

# Analysis of Fires in Non-domestic Properties in Walsall & Wolverhampton

Analysis of Fire and Casualty data to identify geographical areas and groups of properties most at risk of accidental non-domestic fires in the Black Country North Command Area

April 2011 to March 2014



Data Intelligence Hub  
October 2014

## Introduction

This report presents the results of the analysis of primary fires at non-domestic premises in Walsall and Wolverhampton (Black Country North) between April 2011 and March 2014.

During this time period there were 271 accidental and 134 deliberate fires at non-domestic premises in Black Country North.

There are currently approximately 11,700 non domestic properties in Walsall, and 11,400 in Wolverhampton<sup>1</sup>.

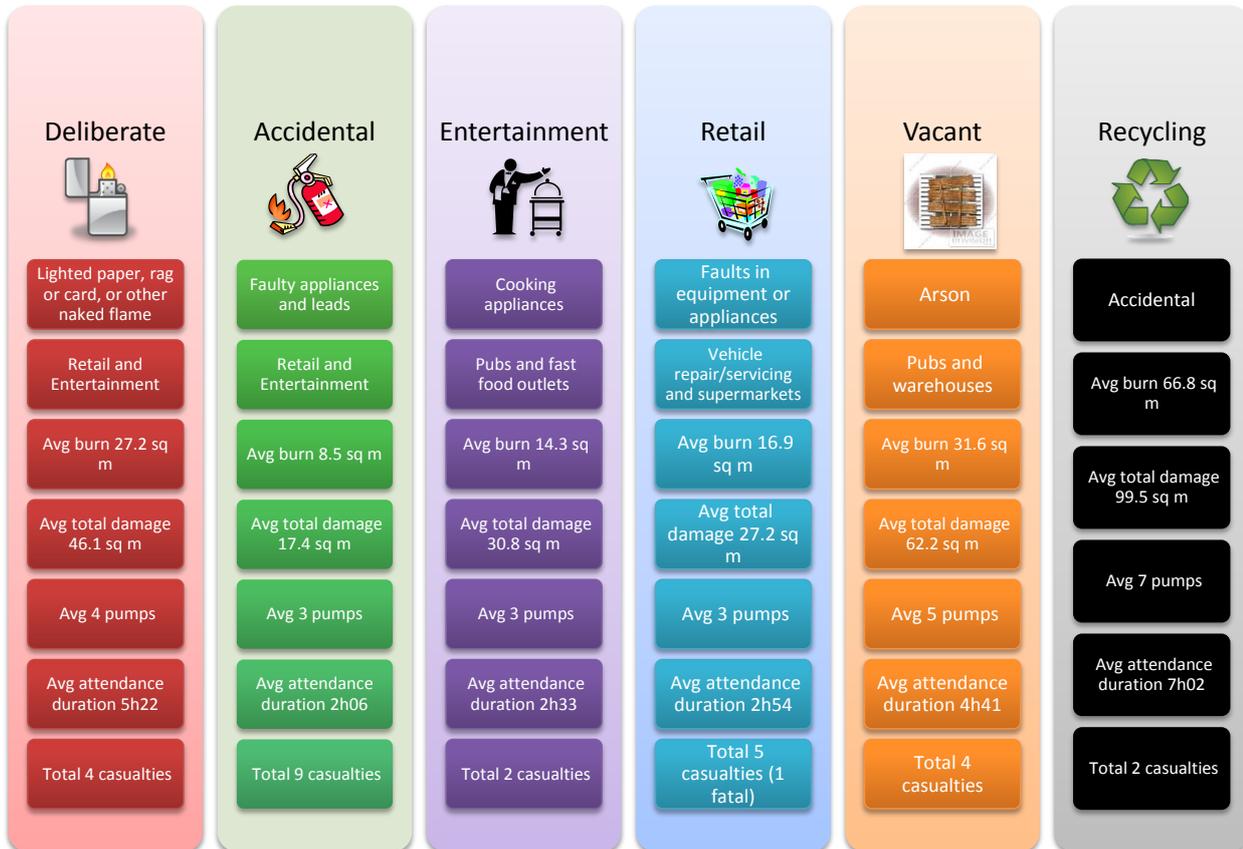
Although non-domestic property fires are fewer than dwelling fires, the impact of fire in non-domestic buildings extends further than just the effects on the business or owner of the property. The economic impact on the business for instance may in turn indirectly affect life, as unemployed people are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

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<sup>1</sup> Extract from the Gazetteer, October 2014

## Summary

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



## Temporal analysis

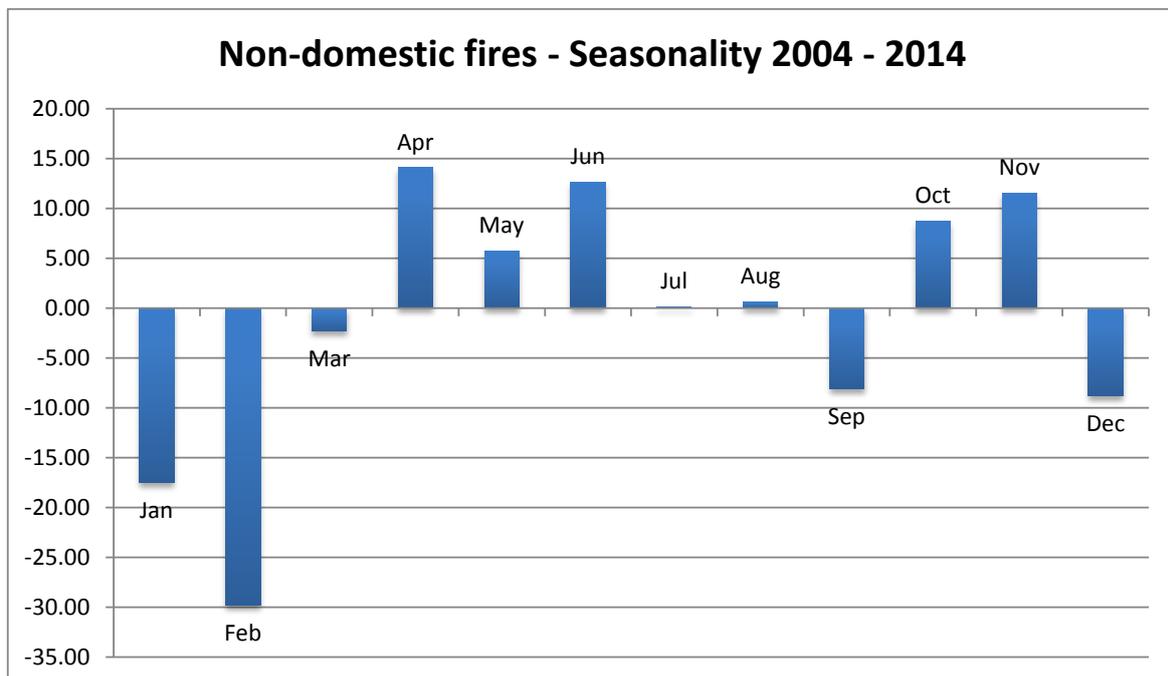
Table 1 illustrates the temporal distribution of non-domestic fires in Black Country North.

Day/Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Monday	Green	Yellow	Orange	Green	Yellow	Green	Yellow	Orange	Green															
Tuesday	Green	Yellow	Orange	Green	Yellow	Green	Yellow	Orange	Green															
Wednesday	Orange	Green	Yellow	Green	Yellow	Green	Yellow	Orange	Green															
Thursday	Orange	Yellow	Green	Yellow	Orange	Green	Yellow	Orange	Green	Yellow	Orange	Green	Yellow	Orange	Green	Yellow	Orange	Green	Yellow	Orange	Green	Yellow	Orange	Green
Friday	Green	Yellow	Orange	Green	Yellow	Green	Yellow	Orange	Green															
Saturday	Green	Yellow	Orange	Green	Yellow	Green	Yellow	Orange	Green															
Sunday	Yellow	Orange	Green	Yellow	Orange	Green	Yellow	Orange	Green	Yellow	Orange	Green	Yellow	Orange	Green	Yellow	Orange	Green	Yellow	Orange	Green	Yellow	Orange	Green

**Table 1 – Fires at non-domestic premises in the Black Country North per hour and day**

It shows that, over the course of a week, non-domestic fires are more likely to take place **between 17'00 and 00'00**, and on **Wednesdays and Thursdays**.

Chart 1 is the seasonality chart for non-domestic fires in the Black Country North. 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 the Black Country North**

It shows that non-domestic fires tend to take place in the **spring** and in **October** and **November**.

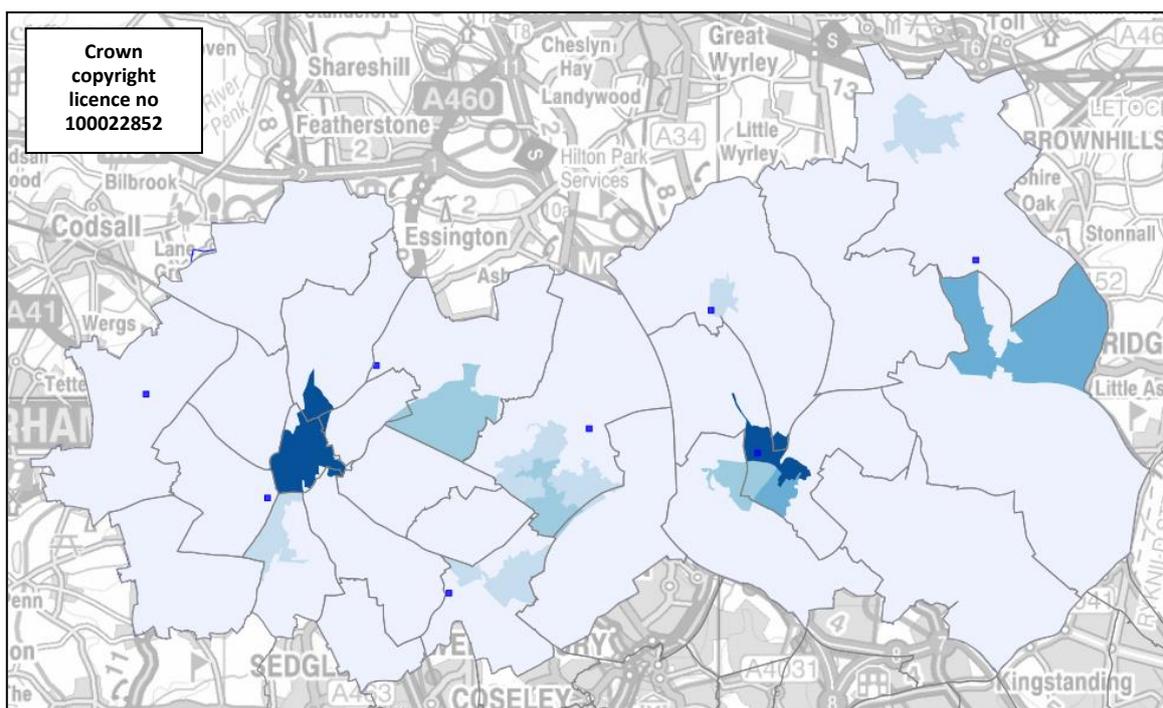
Separating accidental and deliberate fires shows that accidental fires are more likely in May and November, while deliberate fires are more likely in April and June.

The spring increase, in particular for deliberate fires, may be related to the end of the financial year and insurance fraud.

## Location

An overall risk score for each property type group was obtained using a harm matrix and a probability matrix<sup>2</sup>. 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 areas most at risk of fires in non-domestic buildings are around the city centres of Walsall and Wolverhampton. This is heavily influenced by the number of retail and entertainment premises in those areas, as both these property types are within the high-scoring range.



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<sup>2</sup> See Appendix C

## Property type

**Retail premises** and **entertainment venues** incurred almost 45% of both accidental and deliberate fires at non-domestic premises:

Property type group	Arson	Accidental	Total
Retail, single shops and specialist service premises	34	66	100
Entertainment, dining, recreation and venues	25	55	80
Manufacturing / Industrial premises (e.g. factories)	13	46	59
Other residential buildings (not dwelling)	6	30	36
Health	10	25	35
Education	5	17	22
Buildings used for bulk storage	13	7	20
Office, administration and call-centre buildings	8	7	15
Other type of building	3	5	8
Places of worship	3	5	8
Transport buildings	3	1	4
Animal accommodation, breeding and vets	3	1	4
Emergency services	0	4	4
Agricultural buildings	3	0	3
Organisation premises	3	0	3
Public utilities (Gas, electric, water, phone)	1	1	2
Law and order	1	1	2

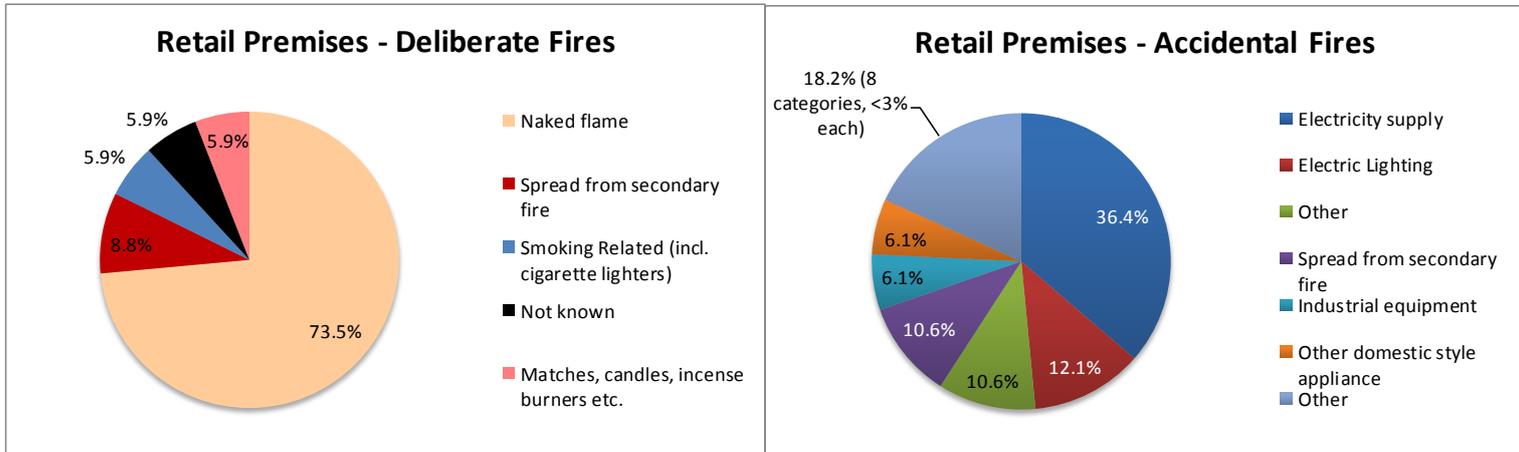
The most common causes of accidental fires are faulty appliances and leads.

### *Retail premises:*

**Vehicle repair and services** incurred the highest number of total incidents at retail premises, with 12: nine accidental and three deliberate fires.



Accidental fires at retail premises were most likely to be due to **faults in equipment or appliances** or in the **leads to equipment or appliances** (37.0%), with **wiring, cabling and plugs on shop floor/showroom/display hall** the most recorded circumstances for a fire to occur.



In over half of incidents at retail premises there was no smoke/heat detector or fire alarm system present in the property, and only seven had a fixed firefighting system installed.

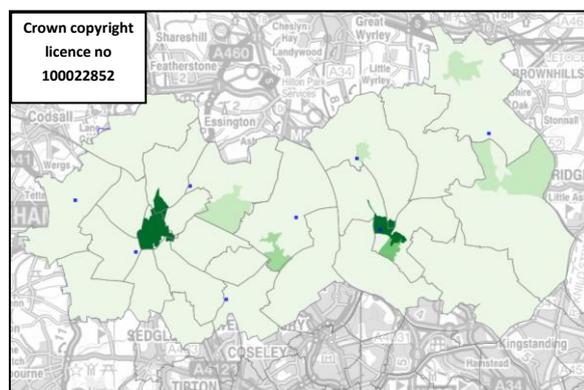
Unsurprisingly, the average resulting burn and total damage tended to be greater at properties where there was no alarm. 11 of the 12 vehicle repair and services premises did not have an alarm system installed.

Average burn and total damage resulting from fires at retail premises was greatest at **'recycling, reclamation or disposal'** facilities, which is likely due to the nature of the goods present on that type of property.

Fires at retail premises also resulted in five of the 13 injuries and in the only fatality at non-domestic premises within that time period.

The average cost of a commercial claim between 2004 and 2013 was £14,829<sup>3</sup>. The total cost of fires at retail premises in the last three financial years in the Black Country North can be estimated at £1.5m.

The map to the right shows that, inevitably, the high risk areas are in the city centres of Walsall and Wolverhampton.



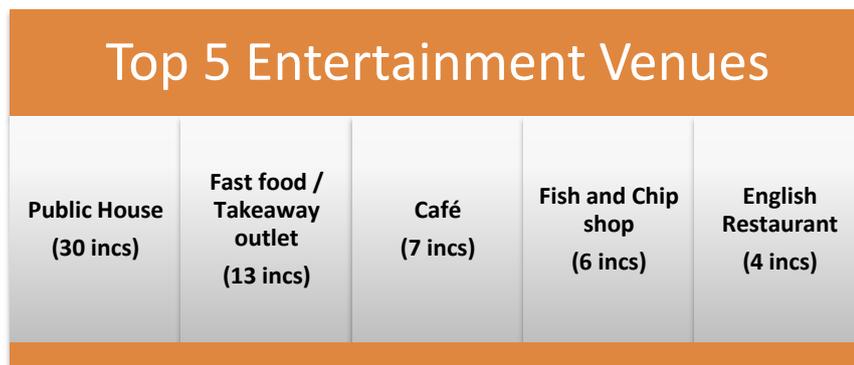
<sup>3</sup> Based on data provided by the Association of British Insurers (ABI) in October 2014

**Entertainment venues:**

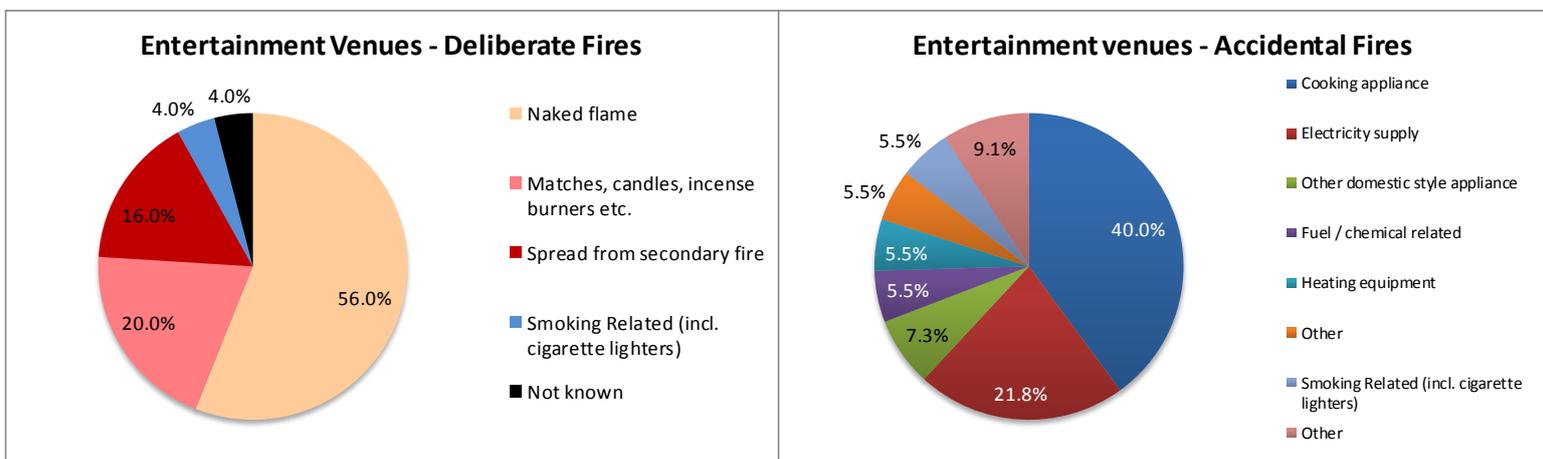
Entertainment venues are the only property types where incidents have increased in the last three years: from 22 in 2011/12 to 28 in 2013/14 (27.3% increase).

The largest rise was for **pubs in Wolverhampton**: from three in 2011/12 to 16 in 2013/14. All except one of the deliberate fires (which account for almost half of pub fires) were at vacant premises, suggesting that the rise is unlikely to be due to an increase in the number of entertainment premises.

**Pubs** were the main entertainment venues affected by fire for both accidental and deliberate fires, representing 37.5% of incidents (30), followed by **fast food and takeaway outlets** (16.3%, 13 incidents).



**Cooking** appliances were mostly responsible for fires at entertainment venues (22 incidents, 40% of accidental incidents), half of which were **deep fat fryers**.



**Faults in equipment or appliances** (including overheating) were the most likely cause of accidental fires. **Cooking oils** were the most likely first item ignited, with 27.5% of all incidents (40% of accidental fires); the first item ignited in deliberate fires tended to be **external structures, rubbish or paper/cardboard**.

Entertainment venues had one of the highest proportions of **vacant properties** affected by fire, with 23.8% (19 incidents); those were mostly pubs (see section on vacant buildings below).

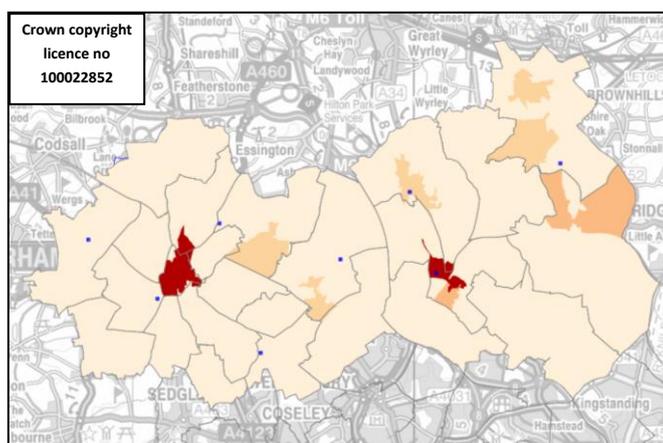
Most entertainment venues affected by fire were fitted with alarms (48 of the 80); however, the average burn damage was greater in those properties (17 sq m) than in those without an alarm (11.1 sq m). This may be due to the variety of premises included in this category: as well as restaurants, pubs and cafés, which tend to be smaller, leisure centres are also within this category, including one incident resulting in over 200 sq m of burn damage.

Nevertheless, unlike burn damage, average total damage was greater for entertainment venues without an alarm: 38.3 sq m compared to 25.8 sq m.

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 two injuries over the three years analysed, both of whom went to hospital for treatment.

Like retail premises, areas most at risk of fires at entertainment premises are in Wolverhampton and Walsall city centres, as shown on the map to the right.



#### ***Vacant buildings:***

Vacant properties are at heightened risk of fire, including an increased risk from accumulation of junk mail for town centre shops or from the attraction to arsonists or intruders setting fires due to the secluded location of industrial premises.

Data from the Gazetteer suggests that in July 2014 there were over 730 empty commercial properties in Walsall<sup>4</sup>.

There were 45 incidents at vacant non-domestic properties: two accidental fires (0.7% of all accidental fires), compared to 43 deliberate fires (32.1%).

Fires at vacant buildings, particularly those set deliberately, resulted in **larger areas of burn and total damage**: because the building is unoccupied, a fire is less likely to be noticed at an early stage. Fires at vacant buildings would also be less of a response

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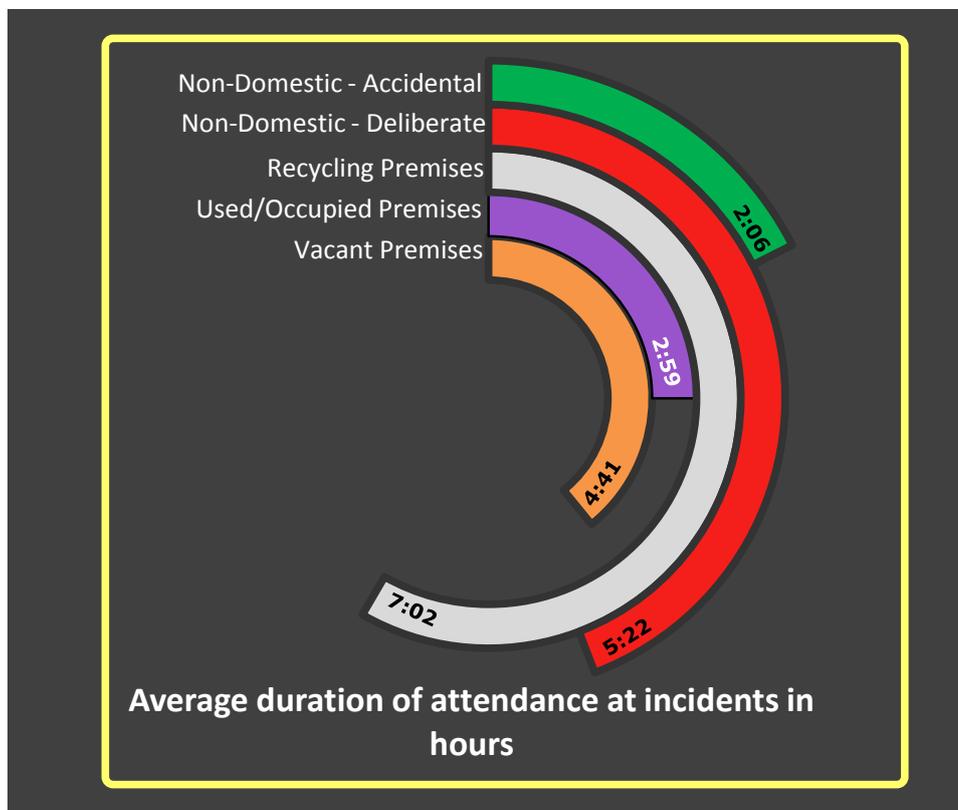
<sup>4</sup> Data extracted in July 2014 for properties which were classed as “Unoccupied”. There are no indications as to when or whether local authorities update all aspects of the database regularly with regards to the usage/occupation status; therefore not all properties may be included in this figure. No data was available for Wolverhampton.

priority should there be ongoing incidents involving risk to life, therefore giving more time for fire, smoke, etc to spread.

35.6% of incidents at vacant properties involved attendance by at least four appliances (PRLs and BRVs), compared to 14.4% of properties which were used or occupied. The average time spent in attendance at vacant premises fires was also greater than at non-vacant: 4hrs41 at vacant premises, 2hrs59 at used/occupied properties.

This suggests that vacant properties place a greater demand on the **Brigade's resources** than used/occupied.

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



Fires at vacant properties also resulted in four injured casualties (30.8% of all casualties), including one firefighter, all of whom went to hospital either for treatment or precautionary check.

There were 13 incidents at **vacant pubs**, representing 28.9% of incidents at vacant premises, and 43.3% of incidents at pubs.

The average cost of a commercial claim between 2004 and 2013 was £14,829. The total cost of fires at entertainment venues in the Black Country North was therefore approximately £1.2m.

### ***Waste / Recycling<sup>5</sup>***

There were six accidental and two deliberate fires at waste / recycling (waste, metal, plastic, etc) facilities in the Black Country North in the three years up to March 2014. Three of the eight recycling premises fires (37.5%) resulted in over 200 sq m of total damage, compared to 20 of the 394 non recycling fires (5.1%). Proportionally, waste / recycling fires also resulted in more **casualties**, with two injuries as a result of the eight recycling fires (0.25 per incident), compared to 12 casualties for the non-recycling fires (0.03 per incident).

Waste / recycling fires also place greater **demand on WMFS** services as, on average, seven appliances (PRLs and BRVs) attended recycling fires, compared to three for non-recycling fires. The average time spent in attendance at recycling fires was also longer than non-recycling: 7hrs for recycling incidents compared to 3hrs for all others.

This suggests that, although incidents at such premises represent only 2% of all non-domestic fires, they are likely to have a high impact both on the affected business and on WMFS resources.

It should be noted that recycling facilities are not currently recorded under one single property type heading, therefore identifying such premises in the data requires manual searching for keywords in the address as well as in the property types, which may lead to some incidents not being included above. Scrap yards are not included in non-domestic properties as they are recorded as 'outdoors FDR' locations; neither are secondary fires at non-domestic properties included.

In July 2013 there were 129 permitted waste sites and four identified illegal waste piles<sup>6</sup> in the Black Country North, including 21 situated within 150m of railways or motorways<sup>7</sup>, at which a large fire could therefore result in major transport disruption for the region.

In July 2014, six of the permitted waste sites and one of the illegal waste piles were considered to be high risk by the Environment Agency, whether because of their location or outstanding issues with the site for instance.<sup>8</sup>

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<sup>5</sup> 'Waste / recycling' is found by searching for the words Recycling, Scrapyard, Metal, Waste, Plastic, Environmental, and Incinerator in the address fields and the property types (apart from manufacturing premises).

<sup>6</sup> Data from the Environment Agency, July 2013. Please note waste piles data is sensitive and must not be shared outside of WMFS.

<sup>7</sup> See Appendix B for list of sites

<sup>8</sup> Please see Appendix for list of high risk sites

### Heritage sites:

There are 30 grade I and II\* listed buildings in the Black Country North, including shops, offices, churches, pubs and schools. The majority are located in Wolverhampton borough.

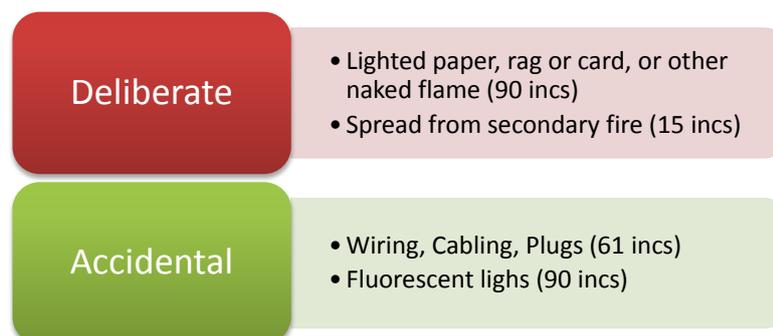
Historical buildings are at heightened risk of fire for a variety of reasons: they are often built from easily-ignited materials, they may have open fires and chimneys which can be in poor condition, their status as listed properties may prevent modifications such as fire doors to be installed, and in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

There have been approximately three incidents<sup>9</sup> at grade I and II\* listed non-domestic buildings in the Black Country North in the last three financial years.

All were accidental and took place at places of worship. Two were due to electric lighting and one to electricity supply.

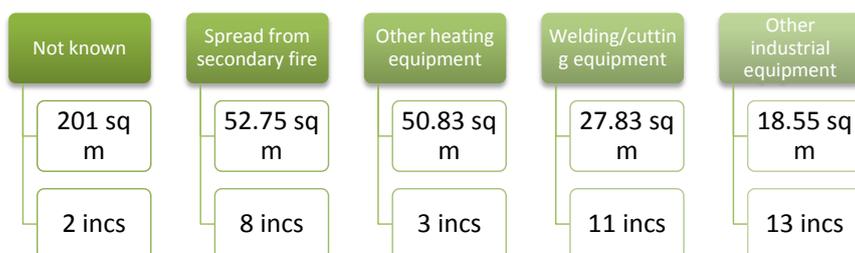
### Source of ignition

The greatest ignition source for accidental fires was wiring, cabling and plugs (22.5%), while for deliberate fires it was lighted paper, rag or card, or other naked flame.



### Ignition source - Accidental fires

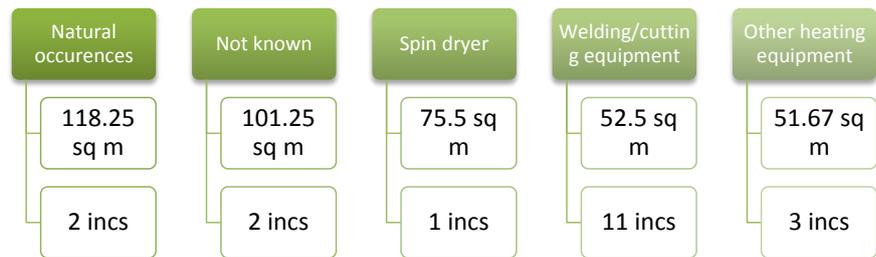
Although **wiring, cabling and plugs** caused the largest number of incidents, they resulted in only minimal burn damage. The known accidental ignition source resulting in the greatest burn damage (52.75 sq m on average) was 'spread from secondary fire', however there were only eight such incidents, representing 3% of accidentals incidents.



The figure on the left shows that the ignition sources which resulted in the greatest average burn damage had very few incidents, while those with a greater number of incidents resulted in less burn damage.

<sup>9</sup> This figure was obtained through manually comparing the list of listed buildings and incident data, therefore some incidents may not have been included

Likewise, the figure on the right shows that the ignition sources which resulted in the greatest total damage had no more than two incidents each, while those with more incidents resulted in less burn damage.



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

Source Ignition	Average burn damage in sq m	Average total damage in sq m	Number of incidents
Wiring, cabling, plugs	2.11	17.36	61
Fluorescent lights	0.8	3.38	28
Other	8.07	21.53	20
Other industrial equipment	18.55	37.77	13
Smoking materials (cigarettes, cigars etc.)	2.95	7	12

#### *Ignition source - Deliberate fires*

Over two thirds 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** (26.1%, 35 incs), followed by **external structures or fittings** (17.2%, 23 incs) then **rubbish or waste material** (16.4%, 22 incs).

Where the first item ignited was known, fires started using **paper/cardboard** resulted in the greatest average burn damage (59.4 sq m), and one of the highest total damage (86.1 sq m). **Rubbish and waste material** fires resulted in less burn damage (11.8 sq m on average), but one of the highest average total damage (47.2 sq m).

#### 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 process/production room, with just 49 incidents (12.1% 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 four were most likely to be:



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



For both accidental and deliberate fires a not inconsiderable proportion of places where the fire started were recorded as ‘other – inside building’: 8.9% of accidental fires and 14.2% of deliberate fires.

#### *Alarms and firefighting systems*

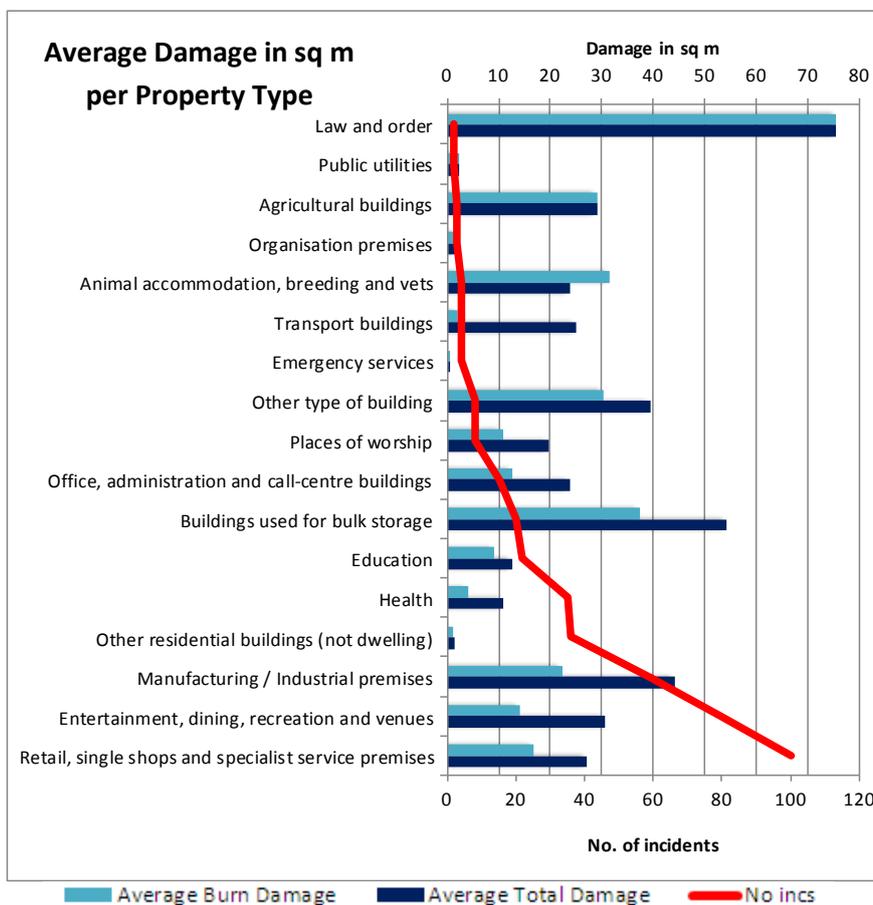
Only 20.7% of non-domestic fires were discovered by an automatic detector or alarm system. Non-dwelling residential buildings had the highest proportion of incidents discovered automatically (61.1%), while in manufacturing/industrial premises 89.8% of incidents were discovered by a person.

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

The graph to the right shows that although law and order buildings incurred the greatest average damage, for both burn and total, however there were only two incidents at this type of property.

When looking at property types incurring more incidents, buildings built for bulk storage experienced the greatest average burn damage.

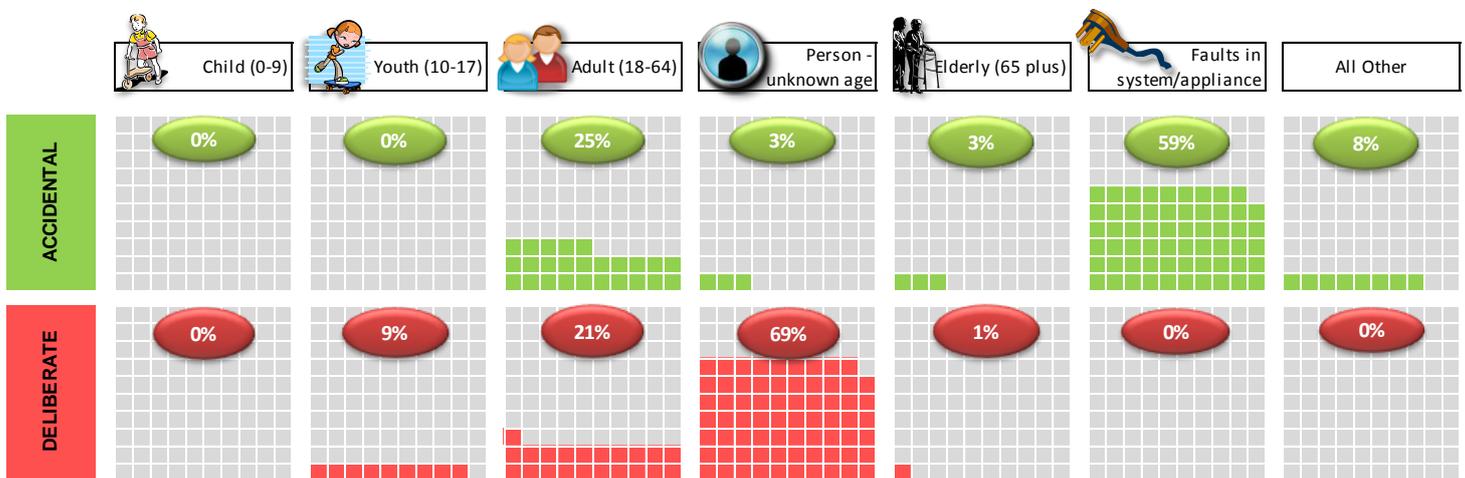


Damage tended to be greater when the source of ignition was a naked flame; this is consistent with 30.2% of these incidents occurring at vacant premises, which are more likely to sustain extensive damage.

## Demographics:

### Caused by:

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



### Casualties:

There were 14 casualties resulting from 12 non-domestic primary fires, including one fatality. One incident resulted in multiple casualties.

Analysis identified no apparent trends, which is likely due to the small number of casualties, but below are the main observations:

Four of the casualties were employees of retail premises.

The most common circumstances for injuries were 'due to fire' and 'immobility'.

## APPENDIX A – High risk waste sites

This data is provided by the Environment Agency and must not be disseminated outside of West Midlands Fire Service without permission.

Site Name	Borough	Status
Blitz Recycling Ltd	Wolverhampton	Permitted
G C Rickards Ltd	Walsall	Permitted
J Watton Scrap Metals	Wolverhampton	Permitted
S & B Waste Management & Recycling Ltd	Wolverhampton	Permitted
Triple R Solutions Ltd	Walsall	Permitted
1st Choice At Walsall, Unit 1	Walsall	Permitted
Crown Street, Wolverhampton	Wolverhampton	Illegal Waste Site

## APPENDIX B – Waste sites within 150m of railways or motorways

Site Name	Borough	Status
European Metal Recycling Limited - Parkfield Works	Wolverhampton	Permitted
J Smith Metals Ltd	Wolverhampton	Permitted
Shaw Road C A Site	Wolverhampton	Permitted
Crown Car Dismantlers	Wolverhampton	Permitted
E M R Wolverhampton	Wolverhampton	Permitted
Recycling Transfer Station	Wolverhampton	Permitted
Ettingshall Recycling	Wolverhampton	Permitted
Former Bushbury Pool	Wolverhampton	Permitted
John Farmer Tradings	Walsall	Permitted
A B Skip Hire	Walsall	Permitted
Intercoat Industrial Paints Ltd	Walsall	Permitted
John Farmer Tradings	Walsall	Permitted
C Fullard Metals Ltd	Walsall	Permitted
A B C Skip Hire	Walsall	Permitted
Hodsons Of Bloxwich Ltd	Walsall	Permitted
J P E Holdings Ltd	Walsall	Permitted
Triple R Solutions Ltd	Walsall	Permitted
Land At 53 Midland Road	Walsall	Permitted
Darlaston Transfer Station	Walsall	Permitted
Branton Lane Quarry Landfill	Walsall	Permitted
1st Choice at Walsall, Unit 1	Walsall	Permitted

## APPENDIX C – 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.

### 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 the Black Country North:

Property Type Groups	Level of Harm score	Probability Score	Overall Risk Score	Level of Risk
Vacant	13	17	221	High
Manufacturing / Industrial premises (e.g. factories)	13	16	208	High
Retail, single shops and specialist service premises	12	17	204	High
Entertainment, dining, recreation and venues	11	18	198	High
Other residential buildings (not dwelling)	10	13	130	Medium
Health	7	14	98	Medium
recycling	17	5	85	Medium
Buildings used for bulk storage	12	7	84	Medium
Education	8.5	9	76.5	Medium
Heritage	8.5	6	51	Low
Places of worship	10.5	3	31.5	Low
Office, administration and call-centre buildings	7	4	28	Low
Other type of building	8	3	24	Low
Animal accommodation, breeding and vets	10	2	20	Low
Agricultural buildings	8.5	2	17	Low
Organisation premises	7	2	14	Low
Transport buildings	6.5	2	13	Low
Emergency services	6	2	12	Low
Law and order	11	1	11	Low
Public utilities (Gas, electric, water, phone)	6	1	6	Low