COMMUNITY RISK MANAGEMENT PLAN 2014-2020

Mid-Point Review 2017-18

CRMP RISK REVIEW 2018

CRMP Risk Review 2018

Contents

The CRMP Risk Review is a technical document providing background information and supporting evidence for the Mid-Point Review of the Community Risk Management Plan 2014-2020. All fire and road traffic collision incident data used is held by the Performance and Information Team, Service Support Directorate.

The Risk Review should be read in conjunction with two other supporting documents: the CRMP Demographic Profile, which provides information about the characteristics of the local population, and a series of Station Risk Profiles, which provide more local detail about risks in each of the Service's 27 fire stations areas.

All documents can be found on the Service website.

1. Introduction

1.1. The Community Risk Management Plan 2014-2020 (the CRMP) was published in 2014. It was supported by a Strategic Risk Review written in 2012, which was updated in April 2014. The Review examined the major life risk incidents the Fire and Rescue Service has a statutory responsibility to address – fires and road traffic collisions – and presented a spatial representation of risks across Herefordshire and Worcestershire. The Review also supported the development of a Fire Cover Review, which was published as part of the CRMP.

1.2. Data used in the 2012 Review and the 2014 update covered the period January 2007 to December 2013. This new review – the 2018 CRMP Risk Review – updates the data used to the end of March 2017.

1.3. As with the 2012 Review, the 2018 Review uses the sophisticated fire risk model successfully used by a number of other Fire and Rescue Services including Cumbria and Lancashire Fire and Rescue Services.

1.4. The model involves an analysis of fires and associated casualties alongside the Index of Multiple Deprivation (IMD). The IMD is a measure of the relative deprivation between different areas, which enables the relative risks of fire among different groups in society and across geographical areas to be determined. The 2012 Review used the 2010 IMD and the 2018 Review uses the updated 2015 IMD.

1.5. The model enables the results of the analysis to be mapped across the Service area, providing a visual representation of fire risk and highlighting where prevention and protection activities should be focused for best effect. The model is also flexible and can be updated with new data on a regular basis, which enables detailed evaluation of whether or not the Service's prevention and protection activities are having the desired effect in reducing risk. The model can also be integrated with information about household types and lifestyle factors, such as Experian's Mosaic Public Sector[1] household classifications. This provides a further level of sophistication to help to identify which groups of people in which areas are likely to be at most risk, and will support where and how prevention activities are targeted.

1.6. The results from the model also provided a basis for assessing the impact of changes to fire cover in the Fire Cover Review 2012. By banding the results into high, medium and low fire risk areas and mapping them, the impact of different fire cover scenarios were assessed against attendance standards for life risk incidents. The 2018 Review updates the risk maps, which will help to support future fire cover reviews.

1.7. The final element of the 2012 Review looked at the location of road traffic collisions (RTCs) across the two counties and the incidence of serious injuries and fatalities in those RTCs. Using the Service's risk rating matrix, the analysis provides a risk rating for each fire station ground, which was then mapped to provide a visual representation of RTC risk across the two counties. The 2018 Review updates these maps.

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[1] Mosaic Public Sector is a sophisticated consumer classification model developed by the consumer credit and market research company Experian as a way of categorising lifestyles and behaviours.

2. The Fire Risk Model

2.1. The Fire Risk Model combines four main risk elements representing fire risk and societal risk:

   a. accidental dwelling fire rate
   b. accidental dwelling fire casualty rate
   c. accidental non-dwelling fires (i.e. other building fires)
   d. 2015 Index of Multiple Deprivation score

2.2. In the above list, the term 'dwelling' means a property that is a place of residence and includes houses, flats, maisonettes, bungalows, houses in multiple occupation and mobile homes/caravans. The term 'non-dwelling' relates to other buildings, both residential (such as hotels, hostels and care homes) and non-residential (such as offices, shops, factories, warehouses, restaurants, cinemas, public and religious buildings, and hospitals).

2.3. Each of the four elements is weighted to provide emphasis on casualties and deprivation, which helps to identifty those areas more likely to suffer an accidental fire resulting in injury. The weightings are informed by the conclusions of the Entec Risk Assessment Toolkit[2] report, which presented ways of categorising risk according to how tolerable they were to the individual and to society as a whole, and included evidence based risk weightings.

2.4. A key feature of the model is the ability to map the data at a neighbourhood level. This is achieved by combining the fire incident data with 2015 IMD data, which is plotted at the Lower-layer Super Output Area[3] (LSOA) level to show the relative risks across all areas in the two counties. The area of Herefordshire and Worcestershire is divided into 480[4] LSOAs, and the model enables risk scores to be calculated for each individual LSOA. There are 116 LSOAs across Herefordshire and 364 in Worcestershire.

2.5. The 2018 Review adds in new fire incident data for 2014/15 to 2016/17, so that the model covers eight years from 2009/10 to 2016/17. This is averaged over three year periods to ensure that the final risk classification for each area is not adversely affected by annual variations or 'spikes.'

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[2] 'Development And Trial Of A Risk Assessment Toolkit For The UK Fire Service' by Michael Wright, Entec UK Ltd. for Home Office Fire Research and Development Group, FRDG Publication Number 5/98 © Crown Copyright 1998

[3] A Lower-layer Super Output Area is a small geographical area containing a neighbourhood of around 1,500 people. It is often used in statistical models to provide detailed information about the social and economic characteristics of local areas.

[4] This is an update from the 477 LSOAs in the 2012 Review, as small boundary revisions were made following the 2011 Census in order to split or combine selected LSOAs.

2.6.   The formula can be expressed as follows:

$$\text{dwelling fire rate (x1)} + \text{casualty rate (x4)} + \text{non-dwelling fires (x1)} + \text{IMD score (x2)} = \text{Fire Risk Score}$$

2.7.   The strong focus on risk to life is reflected in the 'x4' weighting applied to the accidental dwelling fire casualty rate, while a 'x2' weighting for the Index of Multiple Deprivation reflects the strong link between deprivation and fire. The following tables provide details of the risk tolerances[5] applied to each of the fire-related elements of the risk model. These are organised into bands based on the Entec Risk Assessment Toolkit Report weightings, which can then be added together to provide an overall risk score.

Table 1: Accidental Dwelling Fire Rate (per LSOA)

Accidental Dwelling Fire Rate (per LSOA)			
Calculation	**Description**	**Banding**	**Risk score**
no. of dwelling fires / no. of dwellings (averaged over 3 years)	Annual rate of fire per no. of dwellings:		
	- greater than 1 in 200	Greater than 0.005	12
	- between 1 in 200 and 1 in 300	0.005 to 0.003334	10
	- between 1 in 300 and 1 in 400	0.003333 to 0.0026	8
	- between 1 in 400 and 1 in 600	0.0025 to 0.001667	6
	- between 1 in 600 and 1 in 800	0.001666 to 0.00125	4
	- less than 1 in 800	Less than 0.00125	2

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[5] for example, in the Accidental Dwelling Fire Rate table, if the LSOA has fewer than 1 in 800 dwelling fires per year it is considered to be more 'tolerable' to society than if the LSOA has more than 1 in 200 dwelling fires per year. This is reflected in the risk score assigned to the banding.

Table 2: Accidental Dwelling Fire Casualty Rate (per LSOA)

Accidental Dwelling Fire Casualty Rate (per LSOA)			
Calculation	**Description**	**Banding**	**Risk score**
no. of casualties/fatalities no. of Residents (averaged over 3 years)	Annual rate of fire casualty per no. of residents:		
	- greater than 1 in 1000	Greater than 0.001	12
	- between 1 in 1000 and 1 in 1500	0.001 to 0.0006667	10
	- between 1 in 1500 and 1 in 2000	0.0006666 to 0.0005	8
	- between 1 in 2000 and 1 in 3500	0.0005 to 0.0002857	6
	- between 1 in 3500 and 1 in 5000	0.0002856 to 0.0002	4
	- less than 1 in 5000	Less than 0.0002	2

Table 3: Accidental Non-Dwelling Fire Rate (per LSOA)

Accidental Non-Dwelling Fire Rate (per LSOA)			
Calculation	**Description**	**Banding**	**Risk score**
Frequency of accidental primary fires occurring in buildings other than dwellings (3 year period)	Number of accidental primary fires in buildings other than dwellings:		
	- 9 or more	9 or more	12
	- less than 9	Less than 9	10
	- less than 6	Less than 6	8
	- less than 4	Less than 4	6
	- less than 3	Less than 3	4
	- less than 2	2 or less	2

2.8. The fourth element of the model, the Index of Multiple Deprivation[6] score, provides data on relative deprivation levels for each of the 480 LSOAs across Herefordshire and Worcestershire. National and local research has demonstrated that there is a strong link between the rate of dwelling fires and deprivation, such that where the rate of dwelling fire is high, the rate of deprivation is also likely to be high. The scores in the table are based on the actual scores for each LSOA as presented in the 2015 Indices of Deprivation for England.

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[6] Source: UK Government Official Statistics: English indices of deprivation 2015

Table 4: 2015 Index of Multiple Deprivation (per LSOA)

2015 Index of Multiple Deprivation (per LSOA)			
Calculation	**Description**	**Banding**	**Risk score**
IMD 2015 Score	Score greater than 36.92	Greater than 36.92	12
	Score between 36.92 and 24.85	Between 36.92 and 24.85	10
	Score between 24.84 and 13.40	Between 24.84 and 13.40	8
	Score between 13.39 and 11.92	Between 13.39 and 11.92	6
	Score between 11.91 and 7.49	Between 11.91 and 7.49	4
	Score less than 7.49	Less than 7.49	2

2.9. Adding the scores for each risk element together, including weightings, gives a final risk score of somewhere between 16 (minimum – i.e. LSOAs with the least fire risk) and 96 (maximum – i.e. LSOAs at most fire risk). The actual final scores when the formula was applied to the 480 LSOAs in Herefordshire and Worcestershire range between 16 and 68. For the latest period measured, 2014/15 to 2016/17, the highest score reached was 68 (the Meadows, Rugg area of Leominster East ward in Herefordshire), while 56 of the LSOAs gained the lowest score of 16.

2.10. The highest recorded risk LSOA in the two counties over the last eight years was the Wirehill Wood area of Headless Cross & Oakenshaw ward of Redditch, which had a high risk score of 90 for the 2010/11 – 2012/13 period. This has now fallen to a medium risk score of 40 for 2014/15 – 206/17. How fire risk has changed over the last eight years is discussed further in Section 6 of this report.

Using Lower-layer Super Output Areas (LSOAs)

2.11. LSOAs are subdivisions of electoral Wards in all local authority areas of England. They provide a useful basis for statistical comparison because they are generally similar in terms of population size. On average they contain around 1,500 residents or 650 households.

2.12. There are many advantages of presenting risk data at this level:

- it allows comparison of areas of a similar size nationally,
- it allows pockets of deprivation to be identified, which can be missed when looking at a Ward or District level,
- the boundaries of the LSOAs are robust and unlikely to change, allowing trend analysis and comparison over time,
- with relatively small numbers of households, prevention and other fire safety work can be organised at a manageable level, and

- local authorities and other public service partners also present information at the LSOA level, which enables data over comparable areas to be shared.

3. Overall LSOA risk scores and fire risk grades for 2014/15 – 2016/17

3.1. Having assigned a risk score to each LSOA in the two counties, it is appropriate to categorise the scores into bands or grades to demonstrate the relative risks. In common with a number of other Fire and Rescue Services, the scores have been banded into High, Medium and Low grades, as shown in the table below:

Table 5: LSOA Risk Scores and Fire Risk Grades

LSOA Risk Score	Fire Risk Grade
65 and Above	**High**
34 - 64	**Medium**
33 and below	**Low**

3.2. Applying these gradings to all 480 LSOAs across Herefordshire and Worcestershire reveals that there is a low risk of fire across most areas of the two counties. The data shows that over the last three years 2014/15 to 2016/17, 317 LSOAs were rated as a having a Low risk of accidental dwelling fire, representing 66% or two out of every three LSOAs. The data also shows that 158 LSOAs (33%) were rated at Medium risk, and 5 LSOAs (1%) were rated at High risk.

3.3. By taking the full range of data between 2009/10 and 2016/17 and banding it into three year periods to make sure that any 'spikes' are smoothed out, a trend profile can be established. This provides an opportunity to follow how levels of fire risk have changed over time, and will help in analysing how far the Service's prevention and protection activities are having the desired effect in reducing fire risk. Table 6 sets out how fire risk has changed over the eight year period 2009/10 to 2016/17 and Figure 1 shows the changes over the six three-year bands.

Table 6: LSOA Fire Risk Profiles 2009/10 – 2016/17

Fire Risk Profile	Score 2009/10 - 2011/12		Score 2010/11 - 2012/13		Score 2011/12 - 2013/14	
Risk Grade	Risk Score	No. of LSOAs	Risk Score	No. of LSOAs	Risk Score	No. of LSOAs
High	1,456	20	1,006	15	930	17
Medium	8,010	178	8,032	186	7,936	182
Low	6,806	282	6,814	279	6,898	281
Total risk score	**16,272**		**15,852**		**15,764**	

Table 6: continued

Fire Risk Profile	Score 2012/13 - 2014/15		Score 2013/14 - 2015/16		Score 2014/15 - 2016/17	
Risk Grade	**Risk Score**	**No. of LSOAs**	**Risk Score**	**No. of LSOAs**	**Risk Score**	**No. of LSOAs**
High	568	10	492	9	332	5
Medium	7,284	164	6,886	155	6,688	158
Low	7,394	306	7,528	316	7,662	317
Total risk score	**15,246**		**14,906**		**14,682**	

Figure 1: Number of LSOAs per Risk Grade in three year bands

LSOAs per Risk Grade: 2009/10 to 2016/17 (in 3 year bands)
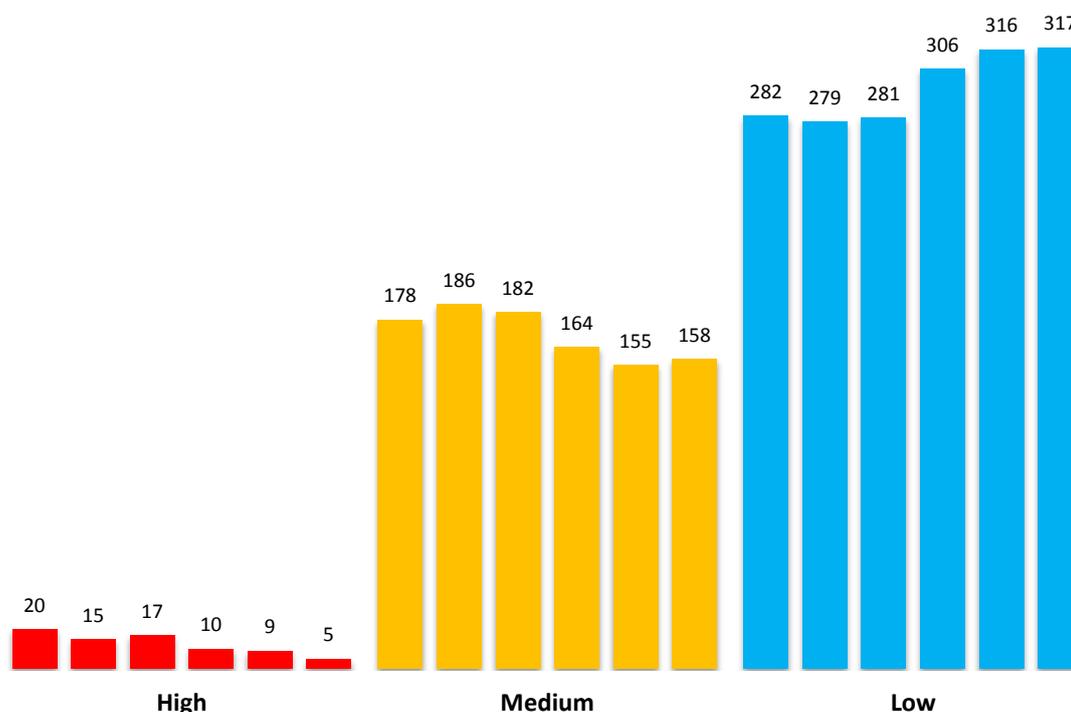
3.4. Table 6 and Figure 1 show that the overall fire risk score has continued to fall throughout the last eight years and now stands at its lowest level. The number of High fire risk LSOAs shows a downward trend, falling from 20 in 2009/10 – 2011/12 to just 5 in 2014/15 – 20016/17. This is to be welcomed and may reflect a number of factors including improved fireproofing in housing and household items as well as the focused prevention and protection work undertaken by the Service. The number of Medium fire risk LSOAs shows a generally downward trends, but continues to represent about one third of all LSOAs and has risen slightly in the last three years. The number of Low fire risk LSOAs continues to show an upward trend, meaning that most areas of the two

counties are at low risk of fire. The following table shows the percentage changes between 2009/10 – 2011/12 and 2014/15 – 2016/17.

Table 7: LSOA Risk Score 2009/10 – 2016/17

LSOA Risk Score	Risk Grade	No. LSOAs 2009/10 – 2011/12	No. LSOAs 2014/15 – 2016/17	% change 2009/10 - 2016/17
65 and Above	High	20	5	- 75%
34 - 64	Medium	178	158	- 11%
33 and below	Low	282	317	+ 12%

4. Risk Mapping

4.1. The locations of all fires across the two counties can be mapped. The following three maps show the distribution of accidental dwelling fires, accidental dwelling fire casualties and accidental non-dwelling fires for the last three years 2014/15 – 2016/17. There are clear concentrations of fire incidents in the larger urban areas, but the maps also show that the incidents occurred in many other locations.
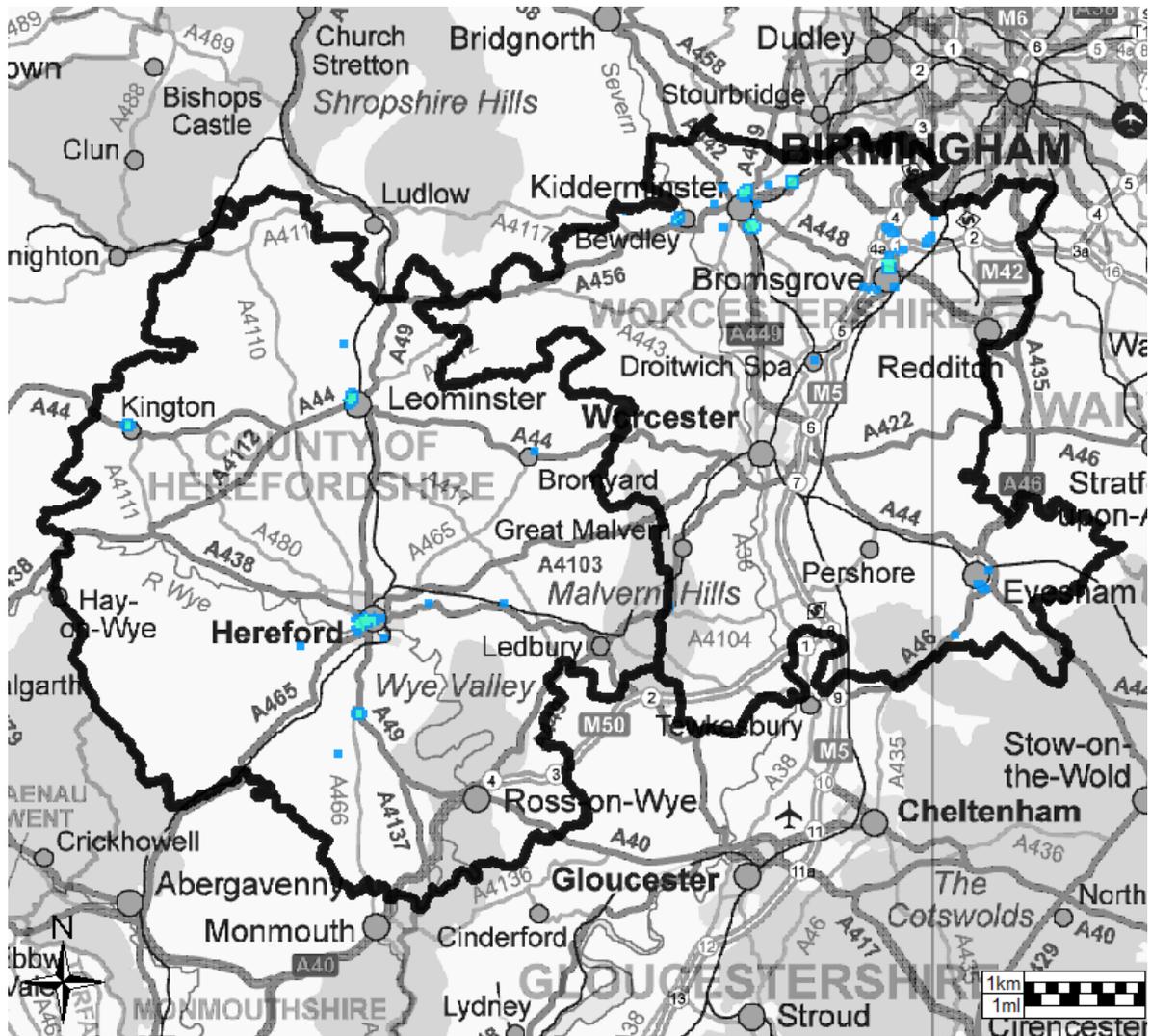
Map 1: Accidental Dwelling Fires 2014/15 – 2016/17 hotspot map

Key

Low/Cold ⇐ ⇒ High/Hot
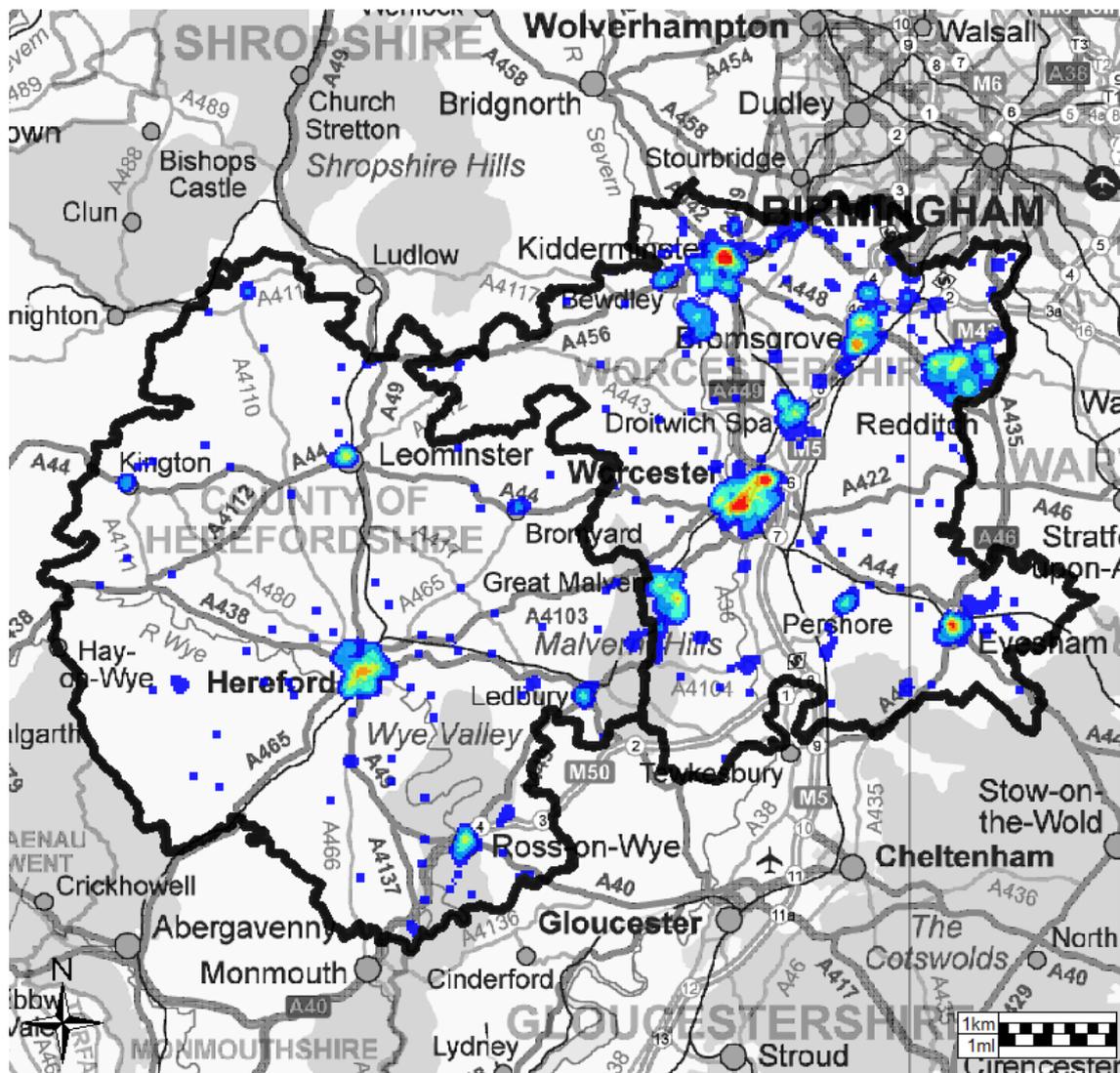
4.2. The map above shows where hotspots of accidental dwelling fire incidents occurred over the last three years, 2014/15 – 2016/17. The hotspots show how concentrated the data is, graduating from **hot/high** (i.e. where incidents occurred most frequently) to **cold/low** (i.e. where incidents occurred least frequently).
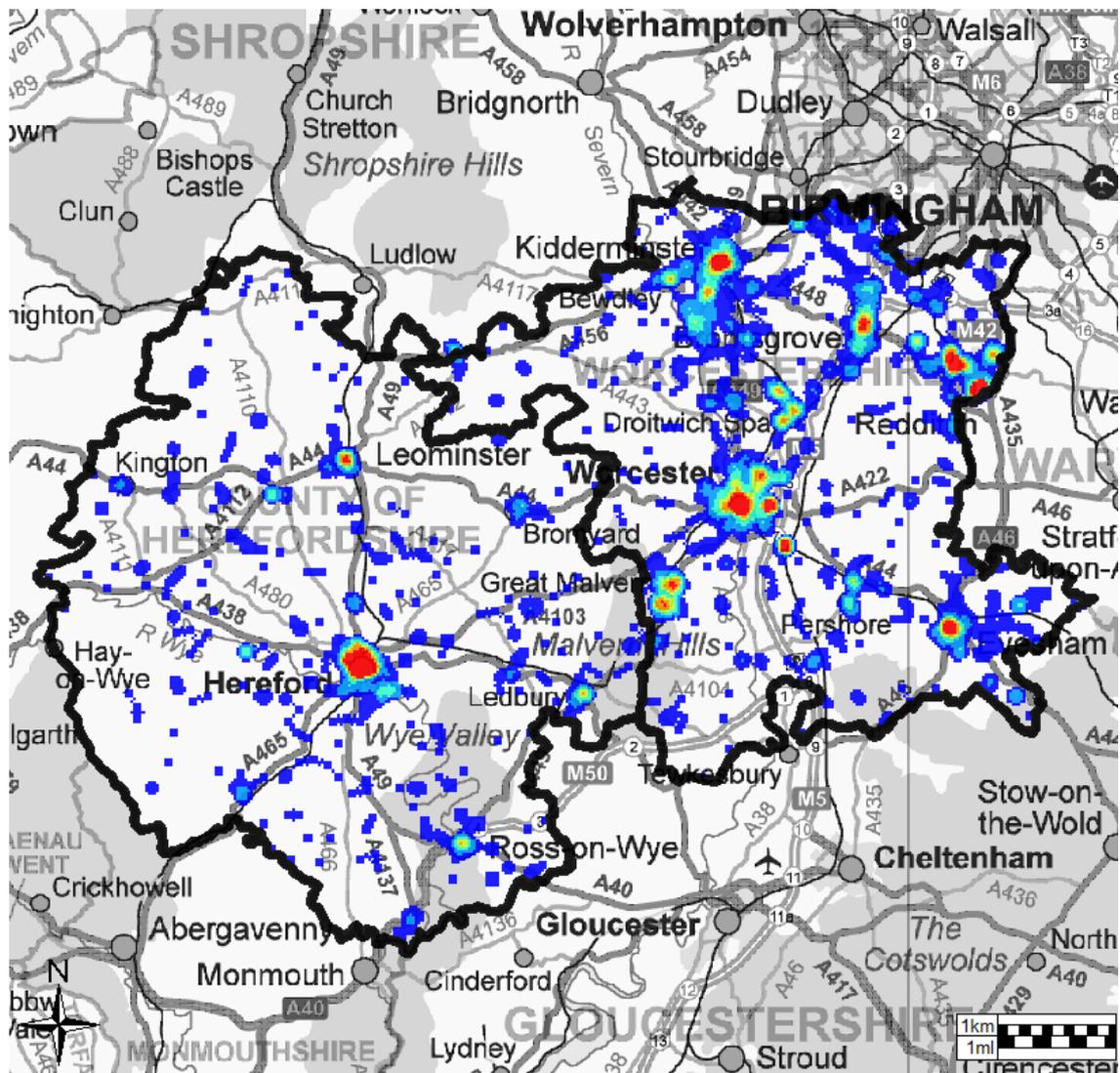

4.3. There were 1,053 accidental dwelling fires across the two counties between 2014/15 and 2016/17; 249 occurred in Herefordshire and 804 in Worcestershire. The map shows that while the majority of dwelling fires occurred in the larger urban centres such as Hereford, Worcester, Kidderminster and Redditch, they also occurred in many other locations throughout the Service area.

Map 2: Accidental Dwelling Fires with Casualties 2014/15 – 2016/17 hotspot map

Key

| Low/Cold | ⇐ | | ⇒ | High/Hot |

4.4. The map above shows where hotspots of accidental dwelling fire incidents involving casualties occurred over the last three years, 201415 – 2016/17. There were 101 accidental dwelling fires involving casualties across the two counties between 2014/15 and 2016/17; 24 were in Herefordshire and 77 were in Worcestershire.

Map 3: Accidental Non-Dwelling Fires 2014/15 – 2016/17 hotspot map

Key

Low/Cold ⟸ ⟹ High/Hot

4.5. The map above shows where hotspots of accidental fires in buildings other than dwellings occurred over the last three years, 2014/15 – 2016/17. There were 582 accidental non-dwelling building fires across the two counties between 20014/15 and 2016/17; 169 were in Herefordshire and 413 were in Worcestershire. There were 33 injuries and no fatalities in these fires,. The map also shows that the majority of accidental non-dwelling building fires occurred in the urban centres. It is estimated that around 66% of these fires occurred in the leisure, retail, office, industrial and healthcare sectors, which are generally referred to as commercial, which also accounted for 22 of the 33 injuries.

4.6.   The fourth element of the formula, the 2015 Index of Multiple Deprivation (IMD) score, can also be mapped. The following map shows the relative levels of deprivation across the two counties.

Map 4: Herefordshire and Worcestershire map of LSOAs by IMD 2015
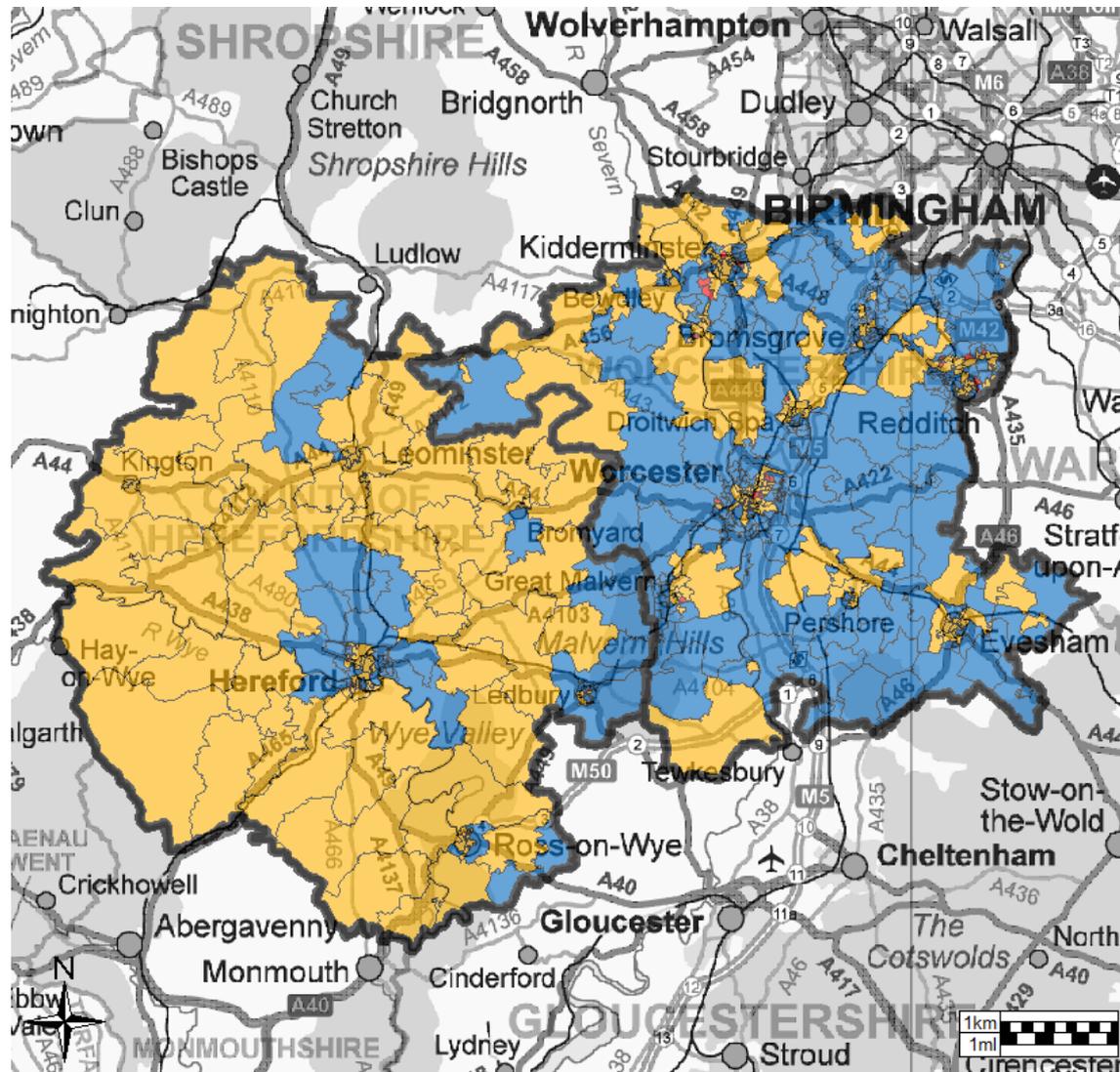
IMD 2015 level of deprivation	Number of LSOAs	Note
High	17	**LSOAs in 10% worst in England**
Medium	201	**LSOAs in worse than average range (51%-90%)**
Low	262	**LSOAs in better than average range (0-50%)**

4.7.   The map above provides a general view of deprivation across the two counties relative to the whole of England. To calculate the score, England is divided up unto 32,844 small areas called Lower-layer Super Output Areas (LSOAs), and a range of data is applied against each to provide a relative measure of multiple deprivation. The data is organised in seven groups each of which reflects a different aspect of deprivation.

These groups are income deprivation, employment deprivation, education, skills and training deprivation, health deprivation and disability, crime, barriers to housing and services and living environment deprivation. The scores for each group are weighted and combined to give an overall Index of Multiple Deprivation score for each LSOA.

4.8. Across England the scores for the 2015 IMD range from 92.60 for the most deprived LSOA to 0.48 the least deprived. Ranking the scores provides a list where the LSOA with a rank of 1 is the most deprived, and the rank of 32,844 the least deprived.

4.9. Of the 480 LSOAs in the two counties, 116 are in Herefordshire and 361 are in Worcestershire. The highest IMD score was 75.574 for part of the Old Warndon area, east of Cranham Drive in Worcester, giving it an overall rank of 97th most deprived LSOA in England. The lowest score was 2.41 in the Northwick area of Claines in Worcester, giving it an overall rank of 32,447. Seventeen LSOAs were within the 10% most deprived areas in England, sixteen of which were in Worcestershire and one in Herefordshire. The seventeen LSOAs are listed in Table 8 below.

Table 8: Herefordshire and Worcestershire LSOAs in 10% most deprived in England, IMD 2015

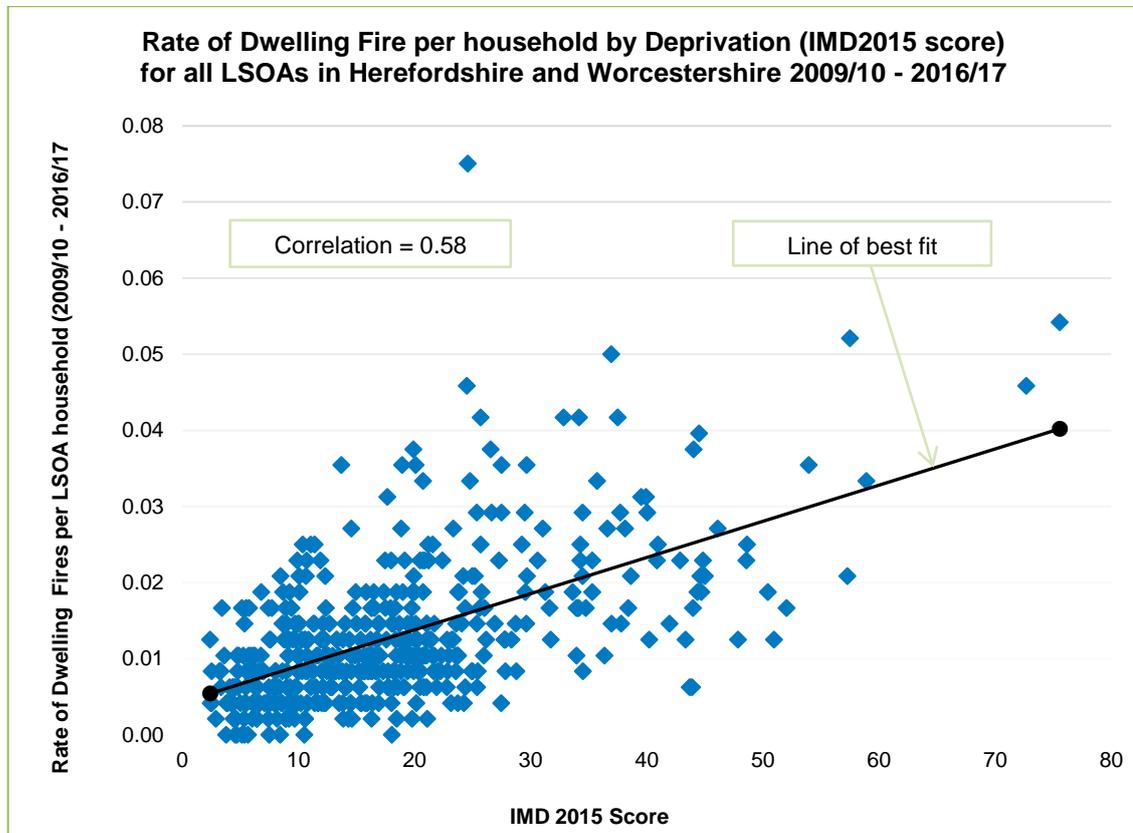|	Local Authority area	Ward	LSOA description	IMD 2015 Rank (out of 32,844)
1	Worcester	Warndon	Old Warndon, east of Cranham Drive	97
2	Wyre Forest	Foley Park & Hoobrook	Rifle Range area (Jubilee Drive, Avon Road, Shrawley Avenue area)	175
3	Redditch	Greenlands	St. Thomas More First School area	1,024
4	Wyre Forest	Broadwaters	Horsefair Area	1,160
5	Worcester	Rainbow Hill	Tolladine	1,193
6	Malvern Hills	Pickersleigh	Sherrard's Green	1,609
7	Worcester	Gorse Hill	South-West Gorse Hill	1,871
8	Worcester	Warndon	Cranham Primary School area	2,059
9	Worcester	St John	Dines Green	2,144
10	Herefordshire	Newton Farm	Golden Post - Newton Farm	2,484
11	Wyre Forest	Areley Kings & Riverside	The Walshes	2,498
12	Redditch	Abbey	Abbeydale	2,626
13	Redditch	Batchley & Brockhill	Batchley	2,945
14	Redditch	Church Hill	Church Hill (YMCA Surrounding area)	3,186
15	Wyre Forest	Foley Park & Hoobrook	Birchen Coppice	3,215
16	Wyre Forest	Offmore & Comberton	Part of Comberton, Coronation Way	3,251
17	Wychavon	Droitwich West	Westlands	3,269

4.10. Using the Index of Multiple Deprivation gives an extra dimension to the formula by adding wider social issues such as unemployment, poor health, low income and crime. National research has found that there is a strong link between the rate of dwelling fires and deprivation,[7] and local research echoes this finding[8].

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[7] research carried out by Greenstreet Berman Ltd presented in 'Fire and Rescue Service partnership working toolkit for Local Area Agreements' CLG 2008
[8] 'Community Fire Safety – Identifying and locating those most at risk of fire' HWFRS 2011

4.11. Figure 2 below plots the incidence of dwelling fire in each LSOA in Herefordshire and Worcestershire over the last eight years against deprivation scores and identifies a strong link between deprivation and dwelling fire.

Figure 2: Link between deprivation and the rate of accidental dwelling fire

Rate of Dwelling Fire per household by Deprivation (IMD2015 score) for all LSOAs in Herefordshire and Worcestershire 2009/10 - 2016/17

Y-axis: Rate of Dwelling Fires per LSOA household (2009/10 - 2016/17)

X-axis: IMD 2015 Score

Correlation = 0.58

Line of best fit

4.12. Figure 2 shows a correlation of 0.58 which means there is a link between the rate of dwelling fires and deprivation. As the figure is a positive one (+ 0.58) this means that where the rate of dwelling fire is high, the rate of deprivation is also likely to be high. **It does not mean that living in an area of high deprivation will cause you to have a fire,** *but it does mean that areas of high deprivation tend to have more fires.*

5. Fire Risk Map 2014/15 – 2016/17

5.1. To create the fire risk map, all four elements of the fire risk model were combined and weighted for each LSOA. The results were colour coded to represent High, Medium and Low risk areas and are shown below for all 480 LSOAs in Herefordshire and Worcestershire for the last three year period 2014/15 – 2016/17.

Map 5: Herefordshire and Worcestershire Fire Risk Map 2014/15 – 2016/17
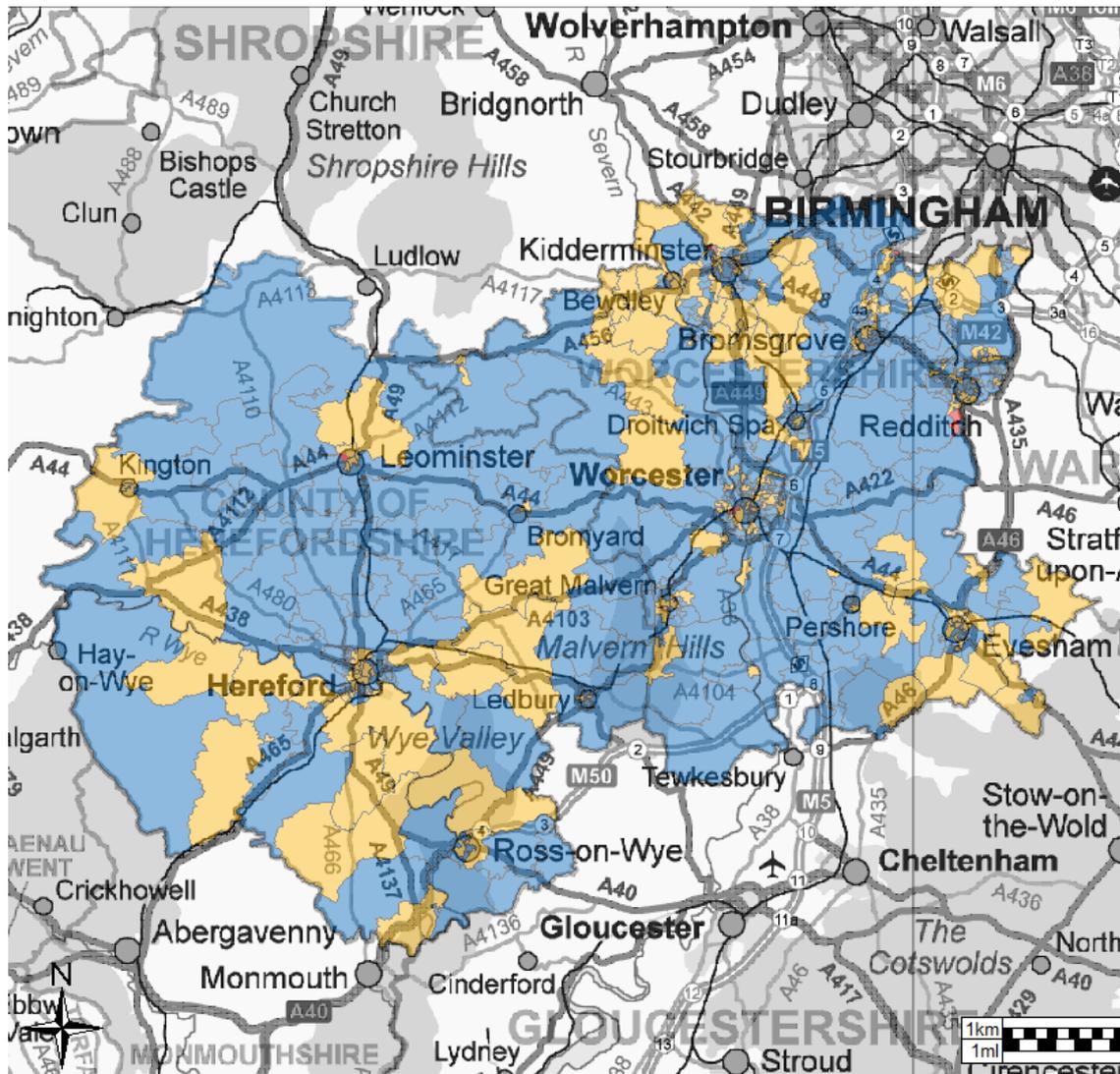
Risk Grade	Number of LSOAs
High	5
Medium	158
Low	317

Note: data from 2014/15 – 2016/17 risk scores

Because LSOAs are drawn so that they contain comparable numbers of residents, some are geographically larger than others as they are more sparsely populated areas.

5.2. The Fire Risk Map provides a visual representation of fire risk across the two counties. It gives a good foundation upon which to consider where prevention activities such as home fire safety checks might be best targeted for greatest impact. It also provides a basis for considering emergency response times against levels of fire risk.

5.3. The five LSOAs that emerge as High fire risk areas in 2014/15 – 2016/17 are listed in Table 9 below. The full list of areas will be examined further with officers from the Community Risk department as part of ongoing work to continue targeting those areas and communities at most risk from accidental fire.

Table 9 - High risk LSOAs in Herefordshire and Worcestershire 2014/15 – 2016/17

Score 2014/15 - 2016/17

Local Authority	Ward	LSOA description	Top 5 Risk Scores
Herefordshire	Leominster East	Meadows, Rugg	68
Wyre Forest	Franche & Habberley North	Part of Franche, Wolverley Road	66
Worcester	St John	Our Lady Queen of Peace area and Cripplegate Park	66
Redditch	Astwood Bank	Dagtail End	66
Bromsgrove	Rubery North	Waseley Road, Rubery	66

5.4. Figure 1 on page 9 of this report showed that the overall number of High risk areas has been falling over the last eight years. The following five tables show that the risk scores of the top five High fire risk areas in three-year bands between 2009/10 and 2014/15 are also falling.

Table 10: High Risk LSOAs in Herefordshire and Worcestershire 2009/10 – 2011/12

Score 2009/10 - 2011/12

Local Authority	Ward	LSOA description	Top 5 Risk Scores
Worcester	St John	Dines Green	86
Wyre Forest	Blakebrook & Habberley South	Park Lane & Park Street	82
Worcester	Warndon	Cranham Primary School Area	80
Malvern Hills	Powick	Collett's Green	80
Wychavon	Bengeworth	Green Gables	80

Table 11: High Risk LSOAs in Herefordshire and Worcestershire 2010/11 – 2012/13

Score 2010/11 - 2012/13

Local Authority	Ward	LSOA description	Top 5 Risk Scores
Redditch	Headless Cross & Oakenshaw	Wirehill Wood	90
Wychavon	Evesham North	Swan Lane First School Area	80
Wyre Forest	Wyre Forest Rural	Churchill & Stone	76
Worcester	Warndon	Cranham Primary School Area	74
Malvern Hills	Powick	Collett's Green	74

Table 12: High Risk LSOAs in Herefordshire and Worcestershire 2011/12 – 2013/14

Score 2011/12 - 2013/14

Local Authority	Ward	LSOA description	Top 5 Risk Scores
Redditch	Headless Cross & Oakenshaw	Wirehill Wood	88
Wychavon	Evesham North	Swan Lane First School Area	82
Malvern Hills	Priory	Priory Park	74
Wyre Forest	Wyre Forest Rural	Churchill & Stone	72
Herefordshire	Golden Valley South	Dulas Brook	72

Table 13: High Risk LSOAs in Herefordshire and Worcestershire 2012/13 – 2014/15

Score 2012/13 - 2014/15

Local Authority	Ward	LSOA description	Top 5 Risk Scores
Redditch	Headless Cross & Oakenshaw	Wirehill Wood	84
Malvern Hills	Priory	Priory Park	76
Herefordshire	Golden Valley South	Dulas Brook	72
Bromsgrove	Sanders Park	St. John's Middle School Area	68
Wyre Forest	Broadwaters	Broadwaters	68

Table 14: High Risk LSOAs in Herefordshire and Worcestershire 2013/14 – 2015/16

Score 2013/14 - 2015/16

Local Authority	Ward	LSOA description	Top 5 Risk Scores
Wyre Forest	Franche & Habberley North	Part of Franche, Wolverley Road	78
Bromsgrove	Charford	Charford	76
Malvern Hills	Pickersleigh	Great Malvern Cemetery	72
Herefordshire	Kington	Kington central	68
Bromsgrove	Wythall West	Headley Heath	68

5.5. Table 15 below combines the risk scores of each LSOA over all eight years, which identifies a further list of High risk areas. These areas represent those LSOAs that have continued to persist among the most at fire risk areas.

Table 15: High Risk LSOAs in Herefordshire and Worcestershire 2009/10 – 2016/17

Score 2009/10 - 2016/17

| Local Authority	Ward	LSOA description	Top 5 Risk Scores
Redditch	Headless Cross & Oakenshaw	Wirehill Wood	432
Worcester	St John	Dines Green	406
Wyre Forest	Franche & Habberley North	Part of Franche, Wolverley Road	384
Bromsgrove	Charford	Charford	380
Herefordshire	Golden Valley South	Dulas Brook	378

6. Identifying Trends

6.1. As the tables in Section 5 show, the fire risk model provides a way of identifying those areas and groups that are most at risk of fires in their homes. As new data is added to the model each year, trends can be identified. Map 6 below shows how the eight years' worth of data can be grouped into three-year risk bands and represented on maps to highlight how risks have changed over the 2009/10 to 2016/17 period.
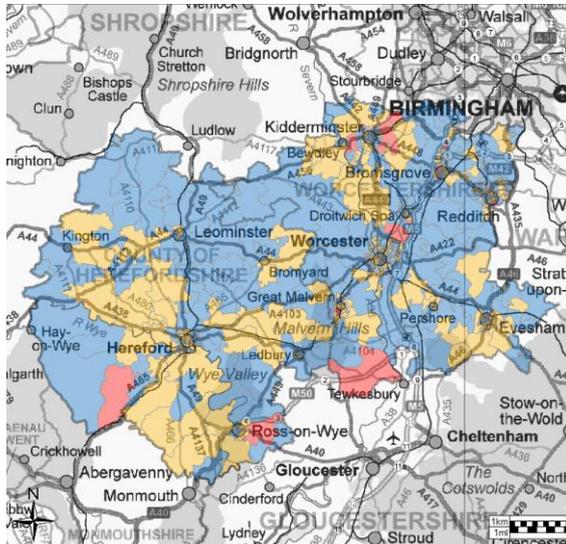
Map 6: Risk Map changes over time 2009/10 to 2016/17
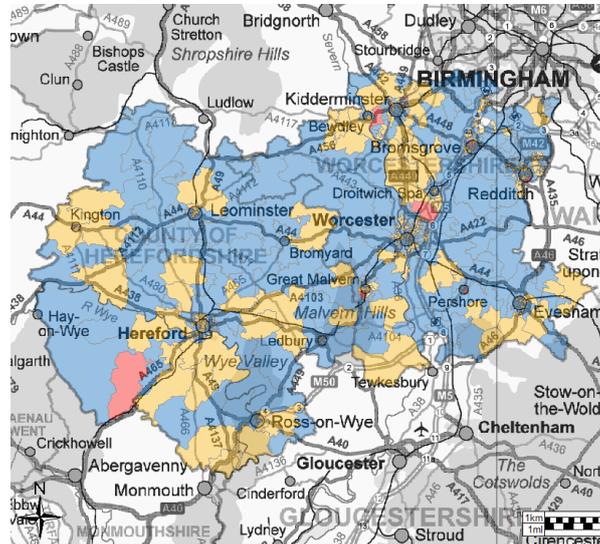
2009/10 – 2011/12
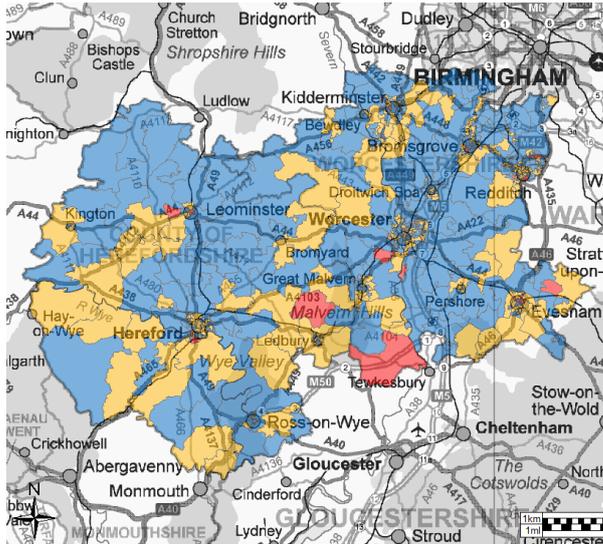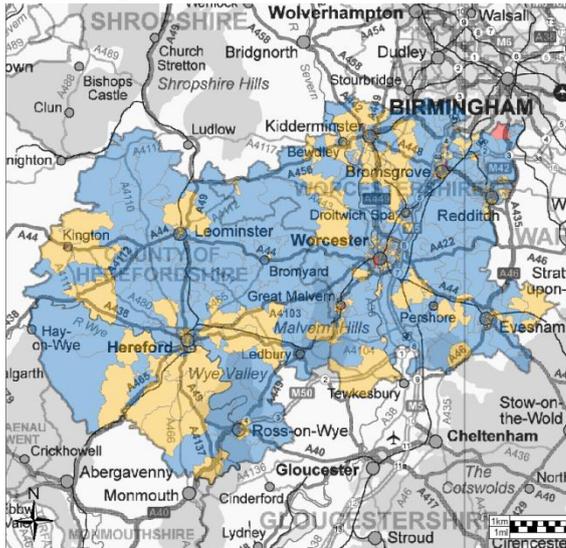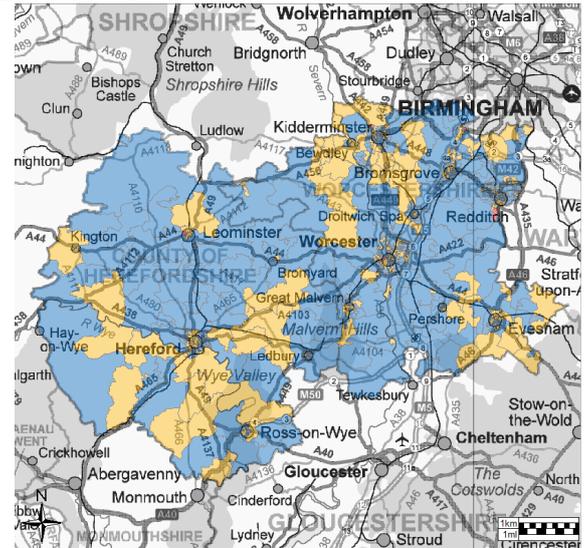

2010/11 – 2012/13
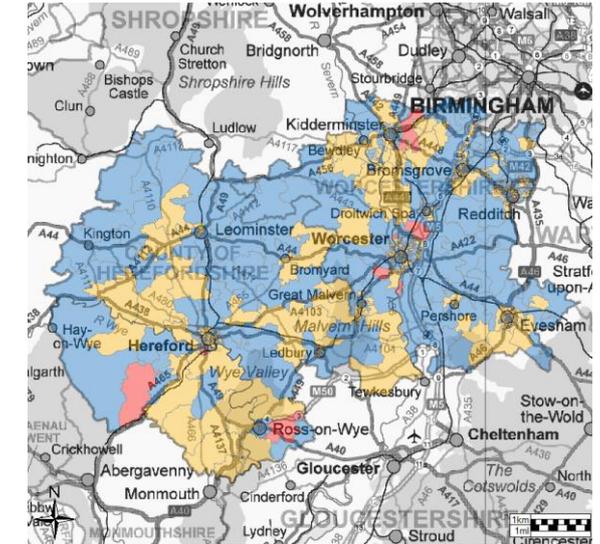
2011/12 – 2013/14

2012/13 – 2014/15

2013/14 – 2015/16

2014/15 – 2016/17

6.2. Looking at the maps, it is clear that the number of Low risk LSOAs (shaded in blue) has been increasing and the number of High risk LSOAs (shaded in red) has been decreasing. The details of these changes can be analysed further to identify trends such as whether community safety activity is helping to lower risk in certain areas or whether some areas are continuing to remain at higher risk than other areas.

6.3. A further analysis of the top 50 High and Medium risk scores has been carried out help to identify those LSOAs which have tended to remain at greater fire risk than other areas and may, therefore, have a greater impact on their local communities. To do this, for each of the six three-year bands between 2009/10 – 2011/12 and 2014/15 – 2016/17 a score of 1 was awarded each time the LSOA scored above the midpoint of the total range of risk scores for all 480 LSOAs. This enabled a combined score for each LSOA to be made for the eight year period. Table 16 and Map 7 show the results of this scoring.

Table 16: LSOAs most at risk of fire 2009/10 – 2016/17

Local Authority	Ward	LSOA name	Risk 2009/10 - 2011/12	Risk 2010/11 - 2012/13	Risk 2011/12 - 2013/14	Risk 2012/13 - 2014/15	Risk 2013/14 - 2015/16	Risk 2014/15 - 2016/17	Overall Score
Redditch	Headless Cross and Oakenshaw	Wirehill Wood	H	H	H	H	M	M	4
Worcester	St John	Dines Green	H	H	H	M	M	M	3
Wyre Forest	Franche & Habberley North	Part of Franche, Wolverley Road	M	M	H	M	H	H	3
Bromsgrove	Charford	Charford	H	M	H	M	H	M	3

| Local Authority	Ward	LSOA name	Risk 2009/10 - 2011/12	Risk 2010/11 - 2012/13	Risk 2011/12 - 2013/14	Risk 2012/13 - 2014/15	Risk 2013/14 - 2015/16	Risk 2014/15 - 2016/17	Overall Score
Herefordshire	Golden Valley South	Dulas Brook	M	H	H	H	M	M	3
Wychavon	Evesham North	Swan Lane First School Area	H	H	H	M	M	M	3
Worcester	Warndon	Cranham Primary School Area	H	H	H	M	M	M	3
Worcester	Lovett and North Claines	Fernhill Heath & Martin Hussingtree	L	H	H	H	L	L	3
Worcester	St John	Our Lady Queen of Peace Area & Cripplegate Park	M	M	M	M	H	H	2
Malvern Hills	Priory	Priory Park	M	M	H	H	M	M	2
Wyre Forest	Wribbenhall & Arley	Blackstone & Catchems End	M	M	H	H	M	M	2
Wyre Forest	Wyre Forest Rural	Churchill & Stone	M	H	H	M	L	L	2
Herefordshire	Central	Smallwood	M	H	H	M	M	M	2
Malvern Hills	Powick	Collett's Green	H	H	M	M	M	M	2
Malvern Hills	Longdon	Longdon	H	M	H	M	M	L	2
Herefordshire	Penyard	Treacle Mines	M	H	H	M	L	L	2
Bromsgrove	Sanders Park	St. John's Middle School Area	L	M	H	H	M	M	2
Malvern Hills	Kempsey	Kempsey	H	H	M	M	M	M	2
Herefordshire	Kington	Kington central	L	L	L	H	H	M	2
Herefordshire	Redhill	Redhill-Ross Road	H	H	M	L	L	L	2
Redditch	Churchill	Moon's Moat First School Area	H	M	M	M	M	M	1
Wyre Forest	Blakebrook & Habberley South	Park Lane & Park Street	H	M	M	M	M	M	1
Wychavon	Bengeworth	Green Gables	H	M	M	M	M	M	1
Redditch	Astwood Bank and Feckenham	Dagtail End	M	M	M	M	M	H	1

… continued

Local Authority	Ward	LSOA name	Risk 2009/10 - 2011/12	Risk 2010/11 - 2012/13	Risk 2011/12 - 2013/14	Risk 2012/13 - 2014/15	Risk 2013/14 - 2015/16	Risk 2014/15 - 2016/17	Overall Score
Worcester	Gorse Hill	South-West Gorse Hill	M	H	M	M	M	M	1
Herefordshire	Leominster East	Leominster Grange	H	M	M	M	M	M	1
Worcester	Claines	Grange Avenue	M	H	M	M	M	M	1
Redditch	Churchill	Moon's Moat	H	M	M	M	M	M	1
Wyre Forest	Blakebrook & Habberley South	Blakebrook	M	M	M	H	M	M	1
Bromsgrove	Bromsgrove Central	North Bromsgrove High School Area	M	M	M	M	H	M	1
Worcester	Rainbow Hill	King George's Field Area, Tolladine	M	M	M	M	H	M	1
Wyre Forest	Franche & Habberley North	Low Habberley	H	M	L	L	M	M	1
Bromsgrove	Catshill North	Upper Catshill	M	M	H	M	M	L	1
Malvern Hills	Pickersleigh	Great Malvern Cemetery	L	L	M	M	H	M	1
Wychavon	Pershore	Abbey Park	M	M	M	H	M	M	1
Wyre Forest	Broadwaters	Broadwaters	L	M	M	H	M	M	1
Bromsgrove	Rubery North	Waseley Road, Rubery	M	L	L	M	M	H	1
Herefordshire	Hinton & Hunderton	Hunderton	H	M	M	M	M	M	1
Herefordshire	Hope End	Greater Bosbury	H	M	M	L	L	L	1
Wychavon	Droitwich South East	Primsland Area, York Avenue	M	M	H	M	L	L	1
Bromsgrove	Wythall West	Headley Heath	L	L	M	M	H	M	1
Herefordshire	Red Hill	Redhill-Belmont Road	M	H	M	M	M	M	1
Herefordshire	Leominster West	Leominster - Barons Cross	H	M	M	L	L	L	1
Worcester	Bedwardine	Christopher Whitehead's	L	L	M	L	H	M	1
Wychavon	The Littletons	South Littleton	H	M	M	M	M	L	1
Redditch	Crabbs Cross	Part of Walkwood, Yvonne Road	H	M	L	L	L	L	1

… continued

| Local Authority	Ward	LSOA name	Risk 2009/10 - 2011/12	Risk 2010/11 - 2012/13	Risk 2011/12 - 2013/14	Risk 2012/13 - 2014/15	Risk 2013/14 - 2015/16	Risk 2014/15 - 2016/17	Overall Score
Herefordshire	Leominster East	Leominster - Meadows, Rugg	L	L	L	L	L	H	1
Wychavon	Badsey	Badsey	M	M	M	M	M	M	0
Wychavon	Little Hampton	Charity Crescent	M	M	M	M	M	M	0
Wyre Forest	Foley Park & Hoobrook	Sutton Farm	M	M	M	M	M	M	0
Herefordshire	Greyfriars	Whitecross-Sainsbury's	M	M	M	M	M	M	0

Map 7: LSOAs most at risk of fire 2009/10 – 2016/17
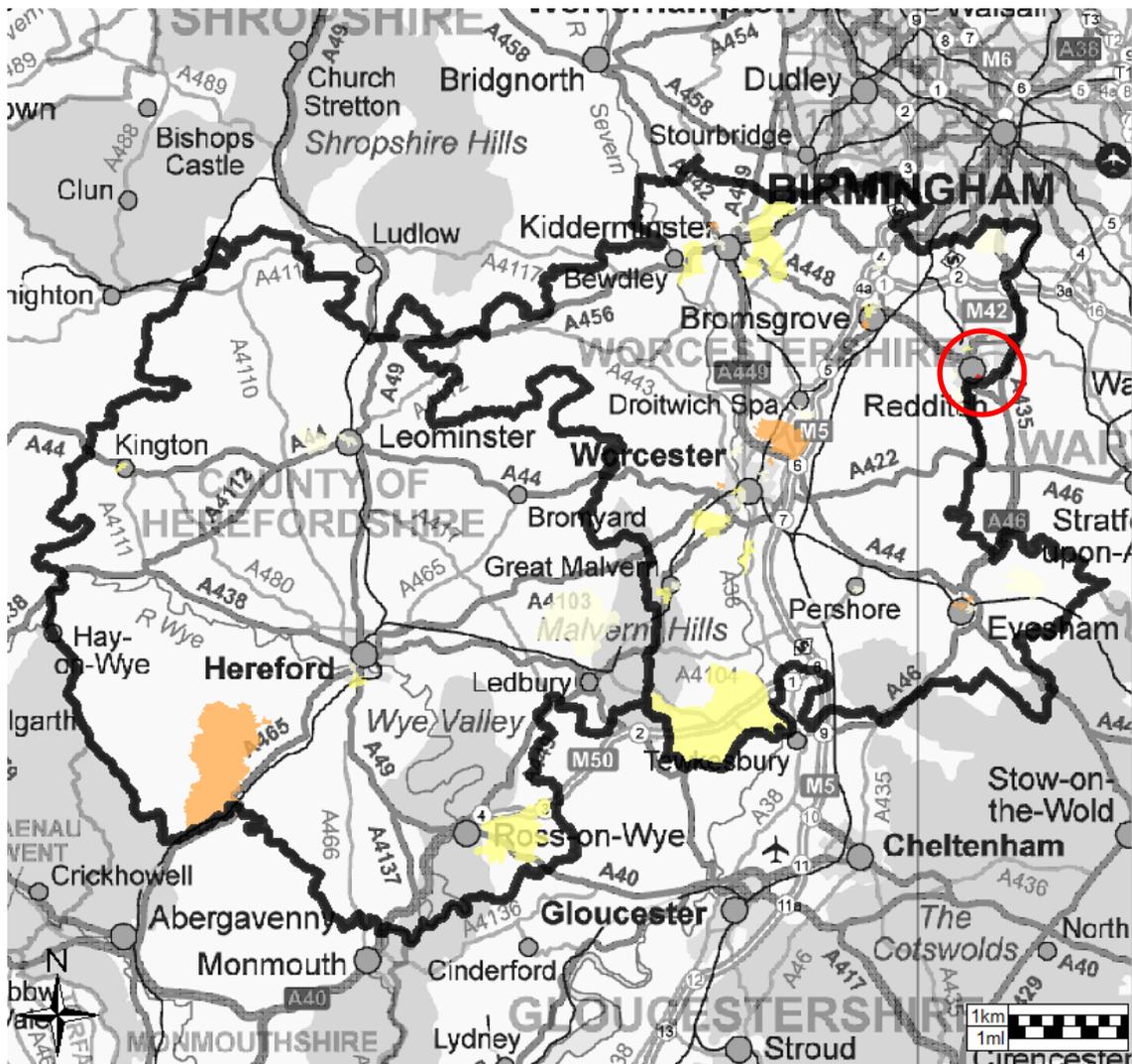
Key	Number of LSOAs	Number of times in top 50 High or Medium risk LSOAs
	1	4
	7	3
	12	2
	27	1

6.4. Table 16 shows that some LSOAs have remained at either High or Medium risk throughout the last eight years. Some have been High risk, but have decreased to Medium or Low over time, while others have risen from Low risk to Medium or High. The table shows that Wirehill Wood in the Headless Cross and Oakenshaw ward of Redditch appeared in the top 50 High and Medium risk LSOAs on four occasions of the six three-year bands. Where upward trends are identified, further analysis can be undertaken to support the Community Risk department in targeting prevention and protection services.

6.5. Map 7 shows those LSOAs that have been in the top 50 High and Medium risk categories the most times over the last each eight years. The Wirehill Wood LSOA has been highlighted with a red circle to show its location. Because the LSOAs are generally small areas, the map scale can be enlarged to show the area more clearly. This is highlighted in Map 8 below, which shows a closer view of the local neighbourhood. The map can also be enlarged further to show streets, houses and the locations of accidental dwelling fire incidents over the years, so that Community Risk officers can best target their prevention and protection activities.

Map 8: Wirehill Wood LSOA in the Headless Cross and Oakenshaw ward of Redditch
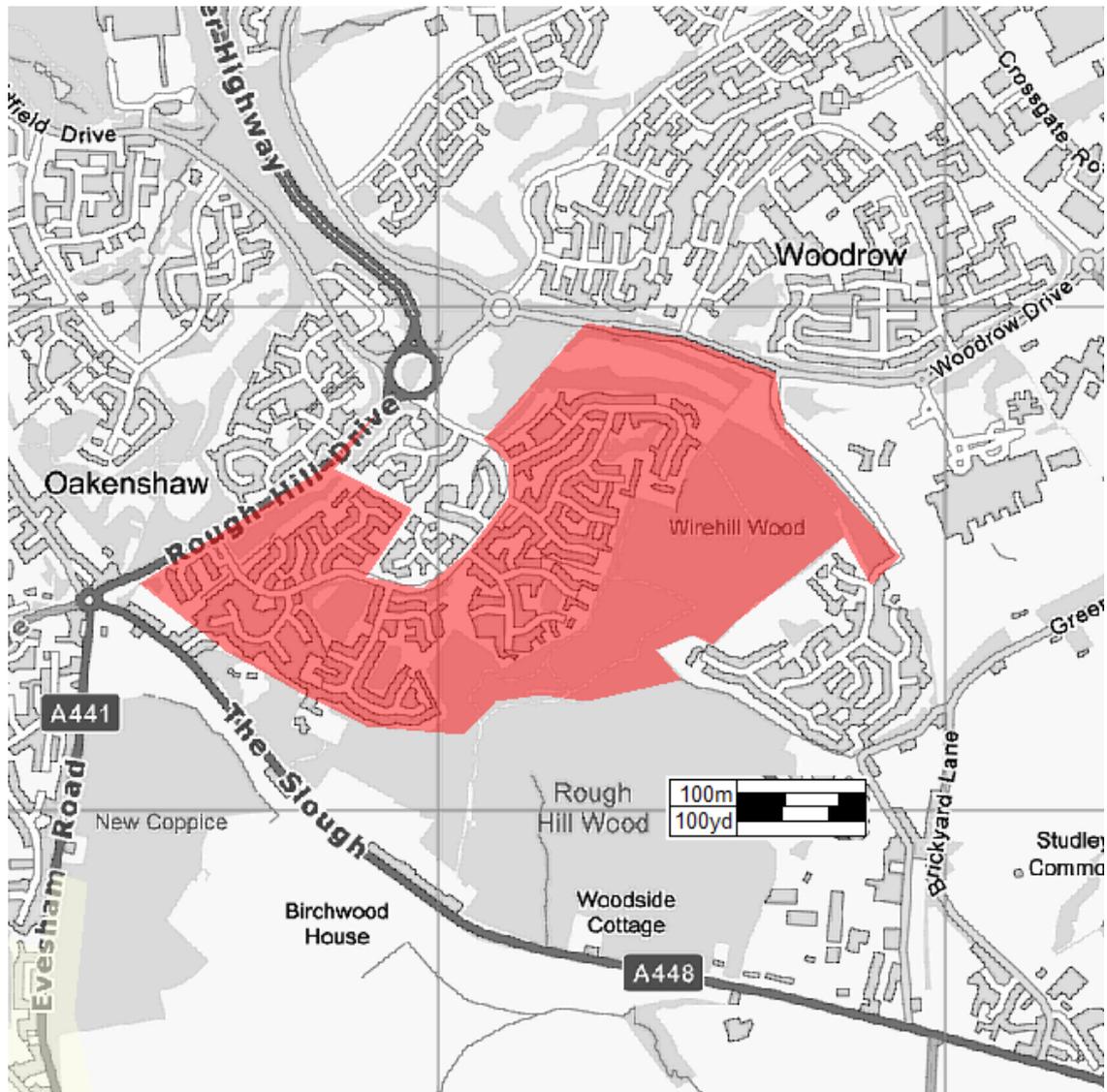
6.6. As part of the approach to targeting community fire safety activity towards those areas most at risk, over 31,000 [9]Home Fire Safety Checks (HFSCs) have been carried out over the last eight years. The hotspot map, Map 9, below shows where the HFSCs have been targeted; the redder the hotspot the more the number of HFSCs that have been completed in that area.

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[9] The Service carried out 31,084 targeted Home Fire Safety Checks between 1 April 2009 and 31 March 2017.

Map 9: Home Fire Safety Check activity 2009/10 – 2016/17 hotspot map

Key

| Low/Cold	⇐		⇒	High/Hot
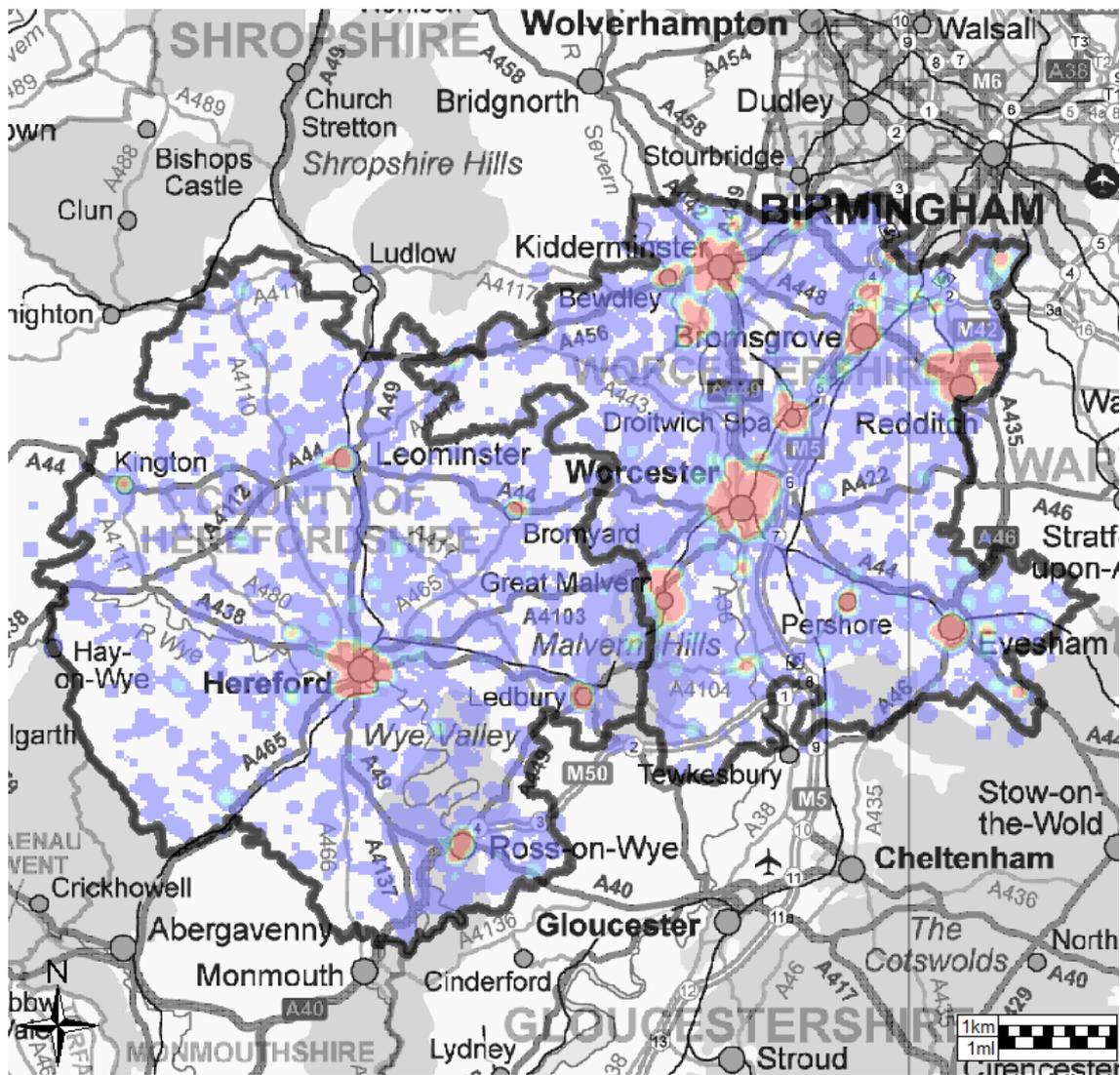
6.7. Map 9 above has a close resemblance to the actual pattern of accidental dwelling fires over the last eight years shown in Map 10 below, which indicates that HFSCs have continued to be targeted towards the areas at most risk of fire.

Map 10: Accidental Dwelling Fires 2009/10 – 2016/17 hotspot map
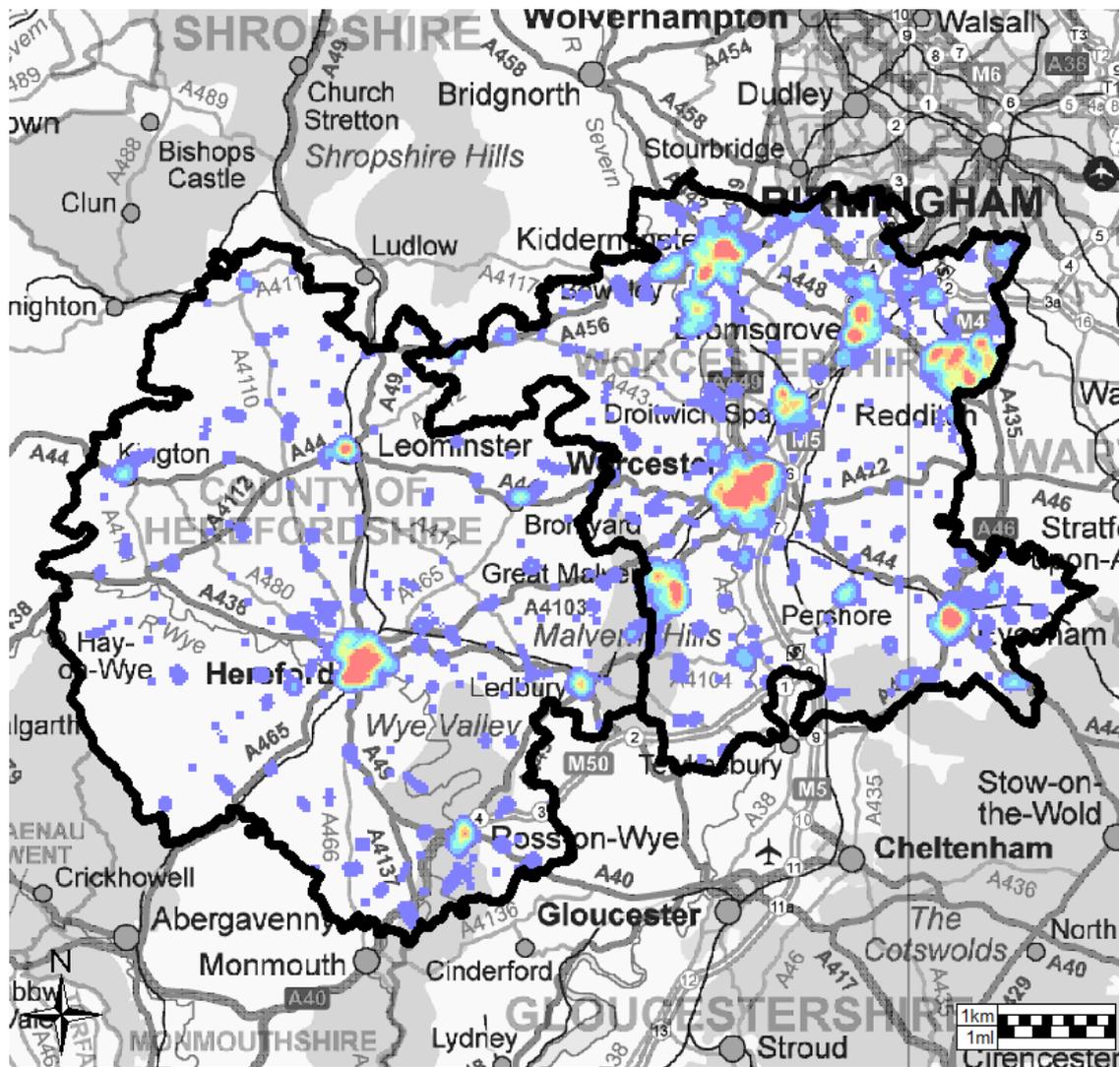
6.8. The following graph (Figure 3) shows a link between the rate of HFSCs carried out and the rate of decrease of accidental dwelling fires. While not conclusive at this stage, the link will be explored further in order to help determine the strength of the correlation. This should also help to highlight the effectiveness of targeted HFSC activity.

Figure 3: Home Fire Safety Checks and Accidental Dwelling Fires 2009/10 – 2016/17

Accidental Dwelling Fires by Financial Year

Home Fire Safety Checks by Financial Year
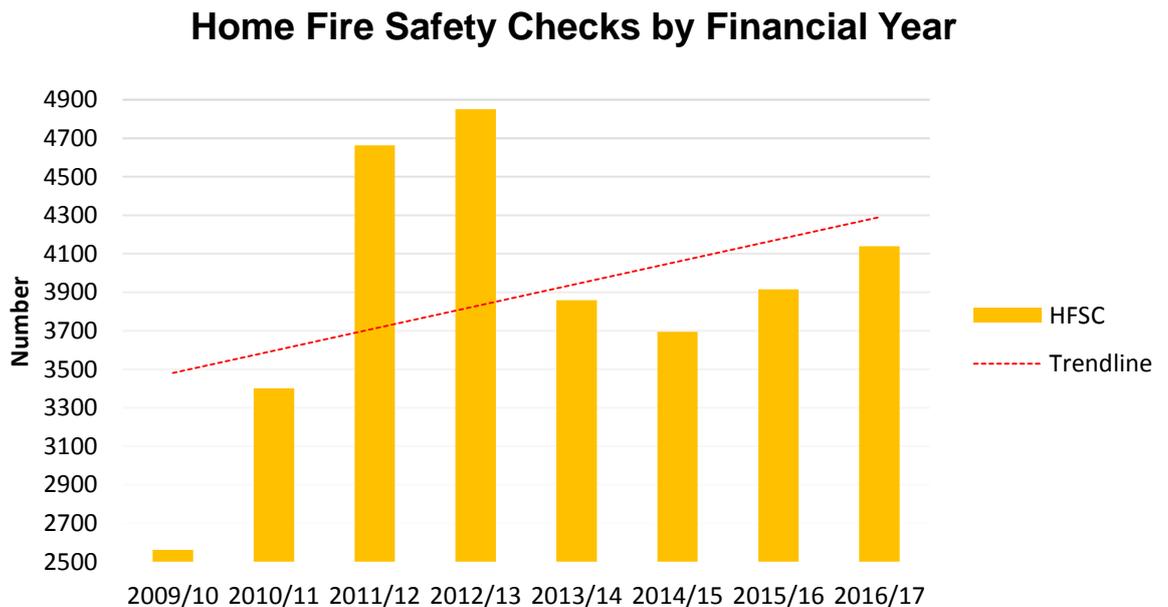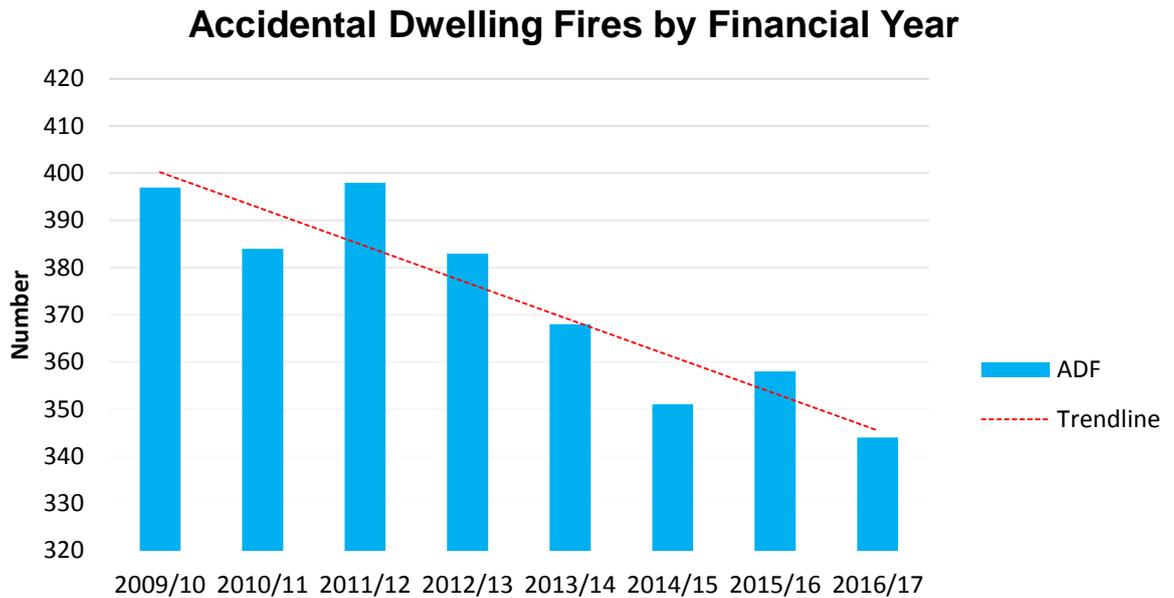
6.9. It should also be noted that over the eight year period, 2,706 households refused to have a Home Fire Safety Check carried out. When mapped, the pattern is also similar to the pattern of accidental dwelling fires. Although the numbers are relatively small, early indications are that the households refusing HFSCs tend to be those identified as most at risk of accidental dwelling fire, particularly elderly people. Further analysis will be undertaken to help to identify if these households share any other characteristics and to see if there are better ways of communicating with them.

7. At Risk Households

7.1. While the Fire Risk Map provides a visual representation of which areas are considered to be more likely to have fires than others, it cannot tell us who is going to have a fire next or where they live. In plain terms, fire can happen to anyone, anywhere.

7.2. However, we know from national and local analyses[10] of fire risk factors that some people are more at risk of fire than others. The findings point to a number of characteristics common amongst fire victims that may contribute to the incidence of fire. These characteristics can be categorised under four main headings.[11]

- lifestyle and life-stage: lifestyle is about the way people live, and how some people's way of living makes them more at risk of fire than others. Life-stage is about the stage of life a person has reached, from the very young to the very old. Lifestyle and life-stage also tells us about the person's social, educational and economic status.

- household type: the sorts of dwellings people live in, family size and make up. It relates to the characteristics of where people live, and particularly the level of (multiple) deprivation.

- vulnerability: this considers those factors that affect someone's ability to protect themselves and stay safe when a fire starts, and includes factors such as learning, physical, mental or sensory disability, and which often require a high level of care support.

- attitude and behaviour: this is about how concerned someone might be about the risk of fire, and can range from a lack of knowledge or understanding to behaviour that shows a disregard for personal safety.

7.3. Table 17 organises the main characteristics that fire victims have displayed into these four categories. These characteristics are interrelated and can often overlap into one or more categories, and a person at risk of fire might portray one or several of these characteristics.

Table 17: Summary of findings: key characteristics of fire risk

Category	Characteristics	Other factors
lifestyle and life-stage	▪ age, especially older people ▪ alcohol misuse ▪ substance (drugs) misuse ▪ smoking ▪ hoarding tendency ▪ unemployed	▪ social isolation ▪ poverty ▪ poor education

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[10] 'Learning Lessons from Real Fires: Findings from Fatal Fire Investigation Reports' (Research Bulletin no. 9, June 2006, DCLG); research carried out by Greenstreet Berman Ltd presented in 'Fire and Rescue Service partnership working toolkit for Local Area Agreements' CLG 2008; and 'Community Fire Safety – Identifying and locating those most at risk of fire' HWFRS 2011

[11] Categories drawn from 'Understanding people's attitudes towards fire risk,' DCLG, August 2008

household type	▪ single people living alone ▪ lone pensioners ▪ single parent families ▪ living in one room ▪ social renters	▪ poor living conditions ▪ levels of deprivation
vulnerability	▪ impaired mental capacity, including temporarily, such as caused by medication, alcohol or substances ▪ taking medication, particularly if more than one and if sedative ▪ sensory impairment ▪ learning disabilities ▪ poor mental or physical health ▪ lack of physical mobility ▪ age-related impairment (e.g. dementia) ▪ inability to take care of themselves ▪ possible oxygen dependence	▪ having poor or dangerous appliances ▪ having had previous fire-related incidents ▪ being known to other agencies
attitude and behaviour	▪ improper use of appliances (e.g. cooker, heating, electrical items) ▪ little or no fire safety awareness ▪ negligence or other lack of concern with own or others' personal safety	▪ not having a working smoke alarm

7.4. The research also shows that these factors not only contribute to the cause of a fire, but can also impair a person's ability to respond to a fire once it has started.

7.5. While it is not easy to pinpoint exactly where people sharing these at risk characteristics can be found, there are other sources of information that can help. One source is the Mosaic Public Sector[12] classification, which is considered below. Another source is the wealth of data held by other public sector organisations.

Mosaic Public Sector

7.6. Mosaic Public Sector draws together a wide range of data and research from numerous sources, including demographic, socio-economic and consumer data, financial measures, property characteristics, value and location. The household data is organised into lifestyle groups and types and can be pinpointed by location for all 341,898 recorded households in the two counties. There are 15 lifestyle groups and 66 types - see the Appendix for descriptions of each Mosaic lifestyle group and type and their distribution across the two counties.

7.7. The household classifications can also be indexed against other characteristics such as the likelihood of smoking in certain household types, the composition of the household and the likelihood of certain households having health issues. This helps to build a more comprehensive description of the lifestyle, behaviour and circumstances

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[12] Mosaic Public Sector is a sophisticated consumer classification model developed by the consumer credit and market research company Experian as a way of categorising lifestyles and behaviours.

of each household in the two counties. It also enables postcodes and households to be clustered into particular groupings sharing similar characteristics, so that each neighbourhood has its own profile.

7.8. By using the Mosaic Public Sector classifications and neighbourhood profiles, all household types can be plotted onto a map of Herefordshire and Worcestershire. By overlaying the locations of all accidental dwelling fires onto the same map, we can gain an understanding of how these factors combine to make some people and some areas more at risk of fire than others. It also provides an opportunity to highlight other neighbourhoods outside the identified high risk areas where fire prevention and awareness activities may also need to be targeted.

Mosaic Analysis of Accidental Dwelling Fires between 2009/10 and 2016/17

7.9. Of the 2,983 accidental dwelling fires between 2009/10 and 2016/17, 2,946 could be matched against Mosaic Public Sector classifications. In the other 37 incidents, the data available was insufficient to provide a Mosaic match.

7.10. Table 18 below shows that accidental dwelling fires (ADFs) occurred in all fifteen Mosaic lifestyle groups. Groups A (Country Living) and N (Vintage Value) had the greatest number of fires, a total of 851 or 29% of all ADFs, while Group C (City Prosperity had the least, just 6 fires or 0.2% of all ADFs.

Table 18 - Accidental Dwelling Fires 2009/10 – 2016/17 by Mosaic Lifestyle Group

	Mosaic Lifestyle Group	ADFs 2009/10 – 2016/17	% of all ADFs
A	Country Living	445	15.1%
B	Prestige Positions	146	5.0%
C	City Prosperity	6	0.2%
D	Domestic Success	109	3.7%
E	Suburban Stability	176	6.0%
F	Senior Security	157	5.3%
G	Rural Reality	196	6.7%
H	Aspiring Homemakers	228	7.7%
I	Urban Cohesion	25	0.8%
J	Rental Hubs	144	4.9%
K	Modest Traditions	120	4.1%
L	Transient Renters	235	8.0%
M	Family Basics	346	11.7%
N	Vintage Value	406	13.8%
O	Municipal Challenge	207	7.0%
		2,946	

ADF = Accidental Dwelling Fire

7.11. However, while this shows which Mosaic groups had accidental dwelling fires and how many, it does not identify the relative risks of fire between the groups. To do this, the data needs to add in the number of households represented in each group across the two counties. By comparing the number of accidental dwelling fires in each group with the number of households in the same group, the relative risks can be identified. This is shown in Table 19 below, which uses mid-year estimates of household numbers for 2016 to measure the relative fire risk of each group.

Table 19 - ADFs 2009/10 – 2016/17 by Mosaic Lifestyle Group and all households in Herefordshire and Worcestershire

	Mosaic Lifestyle Group	ADFs 2009/10 - 2016/17	Households in each Group	Risk Score
A	Country Living	445	60,504	85.4%
B	Prestige Positions	146	29,784	56.9%
C	City Prosperity	6	244	285.4%
D	Domestic Success	109	22,975	55.1%
E	Suburban Stability	176	33,030	61.8%
F	Senior Security	157	34,205	53.3%
G	Rural Reality	196	25,843	88.0%
H	Aspiring Homemakers	228	34,612	76.4%
I	Urban Cohesion	25	2,884	100.6%
J	Rental Hubs	144	11,141	150.0%
K	Modest Traditions	120	18,384	75.8%
L	Transient Renters	235	17,886	152.5%
M	Family Basics	346	22,785	176.2%
N	Vintage Value	406	19,839	237.5%
O	Municipal Challenge	207	7,782	308.7%
		2,946	**341,898**	

7.12. Table 19 shows that while Group A and N households had similar number of accidental dwelling fires, Group N households are more than twice as likely to have a fire than Group A. Group O households can be seen as at greatest risk, because of the relative number of fires per household that make up that Group – one in every 37 Group O households had an accidental dwelling fire in the eight year period, compared to one in every 218 Group F households.

7.13. Although most accidental dwelling fires occurred in Group A, N and M households, Group O, C and N households are seen to be most at risk of fire across the two counties. It should be noted, that there are only 244 households in Group C and only six accidental dwelling fires over the last eight years, so it tends to skew the overall risk scores.

7.14. It can be seen that, apart from Group C households, those households that share characteristics of higher levels of dependency, deprivation and vulnerability (Groups O, N and M) are those most at risk of fire. While households in these groups form just 15% of all households in the two counties, they accounted for 32% of all accidental dwelling fires. Figure 4 below provides a visual representation of the relative incidence of accidental dwelling fires in the 15 Mosaic Groups. The 100% line represents the number of accidental dwelling fires that would be expected if all things were equal. This shows that Mosaic Groups O, C, N, M, L, J and I each had a higher than expected number of fires.

Figure 4: Distribution of Accidental Dwelling Fires by Mosaic Group 2009/10 – 2016/17
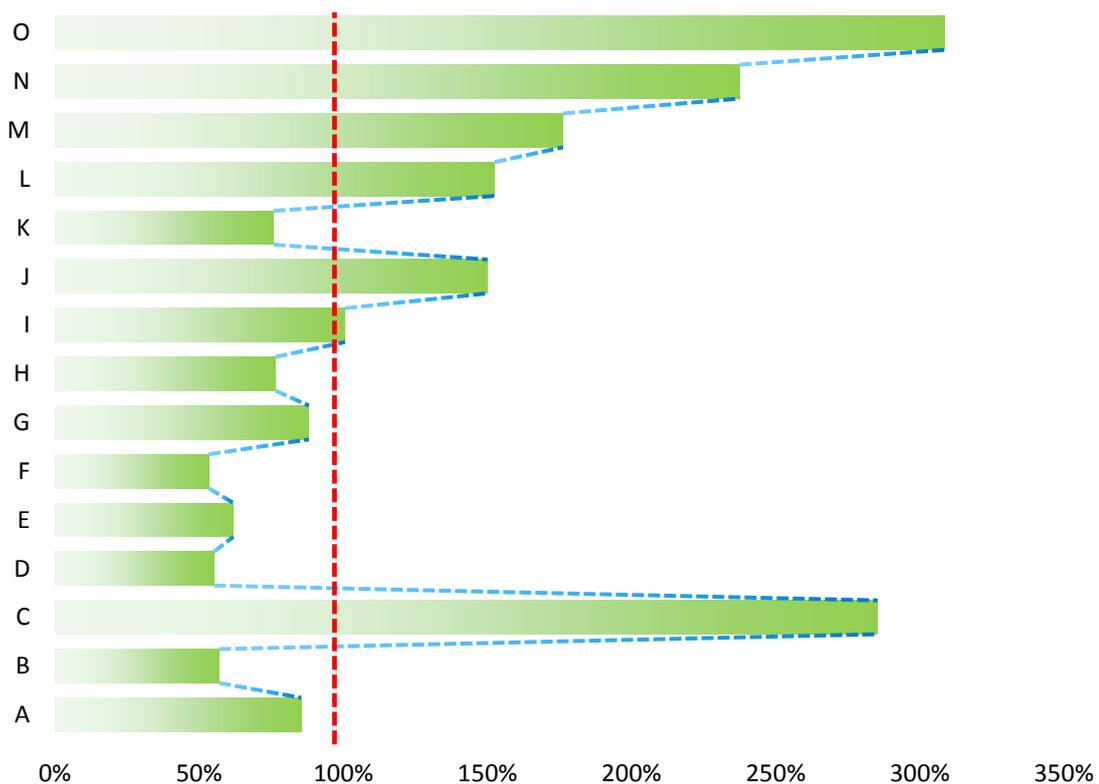
7.15. Table 20 below shows the household types within Groups O, N and M with a list of typical groups most a risk of fire[13] and shows a considerable similarity between the two. Among the chief characteristics of these groups are higher than average levels of dependency, disadvantage and vulnerability. Targeting home fire prevention and community safety activities towards these groups, therefore, is likely to assist in reducing their level of fire risk. Group C household types has also been added to the list to show that their main characteristics are not normally typical of those most at risk of fire. Further analysis of the six accidental dwelling fires experienced by Group C households reveals that at least four of them involved elderly occupants, one of whom had a level of impairment. This suggests that there can be variations within Groups that may show atypical characteristics within households.

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[13] These groups were presented as generic 'case-study' groups in 'Learning Lessons from Real Fires: Findings from Fatal Fire Investigation Reports' (Research Bulletin no. 9, June 2006, DCLG)

Table 20 - Group O, N, M and C household types and typical groups at most risk of fire

Mosaic Lifestyle Group households		Typical at risk groups
Group O	• older social renters settled in low value homes in communities where employment is harder to find • hard-pressed singles in low cost social flats searching for opportunities • renters of social flats in high rise blocks where levels of need are significant • multi-cultural households with children renting social flats in over-crowded conditions • long-term renters of inner city social flats who have witnessed many changes	• elderly men with limited mobility, who smoke and who may be impaired by alcohol • depressed middle-aged persons, who are all alone at home • struggling single-parent families • single elderly women with limited mobility, living alone and impaired in some way, with fire due to careless use of cigarettes or cooking • all age groups - those who fall asleep with no functioning smoke alarm • young or middle aged adults, with fire due to careless use of cigarettes (with or without alcohol) • young adults coming in after a night out drinking, making themselves some food and leaving the stove unattended
Group N	• deep-rooted single elderly owners of low value properties whose modest home equity provides some security • supported elders in specialised accommodation including retirement homes and complexes of small homes • penny-wise elderly singles renting in developments of compact social homes • ageing social renters with high levels of need in centrally located developments of small units • long-standing elderly renters of social homes who have seen neighbours change to a mix of owners and renters	
Group M	• families supporting both adult and younger children where expenditure can exceed income • younger families with children who own a budget home and are striving to cover all expenses • families with many children living in areas of high deprivation and who need support • stable families with children renting better quality homes from social landlords	

Group C	- global high flyers and families of privilege living luxurious lifestyles in the most exclusive locations of the largest cities
	- city workers renting premium-priced flats in prestige central locations, living life with intensity
	- ambitious people in their 20s and 30s renting expensive apartments in highly commutable areas of major cities
	- high status households owning elegant homes in accessible inner city suburbs where they enjoy city life in comfort

> **Note**:
>
> Matching incidents against Mosaic provides a detailed and fairly accurate understanding of household circumstances. It fairly accurate because not all of the addresses of incidents recorded in the incident logs can be matched with the addresses listed in Mosaic. Among the reasons for this are instances where some addresses of flats/apartments are not recorded in the incident reports (instead a general building address is given); some addresses are on caravan sites; some house names have changed or cannot be found; and some buildings no longer exist following the fire incident. In addition, the Mosaic classifications used relates to 2016 data, while the fire incident data covers an eight year range. This may also affect the matching to a small extent, as some people are likely to have moved house during this period.
>
> Therefore, the Mosaic matched information for some households provides a close approximation rather than a definitive match. With almost 3,000 matched incidents examined, however, the analysis is able to provide a high level of confidence.

Information held by other agencies

7.16. Using national trends and fire statistics, local incident data, Mosaic and deprivation data, helps to identify which groups need to be targeted and where they are most likely to live. However, experience shows that these groups are also often very hard to reach. In many cases, door-knocking is not necessarily the answer.

7.17. One way of addressing this is by using Experian's Mosaic model of lifestyles and behaviour, which gives in depth guidance on how best to access each group, such as where their interests lie, and which forms of communication they are most likely to respond to.

7.18. An additional way is to consider the wealth of data held by other public sector organisations, many of whom work with the same at risk groups, and to develop ways of sharing information to identify those people who are likely to be at most risk. For instance, the analysis by the Fire and Rescue Service may reveal a local neighbourhood with a high concentration of households at a potentially high risk of

accidental dwelling fire. Additional intelligence from other agencies might be able to highlight which of these households are likely to be more vulnerable than others, such as if they contain people with limited mobility or mental health issues or whether they are heavy smokers or not.

7.19. Information held by other agencies may be of a personal, confidential and sensitive nature, and will not normally be accessible to Fire and Rescue Services. This is an area that the Fire and Rescue Service and its public sector partners are exploring, in order to find ways of sharing appropriate information that helps to improve how vulnerable and at risk groups are targeted and reached. Current examples include Signposting work in Herefordshire, where there are information sharing protocols and the WODA initiative in Worcestershire. WODA (Worcestershire Office of Data and Analytics) is an initiative to develop an information sharing portal. Partners involved include Worcestershire County Council, Wychavon District Council, Police, Fire, Ambulance and the NHS. The portal will be a platform for partners to share information including fire safety, safeguarding, and the Safe and Well pilot.

8.   Road Traffic Collisions

8.1.   The incidence of road traffic collisions (RTCs), and the injuries or fatalities in those RTCs, is a further factor in assessing the overall risk across the two counties. It should be stressed that this review covers those RTCs requiring attendance by the Fire and Rescue Service, and that there are many more RTCs in the two counties that the Fire and Rescue Service is not required to attend. In the following section, the term RTC is used to relate only to those incidents attended by the Fire and Rescue Service.

8.2.   Between 2009/10 and 2016/17, the Fire and Rescue Service attended almost 5,000 RTCs[14], with close to a quarter of these involving serious injuries[15] or fatalities.

8.3.   An RTC risk model has been developed to examine the likelihood of an RTC occurring in a particular area against the potential of being seriously injured or killed in that RTC. The model uses fire station grounds as the most appropriate areas for analysis, and involves an assessment of four factors:

    a.   the number of RTC incidents attended per fire station ground

    b.   the number of RTC incidents involving serious injury

    c.   the number of RTC incidents involving fatalities

    d.   the rate of RTCs involving serious injuries and fatalities per fire station ground

8.4.   The first factor gives the number of RTCs attended by the Service in each fire station ground over eight years, and provides a measure of the likelihood of an RTC incident occurring in that area. The other three factors provide a measure of the potential severity of the incident: factors b and c ensure that the model reflects the importance attached to reducing injuries and fatalities, while the final factor adds an overall incidence rate for both injuries and fatalities in each fire station ground.

Table 21: Road Traffic Collisions attended by fire station ground

a. Number of RTC incidents attended (per fire station ground)		
Calculation	**Description**	**Risk score**
no. of RTC incidents attended (averaged over 8 years)	Average no. of RTCs attended per year:	
	- 59 or more	3
	- less than 59	2
	- less than 29	1

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[14] The Fire and Rescue Service attended 4,961 RTC incidents between 1 April 2009 and 31 March 2017. Of these, 1,054 involved serious injuries and 108 involved fatalities.
[15] A serious injury is one which requires at least an overnight stay in hospital. The severity of an injury is determined by the officer in charge at the scene, supported by medical judgement where available.

Table 22: Road Traffic Collisions attended involving serious injury by fire station ground

b. Number of RTC incidents involving serious injury (per fire station ground)		
Calculation	**Description**	**Risk score**
no. of RTCs involving serious injury (total over 8 years)	No. of RTCs involving serious injury:	
	- 71 or more	3
	- less than 71	2
	- less than 36	1

Table 23: Road Traffic Collisions attended involving fatality by fire station ground

c. Number of RTC incidents involving fatality (per fire station ground)		
Calculation	**Description**	**Risk score**
no. of RTCs involving serious injury (total over 8 years)	No. of RTCs involving fatality:	
	- 13 or more	3
	- less than 13	2
	- less than 7	1

Table 24: Road Traffic Collisions attended involving fatality by fire station ground

d. Rate of RTC incidents involving serious injury and fatality (per fire station ground)		
Calculation	**Description**	**Risk score**
rate of RTCs involving serious injury and fatality (over 8 years)	Rate of RTCs involving serious injury and fatality:	
	- greater than 63%	3
	- between 31% and 62%	2
	- less than 31%	1

8.5. A composite score for the three severity factors (b, c and d) was derived by simply adding the three scores together and dividing by three. Final scores were then rounded to avoid fractions.

8.6. An overall risk score was then determined by using the Service's Risk Rating Matrix,[16] as below:

		Likelihood		
		unlikely	likely	highly likely
Severity	slightly harmful	1	2	3
	harmful	2	4	6
	extremely harmful	3	6	9

8.7. The formula can be expressed as follows:

$$\text{No. RTCs} \times \frac{\left(\text{Risk of RTCs with serious injury} + \text{Risk of RTCs with fatality} + \text{Risk of RTCs with serious injury and fatality} \right)}{3} = \text{RTC Risk Score}$$
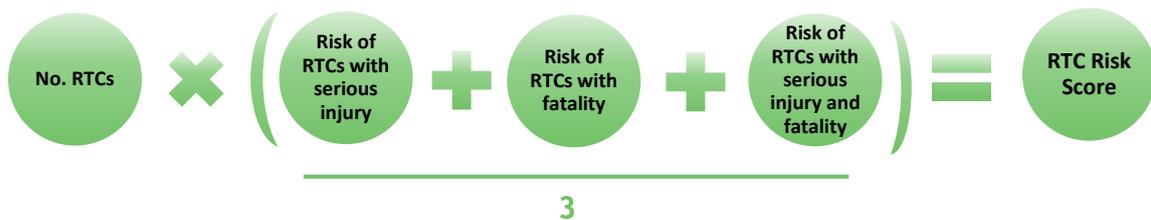
8.8. Using this formula the following table shows the results for each fire station in the two counties. The list is similar to the one presented in the 2012 Review except for Hereford fire station area, which has moved down from High risk to Medium.

Table 25: RTC Risk Rating for each Fire Station Ground 2009/10 – 2016/17

Fire Station Ground	No. RTCs 2009/10 – 2016/17	Likelihood Score	No. RTCs with serious injury	No. RTCs with fatality	Severity Score	RTC Risk Rating	
Station						*Score*	*Grade*
Bromsgrove	477	3	88	9	2	6	High
Redditch	592	3	98	8	2	6	High
Worcester	620	3	117	7	2	5	High
Kidderminster	420	2	79	15	2	5	High
Droitwich	331	2	111	5	2	4	Medium
Hereford	354	2	75	11	2	4	Medium

[16] taken from HWFRS Service Policy/Instructions No.6, Section C, Part 9: Health and Safety Policies, Risk Assessment Procedure for Operational and Non-Operational Activities v4.00.

Malvern	232	1	41	2	1	4	Medium
Evesham	204	1	44	9	2	2	Low
Kingsland	80	1	39	5	2	2	Low
Ledbury	150	1	46	5	2	2	Low
Leominster	145	1	42	4	2	2	Low
Fownhope	35	1	22	0	1	1	Low
Pebworth	16	1	8	0	1	1	Low
Ross-on-Wye	164	1	45	1	1	1	Low
Bewdley	97	1	22	3	1	1	Low
Broadway	43	1	4	0	1	1	Low
Bromyard	174	1	22	0	1	1	Low
Eardisley	51	1	13	1	1	1	Low
Ewyas Harold	46	1	13	0	1	1	Low
Kington	45	1	11	1	1	1	Low
Leintwardine	28	1	4	2	1	1	Low
Pershore	111	1	18	7	1	1	Low
Peterchurch	41	1	4	2	1	1	Low
Stourport	165	1	27	4	1	1	Low
Tenbury	62	1	15	1	1	1	Low
Upton upon Severn	132	1	18	5	1	1	Low
Whitchurch	146	1	28	1	1	1	Low

8.9. The following map (Map 11) provides a visual representation of the RTC risk ratings across the two counties. The map also shows that the higher risk areas are generally within the main urban centres across the two counties and along the M5/M42 motorway corridors.

Map 11: Herefordshire and Worcestershire RTC Risk Map 2009/10 – 2016/17

Key
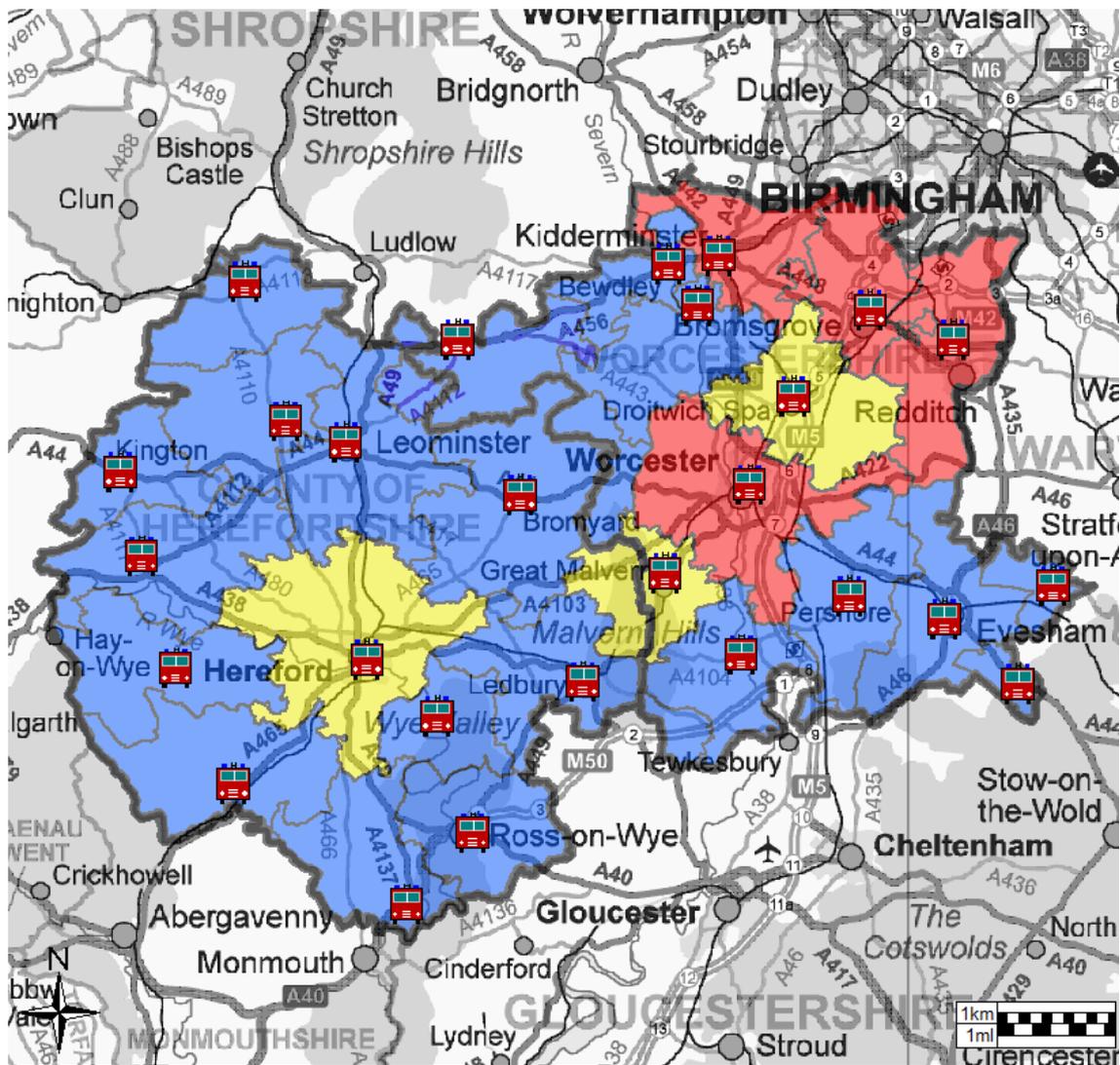
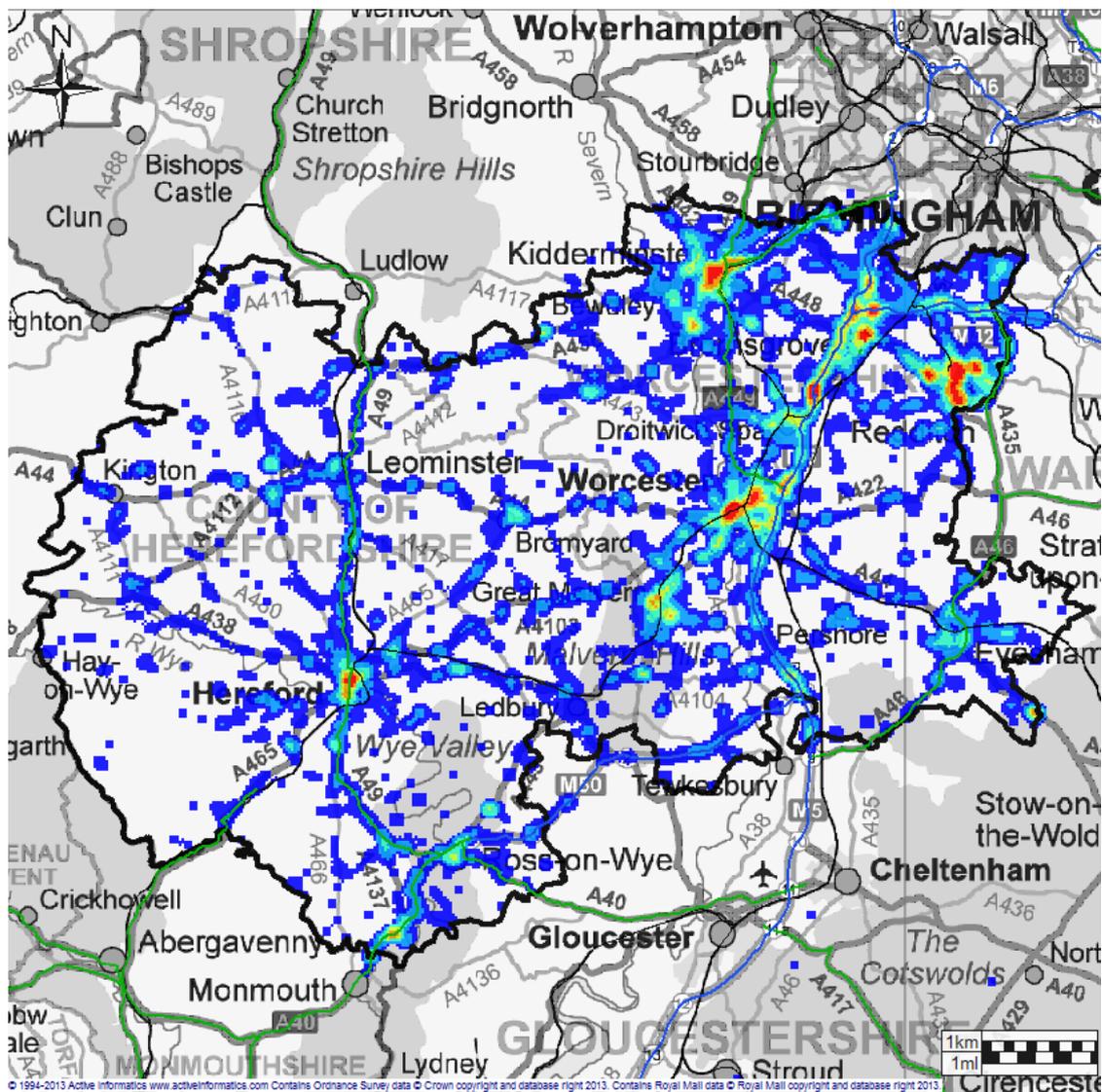| Risk Grade	Number of Fire Station Grounds
High	4
Medium	3
Low	20

8.10. The following hotspot map (Map 12) shows where the majority of incidents occurred between 2009-10 and 2016-17, and gives a similar picture to Map 11.

Map 12: Hotspot map of RTC incidents over 8 years (2009/10 - 2016/17)

Key	Incident Intensity
	0 to 2.9
	3 to 5.9
	6 to 8.9
	9 to 11.9
	12 to 14.9
	15 and over

8.11. Using the same RTC risk formula and applying it to just the last three years, 2014/15 – 2016-17, shows that there are now no areas at High risk, while Bromsgrove, Kidderminster and Hereford fire station areas have moved to Low risk. This can be seen in Table 26 and Map 13 below.

Table 26: RTC Risk Rating for each Fire Station Ground 2014/15 – 2016/17

Fire Station Ground	No. RTCs 2014/15 – 2016/17	Likelihood Score	No. RTCs with serious injury	No. RTCs with fatality	Severity Score	RTC Risk Rating	
Station						*Score*	*Grade*
Droitwich	124	2	53	0	2	4	Medium
Malvern	88	2	11	1	2	4	Medium
Redditch	193	3	7	3	2	3	Medium
Worcester	219	3	44	2	2	3	Medium
Bewdley	30	1	4	1	1	1	Low
Bromsgrove	172	2	30	4	2	2	Low
Broadway	14	1	0	0	1	1	Low
Bromyard	66	1	2	0	1	1	Low
Eardisley	21	1	5	0	1	1	Low
Evesham	81	1	27	6	2	1	Low
Ewyas Harold	12	1	2	0	1	1	Low
Fownhope	17	1	22	0	2	2	Low
Hereford	125	2	26	7	2	2	Low
Kidderminster	150	2	20	4	1	2	Low
Kingsland	26	1	16	1	2	2	Low
Kington	22	1	3	1	1	1	Low
Ledbury	56	1	10	2	1	1	Low
Leintwardine	9	1	2	0	1	1	Low
Leominster	47	1	18	3	1	1	Low
Pebworth	6	1	4	0	2	2	Low
Pershore	41	1	4	1	1	1	Low
Peterchurch	12	1	0	0	1	1	Low
Ross-on-Wye	66	1	17	0	1	1	Low
Stourport	55	1	4	2	1	1	Low
Tenbury	18	1	5	1	1	1	Low
Upton upon Severn	40	1	7	1	1	1	Low
Whitchurch	45	1	14	0	1	1	Low

Map 13: Herefordshire and Worcestershire RTC Risk Map 2014/15 – 2016/17

Key
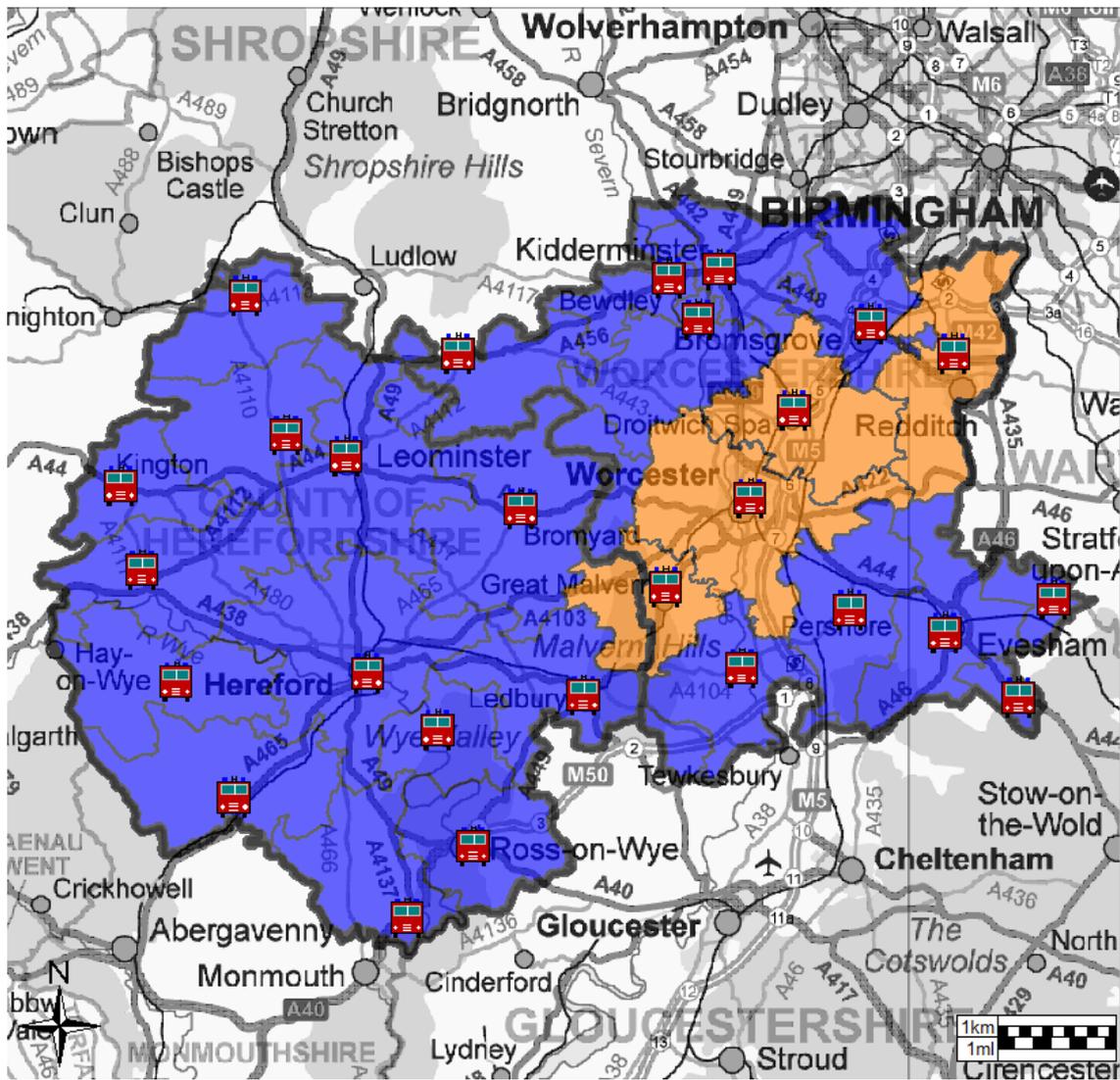
Risk Grade	Number of Fire Station Grounds
High	0
Medium	4
Low	23

8.12. While there continues to be a general reduction in the number of RTCs attended over the last eight years, it is important not to become complacent. In the last three years, the RTCs attended involved 357 injuries and 40 fatalities. Therefore, the Service continues to work closely with road safety partners to help reduce the number of road traffic collisions across the two counties. The maps and data are important in supporting the ongoing road safety work with local authority and road safety agencies

across the two counties. Closer examination of incident types and locations over time will continue to help to identify particular accident hotspots for remedial works.

Mosaic Public Sector classifications 2017

A	**Country Living**	
	A01	**Rural Vogue**: Country-loving families pursuing a rural idyll in comfortable village homes while commuting some distance to work
	A02	**Scattered Homesteads**: Older households appreciating rural calm in stand-alone house within agricultural landscapes
	A03	**Wealthy Landowners**: Prosperous owners of country houses including rural upper class, successful farmers and second-home owners
	A04	**Village Retirement**: Retirees enjoying pleasant village locations with amenities to service their social and practical needs
B	**Prestige Positions**	
	B05	**Empty-Nest Adventure**: Mature couples in comfortable detached houses who have the means to enjoy their empty-nest status
	B06	**Bank of Mum and Dad**: Well-off families in upmarket suburban homes where grown-up children benefit from continued financial support
	B07	**Alpha Families**: High-achieving families living fast-track lives, advancing careers, finances and their school-age children's development
	B08	**Premium Fortunes**: Influential families with substantial income established in large, distinctive homes in wealthy enclaves
	B09	**Diamond Days**: Retired residents in sizeable homes whose finances are secured by significant assests and generous pensions
C	**City Prosperity**	
	C10	**World Class Wealth**: Global high flyers and families of privilege living luxurious lifestyles in the most exclusive locations of the largest cities
	C11	**Penthouse Chic**: City workers renting premium-priced flats in prestige central locations, living life with intensity
	C12	**Metro High-Flyers**: Ambitious people in their 20s and 30s renting expensive apartments in highly commutable areas of major cities
	C13	**Uptown Elite**: High status households owning elegant homes in accessible inner city suburbs where they enjoy city life in comfort
D	**Domestic Success**	
	D14	**Cafes and Catchments**: Affluent families with growing children living in upmarket housing in city environs
	D15	**Modern Parents**: Busy couples in modern detached homes juggling the demands of school-age children and careers
	D16	**Mid-Career Convention**: Professional families with children in traditional mid-range suburbs where neighbours are often older
	D17	**Thriving Independence**: Well-qualified older singles with incomes from successful professional careers in good quality housing
E	**Suburban Stability**	
	E18	**Dependable Me**: Single mature owners settled in traditional suburban semis working in intermediate occupations
	E19	**Fledgling Free**: Pre-retirement couples with respectable incomes enjoying greater space and spare cash since children left home
	E20	**Boomerang Boarders**: Long-term couples with mid-range incomes whose adult children have returned to the shelter of the family home
	E21	**Family Ties**: Active families with teens and adult children whose prolonged support is eating up household resources
F	**Senior Security**	
	F22	**Legacy Elders**: Time-honoured elders now mostly living alone in comfortable suburban homes on final salary pensions

F23 **Solo Retirees**: Senior singles whose reduced incomes are satisfactory in their affordable but pleasant owned homes

F24 **Bungalow Haven**: Peace-seeking seniors appreciating the calm of bungalow estates designed for the elderly

F25 **Classic Grandparents**: Lifelong couples in standard suburban homes enjoying retirement through grandchildren and gardening

G Rural Reality

G26 **Far-Flung Outposts**: Inter-dependent households living in the most remote communities with long travel times to larger towns

G27 **Outlying Seniors**: Pensioners living in inexpensive housing in out of the way locations

G28 **Local Focus**: Rural families in affordable village homes who are reliant on the local economy for jobs

G29 **Satellite Settlers**: Mature households living in expanding developments around larger villages with good transport links

H Aspiring Homemakers

H30 **Affordable Fringe**: Settled families with children owning modest, 3-bed semis in areas where there's more house for less money

H31 **First Rung Futures**: Pre-family newcomers who have bought value homes with space to grow in affordable but pleasant areas

H32 **Flying Solo**: Bright young singles on starter salaries choosing to rent homes in family suburbs

H33 **New Foundations**: Occupants of brand new homes who are often younger singles or couples with children

H34 **Contemporary Starts**: Fashion-conscious young singles and partners setting up home in developments attractive to their peers

H35 **Primary Ambitions**: Forward-thinking younger families who sought affordable homes in good suburbs which they may now be out-growing

I Urban Cohesion

I36 **Cultural Comfort**: Thriving families with good incomes in multi-cultural urban communities

I37 **Community Elders**: Established older households owning city homes in diverse neighbourhoods

I38 **Asian Heritage**: Large extended families in neighbourhoods with a strong South Asian tradition

I39 **Ageing Access**: Older residents owning small inner suburban properties with good access to amenities

J Rental Hubs

J40 **Career Builders**: Motivated singles and couples in their 20s and 30s progressing in their field of work from commutable properties

J41 **Central Pulse**: Entertainment-seeking youngsters renting city centre flats in vibrant locations close to jobs and night life

J42 **Learners & Earners**: Inhabitants of the university fringe where students and older residents mix in cosmopolitan locations

J43 **Student Scene**: Students living in high density accommodation close to universities and educational centres

J44 **Flexible Workforce**: Self-starting young renters ready to move to follow worthwhile incomes from service sector jobs

J45 **Bus-Route Renters**: Singles renting affordable private flats away from central amenities and often on main roads

K Modest Traditions

K46 **Self Supporters**: Hard-working mature singles who own budget terraces manageable within their modest wage

K47 **Offspring Overspill**: Lower income owners whose adult children are still striving to gain independence meaning space is limited

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K48	**Down-to-Earth Owners**: Ageing couples who have owned their inexpensive home for many years while working in routine jobs	

L	**Transient Renters**
L49	**Disconnected Youth**: Young people endeavouring to gain employment footholds while renting cheap flats and terraces
L50	**Renting a Room**: Transient renters of low cost accommodation often within subdivided older properties
L51	**Make Do & Move On**: Yet to settle younger singles and couples making interim homes in low cost properties
L52	**Mid-life Stopgap**: Maturing singles in employment who are renting short-term affordable homes

M	**Family Basics**
M53	**Budget Generations**: Families supporting both adult and younger children where expenditure can exceed income
M54	**Childcare Squeeze**: Younger families with children who own a budget home and are striving to cover all expenses
M55	**Families with Needs**: Families with many children living in areas of high deprivation and who need support
M56	**Solid Economy**: Stable families with children renting better quality homes from social landlords

N	**Vintage Value**
N57	**Seasoned Survivors**: Deep-rooted single elderly owners of low value properties whose modest home equity provides some security
N58	**Aided Elderly**: Supported elders in specialised accommodation including retirement homes and complexes of small homes
N59	**Pocket Pensions**: Penny-wise elderly singles renting in developments of compact social homes
N60	**Dependent Greys**: Ageing social renters with high levels of need in centrally located developments of small units
N61	**Estate Veterans**: Long-standing elderly renters of social homes who have seen neighbours change to a mix of owners and renters

O	**Municipal Challenge**
O62	**Low Income Workers**: Older social renters settled in low value homes in communities where employment is harder to find
O63	**Streetwise Singles**: Hard-pressed singles in low cost social flats searching for opportunities
O64	**High Rise Residents**: Renters of social flats in high rise blocks where levels of need are significant
O65	**Crowded Kaleidoscope**: Multi-cultural households with children renting social flats in over-crowded conditions
O66	**Inner City Stalwarts**: Long-term renters of inner city social flats who have witnessed many changes

	Household proportions by Mosaic Groups 2017	**H&W %**	**UK %**
A	Country Living	17.70	6.49
B	Prestige Positions	8.71	9.01
C	City Prosperity	0.07	3.97
D	Domestic Success	6.72	7.05
E	Suburban Stability	9.66	10.32
F	Senior Security	10.00	6.58

G	Rural Reality	7.56	5.55
H	Aspiring Home Makers	10.12	8.17
I	Urban Cohesion	0.84	5.37
J	Rental Hubs	3.26	6.43
K	Modest Traditions	5.38	5.95
L	Transient Renters	5.23	5.95
M	Family Basics	6.66	8.84
N	Vintage Value	5.80	4.73
O	Municipal Challenge	2.28	5.69
	Total number of households	**342,000**	**27,000,000**