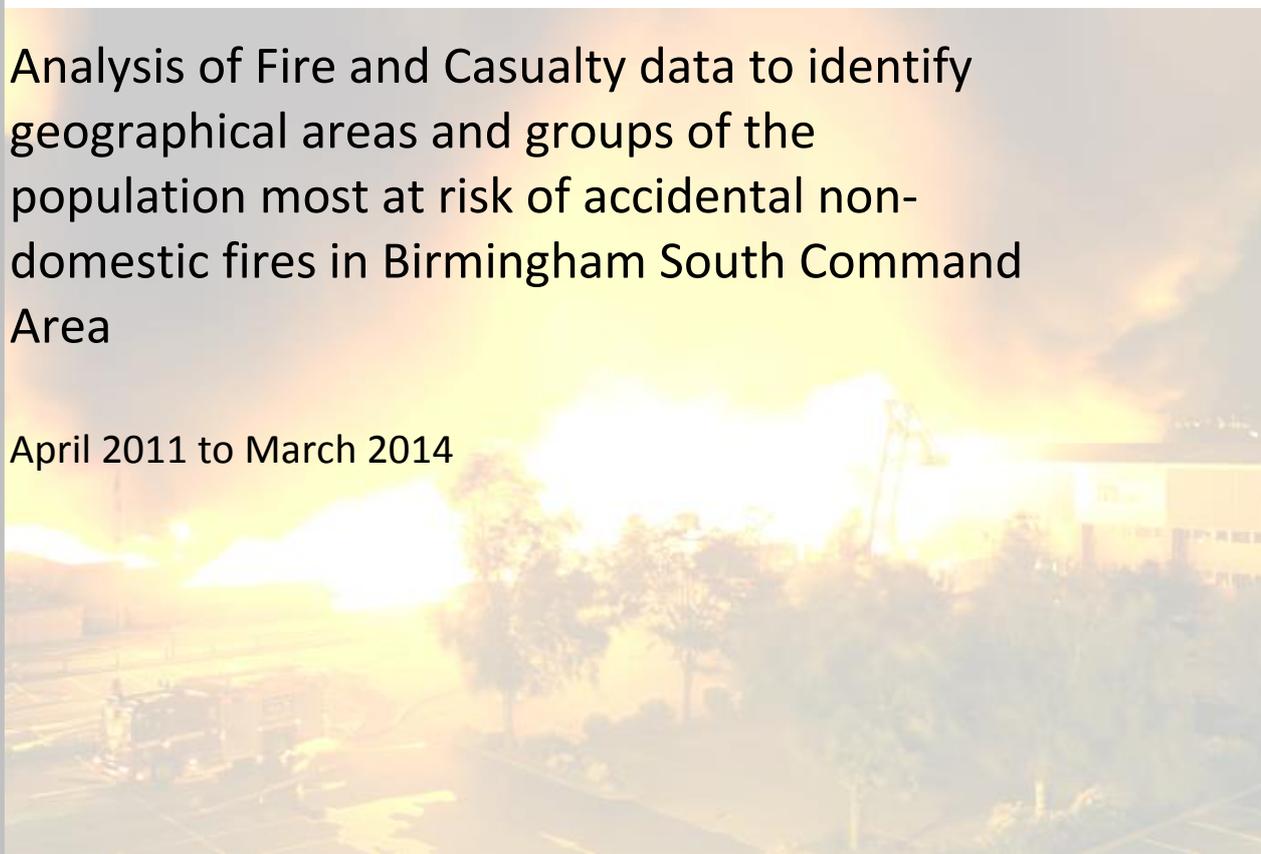


ACCIDENTAL AND DELIBERATE FIRES IN NON-DOMESTIC PROPERTY IN BIRMINGHAM SOUTH

Analysis of Fire and Casualty data to identify geographical areas and groups of the population most at risk of accidental non-domestic fires in Birmingham South Command Area

April 2011 to March 2014



Data Intelligence Hub
(DATE)
Final v.1

Restricted: For Internal Use Only

Introduction

The following document presents the results of the analysis of primary fires at non-domestic premises in Birmingham South between April 2011 and March 2014.

During this period there were 320 accidental and 75 deliberate fires at non-domestic premises

There are currently approximately 19,047 non domestic properties in Birmingham South¹

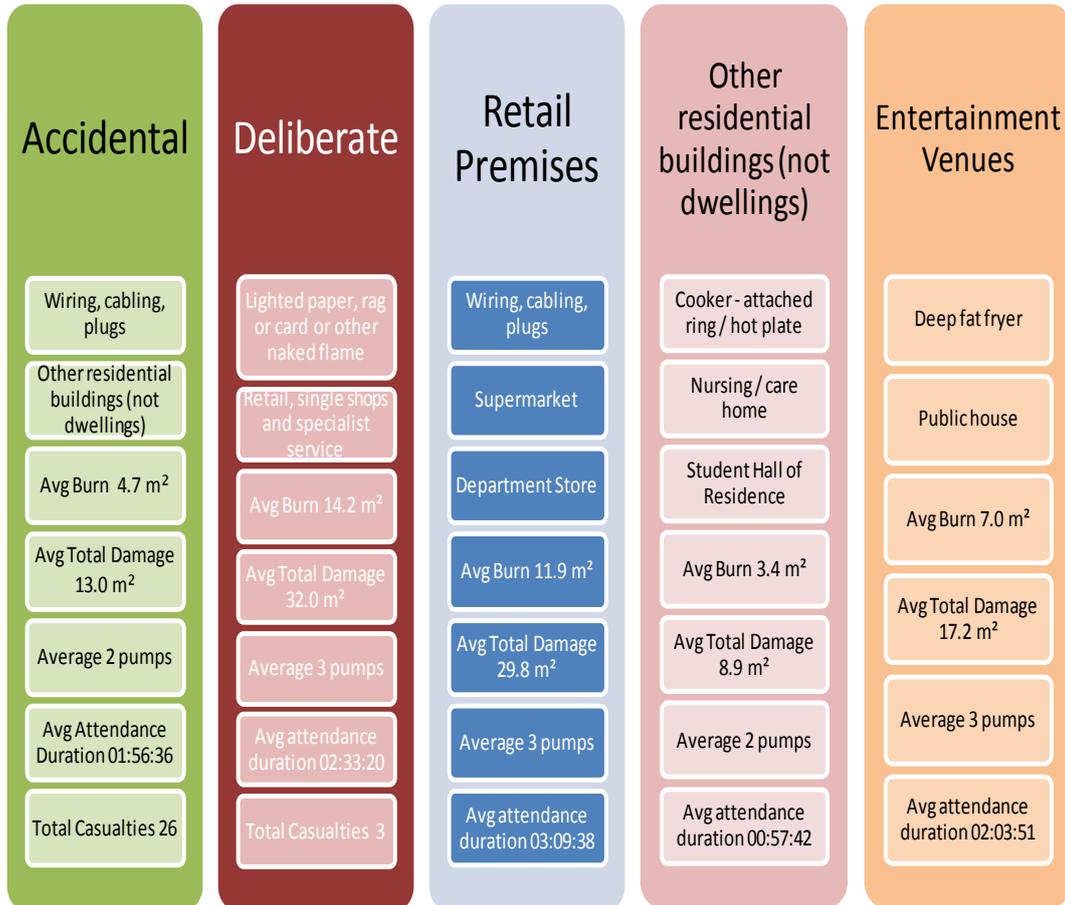
Although non-domestic property fires are fewer than dwelling fires, the impact of fire in non-domestic buildings extends further than just the effects on the business or owner of the property. The economic impact on the business for instance may in turn indirectly affect life, as unemployed people are more at risk of accidental dwelling fires due to their being at home for longer periods of time.

Please note, all maps are available in PDF format from the Data Hub's Alfresco site.

¹ Extract from the Gazetteer, October 2014

Summary

The table below summarises the main features of different types of incidents:



Temporal analysis

Table 1 illustrates the temporal distribution of non-domestic fires in Birmingham South.

Day/Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Monday	Green	Yellow	Yellow	Green	Green	Green	Yellow	Yellow	Green	Green	Yellow	Yellow	Orange	Orange	Yellow	Yellow	Yellow	Green	Yellow	Green	Yellow	Yellow	Yellow	Orange
Tuesday	Green	Green	Yellow	Yellow	Green	Green	Green	Orange	Green	Orange	Yellow	Orange	Yellow	Yellow	Yellow	Yellow	Orange	Yellow	Orange	Green	Green	Orange	Yellow	Orange
Wednesday	Yellow	Yellow	Green	Green	Yellow	Orange	Green	Yellow	Yellow	Orange	Yellow	Yellow	Yellow	Red	Orange	Yellow	Yellow	Green	Green	Yellow	Green	Yellow	Yellow	Green
Thursday	Yellow	Yellow	Green	Green	Green	Yellow	Yellow	Yellow	Yellow	Orange	Orange	Green	Orange	Green	Yellow	Yellow	Green	Orange	Orange	Orange	Orange	Orange	Green	Green
Friday	Green	Green	Green	Yellow	Yellow	Yellow	Green	Yellow	Red	Orange	Yellow	Orange	Green	Yellow	Yellow	Yellow	Yellow	Yellow						
Saturday	Orange	Yellow	Yellow	Green	Green	Green	Yellow	Yellow	Yellow	Green	Orange	Yellow	Green	Green	Yellow	Yellow	Orange	Orange	Yellow	Yellow	Yellow	Yellow	Orange	Orange
Sunday	Green	Green	Yellow	Green	Yellow	Green	Yellow	Green	Green	Green	Yellow	Red	Yellow	Green	Green	Green	Yellow	Orange	Red	Orange	Green	Orange	Green	Green

Table 1 – Fires at non-domestic premises in Birmingham South per hour and day

It shows that, over the course of a week, non-domestic fires are more likely to take place between **1000-1900** and **2100-2200**, and on **Fridays, Tuesdays & Wednesdays**. Over a third of all **arson** fires occurred between **1900 and midnight**

Chart 1 is the seasonality chart for non-domestic fires in Birmingham South. If the column is a positive number (above the 0) then the number of incidents in that month is higher than expected, if the column is a negative number then the number of incidents in that month is lower than expected (the values on the vertical (y) axis are relative values).

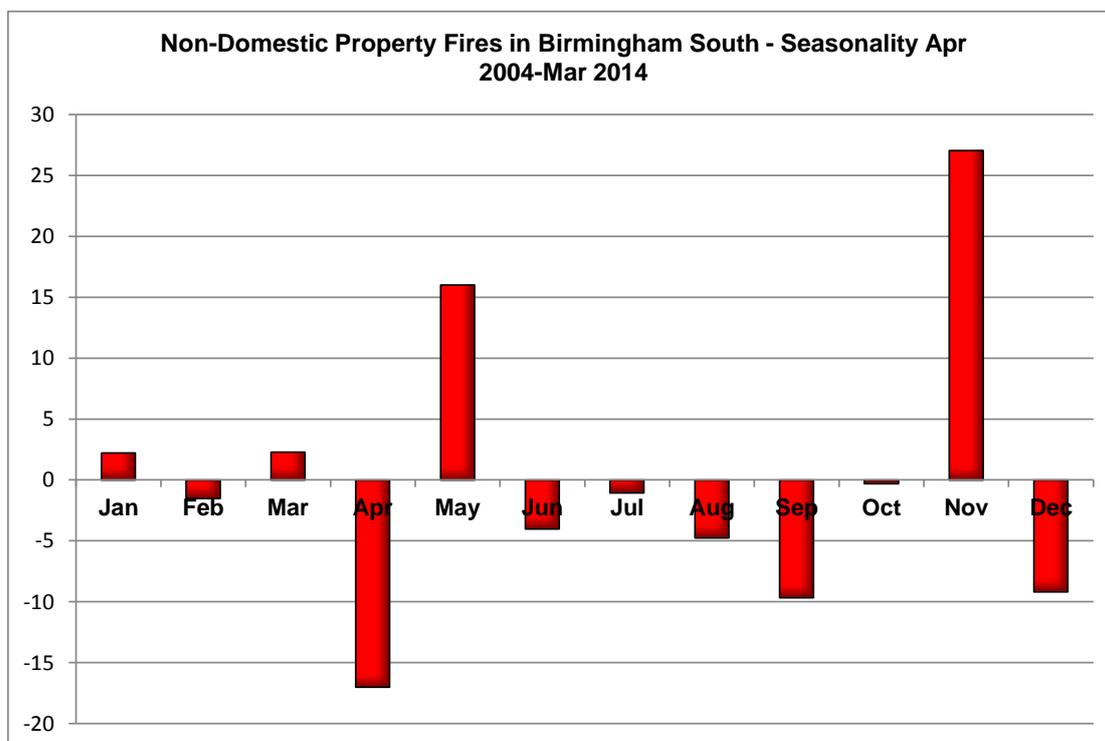
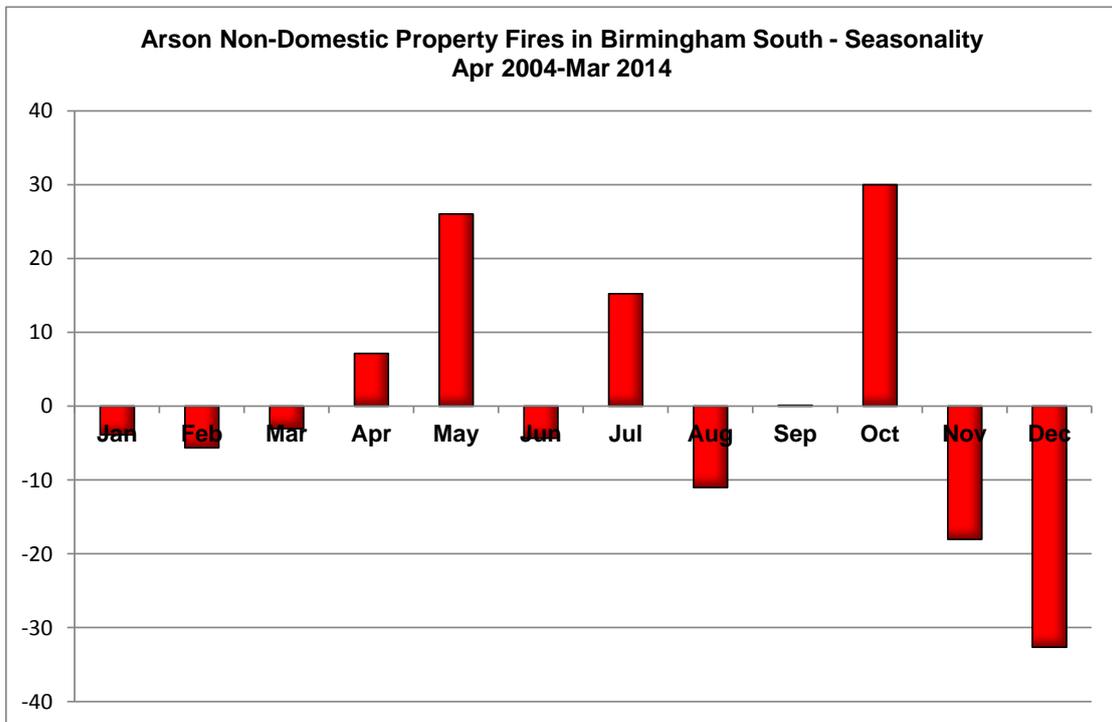
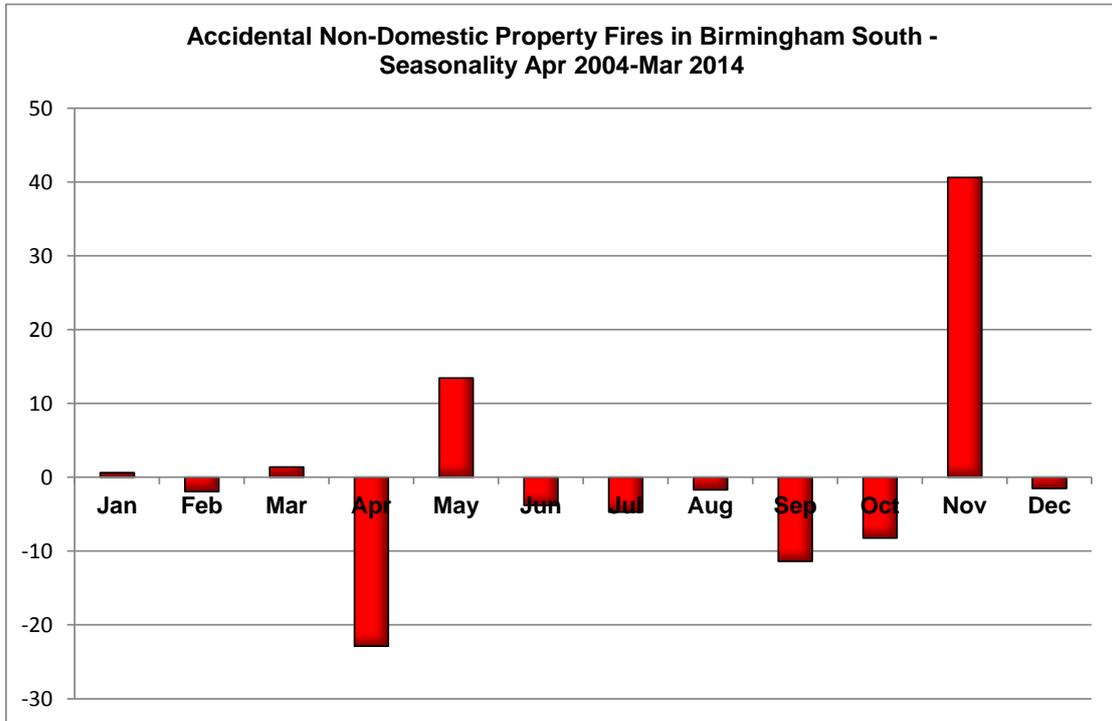


Chart 1 – Seasonality – Non-domestic fires in Birmingham South

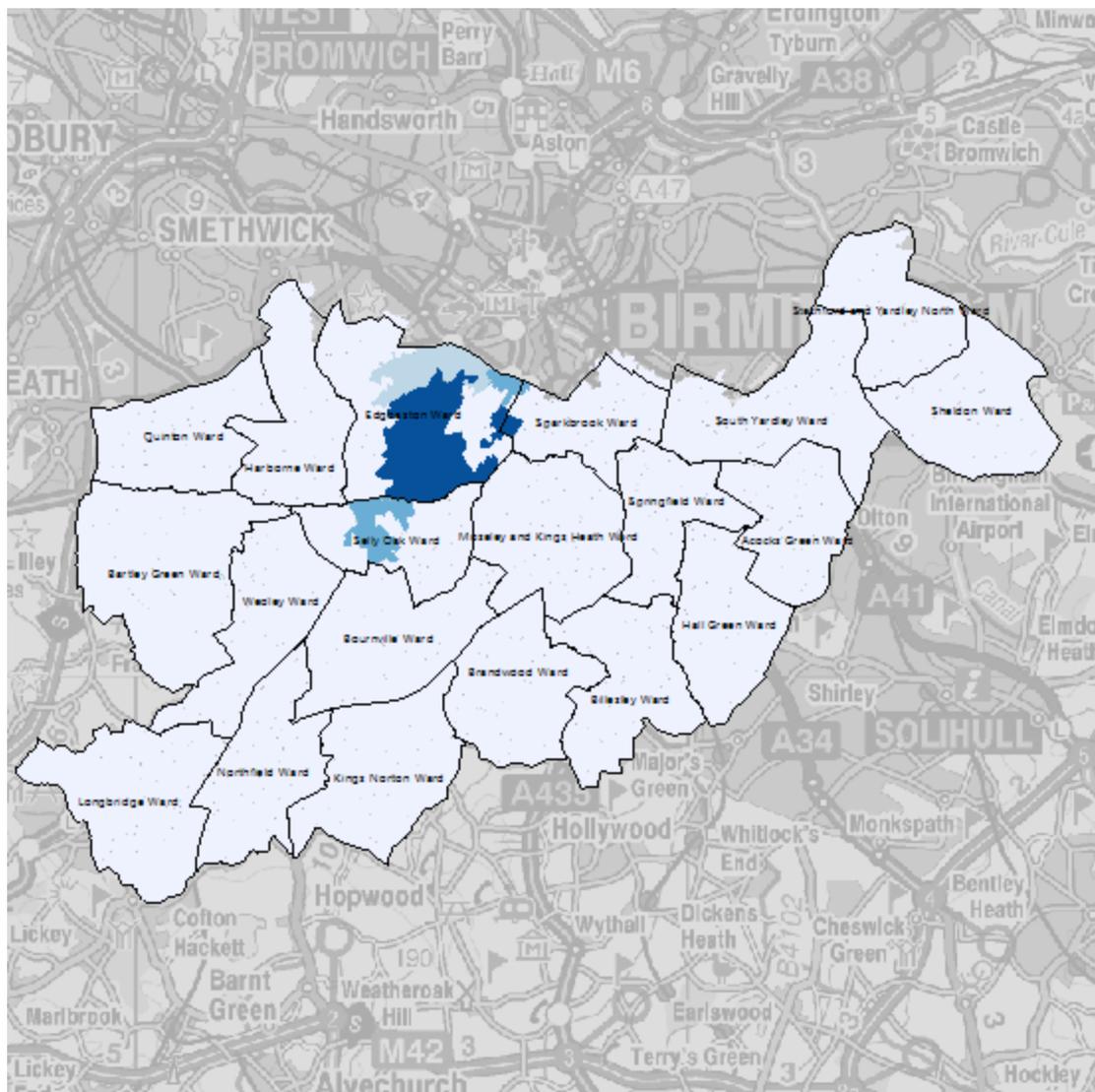
It shows that non-domestic fires tend to take place in the **May** and **November**. Separating accidental and deliberate fires shows that accidental fires are more likely in May and November, while deliberate fires are more likely in October, May & July.



Location

An overall risk score for each property type group was obtained using a harm matrix and a probability matrix¹. This was then used to rank LSOAs (Lower Super Output Areas) in both boroughs to identify geographical areas which may be more at risk.

The map below shows that, overall, the area most at risk of fires in non-domestic buildings are in Edgbaston & Selly Oak Wards. This is heavily influenced by the number of other residential buildings (not dwelling) premises in this area, as this property types is within the high-scoring range.



¹ See Appendix A

Property type

Other residential buildings (not dwellings), retail premises and entertainment venues incurred 57% of both accidental and deliberate fires at non-domestic premises:

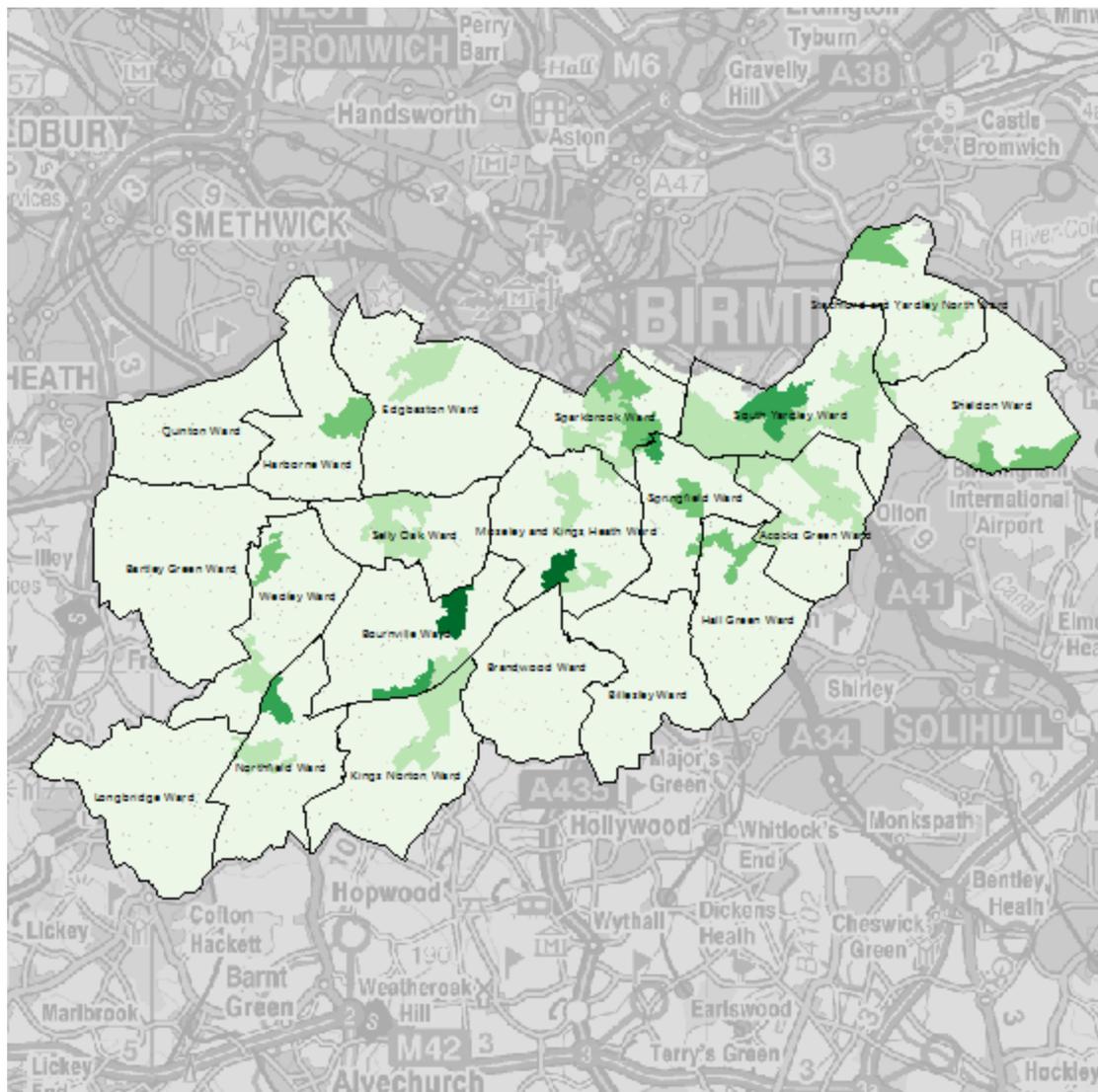
Property Type Grouped	Accidental	Deliberate	Grand Total
Other residential buildings (not dwelling)	79	8	87
Retail, single shops and specialist service premises	58	19	77
Entertainment, dining, recreation and venues	49	13	62
Education	37	8	45
Health	30	14	44
Manufacturing / Industrial premises (e.g. factories)	28	1	29
Office, administration and call-centre buildings	18	4	22
Buildings used for bulk storage	5	4	9
Emergency services	6	2	8
Laboratories	5	0	5
Public utilities (Gas, electric, water, phone)	3	0	3
Transport buildings	1	1	2
Law and order	0	1	1
Places of worship	1	0	1
Grand Total	320	75	395

Almost 21% of Accidental fires had the source of ignition as wiring, cabling or plugs while 14% started in fluorescent lights. Almost **one third** of fires which were deemed **accidental** showed **wiring insulation (eg electrical wire)** as the item mainly responsible

Retail premises:

Location

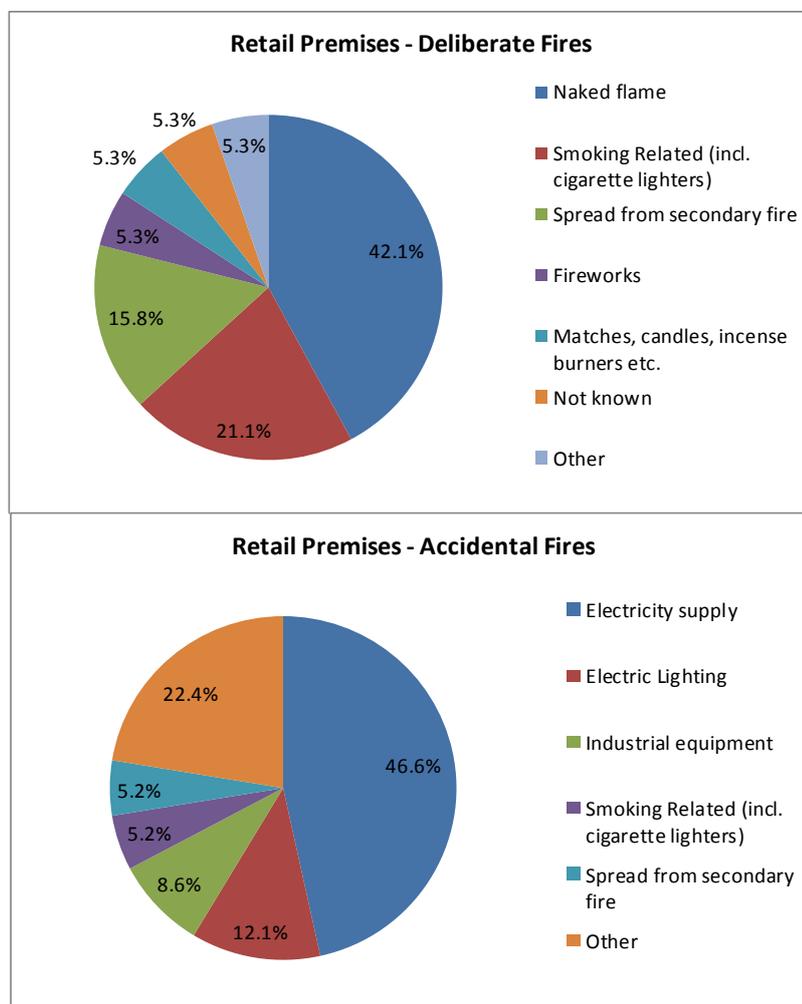
Using the same risk calculation but for **retail, single shops & specialist service premises** only, the map below shows the areas most at risk. Unsurprisingly, they are around shopping centres such as Kings Heath, Strichley & Northfield



Supermarkets and Department Stores incurred the highest number of total incidents at retail premises, with 6 each: although all department store incidents were accidental.

Top 5 Retail, single shops and specialist service premises	Accidental	Arson	Grand Total
Department Store	6	0	6
Supermarket	3	3	6
Grocer, farm shop and pick your own	2	2	4
Other type building related to retail or commercial services	3	1	4
Vehicle repair and servicing garage	2	2	4

Accidental fires at retail premises were most likely to be due to **wiring, cabling & plugs** (43.0%), with **wiring, cabling and plugs on shop floor/showroom/display hall** the most recorded circumstances for a fire to occur.

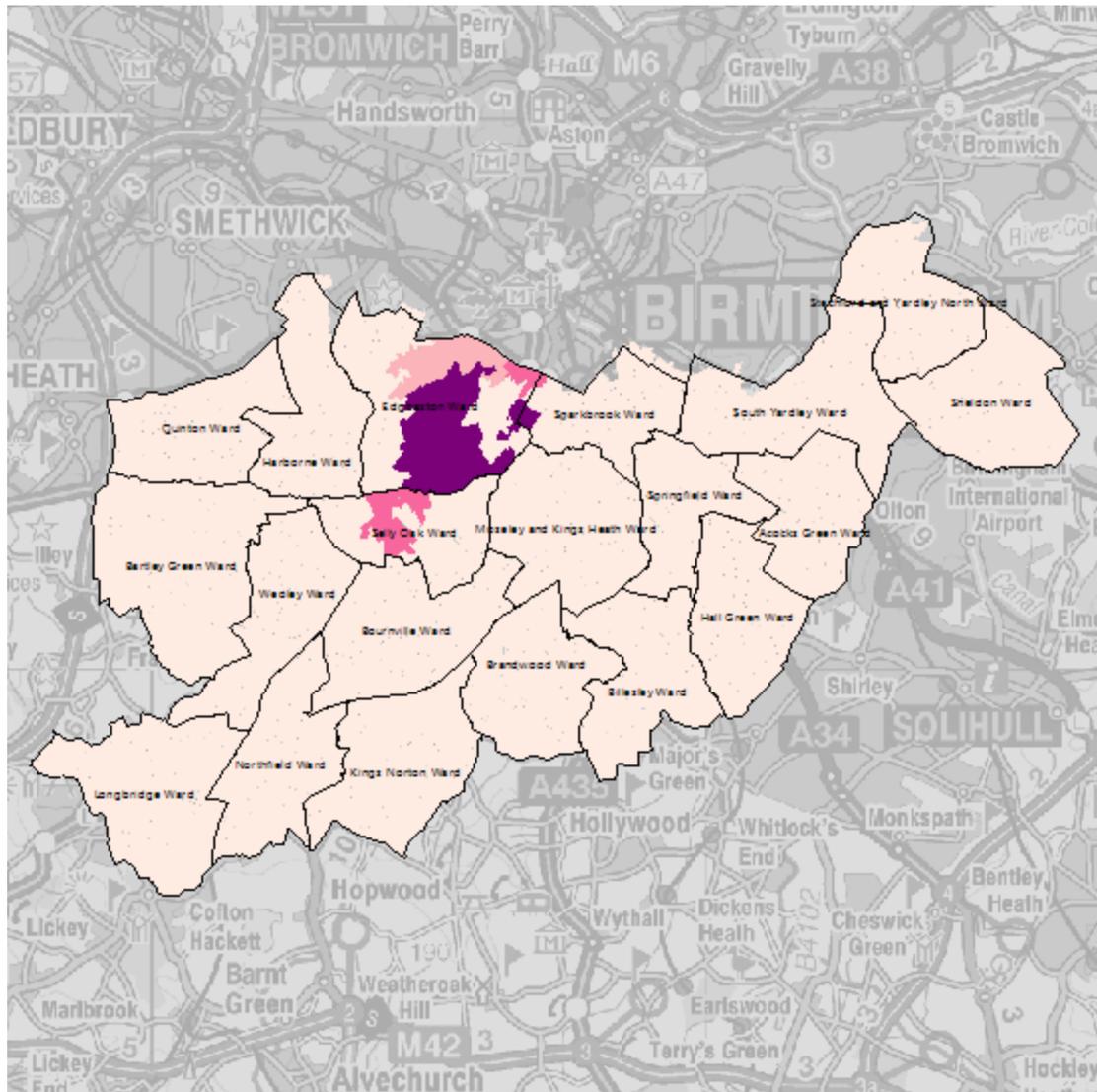


In 45% of incidents at retail premises there was no smoke/heat detector or fire alarm system present in the property. Four had an alarm that was not working.

Unsurprisingly, the average resulting burn and total damage tended to be greater at properties where there was no alarm. 3 of the 4 vehicle repair and services premises and 1 of the 6 supermarkets did not have an alarm system installed.

Other residential buildings (not dwelling)

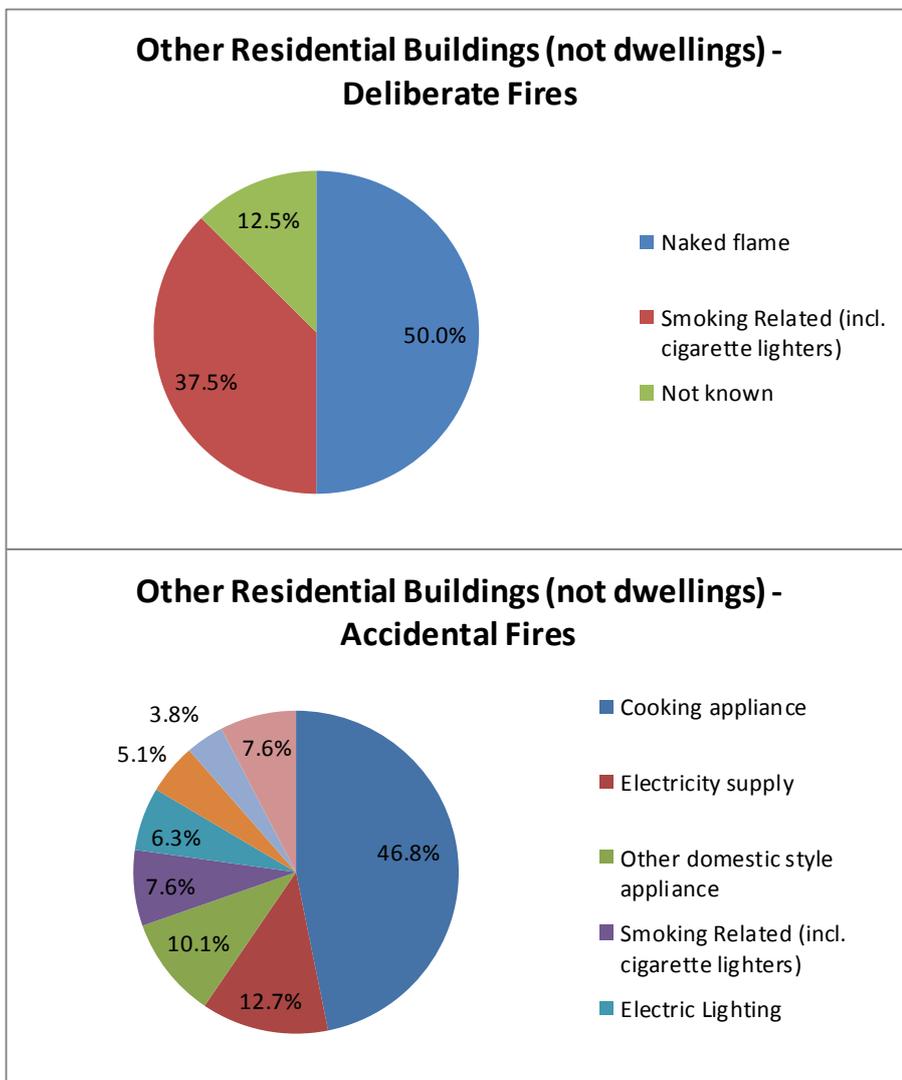
High risk areas in this property type are centred around student halls of residence



Nursing / care home (incl people with disabilities) incurred the highest number of incidents with 21 over the three year period, 90.5% of which were accidental **Student hall of residence (not shared house)** followed closely behind with 20 over the three year period, all of which were accidental

Top 5 Other Residential Buildings (not dwellings)	Accidental	Arson	Grand Total
Nursing / care home (incl. people with disabilities)	19	2	21
Student hall of residence (not shared house)	20	0	20
Old peoples home	12	0	12
Hotel / motel	7	2	9
Hostel for drug / alcohol rehabilitation	4	1	5

Accidental fires in other residential building (not dwelling) were mostly due to **cooking left on or unattended** (23.0%) and **fault in equipment or appliance** (23.0%)



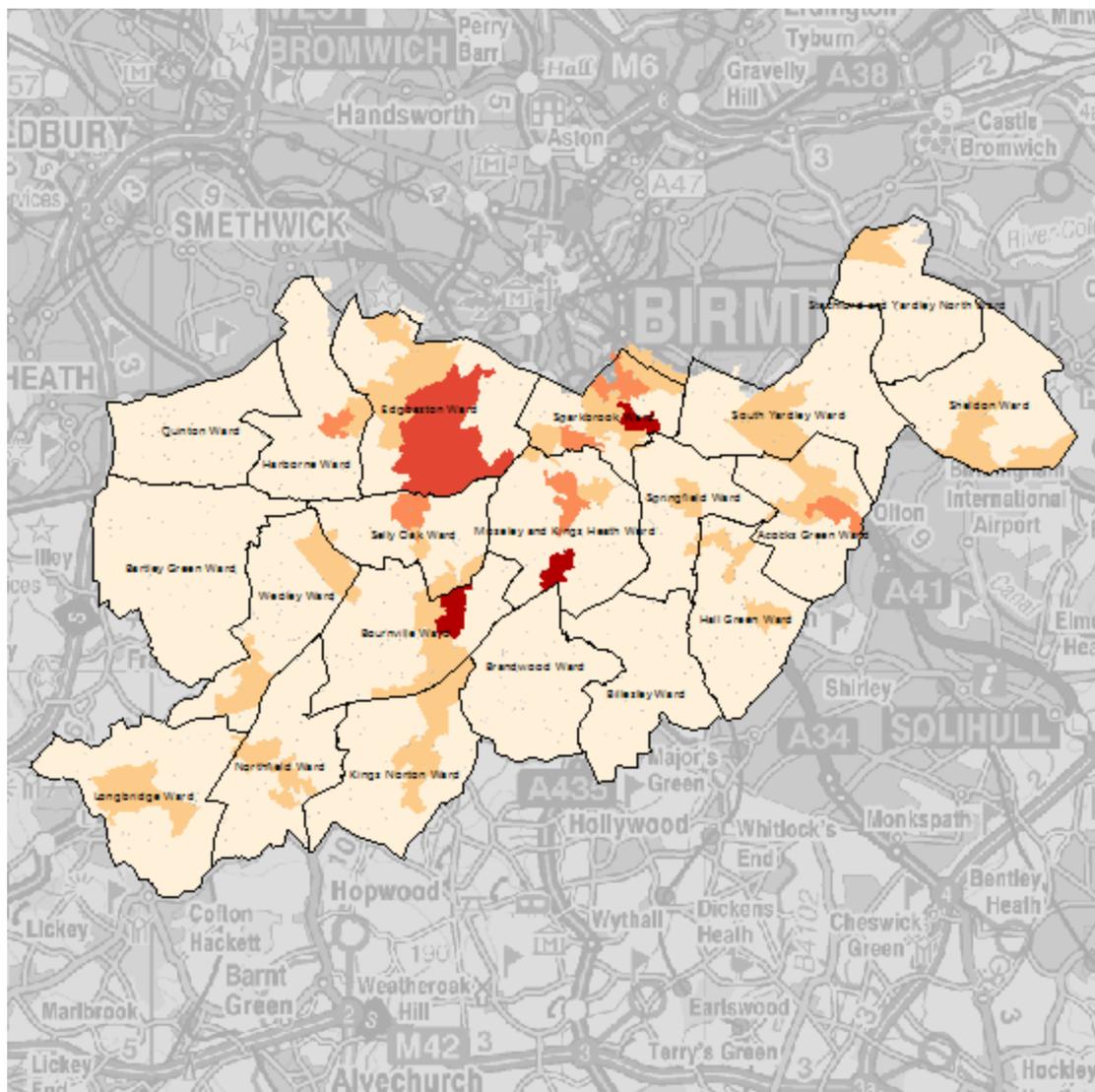
The largest number of incidents 35 (40.2%) started in the **kitchen**, while 10 (11.5%) started in a **bedsitting room** and 9 (10.3%) started in the **bedroom**

95.4% of all other residential building incidents had a working smoke alarm

Fires at other residential buildings resulted in fourteen injuries over the three years analysed, only two of which went to hospital for treatment.

Entertainment venues:

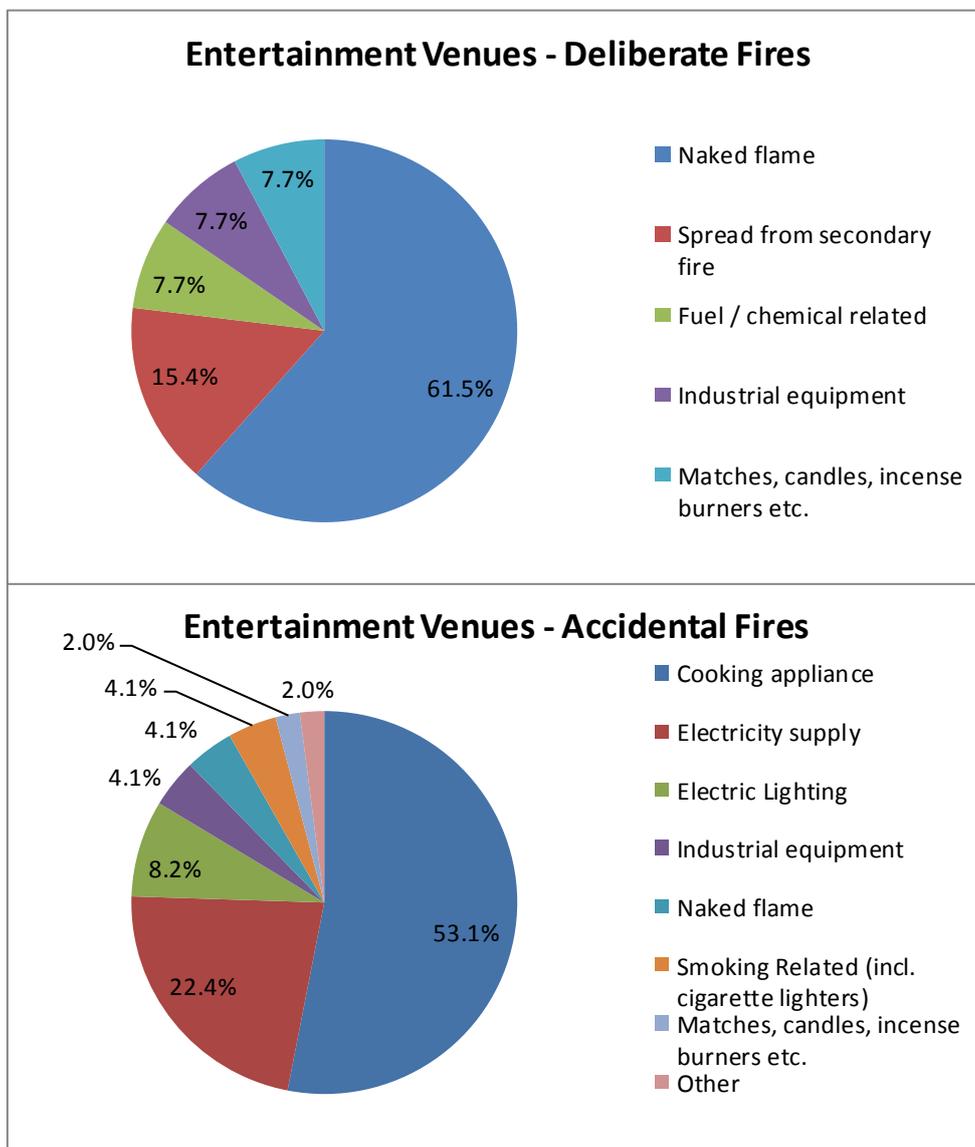
High risk areas again form around the city and town centres as there are more of these venues in these areas. Edgbaston Ward features perhaps due to the proximity of the University



Pubs were the main entertainment venues affected by fire for both accidental and deliberate fires, representing 24.2% of incidents (15), followed by **fast food and takeaway outlets** (13.0%, 8 incidents).

Top 5 Entertainment, dining, recreation and venues	Accidental	Arson	Grand Total
Public house	11	4	15
Fast food and takeaway outlet	8	0	8
Indian and Asian restaurant	8	0	8
Fish and chip shop	5	0	5
Bingo hall	1	2	3
Cafe	2	1	3
Public, community or village hall	3	0	3

Deep fat fryers were mostly responsible for fires at entertainment venues (13 incidents, 26.5% of accidental incidents)



Faults in equipment or appliances (including overheating) were the most likely cause of accidental fires (36.7%). **Cooking oil or fat (incl vapours)** was the most likely first item ignited, with 30.6% of all incidents (39% of accidental fires); the first item ignited in deliberate fires was **external structures/fittings (incl vehicle)**.

Overall, deliberate incidents tended to result in greater burn and total damage. This is likely linked to most deliberate incidents taking place at vacant premises: as there are no occupants, it takes longer for someone to notice the fire, especially as most did not have an alarm installed.

Fires at entertainment venues resulted in just six injuries over the three years analysed, only two of which went to hospital for treatment.

Attendance Times

The graph below shows the average time spent in attendance at various types of incidents, including vacant premises:

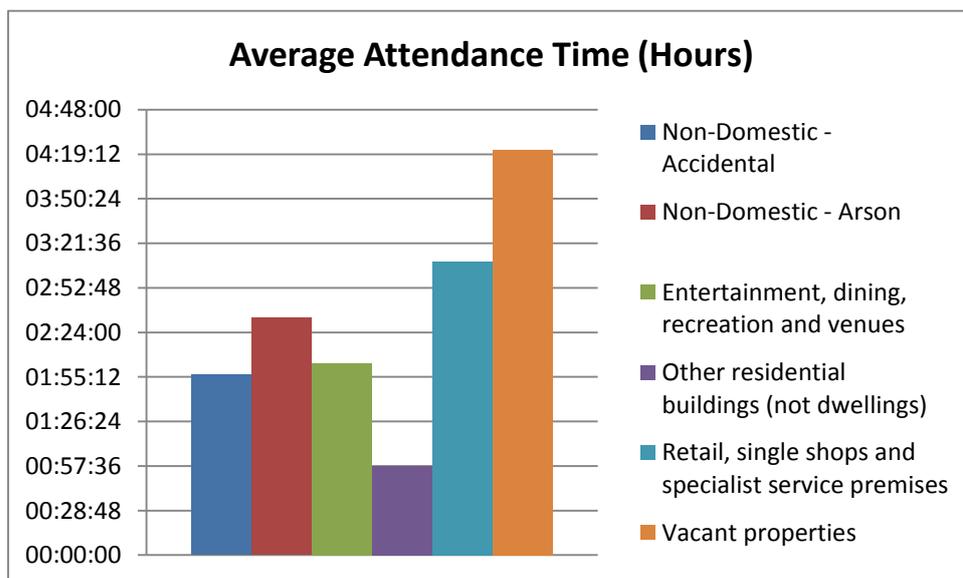


Chart 2 - Average duration of attendance at incidents (hours)

Most time was spent at incidents involving **vacant properties**.

COMAH sites:

At time of writing there was one top tier COMAH sites within Birmingham South (MacDermid Limited), and one lower tier COMAH site (Goodrich Engine Control Systems). MacDermid Limited had one incident in May 2011

While sites affected by the COMAH regulations have the potential to result in major incidents involving serious damage and harm to people and the environment, the likelihood of such incident happening is reduced by their preparedness. Both lower- and top-tier sites are required to produce an on-site emergency plan, prepared by the operator, detailing the emergency procedures in place if an accident were to affect the site, and top-tier also have to have an off-site emergency plan, prepared by West Midlands Fire Service ERP Team, which details the coordinated multi-agency response if an incident at the COMAH site were to have off-site consequences.

Heritage sites:

There are 37 grade I, II* and II listed buildings in Birmingham South, approximately 30 of which are non-domestic buildings, including shops, offices, churches, pubs and schools.

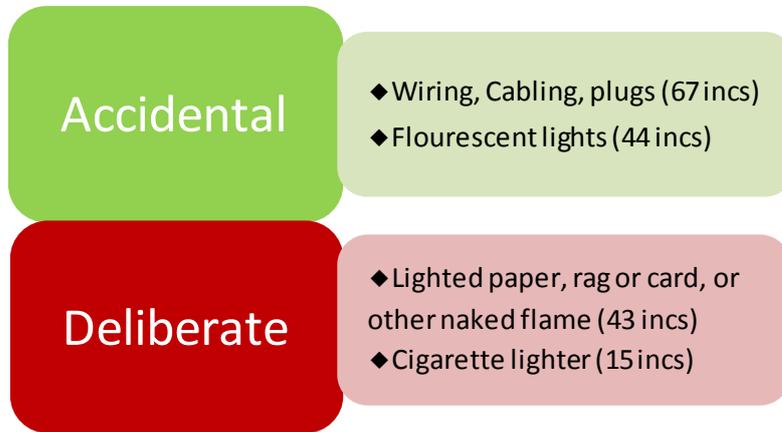
Historical buildings are at heightened risk of fire for a variety of reasons: they are often built from easily-ignited materials, they may have open fires and chimneys which can be in poor condition, their status as listed properties may prevent modifications such as fire doors to be installed, and in some cases they are situated in isolated surroundings delaying the firefighters' arrival.

There have been approximately 1 incident² at grade I, II, and II* listed non-domestic buildings in the last three financial years. It was accidental, and grade II listed.

² This figure was obtained through manually comparing the list of listed buildings and incident data, therefore some incidents may not have been included

Source of ignition

The greatest ignition source for accidental fires was wiring, cabling and plugs (20.9%), while for deliberate fires it was lighted paper, rag or card, or other naked flame (57.3%).



Ignition source - Accidental fires

Although **Wiring, cabling, plugs** caused the largest number of incidents, they resulted in only minimal burn damage. The known accidental ignition source resulting in the greatest burn damage (72.3 sq m on average) was '**kiln, oven, furnace**', however there were only three such incidents



Figure 1 - Accidental incidents: Top 4 ignition sources for average burn damage

The ignition sources which resulted in the greatest average burn damage had very few incidents

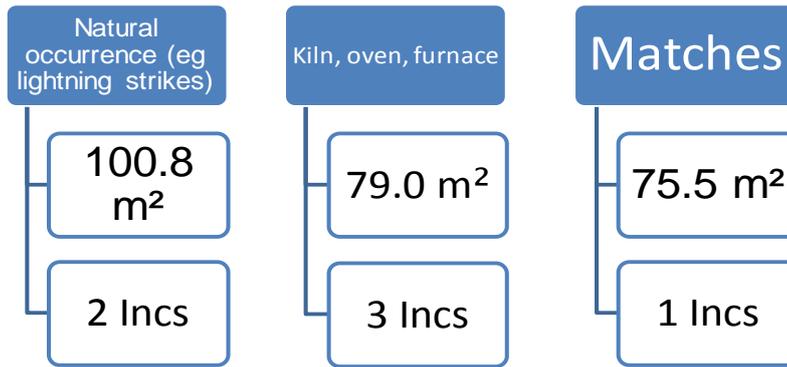


Figure 2 - Accidental incidents: Top 3 ignition sources for total burn damage

The table below shows that, of the five ignition sources causing the highest number of incidents, 'other industrial equipment' resulted in the greatest average burn and total damage.

Source Ignition	Average Burn Damage m ²	Average Total Damage m ²	Number of Incidents
Wiring, cabling, plugs	6.8	11.4	67
Fluorescent lights	3.7	11.2	44
Cooker - attached ring / hot plate	0.7	4.3	22
Cooker - oven	1.6	5.1	18
Deep fat fryer	3.6	11.8	16

Table 2 - Accidental incidents: Top 5 ignition sources and resulting average damage

Ignition source - Deliberate fires

Over 57% of deliberate fires in non-domestic premises were ignited by a naked flame.

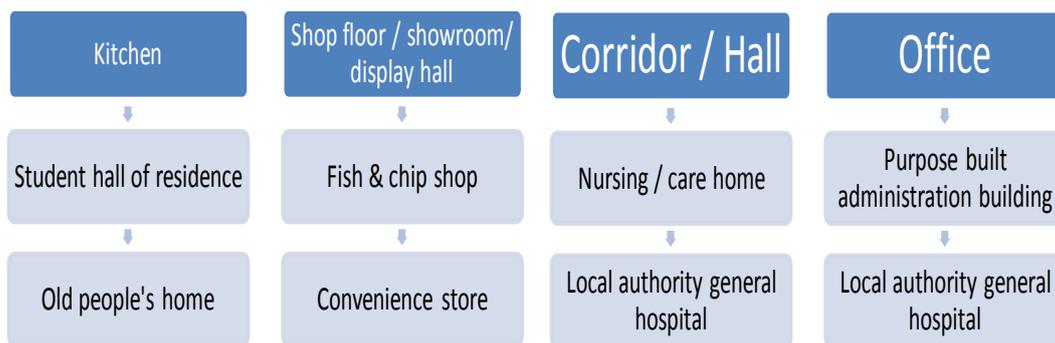
In over a quarter of deliberate incidents the first item ignited was **paper or cardboard** (25.3%, 19 incs), followed by **rubbish / waste material** (13.3%, 10 incs)

Where the first item ignited was known, fires started using **any other furnishings or appliances** resulted in the greatest average burn (69.9 m²) while **recycling – paper, cardboard** resulted in the greatest average total damage (201.0 m²).

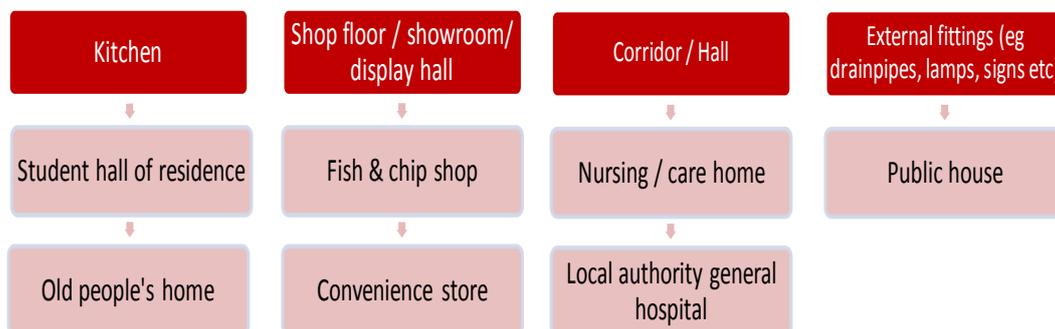
Place the fire started

Due to the wide variety of premises included in the 'non-domestic' category, there is no one place where the fire started which would encompass all property types: overall, the place where the fire started with the greatest number of incidents is the kitchen, with 75 incidents (19.0% of all incidents).

For accidental incidents where the place where the fire started was specified, the diagram below shows in which type of property the top 4 were most likely to be:



The diagram below illustrates the same for the top 4 places where a deliberate fire started:



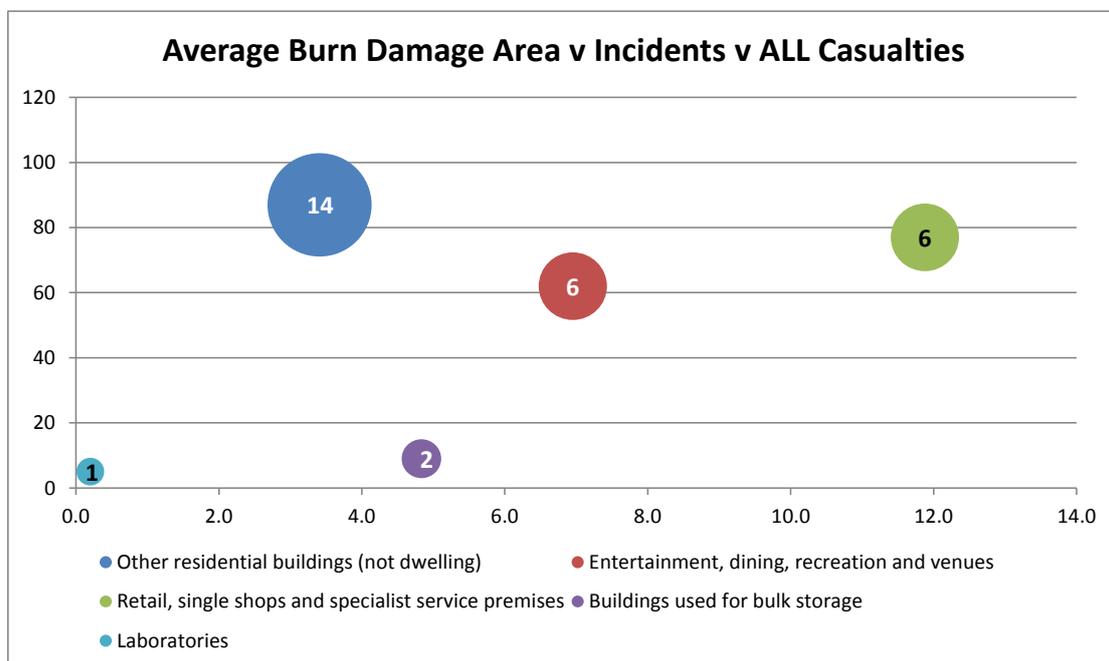
Alarms and firefighting systems

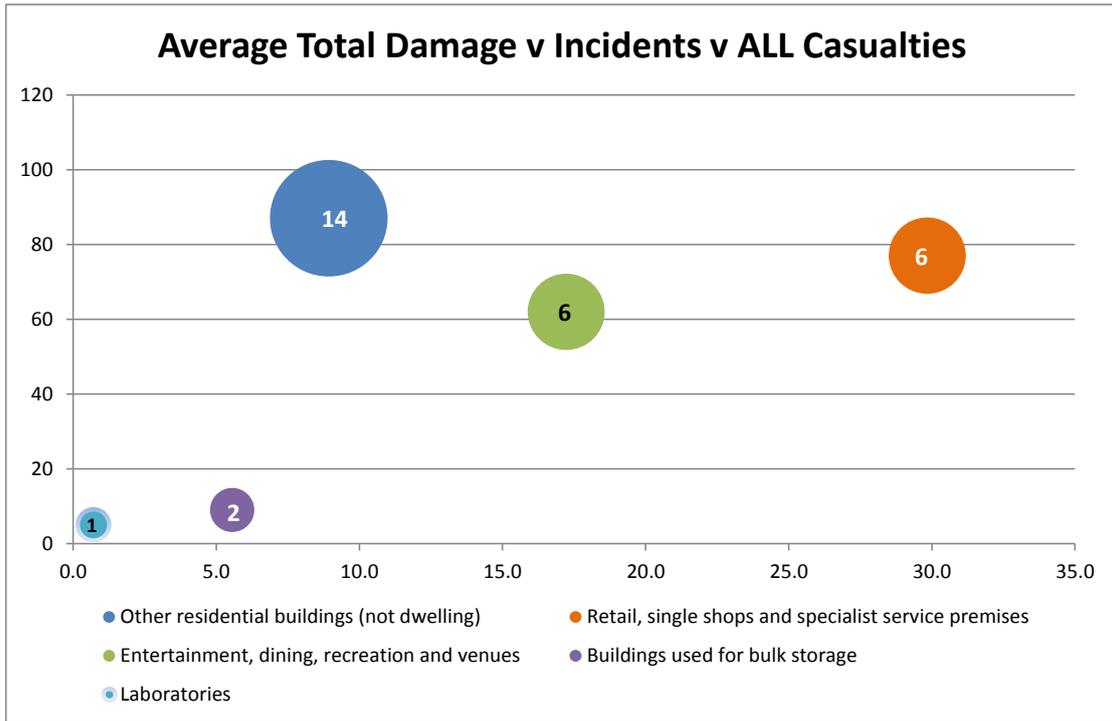
Only 39.0% of non-domestic fires were discovered by an automatic detector or alarm system. Non-dwelling residential buildings had the highest number of incidents discovered automatically (58 out of 83) (34.5%), while in retail, single shops and specialist service premises 47.9% of incidents had no alarm fitted.

The delay between ignition and discovery, and between discovery and first call, is on average shorter when the fire is discovered by an automatic detector/alarm system, and the resulting damage (both burn and total) is also less significant than in fires discovered by a person.

Damage / Casualties

The graphs below show that **manufacturing / industrial premises (eg factories)** incurred the greatest burn and total damage. **Other residential buildings (not dwelling)** had the most casualties

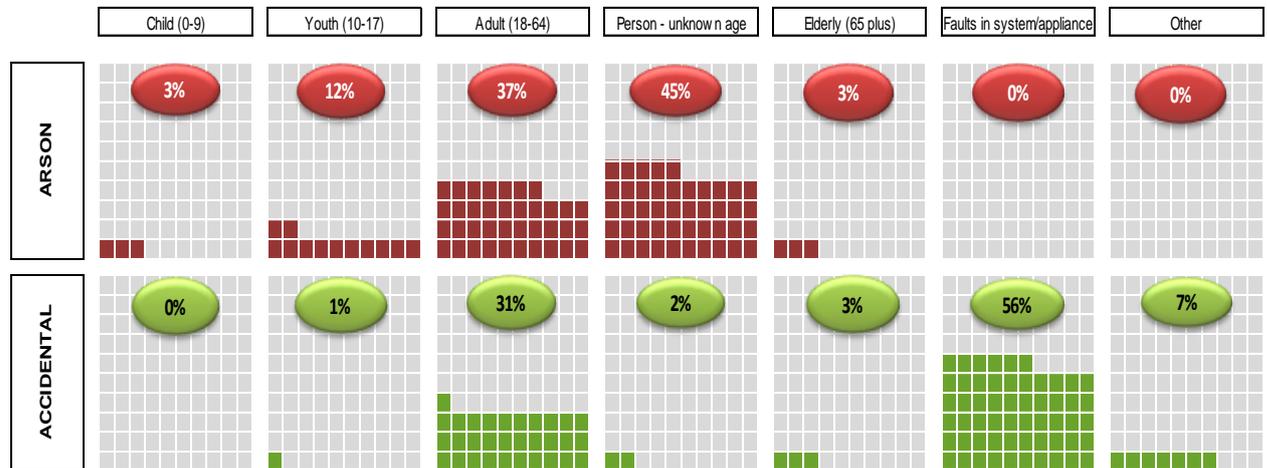




Demographics:

Caused by:

Most accidental incidents were caused by faults in a system or appliance, while for most deliberate fires the person was a person not identified:



APPENDIX A – Risk Scoring

A risk score was developed based on the above analysis in order to identify which property type groups were most at risk of fire.

There are two components which make up the total risk score: the harm score and the probability score (see next pages for matrices).

Each property type group, as well as other groups which analysis revealed as potential risk such as vacant or heritage properties, is given a harm and a probability score, which are then multiplied to form a total score.

This allows us to then rank the property type groups in order of risk: High, Medium and Low.

The overall risk score was also used to rank LSOAs (Lower Super Output Areas) in both boroughs to identify geographical areas which may be more at risk.

This was done by multiplying the number of total properties of each type (obtained from the Gazetteer) by the total risk score for that type for each LSOA, therefore giving us a score for each property type for that LSOA. Adding them up provides the total score for that LSOA.

For example: according to the Gazetteer, in LSOA E01009028 in Acocks Green Ward there is one 'office, admin & call-centre building' (which scores 49) and one 'entertainment, dining, recreation & venues building' (which scores 216).

$(1 \times 49) + (1 \times 216) = 265$. This LSOA scores a total of 265

Level of harm matrix

To identify what the harm factor is for each property type group, five separate factors were looked at to establish the overall impact of fires at different property types:

Factor	Level of harm	score	Definition
Physical - Victim (Owners/ residents of property)	Death	4	Is this type of incident likely to result in the death or serious injury of an individual; or in less serious injury?
	Serious Injury	3	
	Minor Injury	2	
	None	1	
Psychological - Community	Extremely concerned	4	What level of psychological impact is this type of incident likely to have on the community as a whole?
	Significantly Concerned	3	
	Fairly concerned	2	
	Minor concern	1	
Economic - WMFS	Very High	4	How much economic impact does this type of incident have on your organisation (e.g. time cost, number of appliances, etc)
	High	3	
	Medium	2	
	Low	1	
Economic - Victim (Owners/ residents of property)	Very High	4	How much economic impact does this type of incident have on the victim? (e.g. damage size, cost of repairs, etc)
	High	3	
	Medium	2	
	Low	1	
Environmental	Very High	4	what is the likely environmental impact of this type of incident?
	High	3	
	Medium	2	
	Low	1	

Each property type group was scored on each of the factors above, to provide a total harm score.

Probability Matrix

The probability score is obtained using a sliding scale as displayed below:

Proportion of Total Number of Incidents	Level of control or reduction	Score
10% and over	Uncontrolled (increasing)	18
	Controlled (stable)	17
	Reduction	16
8% and over	Uncontrolled (increasing)	15
	Controlled (stable)	14
	Reduction	13
6% and over	Uncontrolled (increasing)	12
	Controlled (stable)	11
	Reduction	10
4% and over	Uncontrolled (increasing)	9
	Controlled (stable)	8
	Reduction	7
2% and over	Uncontrolled (increasing)	6
	Controlled (stable)	5
	Reduction	4
1% and over	n/a	3
0.5% and over	n/a	2
0% and over	n/a	1

Each property type is given score based on the proportion of the total number of incidents it represents.

Total Score

Below is the calculated risk score for each property type group for Birmingham South:

Property Type Groups	Level of Harm Score	Probability Score	Overall Risk Score	Level of Risk
Retail, single shops and specialist service premises	12.0	18	216.0	High
Entertainment, dining, recreation and venues	12.0	18	216.0	High
Education	12.5	17	212.5	High
Other residential buildings (not dwelling)	11.5	16	184.0	Medium
Manufacturing / Industrial premises (e.g. factories)	14.0	12	168.0	Medium
Health	8.0	16	128.0	Medium
Office, administration and call-centre buildings	7.0	7	49.0	Low
Buildings used for bulk storage	10.5	4	42.0	Low
Emergency services	8.0	4	32.0	Low
Laboratories	7.5	3	22.5	Low
Transport buildings	7.0	2	14.0	Low
Public utilities (Gas, electric, water, phone)	7.0	2	14.0	Low
Law and order	11.5	1	11.5	Low
Places of worship	9.0	1	9.0	Low