

## Housing Health and Safety Rating System (HHSRS)

## Case Studies

Group A  
Protection Against  
Accidents

Hazard A4  
Fire and Explosions

Example A4.4  
1920–1945  
Detached House

Vulnerable Group  
All persons aged  
60 years and over

Multiple Locations  
Yes

Related Hazard A7  
Structural Collapse and  
Falling Elements

Related Hazard A8  
Electrical Hazards

Related Hazard B13  
Indoor  
Air Pollutants

Related Hazard D18  
Crowding and  
Space

# Dwelling

## Description

This was originally constructed as a three-bedroomed, two-storey detached house. It was built in the 1930s and is of brick (cavity) under a concrete tiled roof. A two-storey extension was added in the 1980s, housing a study on the ground floor and a fourth bedroom with ensuite on the first floor.

The property has a basement that is utilised as a fifth bedroom and has a separate WC. The fuse box and utility meters are housed in the basement.

There is an open plan-kitchen and living area accessed from the hall; the kitchen leads to the study (inner room). There are now four bedrooms on the first floor, and a separate bathroom. The bedroom in the extension has an ensuite. All windows are double-glazed UPVC. There is gas-fired central heating/hot water, with the boiler being located in the smallest bedroom.

There are two external exits (front and rear). The front

exit leads to a well-lit residential street and the rear to a fence-enclosed garden (approximately 20 m long).

The property is occupied by a single household (two adults and three children). The eldest child (17 years old) occupies the basement bedroom. The property is owner-occupied.

The property has a valid EPC with an E rating, but no gas safety certificate or electrical installation condition report.



1

Front exterior

# Deficiencies

## Description

There is a key-operated lock on the front entrance door (not thumb-turn).

The study window has a top-hung opening casement that is unsuitable as an escape window.

The property has what appears to be a 1960s/70s electrical installation with typical re-wirable fuses. Some additions have been installed at a later date, such as those for the 1980s extension.

All three of the original first-floor bedrooms each contain only one single socket.

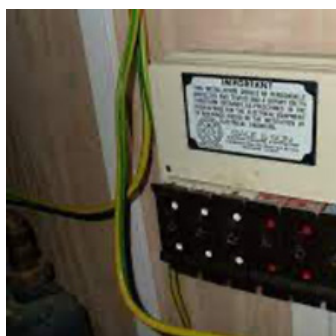
There is no smoke or heat detection, nor is there any fire blanket to the kitchen area.

All internal doors – with the exception of the doors to the study, the ensuite and basement WC (each being a hollow composite door) – are well-fitting, original timber panelled doors. This includes the door down to the basement.

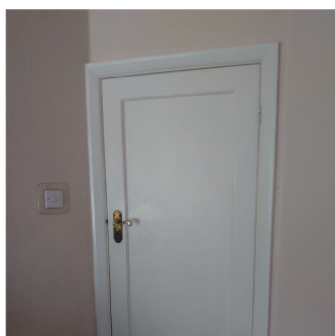
The heating system does not extend to the basement. Instead an LPG cylinder portable gas fire is present. In addition to the LPG cylinder in use, there are two empty and one full LPG cylinders stored in the basement. The basement has no windows or ventilation, natural or mechanical. In addition, the basement houses the gas and electrical meters and the fuse board.

The first-floor box bedroom houses the boiler for the heating and hot water. This room is also utilised as a bedroom for one of the children. The only means of ventilation is the openable window. The boiler vents to the outside via a balanced flue.

There is no external lighting to the front or rear, although artificial street-lighting is present.



2  
Rewireable fuse board



3  
Timber panel door



4  
Basement bedroom

## Relevant Baseline Indicators

0

Satisfactory  
or N/A

1

Not  
Satisfactory

2

Defective

3

Seriously  
Defective

Subject		Score				BI	Baseline Indicators
8	Internal Doors	0	1	2	3	8.1	Internal doors leading between areas of a single dwelling must provide a sufficient barrier to the spread of smoke and fire, any glazing must respond safely to collision, and must be designed for functionality to avoid strains or entrapment when in use and must be maintained in good repair. All bathrooms and WC doors must be fitted with a suitable lock and not contain clear glass.
		0	1	2	3	11.1	Adequate external lighting shall be provided to all means of access including entrances and external refuse stores providing good visibility when there is no daylight.
11	Security	0	1	2	3	11.2	Access doors to dwellings should have adequate locks. Doors must be solid external grade and fitted with a minimum of a mortice deadlock to BS 3621, openable from the inside without a key. There must be a means for occupiers to view visitors without opening the door, either by means of a viewer within the door or by a glazed pane adjacent or close to the entrance door. All rear doors should be fitted with a mortice dead lock to BS 3621 or 2 security bolts.
		0	1	2	3	14.1	Every habitable room shall have adequate natural lighting.
14	Lighting and Services	0	1	2	3	14.4	All electrical installations, including fixtures and fittings, must be maintained in good repair.
		0	1	2	3	14.6	Every habitable room shall have at least 2 separate and remote double electric sockets, that are suitably located for use. Kitchens shall have at least 4 suitably located double sockets.
15	Heating and Insulation	0	1	2	3	15.4	Every dwelling shall have a properly installed heating system in good and safe working condition that is capable of safely and adequately heating all habitable rooms, bathrooms, and toilet rooms. The system must be capable of heating the main living area to 21°C, and the remaining habitable rooms to a temperature of 18°C when the external temperature is minus 1°C, and the system should not allow the temperature to exceed 25°C in any room during the heating season.
		0	1	2	3	15.6	Water heaters, wood stoves and other devices that employ combustion-burning fuel shall be vented to the outside of the structure in an approved manner that meets the manufacturer specification and in compliance with applicable standards, and shall be supplied with sufficient air to support the continuous complete combustion of fuel and prevent back-drafting or the emission of harmful gases to any internal or enclosed spaces. The chimney must be maintained in accordance with the manufacturer requirements, including sweeping and inspection.

Relevant Baseline  
Indicators

0

Satisfactory  
or N/A

1

Not  
Satisfactory

2

Defective

3

Seriously  
Defective

Subject		Score				Baseline Indicators	
16	Ventilation	0	1	2	3	16.1	The air exhausted from a bathroom, toilet room, kitchen, clothes dryer, or basement must be provided by mechanical ventilation or by a correctly designed and installed natural ventilation system, as required by Part F of the Building Regulations. In addition it shall not be vented into any other parts of the building's habitable space or an attic; such air shall discharge directly to the outdoors but not near any intake on the building exterior.
		0	1	2	3	16.2	All habitable rooms must have at least one window, door or skylight which opens to the outside and can be fixed in an open position. In addition, ventilation may also be provided by the presence of trickle vents, air bricks or passive stack ventilation.
		0	1	2	3	16.3	In each habitable room, the size of the openable windows, doors and skylights together must be at least 5% of the floor area of that room.
19	Fire Safety	0	1	2	3	19.3	An annual gas safety check should have been undertaken within the last 12 months with a satisfactory result. Any heating provided by LPG shall be inspected by a suitably qualified engineer annually.
		0	1	2	3	19.4	The electrical installation should have been inspected and tested within the last 5 years.
		0	1	2	3	19.5	There should be sufficient, properly designed and appropriately sited smoke and heat detectors with alarms in every dwelling. These should be properly maintained and regularly tested.
		0	1	2	3	19.6	The escape route from bedrooms through habitable rooms should either be avoided, or mitigated, by other provisions.
		0	1	2	3	19.7	Egress through doors/windows that are required for means of escape should not require the use of a key or a code.

# Other Relevant Matters

0

Satisfactory  
or N/A

1

Not  
Satisfactory

2

Defective

3

Seriously  
Defective

## Consideration of likely scenarios

The assessor is to consider the likelihood of a fire igniting within the scenario presented and the likelihood of that fire becoming uncontrolled. The outcomes relate to the impact of the fire to persons, and includes the effects of smoke inhalation.

The assessor is to consider the likelihood of an explosion occurring and its source, and whether that explosion is also likely to lead to a fire ignition, the outcomes being impacted by the location of the explosion and the provisions within the building to contain the explosion.

## Matters affecting Likelihood of Harm

0

1

2

3

Electrical sources of ignition

0

1

2

3

Smoking management

0

1

2

3

Potential for arson

0

1

2

3

Accidental fire spread

0

1

2

3

Cooking provision

0

1

2

3

Fixed heating

0

1

2

3

Lightning

0

1

2

3

Laundry facilities

0

1

2

3

Multiple occupation and  
overcrowding

**Other Relevant  
Matters****0**Satisfactory  
or N/A**1**Not  
Satisfactory**2**

Defective

**3**Seriously  
Defective**Matters affecting both Likelihood and Harm  
Outcomes**

0	1	2	3
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 Escape route

0	1	2	3
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 Dwelling layout

0	1	2	3
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 Travel distance

0	1	2	3
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 Operation of exits

0	1	2	3
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 Obstructions

0	1	2	3
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 Non-fire resisting fabric – allowing  
fire to spread.

0	1	2	3
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 Smoke permeable fabric – allowing  
smoke to spread.

0	1	2	3
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 Fire stops to cavities – lack of,  
allowing fire to spread.

0	1	2	3
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 Disrepair to fabric – walls, ceilings  
and/or floors may allow smoke,  
fumes and/or fire to spread.

0	1	2	3
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 Internal doors – insufficient doors or  
doors of inappropriate materials or  
ill-fitting doors.

0	1	2	3
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 Fire-resisting construction (including  
any glazing) protecting escape routes

0	1	2	3
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 Measures to ensure that fire-  
resisting doors are maintained in the  
closed position

0	1	2	3
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 Smoke Control

0	1	2	3
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 Artificial lighting

0	1	2	3
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 Levels of compartmentation

0	1	2	3
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 Provision of appropriate Fire Safety  
Signs

0	1	2	3
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 Fire Detection and Alarm Systems

0	1	2	3
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 Provision of fire-fighting equipment

0	1	2	3
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 Fire suppression system
**Matters related to cladding**

0	1	2	3
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 Condition of cladding

0	1	2	3
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 Combustibility and fire performance  
of external wall construction and  
cladding

0	1	2	3
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 Location and adequacy of cavity  
barriers

0	1	2	3
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 Presence/maintenance of dry/wet  
rising mains

0	1	2	3
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 Presence/maintenance of Firemen's/  
Firefighting/Firefighters lifts

0	1	2	3
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 Access arrangements to the site and  
the building for the fire and rescue  
service

0	1	2	3
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 Balconies
**Matters related to explosions**

0	1	2	3
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 Unauthorised gas supply

0	1	2	3
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 Siting of gas tanks

0	1	2	3
---	---	---	---

 Ventilation

0	1	2	3
---	---	---	---

 Hot water storage tank

0	1	2	3
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 Vented hot water system

0	1	2	3
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 Unvented hot water system

# Likelihood of Harm

<b>Scale Points</b> Likelihood of harm from this hazard over the next twelve months	
Very Likely	1 in 1
	1 in 2
	1 in 3
	1 in 5
Likely	1 in 10
	1 in 20
	1 in 30
	1 in 50
Unlikely	1 in 100
	1 in 200
	<b>1 in 300</b>
	1 in 500
Very Unlikely	1 in 1,000
	1 in 2,000
	1 in 3,000
	National Average 1 in 5,000

Score

1 in 300

**Justification of Scoring**  
Likelihood of Harm

The heating system does not extend to the basement; instead, an LPG cylinder portable gas fire is present. The basement is unventilated, having no windows or any other form of ventilation. LPG cylinders – both empty and charged – are stored in the basement, which also houses the gas and electrical meters and the fuse board. The storage and use of LPG cylinders for heating in an unventilated basement increases the risk of fire and also explosion if LPG leaks into the unventilated space. The heater could be knocked over or come into direct contact with clothing or other furnishings, causing a fire.

There is no gas safety certificate or electrical installation report. The property has what appears to be a 1960s/70s electrical installation with typical re-wirable fuses. The old and unmaintained electrical installation combined with insufficient sockets in the bedrooms increases the risk of fire from electrical overloading.

Whilst the existing doors will provide some degree of fire separation, the lack of any early warning system means that a fire is likely to remain undiscovered. Should it take hold, then the occupants have less time to escape, with the stairway becoming smoke logged. This increases the likelihood of harm that requires medical intervention.

Additionally, the study, which is an inner room, is accessible only from the kitchen, and the kitchen area is not equipped with a fire blanket. The means of escape from the property is impeded by the presence of a key-operated door. There is no external lighting to the front or rear, although artificial street lighting is present.

Overall, these factors significantly increase the likelihood of fire and, in particular, an explosion that would result in harm requiring medical attention.



# Harm Outcomes

Extreme		Severe		Serious		Moderate		
Death, permanent paralysis, etc.		Heart attack, serious fractures, etc.		Chronic stress, severe concussion, etc.		Broken fingers, moderate cuts, etc.		
Very Likely	50.0	Very Likely	50.0	Very Likely	50.0	<b>Example Dwelling</b> 50.0 <b>National Average</b> 73.0  These scores are simply calculated as the sum of the other three harm outcomes subtracted from 100%		
<b>Example Dwelling</b>	30.0		30.0		30.0			
National Average	20.0		20.0		20.0			
	10.0	<b>Example Dwelling</b>	10.0	<b>Example Dwelling</b>	10.0			
	5.0		5.0	National Average	5.0			
	2.0	National Average	2.0		2.0			
Unlikely	1.0	Unlikely	1.0	Unlikely	1.0			
	0.5		0.5		0.5			
	0.2		0.2		0.2			
Very Unlikely	0.1	Very Unlikely	0.1	Very Unlikely	0.1			
	0.0		0.0		0.0			
Score 30.0%		Score 10.0%		Score 10.0%		Score 50.0%		

## Harm Outcomes

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### Justification of Scoring

#### Harm Outcomes

The risk of explosion from LPG cylinders being stored and used in an unventilated space, combined with the absence of any fire detection and alarm system, means that occupants sleeping in the property may be oblivious to a fire starting.

Escape is compromised from both the study and the basement bedroom. With a single staircase leading to a final exit having a key-operated door lock, someone aged 60 years or over could be overcome by smoke and would then be unable to escape.

Due to the number of deficiencies, not least the increased possibility of explosion as a result of an unvented basement, there is an increased risk of extreme, severe and serious outcomes for the vulnerable age group. Dealing with each outcome in order, this could mean death, loss of consciousness over several days as a result of an explosion, or serious burns following a fire.

# Safety Ratings

Scenario 1  
As described in this document

## Key

Category	Band	Score
1 Legal duty to take action	High	10,000
2 Discretion to take action	Medium	1,000
	Low	100

Likelihood of Harm 1 in 300			
Extreme 10.0%	Severe 10.0%	Serious 10.0%	Moderate 70.0%
Category	Band	Score	
1 Legal duty to take action	High	10,000	
2 Discretion to take action	Example Dwelling	1,045 1,000	
	Mediur		
	Low	100	
National Average		41	

Score  
1,045

**Scenario 2**

After works meeting baseline indicators

Likelihood of Harm  
1 in 2,000

Extreme 20.0%	Severe 5.0%	Serious 10.0%	Moderate 65.0%
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Category	Band	Score
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1 Legal duty to take action	<b>High</b>	10,000
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2 Discretion to take action	<b>Medium</b>	1,000
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<b>Example Dwelling</b>	<b>Low</b>	<b>104</b> 100
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National Average		<b>41</b>
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Score

**104****Justification of Scoring**

After works meeting baseline indicators

Meeting the baseline indicators would see the removal of the portable LPG heater and spare cylinders from the basement and their replacement with an appropriate heating system, ideally extending the current gas-fired central heating system into this area. Compliance with the BIs would also address the lack of smoke detection via the installation of a dwelling-appropriate system, the absence of a thumb-turn lock to the front door and inadequate external lighting. A gas safety check and an electrical installation condition report would be arranged, with work being carried out to achieve a satisfactory rating. This would include the provision of at least two double electrical sockets in each habitable room and four double sockets in the kitchen. In combination, these measures should reduce risk considerably, but the issue of the inner room (study) and the basement having one means of access remains, with harm outcomes still slightly increased as a result.

**Scenario 3**

After further improvements

Likelihood of Harm  
1 in 5,000

Extreme 20.0%	Severe 2.0%	Serious 5.0%	Moderate 73.0%
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Category	Band	Score
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1 Legal duty to take action	<b>High</b>	10,000
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2 Discretion to take action	<b>Medium</b>	1,000
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<b>Low</b>	<b>100</b>
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<b>Example National Average</b>	<b>41</b>
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Score

**41****Justification of Scoring**

After further improvements

As the property is split over three floors, it would be advisable to go further than the baseline indicators and install a mains-wired and interconnected smoke, heat and carbon monoxide detection system.

Provision of an escape window from the study would reduce the risk posed by this inner room, which is likely to be in regular use, and installation of fire doors throughout the dwelling would further protect the route of escape.

The installation of a domestic sprinkler system could mitigate the risk of fire and explosions posed by use of the basement as a bedroom. This area, however, lacks any natural lighting or ventilation, therefore the dwelling would require assessment under other hazard areas, which would ultimately impact the decisions made regarding its use.

## Other Relevant Legislation and Guidance

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### Updates

Matters for consideration listed in this section were correct at the time of publication. For the most up-to-date legislation and guidance in these areas, please visit the [gov.uk](https://www.gov.uk) website.