providers that in-scope buildings represent adequate collateral for loans. This is expected to improve the functioning of the mortgage and insurance markets by allowing lenders to borrow against flats that they are currently unable to, thus increasing the availability and value of these products to leaseholders and residents. Similarly, the new regime should address the issue of insurers asking for higher premiums for building insurance because they struggle to differentiate between safe and unsafe buildings.
- Making residents feel safer in their homes – mitigating the negative mental health and wellbeing impacts arising from any existing uncertainty/concerns as to the safety of people's homes. This would be achieved by the cumulative impact of a range of measures implemented through the new regime, including a certification process to provide assurance that buildings are safe for occupation, safety cases mandating a proactive approach to building safety, and a more effective complaints system, with the ability for residents' concerns to be escalated to a trusted external body which will ensure that the fire and structural safety risks in their buildings are mitigated.
- Trade and Innovation benefits. Implementation of the new regime is intended is to facilitate industry innovation and trade though industry specific evidence would be required to identify any impact.

Number/Scale of casualties, property and other losses associated with catastrophic fire spread incidents affecting the whole building

6.7 The England analysis used the following methodology for estimating losses associated with **catastrophic fire spread incidents affecting the whole building**:

- The starting point was that the number/scale and type of casualties and losses were estimated for an event similar to the Grenfell Tower tragedy.

- Two main sources were used (i) evidence from the Grenfell Tower tragedy itself, as it emerged and (ii) evidence from a more recent whole building loss incident[5]
  - = The number/extent of casualties and wider health impacts were mainly derived directly from the Grenfell Tower tragedy
  - = The extent of non-health impacts were mainly derived from the more recent building loss incident
- The England analysis then assumed that the number of fatalities and injuries that occurred in the Grenfell Tower tragedy were unlikely to happen in a similar incident in the future because of the awareness of the risks of unsafe cladding and the FRS's consequent change in strategy coupled with residents' voluntary evacuation. Instead, for the counterfactual, two scenarios for whole building fires were modelled – (i) a reduced number of casualties was assumed for a future **worst-case** scenario and (ii) a very small number of casualties based on more recent experience was assumed for a more **typical** scenario. Then, when modelling the number of each type of incident that could occur across England over the 10-year policy appraisal period, further reductions to the estimated number of incidents were made to reflect the wide scale remediation programmes under way coupled with the Combustible Cladding Ban and other changes to building safety regulations.
- A similar approach has been taken in this analysis for Wales – i.e. taking the nature and scale of losses associated with the Grenfell Tower tragedy as the starting point for a catastrophic fire, but assuming fewer casualties would occur in any future whole building loss event.

Number/Scale of casualties, property and other losses associated with other <u>fire incidents affecting part</u> of the building

6.8 The England analysis used the following methodology for estimating losses associated with **fire spread incidents** affecting part of the building:

- The types of impacts identified for a catastrophic fire were also considered for other fire spread incidents which affect part of a building.

[55] The consultants worked on the site to assess the loss and cost of rebuild and so had first hand knowledge of the nature and scale of losses. The specific site/incident is confidential and cannot be quoted therefore

- For fire spread across part of the building, evidence from similar incidents was used to develop an understanding of the number of casualties. This resulted in two scenarios being developed – one with no fatalities and the other where fatalities occurred.
- For fire spread over 1 or 2 floors, data from the incident reporting system was used to estimate the average number of fatal and non-fatal casualties per fire spread incident.
- For other health impacts (such as mental health screening/treatment), a judgment was made about the % of people affected relative to the Grenfell Tower estimates.
- For non-health impacts, an estimate was made based on the number of flats affected and the cost of losses/refurbishment related to these numbers.
- Further reductions were assumed for limited fire spread events (on one or two floors), taking account of the size/height of each building type.

Scale of loss associated with each type of fire spread incident – Category 1 (18m+) buildings

- Table 6.1 sets out the number/scale of losses associated with a Grenfell Tower type incident
- Table 6.2 shows the assumptions made regarding the proportion of Grenfell Tower losses assumed to occur in each type of fire spread incident in the future to adjust for the size of buildings and the extent of damage.
- Table 6.3 applies the proportions in table 6.2 to the scale of loses associated with a Grenfell Tower type incident shown in table 6.1

Table 6.1: Numbers/scale of loss associated with a Grenfell Tower type incident		
		Grenfell Tower Economic Costs - Best estimate
Type of impact	Type of unit	number of units
Health Impacts		
Fatalities – residents	number of persons	72
Serious Injuries – residents	number of persons	20
Slight Injuries – residents	number of persons	42
injuries - rescue services	number of emergency personnel	114
mental health - treatment - residents	number of residents	231
mental health - op - screening	number of non residents - family, friends, neighbours	11,000
mental health - treatment - other	number of non residents - family, friends, neighbours	3,630
mental health - wellbeing - avoiding depression	number of non residents - family, friends, neighbours	3,630
Non-Health Impacts		
Demolition of building	number of buildings	1
rebuilding cost	number of flats	120
lost personal possessions	number of flats	120
specialist recovery	number of flats	120
temporary accommodation	number of residents	231
lost rent from commercial space	number of weeks	48
experts investigation	average cost of investigation	1
legal fees	average cost of investigation	1
residents' meetings	number of meetings	10

Table 6.2: Assumptions made regarding proportion of Grenfell Tower losses assumed to occur in each type of fire spread incident included in the model						
	Cat 1	Cat 1	Cat 1	Cat 1	Cat 1	Cat 1
Type of impact	Major incident - with fatalities	Major incident - with reduced fatalities	Medium incident - with casualties	Medium incident - without casualties	minor incident - 2 floor	minor incident - 1 floor
Health Impacts						
Fatalities – residents	25%	5%	*	0%	*	*
Serious Injuries – residents	25%	25%	*	0%	*	*
Slight Injuries – residents	25%	25%	*	0%	*	*
injuries - rescue services	25%	25%	5%	0%	0%	0%
mental health - treatment - residents	50%	25%	5%	0%	0%	0%
mental health - op - screening	50%	25%	5%	0%	0%	0%
mental health - treatment - other	50%	25%	5%	0%	0%	0%
mental health - wellbeing - avoiding depression	50%	25%	5%	0%	0%	0%
Non-Health Impacts						
Demolition of building	100%	100%	0%	0%	0%	0%
rebuilding cost	50%	50%	10%	10%	1%	0.5%
lost personal possessions	50%	50%	10%	10%	1%	0.5%
specialist recovery	50%	50%	10%	10%	1%	0.5%
temporary accommodation	50%	50%	10%	10%	1%	0.5%
lost rent from commercial space	50%	50%	10%	10%	1%	0.5%
experts investigation	50%	50%	10%	10%	1%	0.5%
legal fees	50%	50%	10%	10%	1%	0.5%
residents' meetings	50%	50%	10%	10%	1%	0.5%

Results – estimated scale of loss associated with each fire spread incident – category 1 (18m+) buildings

6.9 Table 6.3 shows the resulting estimated scale of loss assumed for each category 1 building fire spread incident type, calculated by applying the proportions in table 6.2 to the scale of loses associated with a Grenfell Tower type incident shown in table 6.1

Table 6.3: Resulting estimated scale of loss assumed for each category 1 building fire spread incident type							
Type of impact	Major incident - with fatalities	Major incident - with reduced fatalities	Medium incident - with casualties	Medium incident - without casualties	minor incident - 2 floor	minor incident - 1 floor	Common areas
Health Impacts							
Fatalities – residents	18	4	0.17	-	0.03	0.03	-
Serious Injuries – residents	5	5	0.50	-	0.23	0.23	0.08
Slight Injuries – residents	11	11	0.50	-	0.23	0.23	0.08
injuries - rescue services	29	29	6	-	-	-	
mental health - treatment - residents	116	58	12	-	-	-	-
mental health - op - screening	5,500	2,750	550	-	-	-	
mental health - treatment - other	1,815	908	182				
mental health - wellbeing - avoiding depression	1,815	908	182	0.42	0.42	0.42	0.42
Non-Health Impacts							
Demolition of building	1	1	-	-	-	-	
rebuilding cost – number of flats	60	60	12	12	1	1	
lost personal possessions – number of flats	60	60	12	12	1	1	
specialist recovery – number of flats	60	60	12	12	1	1	
temporary accommodation – number of residents	116	116	23	23	2	1	
lost rent from commercial space – number of weeks	24	24	5	5	0	0	
experts investigation	1	1	0	0	0	0	
legal fees	1	1	0	0	0	0	
residents' meetings	5	5	1	1	0	0	

Scale of loss associated with each type of fire spread incident – other buildings containing 2 or more residential units

6.10 The analysis has made adjustments to the number of casualties and extent of damage to buildings based on the estimated number of flats in each building types and the data from the incident level fire statistics for Wales about the number of casualties as a result of typical fires.

- Table 6.4 shows the assumptions made regarding the proportion of Grenfell Tower losses assumed to occur in each type of fire spread incident in the future for Large Block building types
- Table 6.5: shows the assumptions made regarding the proportion of Grenfell Tower losses assumed to occur in each type of fire spread incident in the future for Small Block building types
- Table 6.6: shows the assumptions made regarding the proportion of Grenfell Tower losses assumed to occur in each type of fire spread incident in the future for Converted building types
- Table 6.7 shows the assumptions made regarding the proportion of Grenfell Tower losses assumed to occur in each type of fire spread incident in the future for HMO building types

Table 6.4: Assumptions made regarding the proportion of Grenfell Tower losses assumed to occur in each type of fire spread incident included in the model for Large Block building types						
	Major incident - with fatalities	Major incident - with reduced fatalities	Medium incident - with casualties	Medium incident - without casualties	minor incident - 2 floor	minor incident - 1 floor
Health Impacts						
Fatalities – residents	5%	3%	*	0%	*	*
Serious Injuries - residents	10%	10%	*	0%	*	*
Slight Injuries - residents	10%	10%	*	0%	*	*
injuries - rescue services	10%	10%	2%	0%	0.0%	0.0%
mental health - treatment – residents	10%	10%	2%	0%	0.0%	0.0%
mental health - op - screening	10%	10%	2%	0%	0.0%	0.0%
mental health - treatment - other	10%	10%	2%	0%	0.0%	0.0%
mental health - avoiding depression	10%	10%	2%	0%	0.0%	0.0%
total Health Costs						
Non-Health Impacts						
Demolition of building	25%	25%	0%	0%	0.0%	0.0%
rebuilding cost	25%	25%	10%	10%	0.5%	0.3%
lost personal possessions	25%	25%	10%	10%	0.5%	0.3%
specialist recovery	25%	25%	10%	10%	0.5%	0.3%
temporary accommodation	25%	25%	10%	10%	0.5%	0.3%
lost rent from commercial space	25%	25%	10%	10%	0.5%	0.3%
experts investigation	25%	25%	10%	10%	0.5%	0.3%
legal fees	25%	25%	10%	10%	0.5%	0.3%
residents' meetings	25%	25%	10%	10%	0.5%	0.3%

Table 6.5: Assumptions made regarding the proportion of Grenfell Tower losses assumed to occur in each type of fire spread incident included in the model for Small Block building types							
		Major incident - with fatalities	Major incident - with reduced fatalities	Medium incident - with casualties	Medium incident - without casualties	minor incident - 2 floor	minor incident - 1 floor
Health Impacts							
Fatalities – residents		5%	3%	*	0%	*	*
Serious Injuries - residents		10%	10%	*	0%	*	*
Slight Injuries - residents		10%	10%	*	0%	*	*
injuries - rescue services		5%	5%	1%	0%	0%	0%
mental health - treatment – residents		5%	5%	1%	0%	0%	0%
mental health - op - screening		5%	5%	1%	0%	0%	0%
mental health - treatment – other		5%	5%	1%	0%	0%	0%
mental health - avoiding depression		5%	5%	1%	0%	0%	0%
Non-Health Impacts							
Demolition of building		10%	10%	0%	0%	0.0%	0.0%
rebuilding cost		10%	10%	3%	3%	0.3%	0.1%
lost personal possessions		10%	10%	3%	3%	0.3%	0.1%
specialist recovery		10%	10%	3%	3%	0.3%	0.1%
temporary accommodation		10%	10%	3%	3%	0.3%	0.1%
lost rent from commercial space		10%	10%	3%	3%	0.3%	0.1%
experts investigation		10%	10%	3%	3%	0.3%	0.1%
legal fees		10%	10%	3%	3%	0.3%	0.1%
residents' meetings		10%	10%	3%	3%	0.3%	0.1%

Table 6.6: Assumptions made regarding the proportion of Grenfell Tower losses assumed to occur in each type of fire spread incident included in the model for Converted building types						
	Major incident - with fatalities	Major incident - with reduced fatalities	Medium incident - with casualties	Medium incident - without casualties	minor incident - 2 floor	minor incident - 1 floor
Health Impacts						
Fatalities – residents	5%	3%	*	0%	*	*
Serious Injuries - residents	10%	10%	*	0%	*	*
Slight Injuries - residents	10%	10%	*	0%	*	*
injuries - rescue services	2%	2%	1%	0%	0.5%	0.3%
mental health - treatment – residents	5%	5%	1%	0%	0.0%	0.0%
mental health - op - screening	0%	0%	0%	0%	0.0%	0.0%
mental health - treatment - other	0%	0%	0%	0%	0.0%	0.0%
mental health - avoiding depression	0%	0%	0%	0%	0.0%	0.0%
Non-Health Impacts						
Demolition of building	5%	5%	0%	0%	0.0%	0.0%
rebuilding cost	2%	2%	2%	2%	0.2%	0.2%
lost personal possessions	2%	2%	2%	2%	0.2%	0.2%
specialist recovery	2%	2%	2%	2%	0.2%	0.2%
temporary accommodation	2%	2%	2%	2%	0.2%	0.2%
lost rent from commercial space	2%	2%	2%	2%	0.0%	0.0%
experts investigation	2%	2%	2%	2%	0.0%	0.0%
legal fees	2%	2%	2%	2%	0.0%	0.0%
residents' meetings	2%	2%	2%	2%	0.0%	0.0%

Table 6.7: Assumptions made regarding the proportion of Grenfell Tower losses assumed to occur in each type of fire spread incident included in the model for HMO building types						
	Major incident - with fatalities	Major incident - with reduced fatalities	Medium incident - with casualties	Medium incident - without casualties	minor incident - 2 floor	minor incident - 1 floor
Health Impacts						
Fatalities – residents	5%	3%				
Serious Injuries - residents	10%	10%				
Slight Injuries - residents	10%	10%				
injuries - rescue services	2%	2%	1%	0%	0.5%	0.3%
mental health - treatment – residents	5%	5%	1%	0%	0.0%	0.0%
mental health - op - screening	0%	0%	0%	0%	0.0%	0.0%
mental health - treatment - other	0%	0%	0%	0%	0.0%	0.0%
mental health - avoiding depression	0%	0%	0%	0%	0.0%	0.0%
Non-Health Impacts						
Demolition of building	5%	5%	0%	0%	0.0%	0.0%
rebuilding cost	2%	2%	2%	2%	0.2%	0.2%
lost personal possessions	2%	2%	2%	2%	0.2%	0.2%
specialist recovery	2%	2%	2%	2%	0.2%	0.2%
temporary accommodation	2%	2%	2%	2%	0.2%	0.2%
lost rent from commercial space	2%	2%	2%	2%	0.0%	0.0%
experts investigation	2%	2%	2%	2%	0.0%	0.0%
legal fees	2%	2%	2%	2%	0.0%	0.0%
residents' meetings	2%	2%	2%	2%	0.0%	0.0%

Results - estimated scale of loss associated with each type of fire spread incident – other buildings under 18m with 2 or more residential units

Buildings - Large Block under 18m – scale of loss

6.11 Table 6.8 shows the resulting estimated scale of loss for each large block building type fire spread incident - calculated by applying the proportions in table 6.4 to the scale of loses associated with a Grenfell Tower type incident shown in table 6.1

Table 6.8: Resulting estimated scale of loss assumed for each Large Block building fire spread incident type

	Major incident - with fatalities	Major incident - with reduced fatalities	Medium incident - with casualties	Medium incident - without casualties	minor incident - 2 floor	minor incident - 1 floor	Common areas
Health Impacts							
Fatalities – residents	4	2	0.17	-	0.03	0.03	-
Serious Injuries - residents	2	2	0.50	-	0.23	0.23	0.08
Slight Injuries - residents	4	4	0.50	-	0.23	0.23	0.08
injuries - rescue services	11	11	2	-	-	-	
mental health - treatment - residents	23	23	5	-	-	-	
mental health - op - screening	1,100	1,100	220	-	-	-	
mental health - treatment - other	363	363	73	-	-	-	
mental health - avoiding depression	363	363	73	0.30	0.30	0.30	0.30
Non-Health Impacts							
Demolition of building	0	0	-	-	-	-	
rebuilding cost	30	30	12	12	1	0	
lost personal possessions	30	30	12	12	1	0	
specialist recovery	30	30	12	12	1	0	
temporary accommodation	58	58	23	23	1	1	
lost rent from commercial space	12	12	5	5	0	0	
experts investigation	0	0	0	0	0	0	
legal fees	0	0	0	0	0	0	
residents' meetings	3	3	1	1	0	0	

Buildings - Small Block under 18m – scale of loss

6.12 Table 6.9 shows the resulting estimated scale of loss for each small block building type fire spread incident - calculated by applying the proportions in table 6.5 to the scale of loses associated with a Grenfell Tower type incident shown in table 6.1

Table 6.9: Resulting estimated scale of loss assumed for each Small Block building fire spread incident type

	Major incident - with fatalities	Major incident - with reduced fatalities	Medium incident - with casualties	Medium incident - without casualties	minor incident - 2 floor	minor incident - 1 floor	Common areas
Health Impacts							
Fatalities – residents	4	2	0.17	-	0.03	0.03	-
Serious Injuries - residents	2	2	0.50	-	0.23	0.23	0.08
Slight Injuries - residents	4	4	0.50	-	0.23	0.23	0.08
injuries - rescue services	6	6	1	-			
mental health - treatment - residents	12	12	2	-			
mental health - op - screening	550	550	110	-	-	-	
mental health - treatment - other	182	182	36	-	-	-	
mental health - avoiding depression	182	182	36	0.07	0.07	0.07	0.07
Non-Health Impacts							
Demolition of building	0	0	-	-	-	-	
rebuilding cost	12	12	4	4	0	0	
lost personal possessions	12	12	4	4	0	0	
specialist recovery	12	12	4	4	0	0	
temporary accommodation	23	23	7	7	1	0	
lost rent from commercial space	5	5	1	1	0	0	
experts investigation	0	0	0	0	0	0	
legal fees	0	0	0	0	0	0	
residents' meetings	1	1	0	0	0	0	

Buildings - Converted building – scale of loss

6.13 Table 6.10 shows the resulting estimated scale of loss for each category 2 converted building type fire spread incident - calculated by applying the proportions in table 6.6 to the scale of loses associated with a Grenfell Tower type incident shown in table 6.1

Table 6.10: Resulting estimated scale of loss assumed for each category 2 converted building fire spread incident type

	Major incident - with fatalities	Major incident - with reduced fatalities	Medium incident - with casualties	Medium incident - without casualties	minor incident - 2 floor	minor incident - 1 floor	Common areas
Health Impacts							
Fatalities – residents	4	2	0.17	-	0.03	0.03	-
Serious Injuries - residents	2	2	0.50	-	0.20	0.20	0.08
Slight Injuries - residents	4	4	0.50	-	0.20	0.20	0.08
injuries - rescue services	2	2	1	-			
mental health - treatment - residents	12	12	2	-	-	-	
mental health - op - screening	-	-	-	-	-	-	
mental health - treatment - other	-	-	-	-	-	-	
mental health - avoiding depression	-	-	-	0.02	0.02	0.02	0.02
Non-Health Impacts							
Demolition of building	0	0	-	-	-	-	
rebuilding cost	2	2	2	2	0	0	
lost personal possessions	2	2	2	2	0	0	
specialist recovery	2	2	2	2	0	0	
temporary accommodation	5	5	5	5	0	0	
lost rent from commercial space	1	1	1	1	-	-	
experts investigation	0	0	0	0	-	-	
legal fees	0	0	0	0	-	-	
residents' meetings	0	0	0	0	-	-	

Buildings - HMO – scale of loss

6.14 Table 6.11 shows the resulting estimated scale of loss for each HMO type fire spread incident - calculated by applying the proportions in table 6.6 to the scale of loses associated with a Grenfell Tower type incident shown in table 6.1.

Table 6.11: Resulting estimated scale of loss assumed for each HMO fire spread incident type

	Major incident - with fatalities	Major incident - with reduced fatalities	Medium incident - with casualties	Medium incident - without casualties	minor incident - 2 floor	minor incident - 1 floor	Common areas
Health Impacts							
Fatalities – residents	1	1.00	0.17	-	0.03	0.03	-
Serious Injuries - residents	1	1	0.67	-	0.23	0.23	0.08
Slight Injuries - residents	2	2	0.67	-	0.23	0.23	0.08
injuries - rescue services	1	1	1	-			
mental health - treatment - residents	3	3	3	-	-	-	
mental health - op - screening	-	-	-	-	-	-	
mental health - treatment - other	-	-	-	-	-	-	
mental health - avoiding depression	-	-	-	0.02	0.02	0.02	0.02
Non-Health Impacts							
Demolition of building	0	0	-	-			
rebuilding cost	1	1	1	1			
lost personal possessions	2	2	2	2			
specialist recovery	2	2	2	2			
temporary accommodation	5	5	5	5			
lost rent from commercial space	1	1	1	1			
experts investigation	0	0	0	0			
legal fees	0	0	0	0			
residents' meetings	0	0	0	0	-	-	-

7. Step 4: Monetising the losses

7.1 Table 7.1 shows the monetary values per unit used for each of the types of impact

7.2 Tables 7.2 to 7.5 show the estimated economic cost of fire, for each fire type, in each building type, broken down by type of cost

7.3 Table 7.6 shows the total estimated economic cost of fire for each fire type and building type

Table 7.1: Unit Values used in analysis for each type of impact

Type of impact	Type of unit	Economic cost per unit	Source
Health Impacts			
Fatalities – residents	per person	£ 2,650,033	DfT Webtag values
Serious Injuries - residents	per person	£ 294,835	DfT Webtag values
Slight Injuries - residents	per person	£ 22,652	DfT Webtag values
injuries - rescue services	per person	£ 98,849	DfT Webtag values
mental health - treatment - residents	per person	£ 11,000	Case study - reported costs from Grenfell Tower
mental health - op – screening - family, friends, neighbours	per person	£ 200	Case study – reported costs from Grenfell Tower
mental health - treatment - family, friends, neighbours	per person	£ 6,000	Case study – reported costs from Grenfell Tower
mental health - wellbeing - avoiding depression – residents, family, friends, neighbours	per person	£ 60,000	Assumes 1.5 years of poor mental health related to PTSD
Non-Health Impacts			
Demolition of building	per building	£ 800,000	Case study review / cost consultant advice
rebuilding cost	per flat	£ 300,000	Cost consultants' advice
lost personal possessions	per flat	£ 25,000	Home office report on economic cost of fires
specialist recovery	per flat	£ 2,000	Case study review
temporary accommodation	per resident	£ 1,200	Assume 12 weeks at £100 per week
lost rent from commercial space	per week	£ 15,000	Cost consultants' advice
experts investigation	per building	£ 250,000	Consultants' industry experience
legal fees	per building	£ 1,000,000	Consultants' industry experience
residents' meetings	per meetings	£ 1,250	Consultants' industry experience

Table 7.2: Category 1 Buildings - Economic Cost of Fire Incidents							
Type of impact	Major incident - with multiple fatalities	Major incident - with reduced fatalities	Medium incident - with fatalities	Medium incident - without fatalities	minor incident - 2 floor	minor incident - 1 floor	Fires in common areas
Health Impacts							
Fatalities - residents	£47,700,599	£9,540,120	£441,672	£0	£82,814	£82,814	£ -
Serious Injuries - residents	£1,474,174	£1,474,174	£147,417	£0	£59,888	£59,888	£22,593
Slight Injuries - residents	£237,843	£237,843	£11,326	£0	£4,601	£4,601	£1,736
injuries - rescue services	£2,817,183	£2,817,183	£563,437	£0	£0	£0	£ -
mental health - treatment - residents	£1,270,500	£635,250	£127,050	£0	£0	£0	£ -
mental health - op - screening	£1,100,000	£550,000	£110,000	£0	£0	£0	£ -
mental health - treatment - other	£10,890,000	£5,445,000	£1,089,000	£0	£0	£0	£ -
mental health - wellbeing - avoiding depression	£108,900,000	£54,450,000	£10,890,000	£25,200	£25,200	£ 25,200	£25,200
total Health Costs	**£174,390,299**	**£75,149,570**	**£13,379,902**	**£25,200**	**£181,598**	**£ 181,598**	**£ 49,528**
Non-Health Impacts							
Demolition of building	£800,000	£800,000	£0	£0	£0	£0	
rebuilding cost	£18,000,000	£18,000,000	£3,600,000	£3,600,000	£360,000	£180,000	£22,100
lost personal possessions	£1,500,000	£1,500,000	£300,000	£300,000	£30,000	£15,000	
specialist recovery	£120,000	£120,000	£24,000	£24,000	£2,400	£1,200	
temporary accommodation	£138,600	£138,600	£27,720	£27,720	£2,772	£1,386	
lost rent from commercial space	£360,000	£360,000	£72,000	£72,000	£7,200	£3,600	
experts investigation	£125,000	£125,000	£25,000	£25,000	£2,500	£1,250	
legal fees	£500,000	£500,000	£100,000	£100,000	£10,000	£5,000	
residents' meetings	£6,250	£6,250	£1,250	£1,250	£125	£63	£ 63
Total non-health costs	**£21,549,850**	**£21,549,850**	**£4,149,970**	**£4,149,970**	**£414,997**	**£207,499**	**£22,163**

Table 7.3: Buildings - Large Block - Economic Cost of Fire Incidents							
	Major incident - with multiple fatalities	Major incident - with reduced fatalities	Medium incident - with fatalities	Medium incident - without casualties	minor incident - 2 floor	minor incident - 1 floor	Fires in common areas
Health Impacts							
Fatalities - residents	£9,540,120	£4,770,060	£441,672	£ -	£ 82,814	£ 82,814	£ -
Serious Injuries - residents	£589,669	£589,669	£147,417	£ -	£ 68,334	£ 68,334	£ 22,593
Slight Injuries - residents	£95,137	£95,137	£11,326	£ -	£ 5,250	£ 5,250	£ 1,736
injuries - rescue services	£1,126,873	£1,126,873	£225,375	£ -	£ -	£ -	£ -
mental health - treatment - residents	£254,100	£254,100	£50,820	£ -	£ -	£ -	£ -
mental health - op - screening	£220,000	£220,000	£44,000	£ -	£ -	£ -	£ -
mental health - treatment - other	£2,178,000	£2,178,000	£435,600	£ -	£ -	£ -	£ -
mental health - avoiding depression	£21,780,000	£21,780,000	£4,356,000	£ 18,000	£ 18,000	£ 18,000	£ 18,000
Total Health Costs	**£35,783,900**	**£31,013,840**	**£5,712,210**	**£ 18,000**	**£ 174,398**	**£ 174,398**	**£ 42,328**
Non-Health Impacts							
Demolition of building	£200,000	£200,000	£0	£ -	£ -	£ -	£ -
rebuilding cost	£9,000,000	£9,000,000	£3,600,000	£ 3,600,000	£ 180,000	£ 90,000	£ 22,100
lost personal possessions	£750,000	£750,000	£300,000	£ 300,000	£ 15,000	£ 7,500	£ -
specialist recovery	£60,000	£60,000	£24,000	£ 24,000	£ 1,200	£ 600	£ -
temporary accommodation	£69,300	£69,300	£27,720	£ 27,720	£ 1,386	£ 693	£ -
lost rent from commercial space	£180,000	£180,000	£72,000	£ 72,000	£ 3,600	£ 1,800	£ -
experts investigation	£62,500	£62,500	£25,000	£ 25,000	£ 1,250	£ 625	£ -
legal fees	£250,000	£250,000	£100,000	£ 100,000	£ 5,000	£ 2,500	£ -
residents' meetings	£3,125	£3,125	£1,250	£ 1,250	£ 63	£ 31	£ 31
Total non-health costs	**£10,574,925**	**£10,574,925**	**£4,149,970**	**£ 4,149,970**	**£ 207,499**	**£ 103,749**	**£ 22,131**

Table 7.4: Buildings - Small Block - Economic Cost of Fire Incidents							
	Major incident - with multiple fatalities	Major incident - with reduced fatalities	Medium incident - with fatalities	Medium incident - without casualties	minor incident - 2 floor	minor incident - 1 floor	Fires in common areas
Health Impacts							
Fatalities - residents	£9,540,120	£4,770,060	£441,672	£ -	£ 82,814	£ 82,814	£ -
Serious Injuries - residents	£589,669	£589,669	£147,417	£ -	£ 68,334	£ 68,334	£ 22,593
Slight Injuries - residents	£95,137	£95,137	£11,326	£ -	£ 5,250	£ 5,250	£ 1,736
injuries - rescue services	£563,437	£563,437	£112,687	£ -	£ -	£ -	£ -
mental health - treatment - residents	£127,050	£127,050	£25,410	£ -	£ -	£ -	£ -
mental health - op - screening	£110,000	£110,000	£22,000	£ -	£ -	£ -	£ -
mental health - treatment - other	£1,089,000	£1,089,000	£217,800	£ -	£ -	£ -	£ -
mental health - avoiding depression	£10,890,000	£10,890,000	£2,178,000	£ 4,050	£ 4,050	£ 4,050	£ 4,050
total Health Costs	**£23,004,413**	**£18,234,353**	**£3,156,313**	**£ 4,050**	**£ 160,448**	**£ 160,448**	**£ 28,378**
Non-Health Impacts							
Demolition of building	£80,000	£80,000	£0	£ -	£ -	£ -	£ -
rebuilding cost	£3,600,000	£3,600,000	£1,080,000	£ 1,080,000	£ 90,000	£ 45,000	£ 22,100
lost personal possessions	£300,000	£300,000	£90,000	£ 90,000	£ 7,500	£ 3,750	£ -
specialist recovery	£24,000	£24,000	£7,200	£ 7,200	£ 600	£ 300	£ -
temporary accommodation	£27,720	£27,720	£8,316	£ 8,316	£ 693	£ 347	£ -
lost rent from commercial space	£72,000	£72,000	£21,600	£ 21,600	£ 1,800	£ 900	£ -
experts investigation	£25,000	£25,000	£7,500	£ 7,500	£ 625	£ 313	£ -
legal fees	£100,000	£100,000	£30,000	£ 30,000	£ 2,500	£ 1,250	£ -
residents' meetings	£1,250	£1,250	£375	£ 375	£ 31	£ 16	£ 16
Total non-health costs	**£4,229,970**	**£4,229,970**	**£1,244,991**	**£ 1,244,991**	**£ 103,749**	**£ 51,875**	**£ 22,116**

Table 7.5: Buildings – Converted Buildings - Economic Cost of Fire Incidents							
	Major incident - with multiple fatalities	Major incident - with reduced fatalities	Medium incident - with fatalities	Medium incident - without fatalities	minor incident - 2 floor	minor incident - 1 floor	Fires in common areas
Health Impacts							
Fatalities - residents	£9,540,120	£4,770,060	£441,672	£ -	£ 82,814	£ 82,814	£ -
Serious Injuries - residents	£589,669	£589,669	£147,417	£ -	£ 68,334	£ 68,334	£ 22,593
Slight Injuries - residents	£95,137	£95,137	£11,326	£ -	£ 5,250	£ 5,250	£ 1,736
injuries - rescue services	£225,375	£225,375	£112,687	£ -	£ -	£ -	£ -
mental health - treatment - residents	£127,050	£127,050	£25,410	£ -	£ -	£ -	£ -
mental health - op - screening	£0	£0	£0	£ -	£ -	£ -	£ -
mental health - treatment - other	£0	£0	£0	£ -	£ -	£ -	£ -
mental health - avoiding depression	£0	£0	£0	£ 900	£ 900	£ 900	£ 900
Total Health Costs	**£10,577,351**	**£5,807,291**	**£738,513**	**£ 900**	**£ 157,298**	**£ 157,298**	**£ 25,228**
Non-Health Impacts							
Demolition of building	£40,000	£40,000	£0	£0	£0	£0	£ -
rebuilding cost	£720,000	£720,000	£720,000	£720,000	£72,000	£54,000	£ 22,100
lost personal possessions	£60,000	£60,000	£60,000	£60,000	£6,000	£4,500	£ -
specialist recovery	£4,800	£4,800	£4,800	£4,800	£480	£360	£ -
temporary accommodation	£5,544	£5,544	£5,544	£5,544	£554	£416	£ -
lost rent from commercial space	£14,400	£14,400	£14,400	£14,400	£0	£0	£ -
experts investigation	£5,000	£5,000	£5,000	£5,000	£0	£0	£ -
legal fees	£20,000	£20,000	£20,000	£20,000	£0	£0	£ -
residents' meetings	£250	£250	£250	£250	£0	£0	£ -
Total non-health costs	**£869,994**	**£869,994**	**£829,994**	**£829,994**	**£79,034**	**£59,276**	**£ 22,100**

Table 7.6: Buildings – HMOs - Economic Cost of Fire Incidents							
	Major incident - with multiple fatalities	Major incident - with reduced fatalities	Medium incident - with casualties	Medium incident - without casualties	minor incident - 2 floor	minor incident - 1 floor	Fires in common areas
Health Impacts							
Fatalities – residents	£ 2,650,033	£ 2,650,033	£ 441,672	£ -	£ 82,814	£ 82,814	£ -
Serious Injuries – residents	£ 294,835	£ 294,835	£ 196,556	£ -	£ 68,334	£ 68,334	£ 22,593
Slight Injuries – residents	£ 45,303	£ 45,303	£ 15,101	£ -	£ 5,250	£ 5,250	£ 1,736
injuries - rescue services	£ 98,849	£ 98,849	£ 112,687	£ -	£ -	£ -	£ -
mental health - treatment - residents	£ 33,000	£ 33,000	£ 33,000	£ -	£ -	£ -	£ -
mental health - op – screening	£ -	£ -	£ -	£ -	£ -	£ -	£ -
mental health - treatment – other	£ -	£ -	£ -	£ -	£ -	£ -	£ -
mental health - avoiding depression	£ -	£ -	£ -	£ 1,200	£ 1,200	£ 1,200	£ 1,200
total Health Costs	**£ 3,122,020**	**£ 3,122,020**	**£ 799,017**	**£ 1,200**	**£ 157,598**	**£ 157,598**	**£ 25,528**
Non-Health Impacts							
Demolition of building	£ 40,000	£ 40,000	£ -	£ -	£ -	£ -	£ -
rebuilding cost	£ 300,000	£ 300,000	£ 300,000	£ 300,000	22,100	22,100	22,100
lost personal possessions	£ 60,000	£ 60,000	£ 60,000	£ 60,000	£ -	£ -	£ -
specialist recovery	£ 4,800	£ 4,800	£ 4,800	£ 4,800	£ -	£ -	£ -
temporary accommodation	£ 5,544	£ 5,544	£ 5,544	£ 5,544	£ -	£ -	£ -
lost rent from commercial space	£ 14,400	£ 14,400	£ 14,400	£ 14,400	£ -	£ -	£ -
experts investigation	£ 5,000	£ 5,000	£ 5,000	£ 5,000	£ -	£ -	£ -
legal fees	£ 20,000	£ 20,000	£ 20,000	£ 20,000	£ -	£ -	£ -
residents' meetings	£ 250	£ 250	£ 250	£ 250	£ -	£ -	£ -
Total non-health costs	**£ 449,994**	**£ 449,994**	**£ 409,994**	**£ 409,994**	**£ 22,100**	**£ 22,100**	**£ 22,100**

Total estimated economic cost (£) of fire for each fire type and building type (round to the nearest thousand)

Table 7.7 shows the total estimated economic cost of fire for each fire type and building type					
	Category 1 (18m+) Building Type	Under 18m - Large Building Type	Under 18m - Small Building Type	Under 18m - Converted Building Type	HMO
Health impacts					
Major incident (whole building loss)	174,390,000	35,780,000	23,000,000	10,580,000	3,120,000
Major incident (whole building loss) - reduced casualties	75,150,000	31,010,000	18,230,000	5,810,000	800,000
rapid fire spread resulting in part building loss - some casualties	13,380,000	5,710,000	3,160,000	740,000	-
Rapid fire spread resulting in part building loss-no casualties	25,000	18,000	4,000	1,000	1,200
internal fire spread beyond residential unit of origin to two floors	180,000	175,000	160,000	160,000	160,000
internal fire spread beyond residential unit of origin but on one floor	180,000	175,000	160,000	160,000	160,000
Fires in common areas (not spreading)	50,000	40,000	30,000	30,000	30,000
Non health impacts					
Major incident (whole building loss)	21,550,000	10,570,000	4,230,000	870,000	450,000
Major incident (whole building loss) - reduced casualties	21,550,000	10,570,000	4,230,000	870,000	450,000
Rapid fire spread resulting in part building loss - some casualties	4,150,000	4,150,000	1,240,000	830,000	410,000
Rapid fire spread resulting in part building loss - no casualties	4,150,000	4,150,000	1,240,000	830,000	410,000
Internal fire spread beyond residential unit of origin to two floors	410,000	210,000	100,000	80,000	20,000
Internal fire spread beyond residential unit of origin but on one floor	210,000	100,000	50,000	60,000	20,000
Fires in common areas (not spreading)	20,000	20,000	20,000	20,000	20,000

8. Structural Incidents

8.1 Identify types of structural incidents that could be avoided by the policy

- Major structural incident – e.g. partial building collapse
- Medium structural incident – e.g. elements falling from a building, such as parts of cladding, windows, balconies etc

8.2 Estimate the likelihood of an incident

- Major incident - partial building collapse – literature review identified one incident in the last 10 years affecting buildings containing flats – as a result, we are assuming one incident occurring every 10 years across buildings in scope
- Medium incident – elements falling from building – literature review identified 3 incidents in the last 10 years affecting buildings containing flats– as a result we are assuming one incident every 3 years across the buildings in scope

8.3 Estimate the cost of an incident

- Major structural incident costed at £400,000 per flat within buildings: for > 18m buildings this equates to £22.4m; 11-18m this equates to £16m; for small blocks of flats this equates to £3.6m and for converted buildings this equates to £0.8m per building
- Medium structural incident costed at 10% of a major incident

8.4 Scaling up

- Category 1 – assume risk reduction of 80% as a result of policy
- Category 2 – assume 40% risk reduction as a result of policy

8.5 Persistence

- Assume benefits of the policy last for 20 years beyond the end of the policy period.

9. Step 5: Scaling up

Estimating the number of such incidents (and associated value of loss) across Wales, in buildings in scope, over the 10-year appraisal period, without and with the Bill

9.1 The likely number of each type of fire incident occurring in Wales in buildings in scope in each year of the 10-year policy appraisal period was estimated as follows.

Without the Bill (the counterfactual)

Counterfactual Methodology

9.2 The probability of each type of fire incident occurring in each building type across Wales per year (without the Bill) was calculated as follows:

- A base-line probability figure was estimated based on probabilities used in the England analysis, adjusted for Wales and on analysis of the Welsh fire statistics.
- The probability will not remain the same however over each of the years in the 10 year appraisal period. It will reduce because of the increased rate of remediation of buildings at risk and because of better building management and better engagement of residents. This will significantly reduce the risk of fire spread. Remediation is of most relevance to the more catastrophic fire spread events in the taller buildings and is of much less relevant to lower height buildings. An adjustment is made to take account of this.

Counterfactual Assumptions

9.3 Table 9.1 shows the estimated base-line probability of each type of fire incident occurring in each building type across Wales per year:

- The probability of a major incident (whole building loss) **with significant casualties** occurring in category 1 buildings, category 2 buildings and category 3 large blocks in each year of the 10 year policy appraisal period was based on the probability used in the England analysis which assumed a 1 in 30 year incident across England and Wales in 18m+ buildings. The probability was then adjusted to reflect the Welsh proportion of England and Wales stock. The same probability was assumed to also apply to category 2 buildings and category 3 large block buildings.

- The probability of a major incident (whole building loss) **but with reduced casualties** occurring in category 1 buildings, category 2 buildings and category 3 large blocks in each year of the 10 year policy appraisal period was also based on the probability used in the England analysis which assumed a 1 in 5 year incident across England and Wales in 18m+ buildings. The probability was then adjusted to reflect the Welsh proportion of England and Wales stock. The same probability was assumed to also apply to category 2 buildings and category 3 large block buildings.
- The probability of the remaining fire spread types - rapid fire spread resulting in part building loss with some casualties, with no casualties, and internal fire spread beyond the room/ residential unit of origin to one floors and two floors – was based on analysis of Welsh fire statistics over the most recent 5 year period (2018-23).

Table 9.1: Estimated base-line probability of each type of fire spread incident occurring in each building type across Wales per year						
	category 1 (over 18m)	under 18m buildings - large block more than 25 flats)	under 18m buildings - small block (6-25 flats)	under 18m buildings - converted building (2-5 flats)	HMO	Source
Major incident (whole building loss) – significant casualties	0.0003	0.0003				estimated based on a major incident (similar in scale to Grenfell) being a 1 in 30 year incident across England and Wales in 18m+ buildings, and calculated a likelihood for Wales based on the proportion of the stock. The same probability was assigned to large category 2 buildings
Major incident (whole building loss) - reduced casualties	0.0019	0.0018				estimated based on a reduced casualty major incident being a 1 in 5 year incident across England and Wales and calculated a likelihood for Wales based on the proportion of the stock. The same probability was assigned to large category 2 buildings
Rapid fire spread resulting in part building loss - some casualties	0.2000	0.13	0.6000	0.4000	0.2000	Estimate based on analysis of fire statistics over 5 years 2018-23
Rapid fire spread resulting in part building loss - no casualties	0.2700	0.1300	1.4000	0.2000	0.2000	Estimate based on analysis of fire statistics over 5 years 2018-23
Internal fire spread beyond residential unit of origin to two floors	0.0700	0.1300	2.0000	2.2000	0.8000	Estimate based on analysis of fire statistics over 5 years 2018-23
Internal fire spread beyond residential unit of origin but on one floor	0.96	1.04	18.2000	10.6000	1.6000	Estimate based on analysis of fire statistics over 5 years 2018-23
Fires in common areas (not spreading)	5.3800	4.4200	29.0000	13.4000	3.0000	Estimate based on analysis of fire statistics over 5 years 2018-23

9.4 Table 9.2 shows the estimated proportion of buildings remediated over the 10-year policy appraisal period under the counterfactual.

Table 9.2: Estimated proportion of buildings remediated over the 10-year policy appraisal period											
Assumptions		yr1	yr2	yr3	yr4	yr5	yr6	yr7	yr8	yr9	yr10
assume it will take 10 years to undertake the remediation work currently being required across the 18m+ stock	Cat 1 (over 18m)	10%	20%	30%	40%	50%	55%	60%	65%	70%	70%
assume large category 2 buildings will have risks remediated to same extent as category 1 - but take longer - RPs are prioritising larger buildings first	under 18m – large block	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
assume small blocks of flats will undertake some remediation works, but not to same extent as larger buildings	Under 18m – small block	2.5%	5%	8%	10%	13%	15%	18%	20%	23%	25%
assume small converted flats are least likely to a) require external fire risk remediation and b) undertake remediation works (larger buildings with cladding are currently being prioritised by RPs)	Under 18m – converted	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
risk reduction relative to baseline - assume HMOs are least affected by policy to a) require external fire risk remediation and b) undertake remediation works (larger buildings with cladding are currently being prioritised by RPs)	Other HMO	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%

9.5 Table 9.3 shows the estimated level of protection provided by remediation to fire spread, based on building height

Table 9.3: Estimated level of protection provided by remediation to fire spread, based on building height

	Category 1 Building Type	under 18m – large block building type	under 18m – small block building type	under 18m – converted building type	HMO
Major incident (whole building loss) - multiple casualties	100%	100%	100%	100%	100%
Major incident (whole building loss) - reduced casualties	100%	100%	100%	100%	100%
rapid fire spread resulting in part building loss - some casualties	100%	100%	100%	100%	100%
rapid fire spread resulting in part building loss - no casualties	100%	100%	100%	100%	100%
internal fire spread beyond residential unit of origin to two floors	30%	30%	30%	30%	30%
internal fire spread beyond residential unit of origin but on one floor	10%	10%	10%	10%	10%
Fires in common areas (not spreading)	10%	10%	10%	10%	10%

With the Bill

Methodology

9.6 The estimated further reduction in fire spread risk as a result of the new regime is based on the anticipated timing of additional measures to implement fire safety improvements and how long these measures will continue to persist in the longer term (based on a 10 year policy period).

Assumptions - Reduction in Risk of Fire Spread Due to Building Safety Bill

9.7 The analysis considers the potential benefits over a 70 year period (assuming a 10 year policy period and a 60 year building lifespan)

9.8 Table 9.4 shows the estimated reduction in risk of major fire spread due to the fire safety improvements resulting from the Building Safety Bill. Points to note are:

- The analysis assumes that the risk of major fire spread will be reduced over time as principal accountable persons investigate buildings, and work with residents to resolve issues that are identified.
- The analysis assumes that it will take 15 years to action all of mitigation measures, such as those identified in safety cases, and achieve the risk reduction.
- It is also assumed for each building that some of the benefits of the Building Safety Bill will not persist indefinitely, and that the value of the benefits will start to reduce over time from Year 20 until Year 30, when it will reach a steady-state of 30% of the maximum benefit for the remainder of the building lifespan.

Table 9.4: Reduction in risk of major fire spread due to Building Safety Bill fire safety improvement															
	yr1	yr2	yr3	yr4	yr5	yr6	yr7	yr8	yr9	yr10	yr11	yr12	yr13	yr14	yr15
Reduction in risk of major fire spread due to Building Safety Bill fire safety improvement – Cat 1	2%	5%	10%	15%	20%	30%	40%	50%	60%	75%	75%	80%	85%	90%	90%
Reduction in risk of major fire spread due to Building Safety Bill fire safety improvement – other buildings under 18m	0%	2%	5%	10%	15%	20%	30%	40%	50%	60%	75%	75%	80%	85%	90%

9.9 The analysis assumes that the risk of fire spread is unlikely to be reduced by the same amount across all types of fires as a result of the Bill.

9.10 Tables 9.5 and 9.6 shows that it is assumed that the Bill's measures are most likely to reduce the risk of major incidents in category 1 buildings, with a smaller reduction in risk in smaller buildings and less serious fires.

Table 9.5: Risk Adjustment factor: Option 2					
	Category 1 (over 18m)	Category 2 - large block (4-7 storeys)	Category 2 - small block (1-3 storeys)	Category 2 - converted building	HMO
Major incident (whole building loss)	100%	30%	30%	30%	25%
Major incident (whole building loss) - reduced casualties	100%	30%	30%	30%	25%
rapid fire spread resulting in part building loss - some casualties	75%	15%	15%	15%	10%
rapid fire spread resulting in part building loss - no casualties	50%	15%	15%	15%	10%
internal fire spread beyond residential unit of origin to two floors	50%	15%	15%	15%	10%
internal fire spread beyond residential unit of origin but on one floor	25%	10%	10%	10%	10%
Fires in common areas (not spreading)	50%	30%	30%	30%	25%

Table 9.6: Risk Adjustment factor: Option 3					
	Category 1 (over 18m)	Category 2 - large block (4-7 storeys)	Category 3 - small block (1-3 storeys)	Category 3 - converted building	HMO
Major incident (whole building loss)	100%	75%	40%	40%	25%
Major incident (whole building loss) - reduced casualties	100%	75%	40%	40%	25%
rapid fire spread resulting in part building loss - some casualties	75%	50%	25%	25%	10%
rapid fire spread resulting in part building loss - no casualties	50%	35%	20%	20%	10%
internal fire spread beyond residential unit of origin to two floors	50%	35%	20%	20%	10%
internal fire spread beyond residential unit of origin but on one floor	25%	15%	10%	10%	10%
Fires in common areas (not spreading)	50%	30%	25%	25%	25%

10. An example of the whole sequence of calculations – for category 1 buildings

10.1 This section sets out an example of the overall sequence of calculations undertaken to estimate the reduced number of fires (and the monetised value of these) as a result of the Building Safety Bill, based on the assumptions set out in the preceding chapters. The example below is for category 1 buildings. A similar set of calculations are undertaken for each of the other building types:

Benefits of Reducing the Risk of Fire Incidents _Cat 1 Calculations

- Table 10.1 shows the estimated risk of fires - pre counterfactual (the baseline)
- Table 10.2 shows the anticipated improvement to fire safety without the Bill, based on the increasing proportion of buildings that are remediated (changes to the baseline counterfactual)
- Table 10.3 shows the assumptions used to estimate the further risk reduction attributable to the Building Safety Bill
- Table 10.4 shows the resulting reduced number of incidents attributable to Building Safety Bill
- Table 10.5 shows the monetised value of avoided incidents

Table 10.1: Estimated risk of fires - pre counterfactual (Baseline) - (% probability of fire occurring each year - historic data)

		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Incidents per annum	yr1	yr2	yr3	yr4	yr5	yr6	yr7	yr8	yr9	yr10
Major incident 25% fatalities	0.00030	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
Major incident (whole building loss)	0.00192	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019
Medium incident (casualties)	0.20000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
Medium incident (no casualties)	0.27000	0.2700	0.2700	0.2700	0.2700	0.2700	0.2700	0.2700	0.2700	0.2700	0.2700
Minor incident (2 floors)	0.07000	0.0700	0.0700	0.0700	0.0700	0.0700	0.0700	0.0700	0.0700	0.0700	0.0700
Minor incident (1 floor)	0.96000	0.9600	0.9600	0.9600	0.9600	0.9600	0.9600	0.9600	0.9600	0.9600	0.9600
Fires in common areas	5.38000	5.3800	5.3800	5.3800	5.3800	5.3800	5.3800	5.3800	5.3800	5.3800	5.3800

Table 10.2: the anticipated improvement to fire safety without the Bill, based on the increasing proportion of buildings that are remediated (changes to the baseline counterfactual)

		yr1	yr2	yr3	yr4	yr5	yr6	yr7	yr8	yr9	yr10
risk reduction		10%	20%	30%	40%	50%	55%	60%	65%	70%	70%
relative risk of fire spread due to defect remediation compared to baseline fire statistics		90%	80%	70%	60%	50%	45%	40%	35%	30%	30%
Gross impacts net of counterfactual											
	risk reduction adjustment factor	yr1	yr2	yr3	yr4	yr5	yr6	yr7	yr8	yr9	yr10
Major incident 25% fatalities	100%	0.0003	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Major incident (whole building loss)	100%	0.0017	0.0015	0.0013	0.0011	0.0010	0.0009	0.0008	0.0007	0.0006	0.0006
Medium incident (casualties)	100%	0.1800	0.1601	0.1397	0.1194	0.0990	0.0900	0.0800	0.0700	0.0600	0.0603
Medium incident (no casualties)	100%	0.2430	0.2161	0.1886	0.1612	0.1337	0.1215	0.1080	0.0945	0.0810	0.0814
Minor incident (2 floors)	30%	0.0679	0.0658	0.0637	0.0615	0.0594	0.0585	0.0574	0.0564	0.0553	0.0553
Minor incident (1 floor)	10%	0.9504	0.9408	0.9311	0.9213	0.9115	0.9072	0.9024	0.8976	0.8928	0.8929
Fires in common areas	10%	5.3262	5.2727	5.2179	5.1631	5.1084	5.0841	5.0572	5.0303	5.0034	5.0041

Table 10.3: Assumptions used to estimate the further risk reduction attributable to the Building Safety Bill											
		yr1	yr2	yr3	yr4	yr5	yr6	yr7	yr8	yr9	yr10
Further risk reduction attributable to the Building Safety Bill		*2%*	*5%*	*10%*	*15%*	*20%*	*30%*	*40%*	*50%*	*60%*	*75%*
risk reduction adjustment factor		yr1	yr2	yr3	yr4	yr5	yr6	yr7	yr8	yr9	yr10
Major incident 25% fatalities	100%	2%	5%	10%	15%	20%	30%	40%	50%	60%	75%
Major incident - minor fatalities	100%	2%	5%	10%	15%	20%	30%	40%	50%	60%	75%
Medium incident (casualties)	75%	2%	4%	8%	11%	15%	23%	30%	38%	45%	56%
Medium incident (no casualties)	50%	1%	3%	5%	8%	10%	15%	20%	25%	30%	38%
Minor incident (2 floors)	50%	1%	3%	5%	8%	10%	15%	20%	25%	30%	38%
Minor incident (1 floor)	25%	1%	1%	3%	4%	5%	8%	10%	13%	15%	19%
Fires in common areas	50%	1%	3%	5%	8%	10%	15%	20%	25%	30%	38%

Table 10.4: Resulting reduced number of incidents attributable to Building Safety Bill										
	yr1	yr2	yr3	yr4	yr5	yr6	yr7	yr8	yr9	yr10
Major incident 25% fatalities	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001
Major incident - minor fatalities	0.0000	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0004
Medium incident (casualties)	0.0027	0.0060	0.0105	0.0134	0.0149	0.0203	0.0240	0.0263	0.0270	0.0339
Medium incident (no casualties)	0.0024	0.0054	0.0094	0.0121	0.0134	0.0182	0.0216	0.0236	0.0243	0.0305
Minor incident (2 floors)	0.0007	0.0016	0.0032	0.0046	0.0059	0.0088	0.0115	0.0141	0.0166	0.0207
Minor incident (1 floor)	0.0048	0.0118	0.0233	0.0345	0.0456	0.0680	0.0902	0.1122	0.1339	0.1674
Fires in common areas	0.0533	0.1318	0.2609	0.3872	0.5108	0.7626	1.0114	1.2576	1.5010	1.8765

Table 10.5 Monetised Value (£) of avoided incidents											
Health Impacts	cost per incident	yr1	yr2	yr3	yr4	yr5	yr6	yr7	yr8	yr9	yr10
Major incident 25% fatalities	174,390,000	927	2,062	3,600	4,613	5,101	6,955	8,243	9,016	9,273	11,642
Major incident - minor fatalities	75,150,000	2,597	5,776	10,082	12,920	14,289	19,481	23,088	25,253	25,975	32,609
Medium incident (casualties)	13,430,000	36,261	80,629	140,753	180,370	199,481	271,958	322,320	352,538	362,610	455,231
Medium incident (no casualties)	30,000	73	162	283	363	401	547	648	709	729	915
Minor incident (2 floors)	180,000	122	296	573	831	1,069	1,578	2,066	2,536	2,986	3,735
Minor incident (1 floor)	180,000	855	2,117	4,190	6,219	8,204	12,247	16,243	20,196	24,106	30,136
Fires in common areas	50,000	2,663	6,591	13,045	19,362	25,542	38,131	50,572	62,879	75,051	93,827
Total (non discounted)		40,836	97,633	159,480	205,315	228,546	312,765	372,609	410,247	425,678	534,268
PV (Discounted value)		**£0**	**£35,753**	**£77,147**	**£130,504**	**£161,077**	**£193,089**	**£255,042**	**£295,212**	**£314,525**	**£373,363**
Non Health Impacts	cost per incident	yr1	yr2	yr3	yr4	yr5	yr6	yr7	yr8	yr9	yr10
Major incident 25% fatalities	21,550,000	115	255	445	570	630	859	1,019	1,114	1,146	1,439
Major incident - minor fatalities	21,550,000	745	1,656	2,891	3,705	4,098	5,586	6,621	7,242	7,448	9,351
Medium incident (casualties)	4,150,000	11,205	24,915	43,494	55,736	61,642	84,038	99,600	108,938	112,050	140,671
Medium incident (no casualties)	4,150,000	10,085	22,424	39,145	50,162	55,478	75,634	89,640	98,044	100,845	126,604
Minor incident (2 floors)	410,000	278	675	1,305	1,892	2,435	3,595	4,707	5,776	6,802	8,507
Minor incident (1 floor)	210,000	998	2,470	4,888	7,255	9,571	14,288	18,950	23,562	28,123	35,159
Fires in common areas	20,000	1,065	2,636	5,218	7,745	10,217	15,252	20,229	25,152	30,020	37,531
Total (non-discounted)		**24,490**	**55,031**	**97,386**	**127,066**	**144,070**	**199,252**	**240,765**	**269,826**	**286,435**	**359,260**
PV (Discounted value)		**24,490**	**53,170**	**90,911**	**114,606**	**125,549**	**167,765**	**195,863**	**212,081**	**217,522**	**263,600**
Health + Non health benefits (non-discounted, annual)		65,327	152,663	256,866	332,381	372,616	512,018	613,374	680,073	712,113	893,528
Total Discounted Benefits (annual)		65,327	149,360	245,712	310,952	340,881	458,093	536,629	581,724	595,401	730,867
Total Discounted Benefits (cumulative)	**19,683,620**										

11. Results – total estimated benefits of the Building Safety Bill, compared with the costs

Results – central estimate

11.1 Table 11.1 shows the total costs of the two policy options.

Table 11.1: Costs PV (£)		
	Option 2	Option 3
7 storeys+	£26,987,222	£26,987,222
4-6 storeys	£5,747,606	£8,306,496
under 4 storeys	£72,314,979	£73,402,134
HMO	£10,426,328	£10,426,328
Other costs	£24,045,198	£25,787,477
Total costs	**£139,521,334**	**£144,909,658**

11.2 Table 11.2 shows the estimated total benefits that will derive from each policy option. (See separate benefits report for detail of the benefits calculations)

Table 11.2: Benefits_PV (£)		
	Option 2	Option 3
7 storeys+	£19,820,068	£19,820,068
4-6 storeys	£3,228,855	£6,809,985
under 4 storeys	£30,307,711	£34,328,225
HMO	£1,645,106	£1,645,106
Total benefits	**£55,001,740**	**£62,603,384**

Table 11.3 shows the total net cost (the costs minus the benefits)

Table 11.3: Net Costs (NPC) (£)		
	Option 2	Option 3
7 storeys+	£7,167,154	£7,167,154
4-6 storeys	£2,518,751	£1,496,511
under 4 storeys	£42,007,268	£39,073,909
HMO	£8,781,223	£8,781,223
Other costs	£24,045,198	£25,787,477
Total net costs	**£84,519,594**	**£82,306,274**

11.3 The costs are estimated to be greater than the benefits for both policy options.

11.4 As noted, some of the identified benefits have not been monetised. If it had been possible to monetise these, table 11.4 shows the annual non-monetised benefits per resident required to break even and table 11.5 provides a breakdown by building type.

Table 11.4: Summary of benefits, costs, net benefits and annual non-monetised benefits per resident required to break even		
	Option 2	Option 3
Benefits	£55,001,740	£62,603,384
Costs	£139,521,334	£144,909,658
Net Benefits	- £84,519,594	- £82,306,274
Annual non-monetised benefits per resident required to break even	**£27**	**£26**

Table 115: Breakeven additional annual benefit required per resident by building type		
	Option 2	Option 3
7 storeys+	£55	£55
4-6 storeys	£11	£6
under 4 storeys	£20	£18
HMO	£13	£13
Total	**£27**	**£26**

11.5 Table 11.6 shows the Benefits Cost Ratio (BCR) for option 2 and table 11.7 for option 3

Table 11.6: Benefit Cost Ratio – Option 2

	Benefits (PV)	Costs (PV)	Benefit Cost Ratio	Number of residents	Net Cost (costs minus monetised benefits)	Net Additional Benefits per resident required to break even (10yr NPV)	Average Annual benefit per resident
7 storeys+ (18m+ with 2 or more residential units)	£19,820,068	£26,987,222	73%	15,120	£7,167,154	£474	£55
4-6 storeys (11-18m with 2 or more residential units)	£3,228,855	£5,747,606	56%	26,940	£2,518,751	£93	£11
under 4 storeys (under 11m with 2 or more residential units)	£30,307,711	£72,314,979	42%	248,909	£42,007,268	£169	£20
HMO	£1,645,106	£10,426,328	16%	78,348	£8,781,223	£112	£13
Other costs		£24,045,198			£24,045,198		
Total	**£55,001,740**	**£139,521,334**	**39%**	**369,317**	**£84,519,594**	**£229**	**£27**

Table 11.7: Benefit Cost Ratio – Option 3							
	Benefits (PV)	Costs (PV)	Benefit Cost Ratio	Number of residents	Net Cost (costs minus monetised benefits)	Net Additional Benefits per resident required to break even (10yr NPV)	Average Annual benefit per resident
7 storeys+ (18m+ with 2 or more residential units)	£19,820,068	£26,987,222	73%	15,120	£7,167,154	£474	£55
4-6 storeys (11-18m with 2 or more residential units)	£6,809,985	£8,306,496	82%	26,940	£1,496,511	£56	£6
under 4 storeys (under 11m with 2 or more residential units)	£34,328,225	£73,402,134	47%	248,909	£39,073,909	£157	£18
HMO	£1,645,106	£10,426,328	16%	78,348	£8,781,223	£112	£13
Other costs		£25,787,477			£25,787,477		
Total		**£144,909,658**	**43%**	**369,317**	**£82,306,274**	**£223**	**£26**

12. Annex A: Further details of the approach taken in the England analysis

12.1 In the England analysis, it was assumed that it is unlikely that a future whole building loss event would result in a similar number/ level of casualties to that of the Grenfell Tower tragedy, even in a building with similar cladding and other fire safety defects. This is because of awareness of the risks of rapid fire spread, improvement to buildings (signage, temporary/permanent fire and evacuation alarms, waking watch etc) and the FRS's consequent changes in response strategy coupled with residents' awareness. The England analysis therefore assumed that, in a worst-case scenario of a future whole building loss event, only a proportion of the total number of Grenfell Tower casualties would occur. A lot of wider research and analysis has been undertaken to identify the precise number of reduced casualties, but it was concluded that it is not possible to be certain. Instead, the England analysis adopted a 'what-if' scenario modelling approach. Therefore, the England analysis takes the nature and number of casualties that occurred in the Grenfell Tower tragedy as the starting point, but then applies assumptions about the likely reduced number of casualties that could/would occur in a worst-case and then in other scenarios, for each fire spread type. This is clearly not a precise science. The results can only ever be treated as illustrations of one set of possible future outcomes. Recent whole building loss fires in the UK have so far resulted in no fatalities and a small number of minor casualties, because of rapid evacuation – both voluntary and required by the attending FRS. This is not to say that things could not go dreadfully wrong in a future whole building loss fire, hence the need to allow for a worst-case scenario, but, as described below, a low probably of such an event occurring is assumed in the modelling.

13. Annex B: Method for monetising avoided fatalities and injuries

13.1 The analysis uses the Government's standard method for monetising avoided fatalities and injuries which is to adopt to latest figures used by the Department of Transport.

13.2 Table 13.1 shows how the values are compiled

Table 13.1 (A 4.1.1): Average value of prevention per casualty by severity and element of cost				
£ (2024 prices and 2024 values)				
	Net	Willingness	Medical &	Total
Casualty type	output	to pay*	ambulance	
Fatal	168,167	2,480,423	1,443	2,650,033
Serious	32,394	242,817	19,624	294,835
Slight	3,424	17,774	1,453	22,652
Average, all casualties	10,219	84,097	4,532	98,849

Source DfT Webtag Table A 4.1.1

14. Annex C: Average cost of a fire

14.1 Table 14.1 shows the average cost of a fire in England for 2020, taken from the Home Office's Economic Cost of Fire - 2023 publication.

Table 14.1: Average Cost of Fires in England, 2020	
Direct Marginal Cost per dwelling fire (consequence and response)	£32,384
Anticipation of fire costs per primary fire	£127,893
injury costs - all incidents	£831
injury costs - injury incidents	£4,590
emotional harm - dwellings - all incidents	£177
emotional harm - dwellings - injury incidents	£978
total physical and emotional harm costs - all incidents	£8,713
total physical and emotional harm costs - primary incidents	£9,679
property damage costs - all incidents	£12,610
property damage costs - primary incidents	£14,009
property damage costs - damage incidents – direct	£17,252
property damage costs - damage incidents - dwellings - direct and indirect	£22,100

Source: Home Office Economic Cost of Fire - 2023 publication

15. Annex D: Discount Rates

15.1 The analysis uses the following discount rates, as provided in the Green Book annexes

Table 15.1: Discount Rates used in the Analysis

		yr1	yr2	yr3	….	yr10	….	yr69	yr70
PV Discount Factor	Health		1.500%	1.500%		1.500%		1.286%	1.286%
PV Discount Rate	Health	1	0.9852	0.9707		0.8746		0.3937	0.3887
PV Discount Rate	Standard		3.500%	3.500%		3.500%		3.000%	3.000%
PV Discount Factor	Standard	1	0.9662	0.9335		0.7337		0.1159	0.1125

16. Annex E: Average annual number of fires and casualties in Wales by building type and extent of fire spread.

16.1 Table 16.1 shows the average annual number of fires in multi occupancy residential buildings, that spread from the residential unit of origin, in Wales between 2018 and 2023, based on Welsh Government fire statistics, broken down by height/size of building and the extent of fire spread

16.2 Table 16.2 shows the average annual number of fires with casualties, broken down by type of casualty

Table 16.1: Average Annual Number of Fires in Wales - 2018-2023					
		Average Annual Number of fires	Average Annual Number of fires	Average Annual Number of fires	Average Annual Number of fires
		Whole Building	2 Floors	1 Floor	Common area
	Purpose Built High Rise (10+) Flats	0.4	-	0.4	3.0
	Purpose Built Medium Rise (4-9) Flats	0.2	0.2	1.6	6.8
	Purpose Built Low Rise (1-3) Flats/Maisonettes	2.0	2.0	18.2	29.0
	Converted Flat/Maisonette - single occupancy	0.6	2.2	10.6	13.4
	Dwelling - Multiple occupancy	0.4	0.8	1.6	3
**from the figures below are used to convert the statistics for the building categories used in the incident level fire statistics to the category 1 and category 2 building types used in the analysis of the building safety regime.					
Cat 1 (10+)	Purpose Built High Rise (10+) Flats	100%	100%	100%	100%
Cat 1 (7-9)	Purpose Built Medium Rise (4-9) Flats	35%	35%	35%	35%
Cat 2 - large block (4-6)	Purpose Built Medium Rise (4-9) Flats	65%	65%	65%	65%
Cat 2 - small block	Purpose Built Low Rise (1-3) Flats/Maisonettes	100%	100%	100%	100%
Cat 2 - converted	Converted Flat/Maisonette - single occupancy	100%	100%	100%	100%
	HMO	100%	100%	100%	100%
Source: Adroit analysis of incident level fire statistics 2018-23					

Table 16.2: Average annual number of fire casualties in Wales 2018-2023													
	Average Annual Number of fires				Number of fatalities				non-fatal casualties				Notes
	Whole Building	2 Floors	1 Floor	common areas	Whole Building	2 Floors	1 Floor	common areas	Whole Building	2 Floors	1 Floor	common areas	
Purpose Built High Rise (10+) Flats	0.2	-	-	-	-	-	-	-	0.2	-	-	-	All category 1
Purpose Built Medium Rise (4-9) Flats	-	-	0.6	0.4	-	-	-	-	-	-	0.8	0.4	assume even split between Cat 1 and category 2 buildings
Purpose Built Low Rise (1-3) Flats/Maisonettes	0.6	0.8	6.0	3.6	-	0.2	0.6	0.2	0.8	0.6	7.8	5.0	All category 2 - small block
Converted Flat/Maisonette - single occupancy	0.4	0.4	3.4	1.2	0.2	-	0.2	-	0.2	1.2	4.0	2.4	All category 2 - converted
HMO	0.2	0.4	0.4	0.2	0	0	0	0	0.4	0.8	1	0.2	
Source: Adroit analysis of incident level fire statistics 2018-23													

17. Annex F: Mental wellbeing impacts from living in a fire affected building.

17.1 This note considers the mental health impacts on persons living in a fire affected building, but not directly affected by a fire.

- There is very limited research on the emotional harms that someone who requires no medical treatment following a fire may suffer after the event.
- The likelihood of someone suffering emotional harm is positively correlated with their vulnerability to suffering emotional harm prior to the fire.
- Residents of flats have a greater fear of fire breaking out in their property than residents of houses.

17.2 In June 2023 the Home Office published a report on the economic and social cost of fires.[6] The report estimates the total annual economic and social cost of fire in England using data on fires that occurred in the year ending March 2020.

17.3 Costs are split into three categories:

- Anticipation – measures designed to either prevent fires from occurring or protective measures to mitigate the damage and impact of fires.
- Consequence – direct and indirect costs that occur because of fire, such as property damage, loss of business, human injury, and fatalities.
- Response – cost of fire and rescue services responding to incidents.

17.4 The report also calculates the marginal costs of fire, which is defined as "the cost incurred following a fire, that would be directly impacted by the change in the number of fires."

17.5 Our research into the cost associated with emotional impact of fire on people who are not directly affected therefore relates to understanding the marginal consequential costs of fire.

[6] Economic and social cost of fire, Home Office

17.6 The report calculates the physical and emotional injury cost of a fire using the Quality Adjusted Life Year (QALY) method. The current monetary willingness to pay (WTP) value for a QALY is £70,000 in 2020/2021 prices.[7]

17.7 Using data on the number of reported injuries, the severity of injuries and the duration of injuries, the report monetises the cost of fire related injuries. For emotional injuries the extra variable of the likelihood of experiencing emotional trauma was included in the calculations. The emotional harm from rescues from fires was calculated using a similar method, but with a reduced unit cost of harm and by using the number of rescues recorded.

17.8 The report uses the following formula for calculating the average cost of emotional harms:

LIKELIHOOD * REDUCEQL * DUR * QALY (£70,000) = Average emotional cost

17.9 In this formula LIKELIHOOD is the percentage likelihood of the emotional harm occurring, REDUCEQL is the percentage reduction in quality of life and DUR is the duration of that reduction in quality of life in years.

17.10 The report uses that formula to calculate the average emotional cost of three emotional harm categories – fear, depression and anxiety/panic attacks.

17.11 It then presents its findings, split between the cost of emotional harm to individuals who do attend hospital after fire and individuals who do attend hospital after the fire.

[7] The Green Book (2022), HMT

Table 17.1: Unit costs of emotional harm

Harm type	Likelihood	Duration (years)	REDUCEQL	Cost
Fear				
Non-hospital	13%	1.25	3%	£340
Hospital	26%	1.25	3%	£680
Depression				
Non-hospital	11%	0.17	15%	£178
Hospital	21%	0.17	15%	£356
Anxiety/Panic Attack				
Non-hospital	11%	0.17	13%	£163
Hospital	21%	0.17	13%	£327

Source: Economic and social cost of fire, Home Office

17.12 We propose that the variables in this formula (likelihood of harm, duration of harm, reduction in quality of life) are unlikely to differ significantly between fire-affected individuals in England and Wales and therefore would continue to be relevant.

17.13 However, the likelihood of someone who is not injured in a fire suffering one of the three emotional harms may be lower than that of someone who is physically injured (and either does or does not go to hospital) suffering emotional harm.

17.14 Therefore, we propose to use the Home Office formula, but to also assess whether the variables need to be revised based on other available data and research.

17.15 A University of Pennsylvania study[8] of 69 survivors of residential fires found that 36% met the clinical criteria for PTSD at 3-months post-fire, falling to 22% at 6-months post-fire. Whilst less than 15% of residents in the study reported direct physical or emotional impact (injuries, being rescued, encountering flames, knowing of a fatality), over 50% of residents were having to live elsewhere following the fire.

17.16 An Australian study[9] of 627 individuals who were exposed to wildfires found that, amongst the group with low fire exposure, 10% met the clinical criteria for PTSD at 12-18 months after the fire.

17.17 A systematic review[10] of 18 studies with 16,000 participants in total found that amongst 'vulnerable' groups (the unemployed, ethnic minorities, those in existing poor health or with low educational achievement) the rates for emotional harm were up to 36% for PTSD, 15% for depression and anxiety and 10% for anger.

17.18 Whilst these two studies and the systematic review provide useful comparators for likelihood of emotional harm metrics, they are focused on individuals with usually greater exposure to a fire (either at the time of the fire or afterwards such as losing their home) or on individuals who were classed as vulnerable before the fire and therefore may suffer greater emotional harms after the fire.

17.19 The English Housing Survey[11] found that 26% of respondents who live in purpose-built high-rise flats in blocks that are six or more storeys high said they did not feel safe in their homes because they feared a fire might break out. 10% of respondents who live in purpose-built low-rise blocks of flats which are less than six storeys high said they did not feel safe, and 13% of respondents who live in converted flats/maisonettes said they did not feel safe.

[8] Psychological distress in the survivors of residential fires, University of Pennsylvania, 1994
[9] Social group connections support mental health following wildfire, Social Psychiatry and Psychiatric Epidemiology, 2024
[10] Mental health of vulnerable groups experiencing a drought or bushfire
[11] English housing survey: feeling safe from fire

Table 17.2: Agreement with statement 'I do not feel safe at home because I fear that a fire may break out', by dwelling type, 2020-21

	Small terraced house	Medium / large terraced house	Semi-detached house	Detached house	Bungalow	Converted flat	Purpose built flat, low rise	Purpose built flat, high rise
Strongly agree	0.0	u	u	u	0.0	u	u	u
Tend to agree	7.0	4.9	1.4	1.7	4.9	10.4	9.2	18.4
All agree	**7.0**	**5.2**	**2.3**	**2.0**	**4.9**	**13.0**	**10.2**	**25.6**
Neither agree nor disagree	7.6	7.8	6.2	7.7	8.6	5.9	8.3	9.9
Tend to disagree	23.5	19.8	21.8	15.9	21.7	30.6	27.1	22.1
Strongly disagree	61.8	67.3	69.7	74.4	64.8	50.5	54.4	42.2
All disagree	**85.3**	**87.0**	**91.5**	**90.3**	**86.5**	**81.1**	**81.5**	**64.5**
All households	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Sample sizes	180	418	623	671	231	97	376	68

Source: English Housing Survey, 2020-2021. 'u' indicates sample size too small for a reliable estimate.

17.20 This survey data provides a useful indication of the fear of fire that residents of different types of property may have. Residents of flats have a fear of fire breaking out that is 3.8 times higher than residents of houses. However, it reflects the views of all residents surveyed, not just those residents who have experienced a fire, and therefore is of less value to our current research.

17.21 In Table 17.3 we have included a further category of individual indirectly impacted by fire. The 'non-treated' category represents individuals who are indirectly impacted by a fire but who are not rescued from the property by fire services and who require no medical treatment either at the scene or later in a hospital.

17.22 The likelihood of non-treated individuals suffering emotional harm is given a range of 25% to 75% of the likelihood of individuals who require first aid or precautionary checks at the scene of a fire ('non-hospital' in Table 17.1) suffering emotional harm.

17.23 The duration of any emotional harm, and the consequential reduction in quality of life, is kept constant to enable comparisons with the emotional cost calculations in Table 17.1.

Table 17.3: Estimated of proportion of persons suffering from emotional harm in a fire affected building

Harm type	High likelihood (75%)	Medium likelihood (50%)	Low likelihood (25%)	Duration (years)	REDUCEQL
Fear					
Non-treated	9.75%	6.5%	3.25%	1.25	3%
Depression					
Non-treated	8.25%	5.5%	2.75%	0.17	15%
Anxiety/Panic Attack					
Non-treated	8.25%	5.5%	2.75%	0.17	13%

17.24 Our research and the data shows that the scale of negative impact on mental wellbeing from living in a fire-affected building is lower for residents who are only indirectly impacted and not injured than compared to other residents who are directly impacted and/or injured:

17.25 “It was shown that evacuated (first-hand experience) compared to not-evacuated (second-hand experience) participants thought and talked more about the fire. Evacuated residents also mentally travelled back and re-lived the disaster more; as well as saw the fire, heard its sound, smelled it more, and felt more anxious, enraged, and emotionally strong.”[12]

17.26 However, the duration of negative impact can persist for many years after the fire and is greater in certain populations at higher risk of psychological distress:

17.27 “A set of predictor variables was identified that can assist the clinical targeting of those at high risk for psychological distress after a fire. They were: loss, injury, death, receipt of public assistance, sex, less than college education, concurrent stressors, inadequate social support, perceived loss of control, and attributional variables.”[13]

[12] Cognitive, emotional and personal consequences of a natural disaster, Journal of Environmental Psychology, 2021
[13] Factors associated with distress in urban residential fire survivors, Journal of Nursing Scholarship, 2002