SURREY
COUNTY COUNCIL

Community Risk Profile

Surrey Fire and Rescue Service

Introduction

Welcome to Surrey Fire and Rescue Service's Community Risk Profile. Surrey Fire and Rescue Service is part of Surrey County Council.

The Fire and Rescue Services Act of 2004 requires us, as a fire and rescue service, to:

- Protect life and property in the event of fires in our area.
- Extinguish fires in our area.
- Rescue and protect people in the event of a road traffic collision.
- Rescue and protect people in the event of other emergencies.

Other emergencies can include, but are not limited to:

- natural disasters such as flooding
- incidents arising from acts of terrorism
- hazardous materials incidents
- transportation incidents
- national emergencies (such as the COVID-19 pandemic).

The Community Risk Profile (CRP) is our assessment of the risks facing communities in Surrey based on our analysis of available data. Fires, floods, road traffic collisions and other emergencies can have devastating consequences for individuals, businesses and communities. By understanding these risks, we can plan for how to use our resources to reduce the occurrence and impact of incidents across Surrey. This contributes to the achievement of Surrey County Council's vision:

All sorts of things can affect risk, some are obvious, some less so, and in this CRP we've tried to capture all the things that we need to consider when we're assessing risk. We have included data about the population, past incidents, the natural environment and buildings in Surrey. We have highlighted any trends and any information we have about future predictions, eg about population. As we go through, we'll explain why we've included the information and what it tells us about the risk. The risk might be to residents, people passing through Surrey or to firefighters.

Much of the data we analyse changes over time. We will review this document annually and update it with newer data.

The CRP does not include information about how we manage the risk we've identified. Our Community Risk Management Plan, our strategies and our team, borough and station plans

describe the prevention, protection and response activities we use to reduce both the demand from fires and other incidents and the impact of risk on our firefighters and communities.

Methodology and Data Sources

There is no single methodology for identifying levels of risk and their distribution in the county. For example, the National Fire Chiefs Council (NFCC) have developed an approach specifically for identifying and weighting risks in relation to accidental dwelling fires. The Service also has a well-established methodology in relation to identifying risk levels of business premises. We will set out the detail of these methodologies and those used for other types of risk in the relevant chapters.

Types of Risk

We allocate risks in Surrey to one of four major categories (as visualised in the picture below):

- **People** – those fire risks that are associated, on average, with specific characteristics that people may have such as the age group which they fall into, or their level of mobility, or whether they smoke, etc.
- **Places** – risks that are associated with the certain features in the built and non-built environment. For example, some roads are more likely to be the scene of road traffic collisions, or some areas of land with housing developments are more prone to flooding.
- **Premises** – those fire risks that are associated with certain features within premises, or because of the special value of those sites. For example, some non-domestic premises will attract a higher risk if they include facilities for sleeping on site. High-rise developments are associated with different risks that come from safe exit and building access. Heritage sites may hold a higher value than non-heritage buildings in both fabric and contents.
- **Products** – those fire risks that occur as the result of:
  - New product developments with a unique profile of risk, or specific makes of a product being recalled due to known occurrences of incidents eg mobile phones or chargers overheating, faulty tumble dryers, alternative fuelled vehicles.
  - Existing products which can cause risk if not used with proper care eg candles, cigarettes.

Data Sources

Risk assessments are based on a mixture of historical incident data and data about other known factors that can contribute to risk. Looking at patterns of the past can help us predict future likelihood. The presence of other known risk factors, where possible broken down to a small area of land, can help us identify where future incidents might take place. We have listed all the data sources we have used in Appendix 1.

People Risks

What we mean by people risks is the risk that people are at from fire, particularly accidental fires in the home because these can have a big impact on people's physical wellbeing and/or their material assets.

In addition, this section will also look at the risk of deliberate fires started with malicious intent.

The Home Office collects data from every Fire and Rescue Service in England and Wales on a range of incidents including dwelling fires. When we compare the number of dwelling fires per 1000 people with those reported by other services, the number for Surrey is below the average. There is a graph in Appendix 5 which shows the number of primary dwelling fires in Surrey per 1000 population in the years between 2002 and 2021. In 2002 it was 1.5 primary dwelling fires per 1000 people; in 2022 it had reduced to 0.9 dwelling fires per 1000 people.

We know from national and local research that some of the factors that affect people's vulnerability to fire include characteristics relating to age and health. We therefore look at data about the population of Surrey to assess risk. In this section we look at the population, where people live, who is vulnerable to a fire, what are the main causes of a fire in a home, and where those vulnerable to a fire live.

The population of Surrey and where people live

The 2021 Census records a population of 1,203,100 for Surrey, a 6.2% increase on the 2011 Census figure. This growth rate is slightly lower than the one for the whole of England of 6.6%. There are approximately 481,000 households in Surrey, up 5.7% from the number in 2011.

We look at data about where people live in Surrey as we want to be in the best locations to deliver our prevention work and our response to any incidents.

The largest local authorities by population from the 2021 Census are Reigate and Banstead (150,900) and Guildford (143,600), with the smallest being Epsom and Ewell (80,900). The most densely populated area is Epsom and Ewell, with an average population of over 2,000 people per square kilometre of land.

The map that follows shows that our fire stations are in the places where people live.

Heatmap showing density of domestic dwellings in Surrey (Mosaic data 2018) and distribution of fire stations

Heat map where dark blue is highest concentration of domestic dwellings. This is around clustering of larger towns and villages, which is more generally more intense in the north of the county.

People vulnerable to a fire

Historic fatal fire analysis has shown the following factors affect a person's vulnerability to fire and to the risk of injury or death in the event of a fire:

- Smokes in their home
- Is over the age of 60
- Lives alone
- Has: a) limited mobility, b) a hearing impairment or c) is blind or partially sighted
- Would have difficulty responding to, or escaping from, a fire
- Has had a fire before, or shows signs of burns or scorching in the home
- Has learning disabilities
- Is supported by family, carers and friends
- Shows signs of neglect or abuse by others
- Has a mental health condition such as dementia or depression
- Has drug or alcohol dependencies
- Doesn't have an alarm in all areas where a fire might start
- Collects or hoards in their home

- Shares a home with a child or young person who sets fires.

The number of domestic dwelling fire fatalities in Surrey every year is very low and is lower than the national average. We analysed 21 fires in Surrey between 1 April 2017 and 31 March 2022 that resulted in the deaths of 24 people. Fourteen of those deaths were accidental and in half of those cases, hoarding was an issue. Six of those who died in accidental fires were smokers and smoking materials caused five of those fires, with no cause being established for the sixth fire. Of the 10 victims whose deaths were not deemed accidental, 6 had committed suicide, 1 was an unlawful killing and an open verdict was returned in 3 cases.

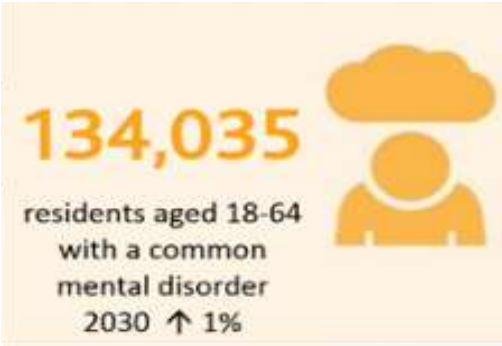
All the fatal fires, however caused, included at least one of the risk factors listed below and more than half the victims were known to Surrey County Council's Adult Social Care team:

- Aged over 60
- Alcohol dependency
- Alzheimer's
- Anxiety/depression
- Mobility issues.

This is consistent with the national research.

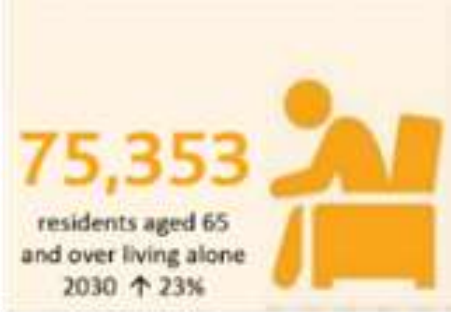
The graphics below show how many people there were in Surrey in 2020 with some of the characteristics listed above and the percentage increase expected by 2030. A significant increase in those aged over 65, living alone, unable to self-care, having a limiting long-term illness, and potentially having dementia is forecast.

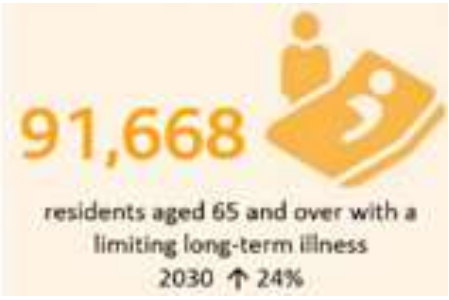
Poor mental health is a contributory factor to fire deaths. Those with dementia may be more at risk of causing accidental fires and may be less able to self-rescue or respond to smoke alarms when they do. Dementia is an increasingly prevalent condition, and one that is expected to rise. The number of people aged 65 and over with dementia in Surrey is predicted to increase from an estimated 17,700 in 2020 to 22,672 in 2030, a rise of 28%.



It is estimated those under 65 suffering from a common mental disorder are 134,035 in 2020 and this will rise by 1% by 2030.

As more people are supported to live at home for longer, the risks increase for those who are vulnerable. It is projected those living alone aged 65 and over will increase by 23% from 75,353 in 2020.



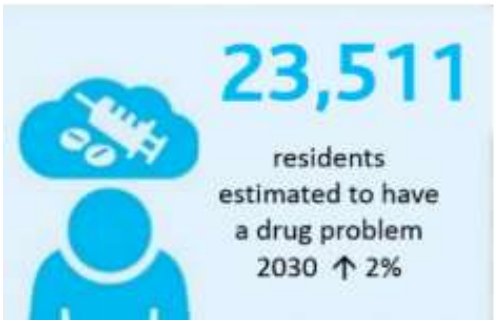


People with mobility issues may find it harder to self-rescue and may suffer from slips, trips and falls. Residents aged 65 and over with a limiting long-term illness are predicted to increase from 91,688 in 2020 to 113,528 by 2030 (an increase of 24%).

Likewise, those unable to manage at least one self-care task on their own increases by 27% from 65,565 to 83,567, and those vulnerable to having a fall leading to hospital admission increasing by 30% from 7,853 to 10,194.

The Home Office found that the fire-related fatality rate per million is higher for men and older people. For men aged 65-79 the fatality rate was 13.3 per million population while the equivalent rate for women was 7.8 per million. For those aged 80 and over, the rate for men was 20.2 per million and for women was 19.3 per million.

There are approximately 288,678 children and young people aged 0 to 19 in Surrey. For younger residents, common mental disorders, physical and learning disabilities and autistic spectrum disorders are factors that increase their vulnerability to fire. These factors are all predicted to have small percentage increases between 2020 and 2030.



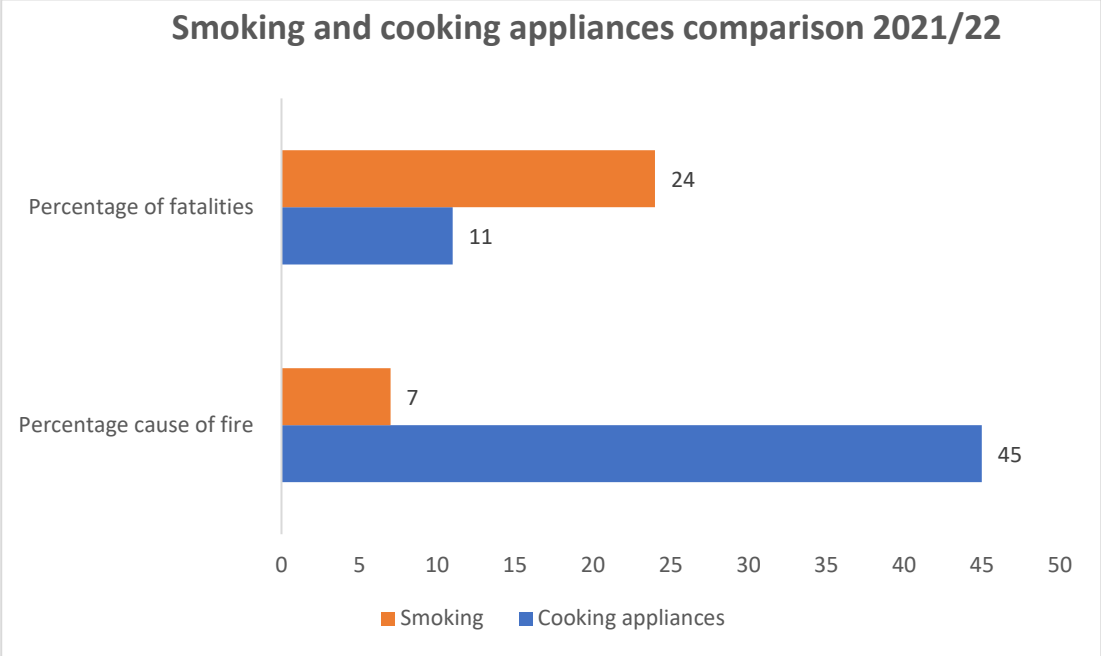
Alcohol and drug dependencies and prevalence of smoking are forecast to register only small changes in that time. In 2020 there were 31,431 adults under 65 with drug and alcohol problems with a forecast increase of 1% to 2030. There were 23,511 residents estimated do have a drug problem in 2020 which is projected to increase by 2% by 2030.

Causes of fire in the home

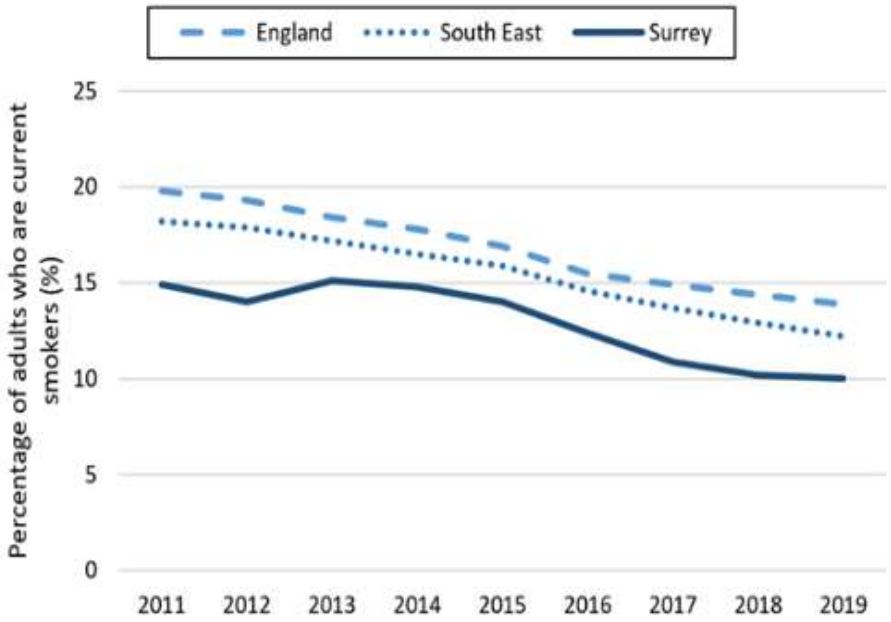
In 2021/22, the biggest cause of fires starting in England was cooking appliances, which caused 45% of accidental dwelling fires but only 11% of fire related fatalities.

Smoking materials accounted for only 7% of all accidental dwelling fires but were involved in 24% of fire fatalities.

The chart below shows the percentage in orange of fires and fatalities caused by smoking and in blue the percentage of fires and fatalities caused by cooking appliances.



Smoking is a high-risk factor in causing fires. Looking at both Surrey and the national picture, smoking is seeing a downward trend in percentage of adults who are current smokers since 2011. The chart below shows the percentage of adult smokers at around 20% in 2011 and steadily declining to around 14% in 2019. For Surrey the equivalent percentages are 15% and 10%.



The estimated smoking prevalence in 2011 to 2019 – From Surrey I – Original source https://fingertips.phe.org.uk/profile/tobacco-control

Types of dwelling and their construction

At a national level there is no clear pattern that shows one type of dwelling carries significantly more fire risk than another. However, clustering does start to occur when you look at the dwelling type in relation to the occupancy type. The highest occurrences of accident dwelling fires are against the following combinations:

- Lone persons over pensionable age in ‘other dwelling’
- Lone persons over pensionable age in bungalows
- 3 or more adults under pensionable age (no children) in houses of multiple occupation
- Lone persons under pensionable age in converted flat/maisonette

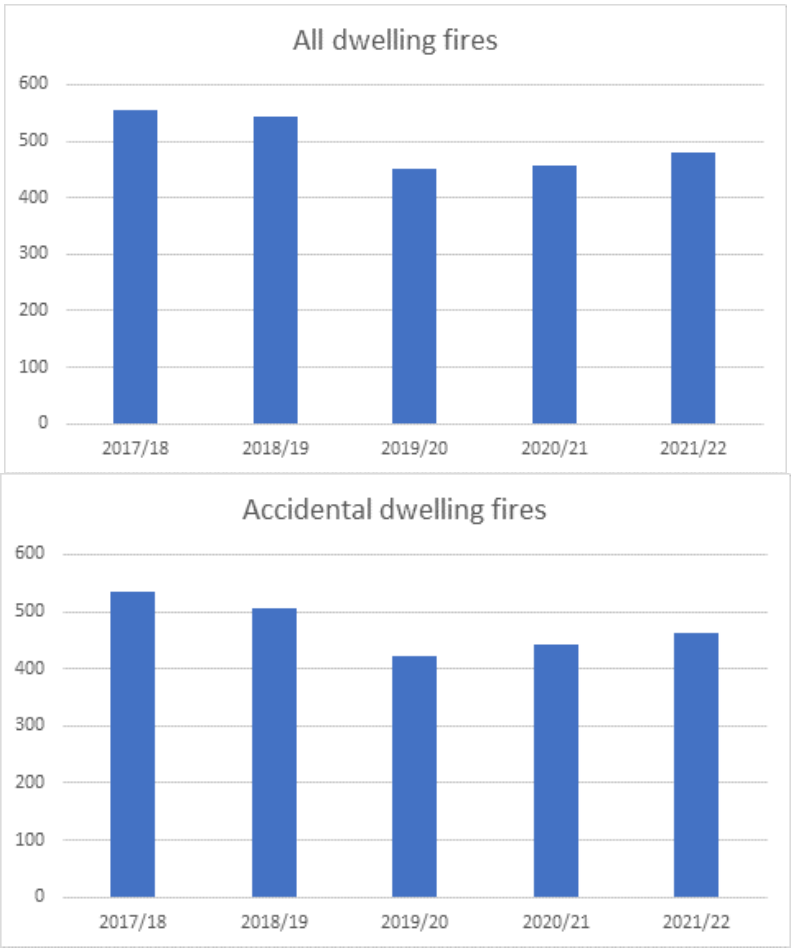
The data around building construction materials used is not strong with the option “other/not known” being chosen 9 times out of 10. With that caveat in mind the data does indicate that thatched roofs and timber-framed construction tend to lead to both greater fire damage. When it comes to fire growth, again thatched roofs and sandwich panels seem to pose a slightly higher risk.

Smoke alarms and dwelling fire damage

The national data is very strong when it comes to showing the value of smoke alarms in giving an early warning. Over 12 years since April 2010, in 78% of fires where no significant damage occurred an alarm was present in the home. In contrast for those fires where the whole building or more than two floors were damaged, an alarm was present on only 38% of occasions.

Assessing the risk of dwelling fires in Surrey

Most dwelling fires are accidental. Two bar charts follow. The first shows all dwelling fires, whether they were caused accidentally or deliberately, from 1 April 2017 to 31 March 2022. These have been in the region of 450 to 550 incidents each year. The second shows just accidental dwelling fires over that same period. The numbers look almost the same, which shows that the number of deliberate fires is very small. Deliberate fires include those that have been set to harm someone else and those that have been started by the victim themselves.



The more we know about where domestic dwelling fires are likely to happen, the more we can target our resources to prevent them or minimise their impact. There are a few different models and methodologies we can look at to try to predict which areas and individual houses are most at risk of a dwelling fire. (A dwelling is any permanent domestic housing structure but does not include other types of sleeping accommodation such as nursing homes, boarding schools or hotels.)

National Fire Chiefs Council and Operational Research in Health Limited Model

One important model published in 2022, is from the National Fire Chiefs Council and Operational Research in Health Limited who worked together to find out what factors contributed to the likelihood and consequence of dwelling fires. This is an extract from their "Proof of Concept: Domestic Dwelling Fires[2]" report on the methodology:

"The approch involved collecting incident data from IRS and national data on a wide range of potential influencing factors. We used data analysis and statistical modelling to assess the factors and develop a long list of associated factors. From this, the focus shifted to producinf a framework methodology that any FRS could apply to its local area."

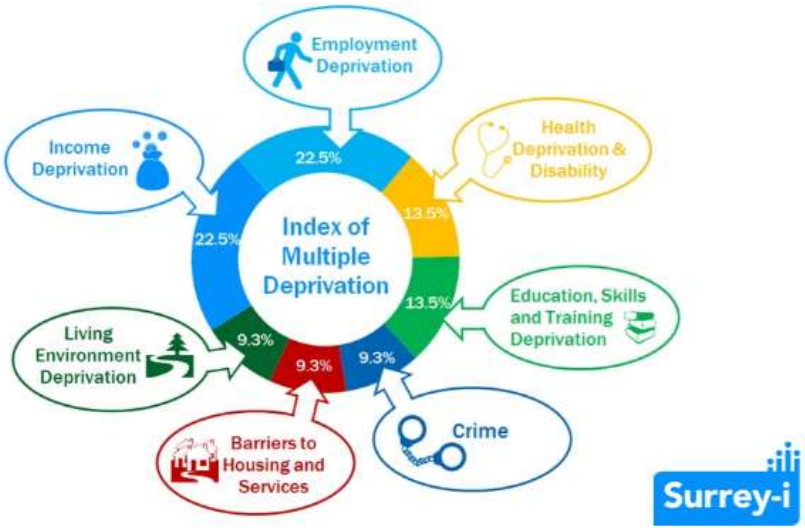
From this, the National Fire Chiefs Council were able to develop a model for assessing the risk of dwelling fires. Their model takes Place, Property and People data to build on the likelihood of a dwelling fire and the consequence of a dwelling fire on life, to develop an overall risk of dwelling fires.

Some key risk factors included in the model are:

- Health and Disability Deprivation Data
- Proportion of people in poor or very poor health
- Car/van ownership
- Unemployment
- Income Ranking
- Employment Ranking
- Fewer rooms than required
- Proportion of homes rented
- Crime Ranking
- Living Environment
- Main language spoken
- Children in household
- Council Tax A/B
- Living in a Flat.

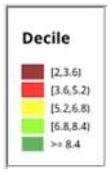
The data used in the model currently comes from Population, Census 2011, and Index of Multiple Deprivation 2019 data and it will be updated once data is refreshed, for example with Census 2021 data.

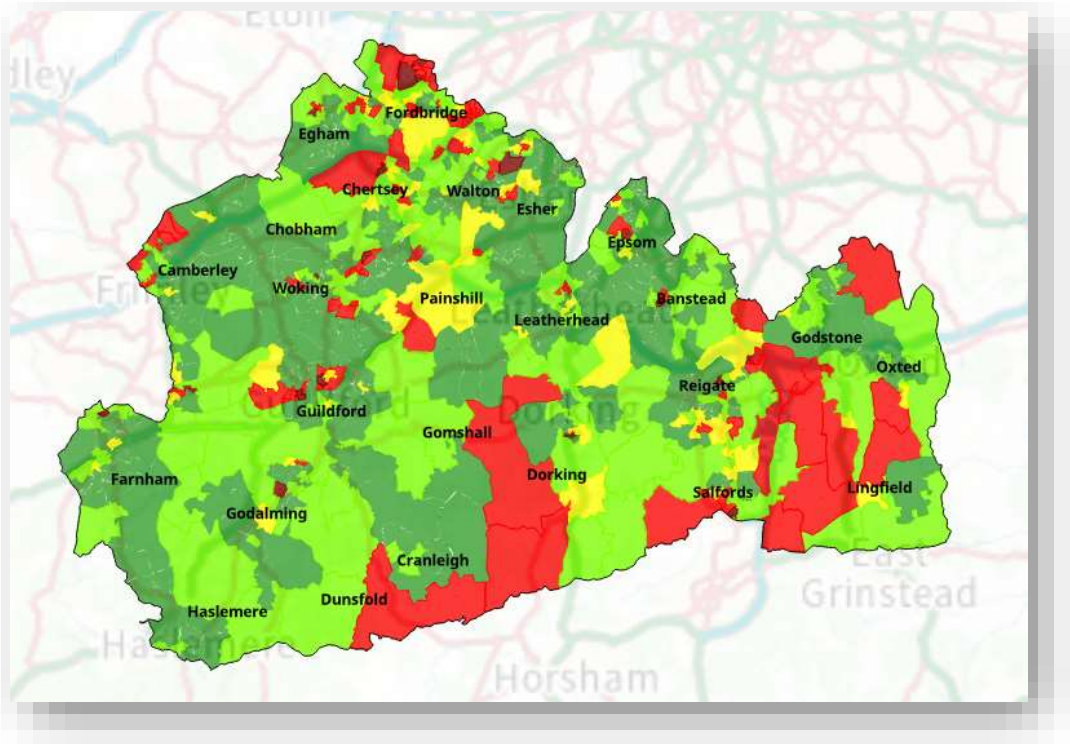
The Index of Multiple Deprivation divides England into 32,844 units with an average population of around 1500 and a minimum population of 1000. These units are called Lower Super Output Areas (LSOAs) and they are ranked from the first (most deprived) to the 32,844th (least deprived) area. The index of Multiple Deprivation is part of the Indices of Deprivation, and it combines information from seven domain indices using weights to gather an overall relative measure of deprivation. Income deprivation has a 22.5% weighting along with employment deprivation. Health deprivation and disability has a 13.5% weighting. Education, skills, and training deprivation has a 13.5% weighting. There is equal weighting of 9.3% to Living Environment deprivation, Barriers to Housing and Services, and Crime. This means that income and employment have a higher impact on deprivation levels compared to living environment and crime.



Overall, Surrey is one of the least deprived counties in the country, but there are some pockets of deprivation we should not overlook. The four most deprived LSOAs are shown in dark red on the map below and they fall within the bottom 20% of the National Index of Multiple Deprivation.

In Surrey the local authorities with the most deprivation at local authority level are Spelthorne, Runnymede, and Tandridge. The least deprived local authority area is Waverley. The top 4 LSOAs highlighted in dark red highlighted as areas of deprivation are Hooley, Merstham, and Nethern (Reigate and Banstead), Canalside (Woking), Westborough (Guildford), Stoke (Guildford)

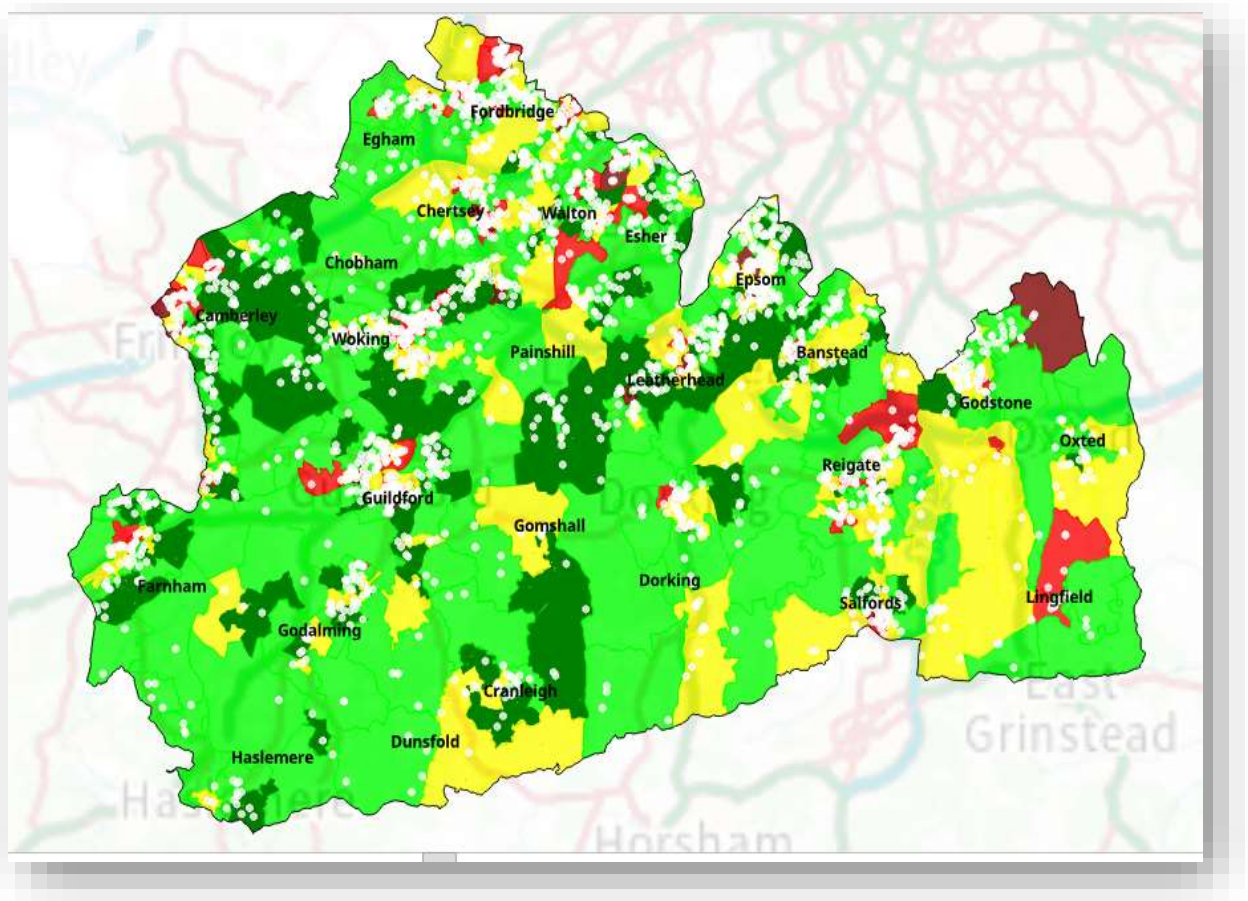




The National Fire Chiefs Model looks at LSOAs and we have applied that approach to Surrey. The map below shows the results and helps to highlight to us certain LSOAs at greater risk. Higher numbered categories carry higher risk and are shown in darker red, while dark green is projected as very low risk.

We are evaluating the model to see how it compares with historic dwelling fire incidents, in particular primary accidental dwelling fires. The map below combines the LSOA map with locations of primary accidental dwelling fires, over the last five years, which are shown with white dots. The LSOAs with the highest number of incidents, and white dots are Epsom and Ewell 007A, Epsom and Ewell 008B, Spelthorne 012D, Reigate and Banstead 018A, and Surrey Dwelling Fire Risk. Guildford 016B.

Surrey Dwelling Fire Risk Model Map LSOA with past five financial years Dwelling Primary Fires in white dots (Borough) Dwelling Primary fires historic data from April 2017 to March 2022.



The model shown above has some relation to primary accidental dwelling fires over the past five years for LSOAs such as Epsom and Ewell 007A, Epsom and Ewell 008B, Guildford 016B,

Spelthorne 008E and Woking 004D in dark red also have a high number of dwelling fires. There are also some LSOAs that are considered at risk but have not historically had many dwelling fires. For example, LSOA Tandridge 012A in the north of Tandridge (on the top right-hand edge) is dark red but has had few fires. This area is dark red because it has a higher percentage of flats and lower environment living ranking. This does show some restrictions with the model, which relies heavily on certain deprivation factors which are relatively low in Surrey in relation to the rest of the nation and the Census data used is from 2011.

We have had an initial look of adding Mosaic data and Exeter data into the model. Mosaic is a cross- channel classification system to look at structure of UK society. It looks at household segmentation. NHS Exeter Data looks at those populations of those aged over 65. This data has resulted in Reigate and Banstead 008A, Woking 004F, Spelthorne 001B, Spelthorne 008E, and Runnymede 009A being the LSOAs with highest risk. When determining which Mosaic data segments to use in the model, we analysed the two main outstanding segments compared with historic fires. We found the Mosaic Categories Municipal Tenants and Vintage Value to have a higher propensity of fire compared to Surrey population with likelihood and consequence of serious injury or fatality.

Once the 2021 Census data becomes available, we will update the model along with other risk-based data sources such as Mosaic data, and NHS Exeter data, which looks at the ages of individuals aged 65 and over, along with other data sources to see how much this changes the results of the model. The model remains a good reference for us to see where there may be possible risks of fires in the future and to use with other data sources to help prioritise prevention activities based on national data.

Surrey County Council has also developed a model which rank areas within the county according to the levels of deprivation experienced. There is more information about it in Appendix 2.

Surrey fire dwelling risk UPRN model

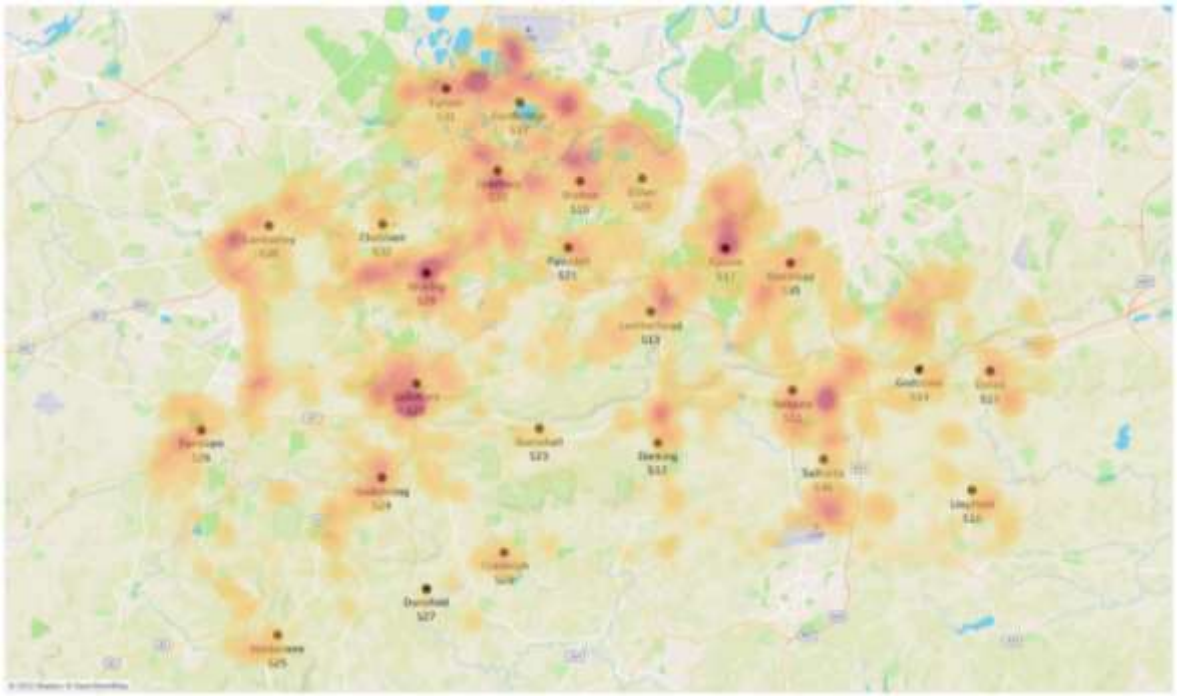
The National Fire Chiefs Council and Operational Research in Health's "Proof of Concept: Domestic Dwelling Fires" document also mentions using a Unique Property Reference Number (UPRN) model to identify homes at risk, which we are also looking at adapting to support our localised plans. The LSOA model is what we will use for a higher-level view needed for our Community Risk Profile.

We currently use UPRN data, including Mosaic, Adult Social Care data, NHS Exeter Data, Oxygen data and Flooding data to identify possible individual properties at risk of fire and/or flooding.

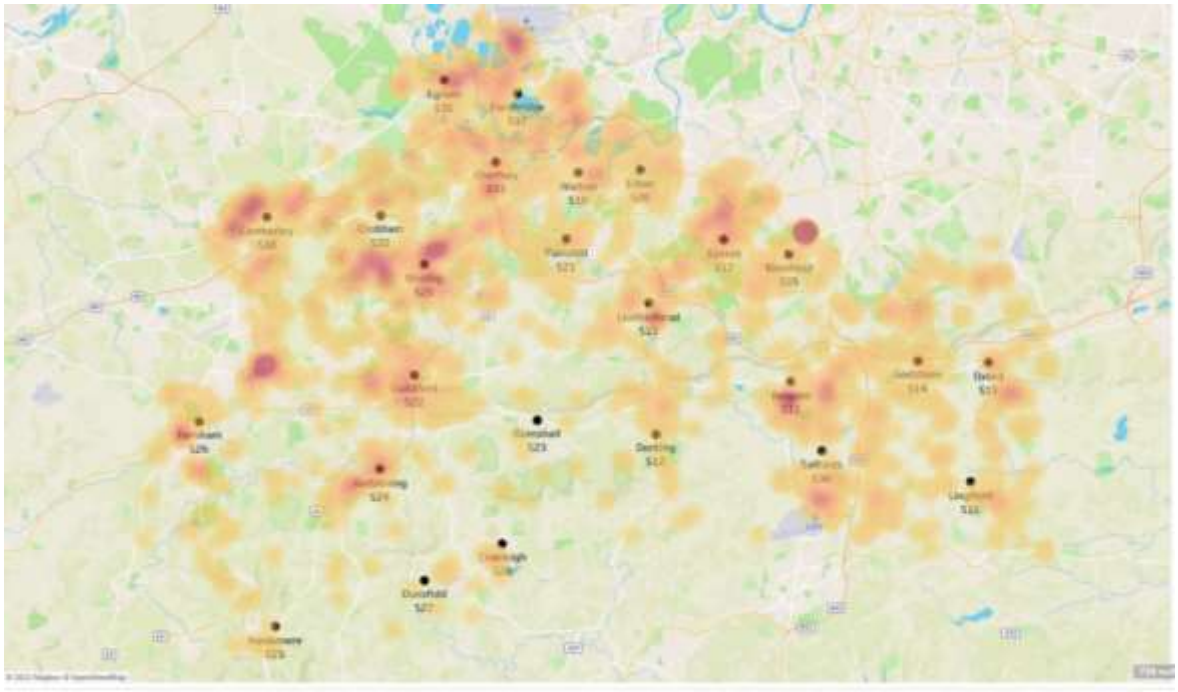
Deliberate fires

A small number of fires are started deliberately. Most of these incidents are outdoors eg bin fires or setting fire to vehicles. Looking at the data collected by the Home Office and comparing our incident numbers per 1000 head of population with those of other Fire and Rescue Services, we have fewer deliberate fires than the national average.
To assess risk, we look at where deliberate fires have occurred and how they correlate with street crime. In the maps below, the darker red areas indicate the most incidents. The place names and numbers show the location of our fire stations. Most deliberate fires occur in the north of the county reflecting the main areas of population settlements.

Recorded street level crime in Surrey, April 2019 to March 2020 (source Data Police UK)



Deliberate fires in Surrey, April 2017 to March 2022 (source SFRS Incident Reporting System



© OpenStreetMap

1 This area is around the town of Ash. The hotspot shows more strongly for deliberate fires incidents than it does for street level crime. Ash has several green spaces nearby and many of these fires are outdoor grassland or scrubland fires.

2 The towns of Guildford and Epsom show more strongly for street level crime than they do for deliberate fires. This suggests that more street level crime does not necessarily always result in more deliberate fires.

3 The deliberate fire hotspot around Banstead is strongly influenced by the location of a prison in that area, and this unusual demographic needs to be recognised.

Conclusion

The population of Surrey is growing. The number of people who are more likely to have accidental dwelling fires and be more impacted by those fires is growing. This is because there is an increasing number of elderly residents and residents with health issues that may prevent them from being able to get out in the event of a fire. There is data available which we can use with modelling techniques to help us identify the areas with a greater number of vulnerable people. This will enable us to target our resources to help prevent those fires and make homes

safer. Our fire stations are based in the areas of highest population density, which historically have been the areas with the most incidents.

Place Risks

These are risks associated with the naturally occurring environment and some of the built features in locations around Surrey. This will cover the risks associated with:

- travel on roads and other transport infrastructure
- fires occurring in heathlands and woodlands
- rescues from rivers, bodies of water and flood plains.

Built premises are covered in our separate section on Premises Risks.

Risk of road traffic collisions

Surrey has around 3,452 miles of roads, with the majority being minor or A and B roads. However, we do have some of the country's busiest arterial routes such as the M3, A3, M25 and M23. Our roads carry almost double the national average amount of traffic and the county has more cars per mile of road than any other non-metropolitan county. (The metropolitan counties are the West Midlands, Greater Manchester, West Yorkshire, Merseyside, South Yorkshire and Tyne and Wear.)

The number of Road Traffic Collisions (RTCs) that we have been called to has been reducing in the last few years. The Department for Transport (DfT) collates data on the number of accidents and casualties. The following table shows the total number of casualties on roads within Surrey in the years 2016 (on the left in darker blue) to 2020 (on the right in a lighter blue). Casualties includes those who are injured and fatalities. The number of fatalities is also shown separately. The Covid pandemic reduced the number of RTCs in 2020.

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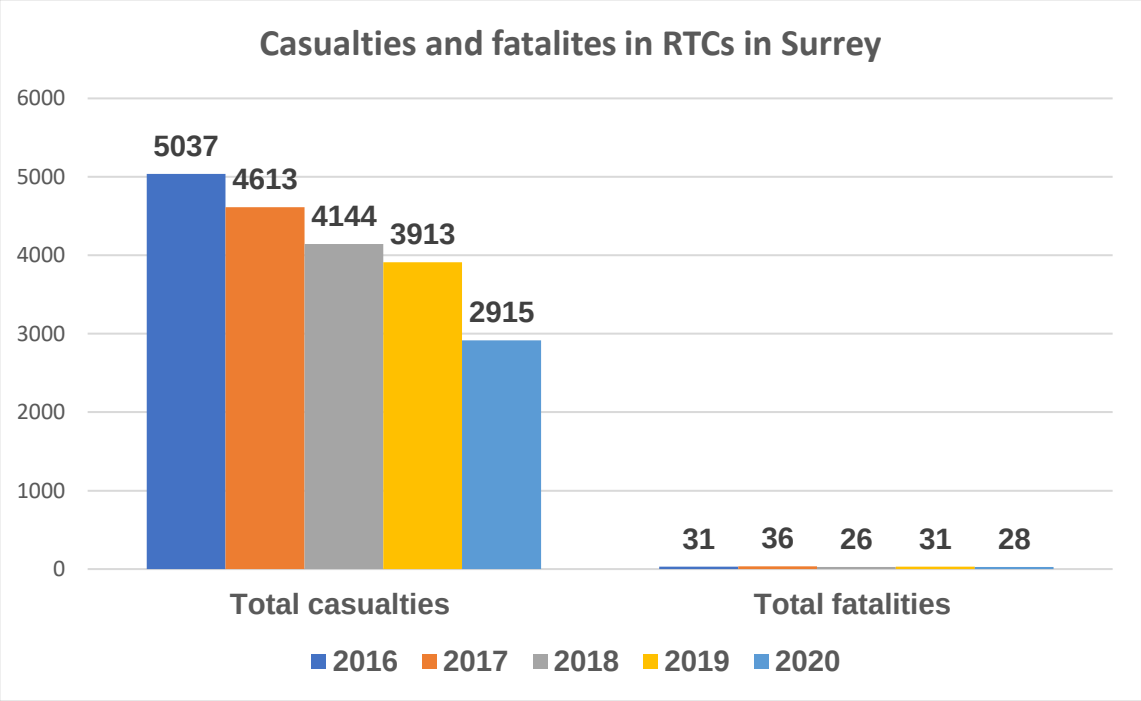
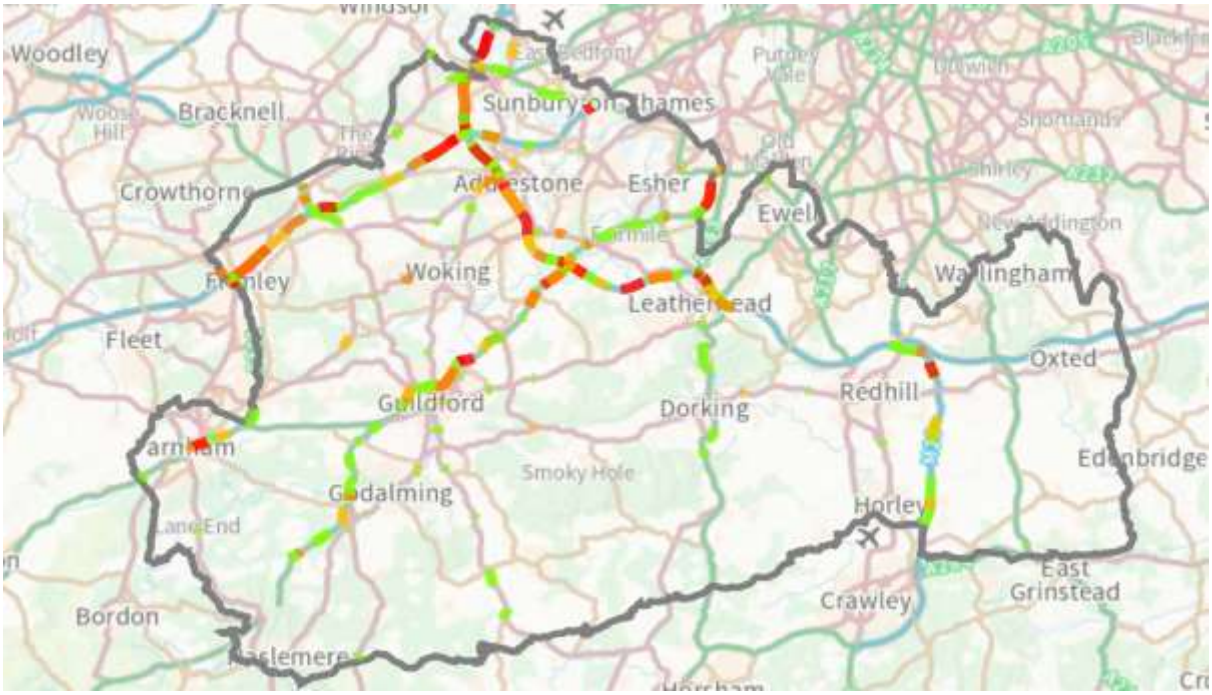


In the year ended 31 March 2021, there were more than the national average number of RTCs in Surrey. They accounted for 9.86% of all the incidents we attended.

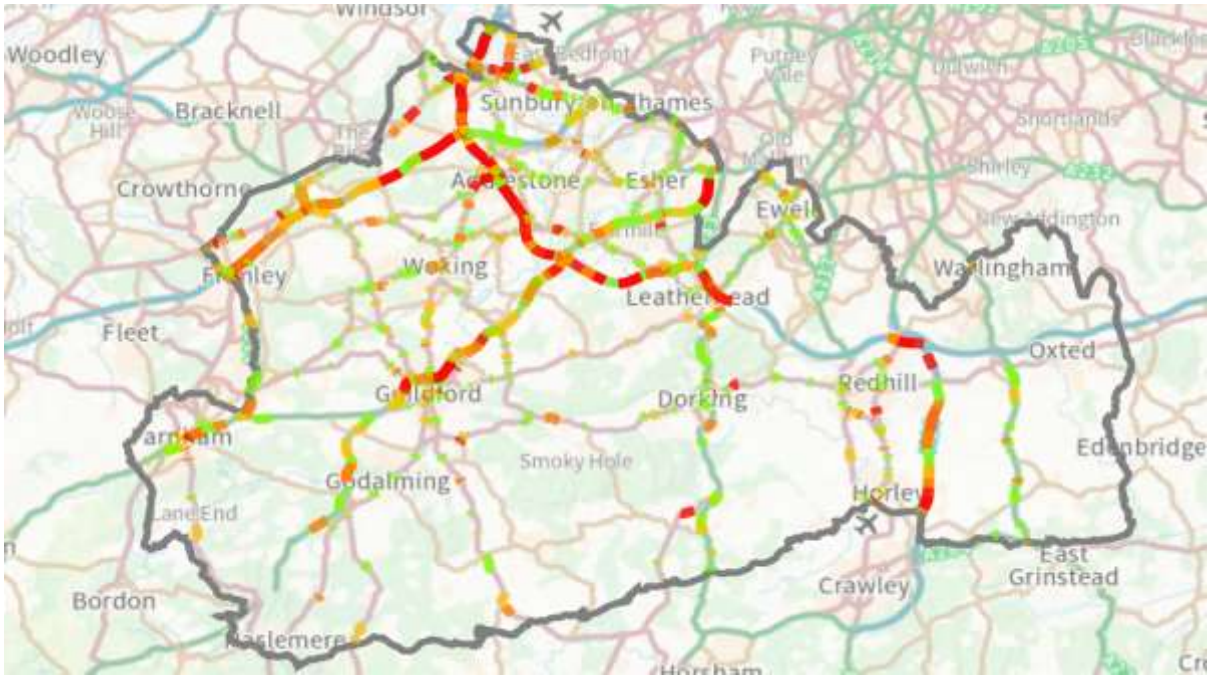
The following map shows a hotspot of incidents which Surrey Fire and Rescue Service (SFRS) has attended on the road network. This clearly identifies the route of the M23, M25, M3 and A3, with the highest concentration of incidents to the north-west of the county.

Road Traffic Collisions that SFRS has attended



The following map shows a hotspot of all collisions on the road network using data from Safer Roads Partnership. It looks very similar, again clearly identifying the routes of the M23, M25, M3 and A3, and with the greatest number of incidents taking place in the north-west of the county. However, it does also identify additional roads when compared to the SFRS incidents.

All Road Traffic Collisions: source Safer Roads Partnership



Driver age and risk

We have looked at the profile of drivers who were casualties. Between 2016 and 2020, 2,844 drivers aged between 16 and 25 years were casualties in road accidents on Surrey roads. This represented 23%, nearly a quarter, of all driver casualties between the ages of 16 and 90 during this period. When we look at the population of Surrey, we find that the number of people aged between 16 and 25 years was 14% of those aged between 16 and 90. This indicates that younger drivers are overrepresented in road driver casualties.

Risks related to transport

Surrey has two of the world's largest international airports on its borders, Gatwick and Heathrow and has several small airfields within its borders. We also have Farnborough airport just outside our border. We are keeping under review plans for a third runway at Heathrow airport, as it would be likely to increase air traffic movements and traffic on the road network.

A further unique road network risk for Surrey is the Hindhead Tunnel which is the UK's longest underground tunnel.

Most major towns in Surrey have connections by rail to central London. Rail network incidents are rare but can have severe effects.

Risk of wildfires

Surrey has a diverse range of countryside. It contains the flat areas in the Thames Basin, the hills of the North Downs and Wealden Greensand, large expanses of open heathland, enclosed wooded gills, river valleys and water bodies, intimate small-scale farmland and open meadows. Woodland covers 22% of the county, but heathland and chalk downland are also particularly characteristic. Farmland, including that of the Low Weald, is another main component of the landscape. Over 25% of the county is designated as an Area of Outstanding Natural Beauty (AONB) (the Surrey Hills and the High Weald AONBs). The county has extensive areas of high biodiversity value and internationally important habitats and contains several high-quality historic parklands.

Our countryside, with its mix of natural fuels, such as pine needles, tree moss, fir trees, leaves and twigs does mean there is potential for wildfires to occur. A wildfire is any fire occurring in natural vegetation, consuming the natural fuels and spreading in the environment. They can range in size from a fire that takes only one fire engine to deal with, to a fire that needs multiple resources over several days. They are usually caused by some sort of human activity eg use of BBQs, smoking materials, careless disposal of glass or prescribed burning for land management purposes.

About 15,500 hectares of land have been identified as a wildfire risk. This is equivalent to 155 square kilometres or almost 60 square miles. Surrey itself covers about 642 square miles. Much of the land at risk of wildfire is a site of special scientific interest or special protection area.

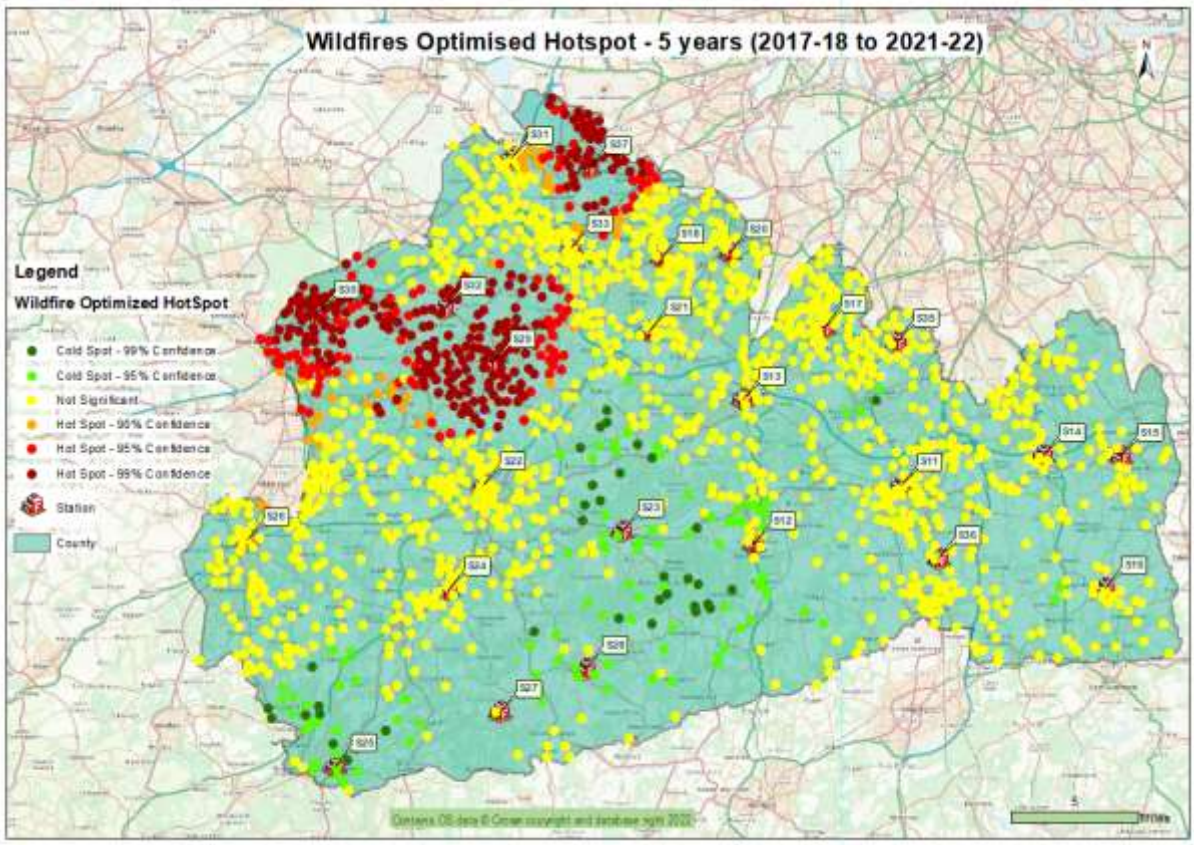
The risk of wildfires is greatest in prolonged spells of hot, dry weather which makes the natural vegetation more combustible. The Met Office has made some predictions about the climate in the Southeast from 2020 to 2039. It is important to note that the predictions are based on assumptions that have been made about future greenhouse gas emissions. For more information about how the Met Office have developed their predictions, please go to Appendix 3.

- Winter rainfall predicted to be increasing by up to 10%
- Summer rainfall predicted to be decreasing by up to 10%
- Winter average temperature predicted to be increasing by up to 1^{o}C
- Summer average temperature predicted to be increasing by between 1^{o}C and 2^{o}C
- Winter average daily maximum temperature predicted to be increasing by up to 1^{o}C

- Summer average daily maximum temperature predicted to be increasing by between 1°C and 2°C.

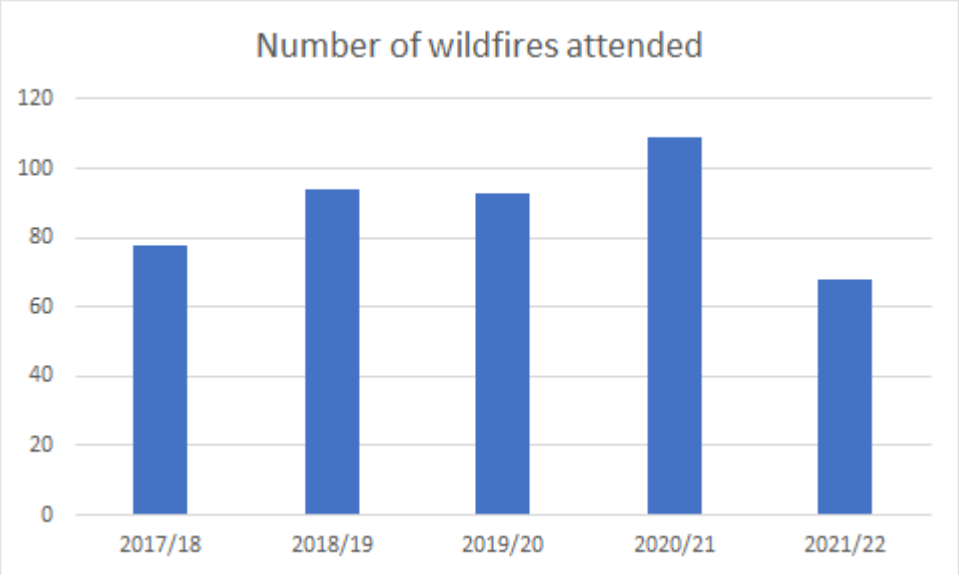
These predictions indicate that the right conditions for wildfire are likely to be present in the future.

The map below illustrates in three colours (red, dark orange and pink) where wildfires have taken place over the last five years. The places shown in dark red, bright red and pink have had more wildfires than those shown in green and orange. Places where there have been wildfires in the past are more likely to have future wildfires than places where there have never been, or rarely been wildfires. The numbers on the map eg S13, show the location of fire stations. There is a list of fire station numbers and names in Appendix 4.



There is some clear clustering of hotspots in the north and north-west of the county. These areas include stretches of motorway whose use might be impacted by a nearby wildfire. Six fire stations are reasonably close to the hotspot areas. The bar chart below shows that there is no discernible trend in numbers over the last five years (where wildfire is defined as a primary fire

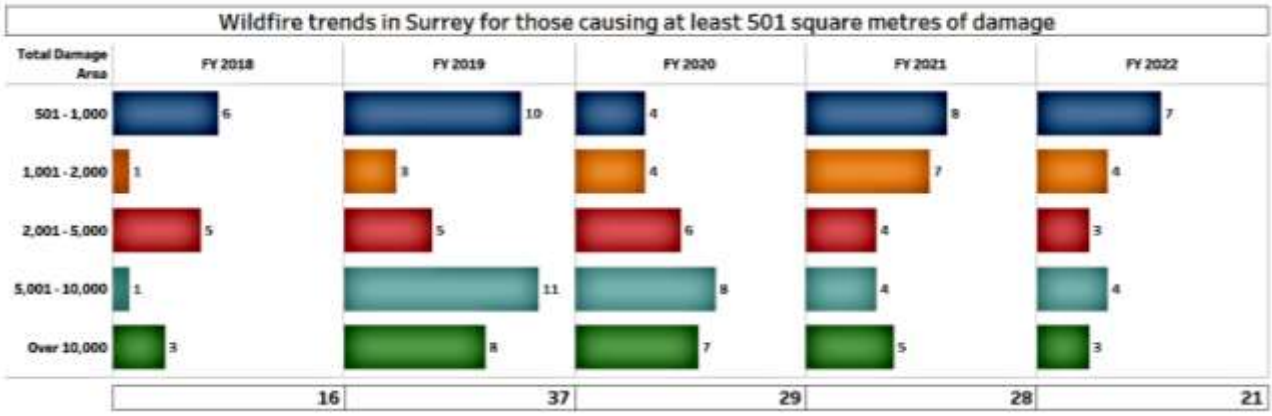
outdoors or with outdoor structure). The highest number in this period was around 110 incidents in 2020/21, but the following year that was down to around 70 incidents.



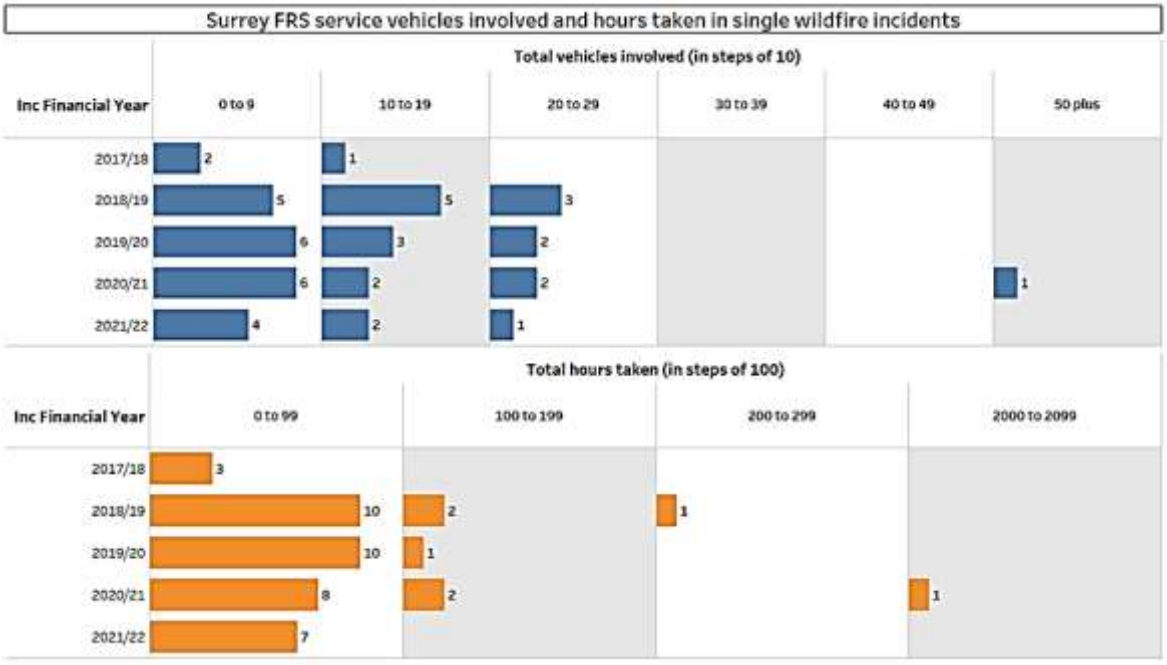
In addition to considering how often wildfires occur, and whether there has been a geographical clustering of those incidents over the last five years, it is helpful to understand the nature of the bigger wildfire incidents that have taken place.

Larger wildfires cause more damage to the environment and pose more threat to people and properties. They also demand a lot of service resources in terms of the number of appliances and the number of hours over which they are needed. During these larger wildfires, those appliances are not available for other incidents, which creates risk in relation to responding to those other incidents.

The chart below shows the number of wildfire incidents in Surrey that caused over 500 square metres of damage over five years from 2017/18 to 2021/22. The totals in the bottom row which show all wildfires that caused at least 500 square metres of damage indicate no clear trend, and neither do the five separate categories which show areas of damage in increasing size.



The next table considers wildfire incidents that both caused over 500 square metres of damage and involved at least five service appliances. It shows both the number of vehicles involved in single incidents by ‘cohorts’: 0 to 9, 10 to 19 etc. Likewise, it shows the hours spent at single incidents by cohorts: 0 to 99, 100 to 199 etc.



For example, in the year 2018/19 there were five incidents which involved between 10 and 19 appliances in making a response, and there were two incidents where the hours taken to close the incident were between 100 and 199. Again, there is no discernible trend in the five full years on view.

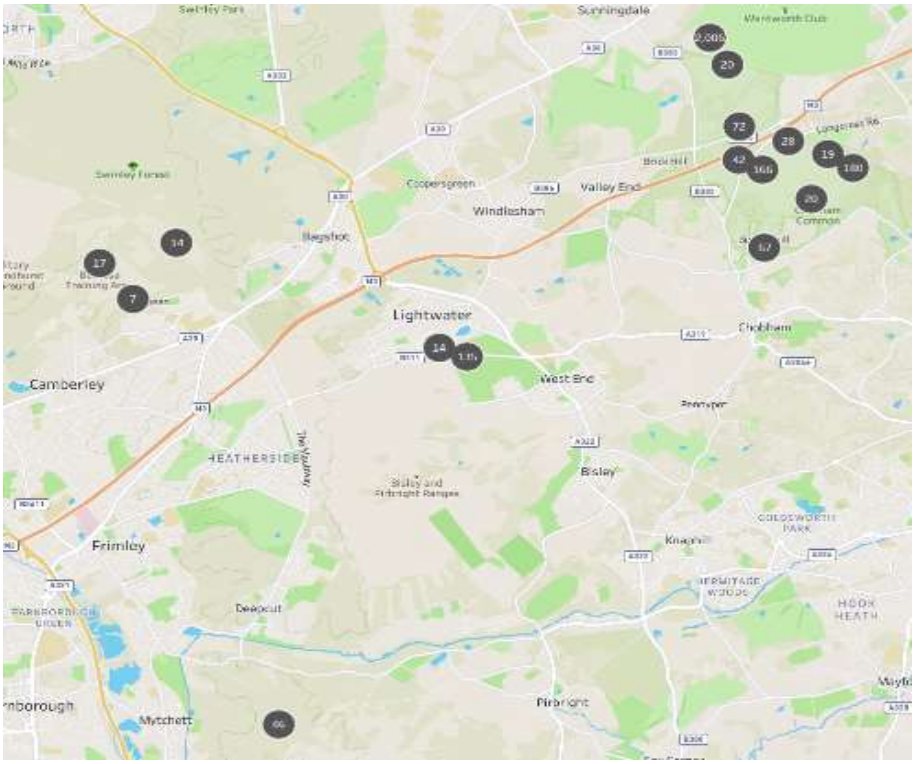
These same incidents have been plotted on a series of maps showing both the vehicle numbers and hours involved.

Surrey Heath – locations and vehicle numbers

The map shows that majority of incidents, and those involving most vehicles occurred around Chobham Common.

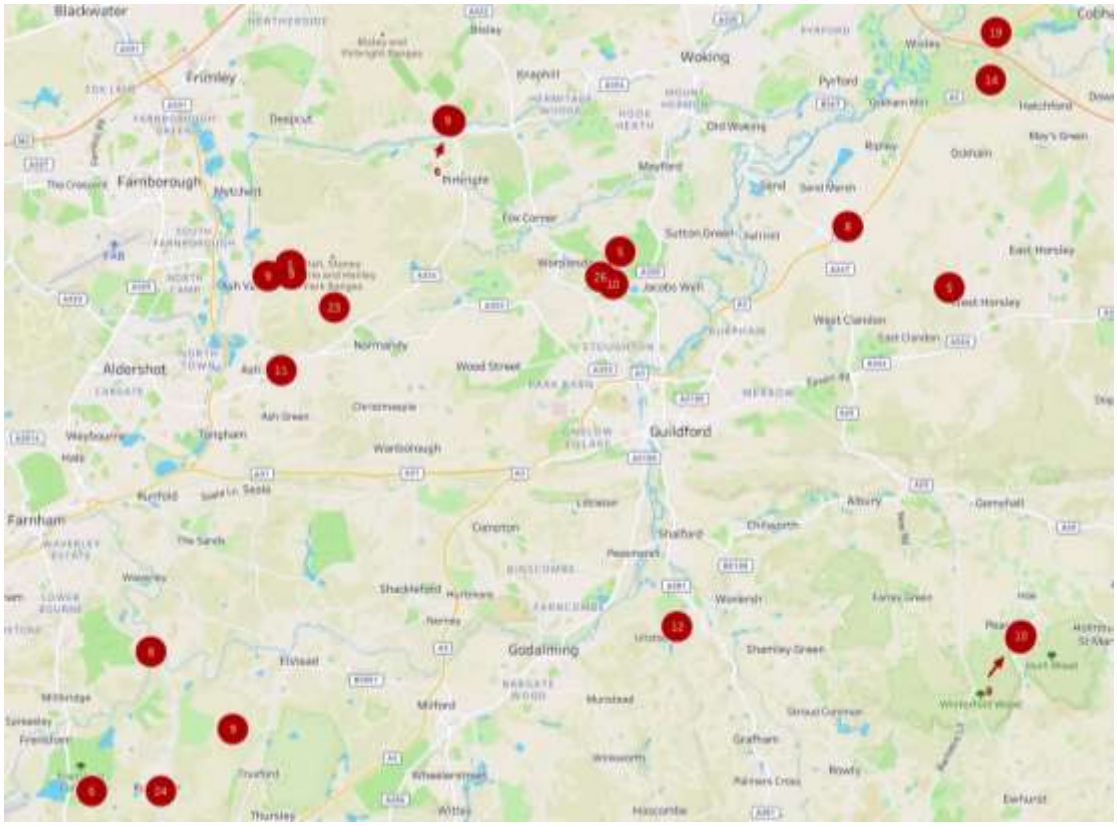
Surrey Heath – locations and hours taken

The map shows that the incidents that took the longest time to deal with occurred around Chobham Common.



Guildford and Waverley – locations and vehicle numbers

The map shows that incidents were evenly distributed around the districts and Guildford and Waverley.



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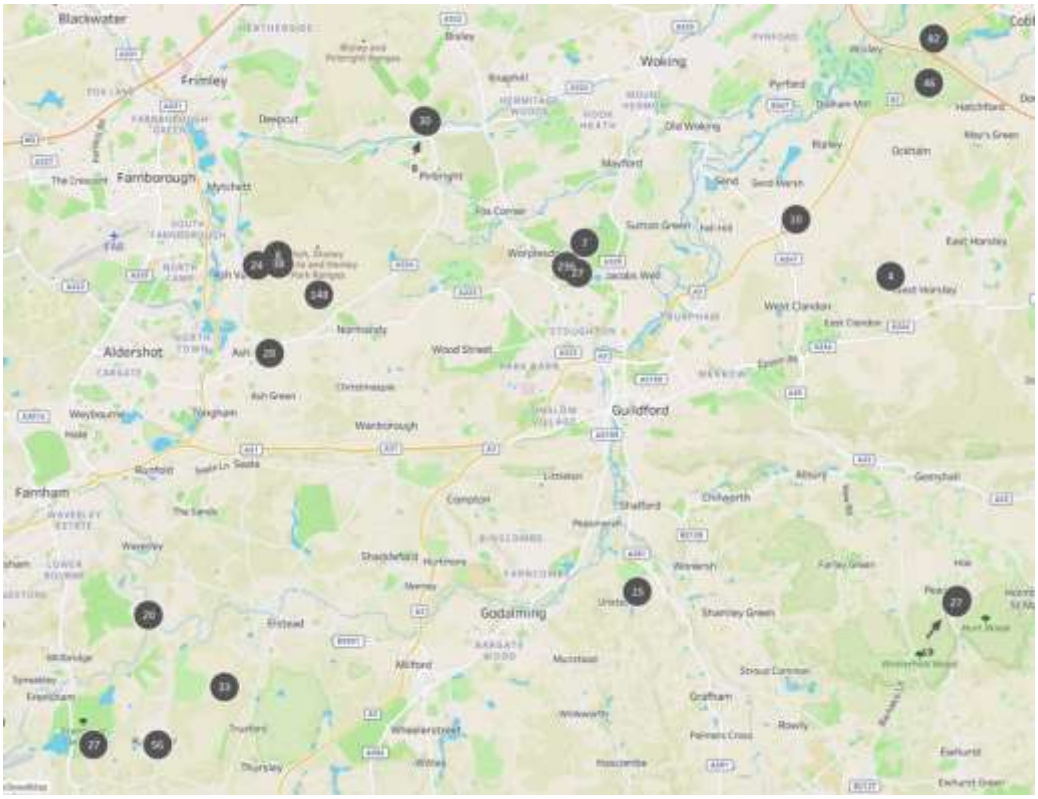
Guildford and Waverley – locations and hours taken

The map shows that the incidents that took over 20 hours to deal with were distributed all over the Guildford and Waverley districts.



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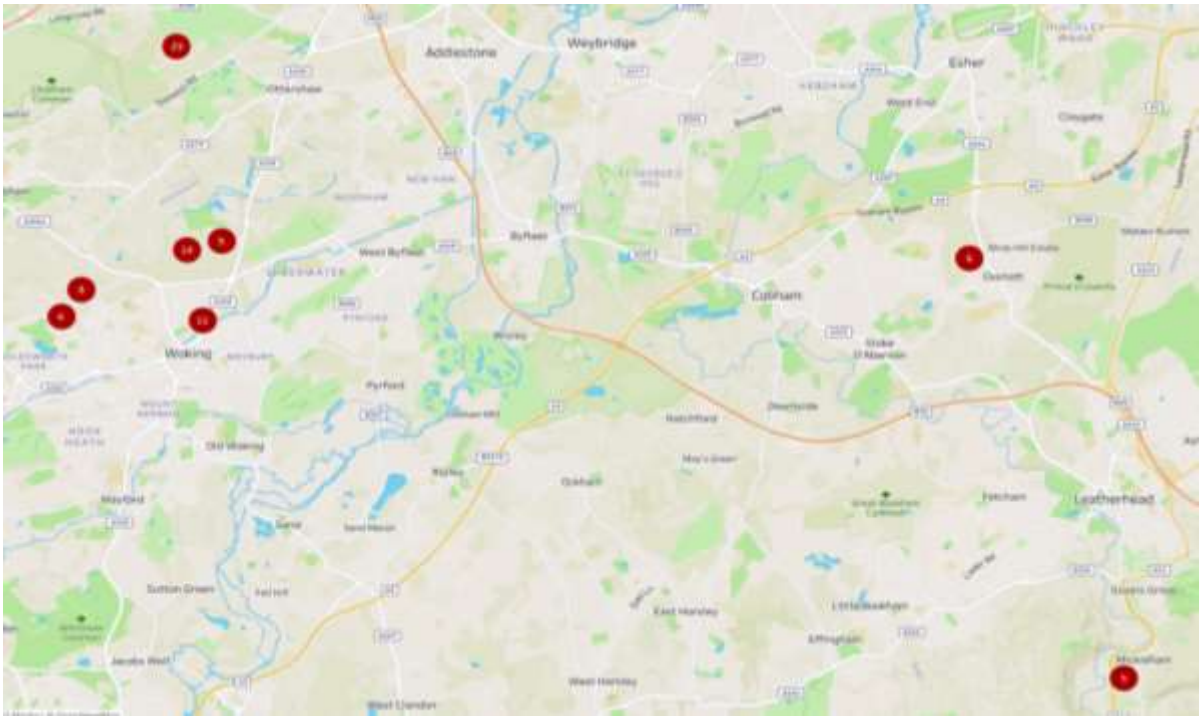
Elmbridge, Epsom & Ewell, Mole Valley, Reigate and Banstead, Runnymede, Spelthorne, Tandridge and Woking – locations and vehicle numbers

The map shows that most incidents in this area occurred to the north and west of Woking.



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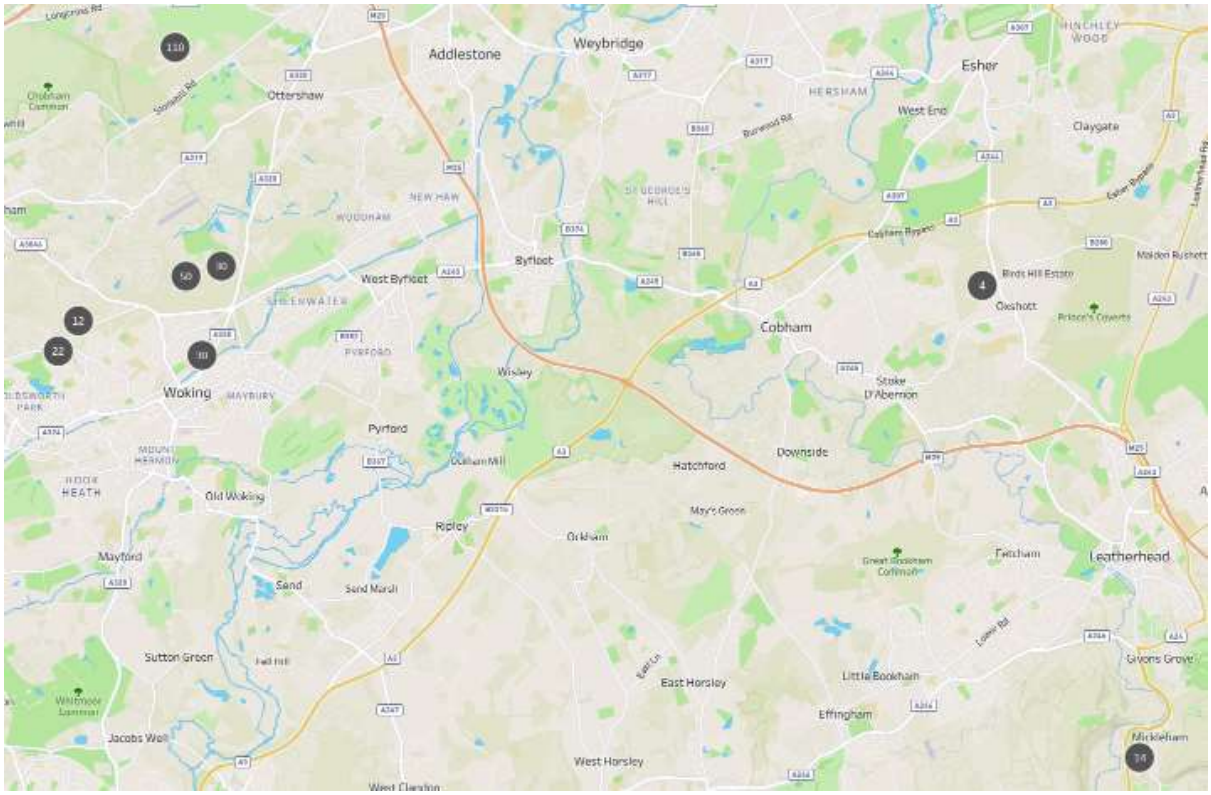
Elmbridge, Epsom & Ewell, Mole Valley, Reigate and Banstead, Runnymede, Spelthorne, Tandridge and Woking – locations and hours taken

The map shows that the most significant incident in terms of time taken occurred around Chobham Common.



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Climate predictions and our own data suggest that wildfires will continue to pose a risk. However, we cannot be certain of how frequently or how severe or exactly where wildfires will occur.

Risks related to water

There are two main types of risk relating to water:

- Flooding incidents caused by rivers bursting their banks in an area that includes dwellings or by surface water floods.
- Getting into distress in a body of water, such as a reservoir, lake, or river.

Flooding incidents

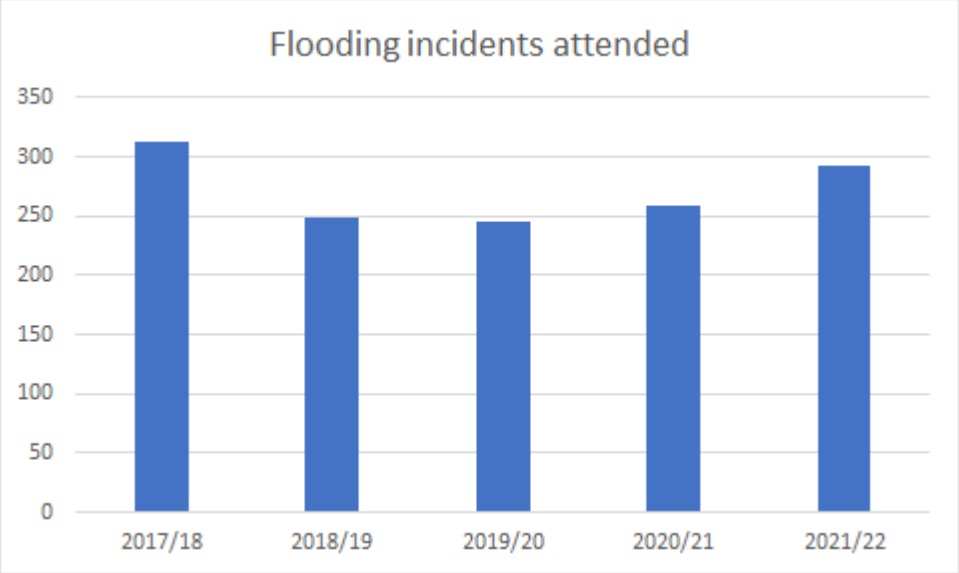
Surrey is vulnerable to both inundation of floodplains by river water (fluvial floods), and local flooding of the drainage networks when overwhelmed by intense rainstorms (surface water floods).

Nearly 64,000 households in Surrey are at risk of fluvial flooding, predominantly from the rivers Wey, Mole and Thames. 24,000 of these households are high risk. The most significant fluvial flood zones are in the north of Surrey around the boroughs of Spelthorne, Elmbridge and Surrey Heath. There are six fire stations reasonably near those areas.

Surface water floods could occur anywhere. They usually happen gradually, and the water level is generally no more than 1 metre deep. They do not usually present a threat to life but can cause a lot of economic damage.

In 2013/14, Surrey experienced sustained flooding, leading to a sharp increase in the call outs for flooding incidents and water rescue. This was particularly felt in Elmbridge, Runnymede, Mole Valley, Spelthorne and Guildford boroughs.

The bar chart below shows water rescues that SFRS has attended in the period 1 April 2017 to 31 March 2022. These have ranged from just over 300 incidents in 2017/18 down to just below 250 incidents in 2019/20.



Looking at Home Office data on flooding incidents across England per 1000 head of population (in this context the data includes both flooding due to natural causes, and other causes such as burst pipes), Surrey experienced a below average number of incidents for the year ended 31 March 2021. In that year, flooding incidents made up 2.61% of all the incidents we attended.

One of the factors that affects flooding incidents is the weather, which in turn is affected by climate change. The evidence increasingly shows that an increase in man-made carbon dioxide

and other greenhouse gases in the atmosphere will have many global impacts. In Surrey, it will increase the likelihood of more prolonged and intense spells of hot weather, increased risk of flooding and reduced availability of drinking water. Whether this happens will depend on the success of measures being taken to reduce carbon emissions.

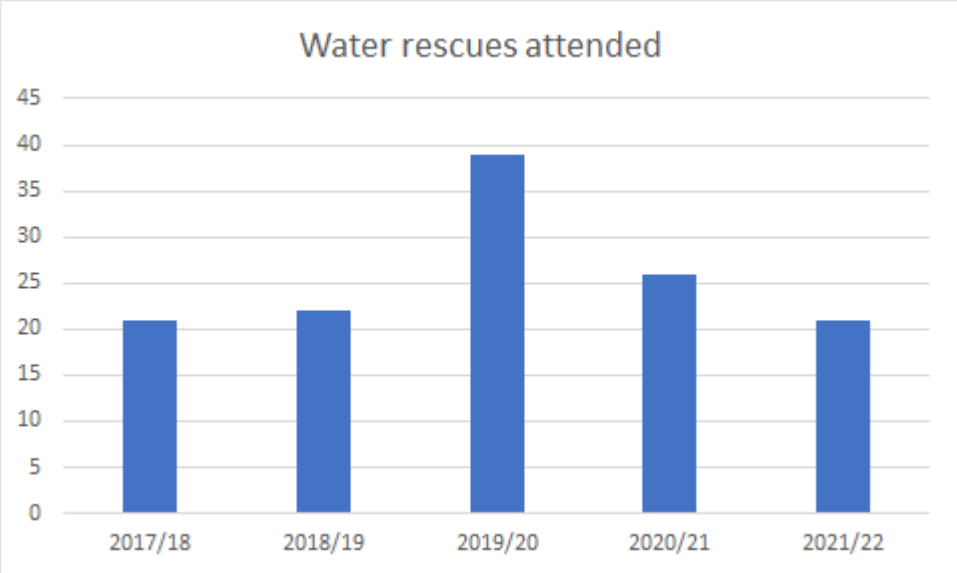
Rescues from water

Drowning is a leading cause of accidental death in the UK. Drownings can happen quickly with most people having no intention of entering the water. In 2020 there were 254 accidental drownings in the UK; nearly half of the victims had not intended to enter the water. 27% of all accidental drownings in 2020 involved drink and/or drugs.

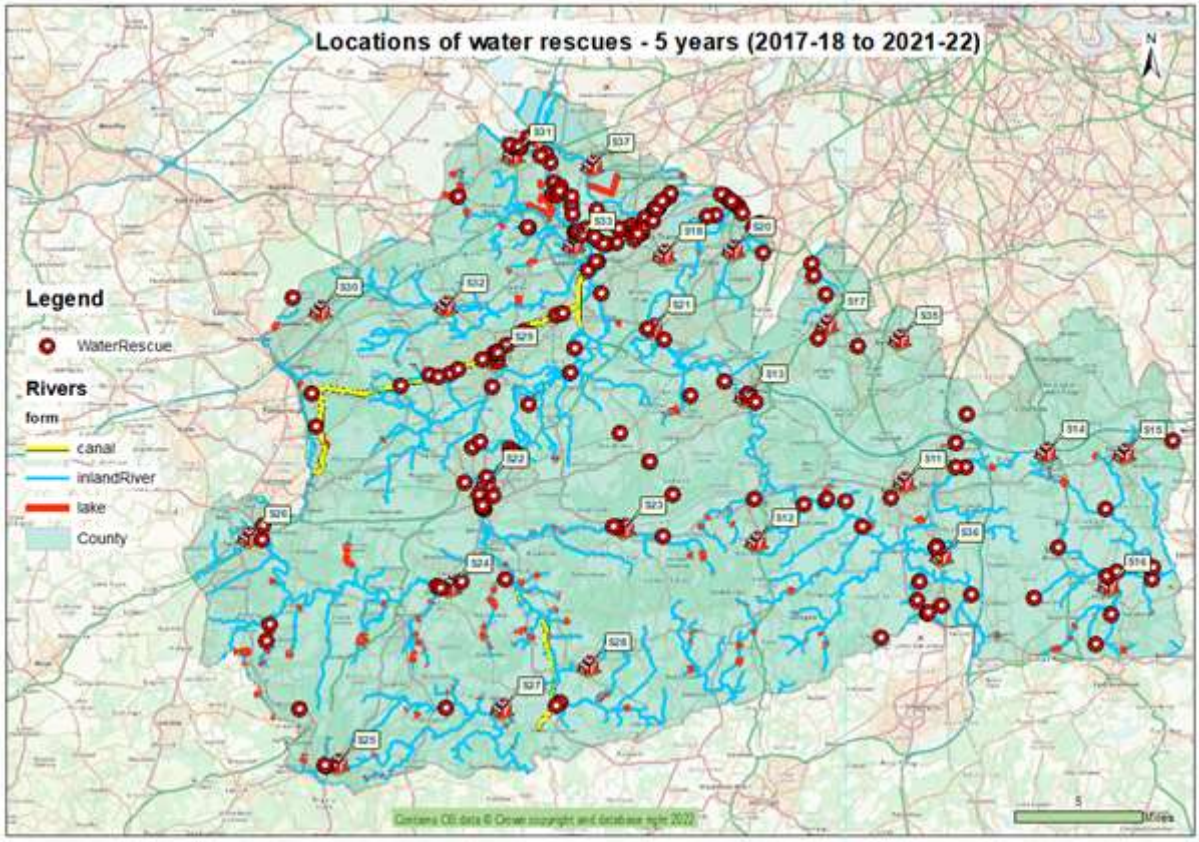
Surrey has no coast, but it does have several rivers, lakes and reservoirs, and most are used for transport and leisure activities. The river Thames presents additional risks due to the number of dwellings on islands within the Surrey stretch of the river. Between 2010 and 2018 SFRS responded to 2816 water-related incidents. We performed rescues in 307 of those incidents and, sadly, recovered fatalities in 34 of those incidents. There were 29 fire deaths in the same period. Water and fire fatalities continue to be comparable.

Water rescues

The bar chart below shows water rescues that SFRS has attended in the period 1 April 2017 to 31 March 2022. Water rescues include both flooding incidents and rescue of individuals from a body of water. These range from 21 in 2017/18 up to 39 in 2019/20.



The map below shows where water rescues have taken place in the period 1 April 2017 to 31 March 2022 (excludes incidents such as domestic flooding due to burst pipes). The concentration of water rescues in the north of the county is clear.



Conclusion

The county has busy roads, particularly in the north, more RTCs than average and younger drivers are over-represented in the casualties. Wildfires and flooding incidents both occur more frequently in the north-west of the county and both are influenced by weather conditions. In recent years more fatalities have occurred in water than as a result of fire.

Premises Risks

Premises are buildings that are usually not used for living in, which include eg hospitals, schools, shops, offices, and which are known as non-domestic premises. The fire safety requirements for non-domestic premises are regulated by legislation which also applies to high-rise residential blocks and houses of multiple occupation, so even though people live in them, they are included in the premises being considered in this section.

All premises need to be safe for people to visit and work in. We need to understand the risks posed by different types of premises in Surrey and the implications of a fire occurring. There are two factors we consider when assessing risk:

1. How likely is it that a fire will happen?
2. What are the consequences if a fire does occur?

The risks might come from one or more of several different factors:

- A non-domestic premises which nevertheless has people sleeping overnight eg hospitals, hotels, hostels
- A business which has equipment or stores which carry a higher risk factor either for fires starting or the impact of a fire occurring eg somewhere that stores chemicals or highly combustible material
- Premises which have features which suggest that specialist firefighting strategies or equipment would be appropriate in the event of a fire incident eg high rise buildings
- Premises which carry a significant heritage value eg listed buildings.

Many non-domestic premises have fire alarm systems installed which can go off even when there is no fire. If we send a fire engine to a fire false alarm, it could result in us taking longer to respond to a genuine incident. This section will also look at fire false alarms, which is the largest category of incident we attend.

How likely is it that a fire will happen?

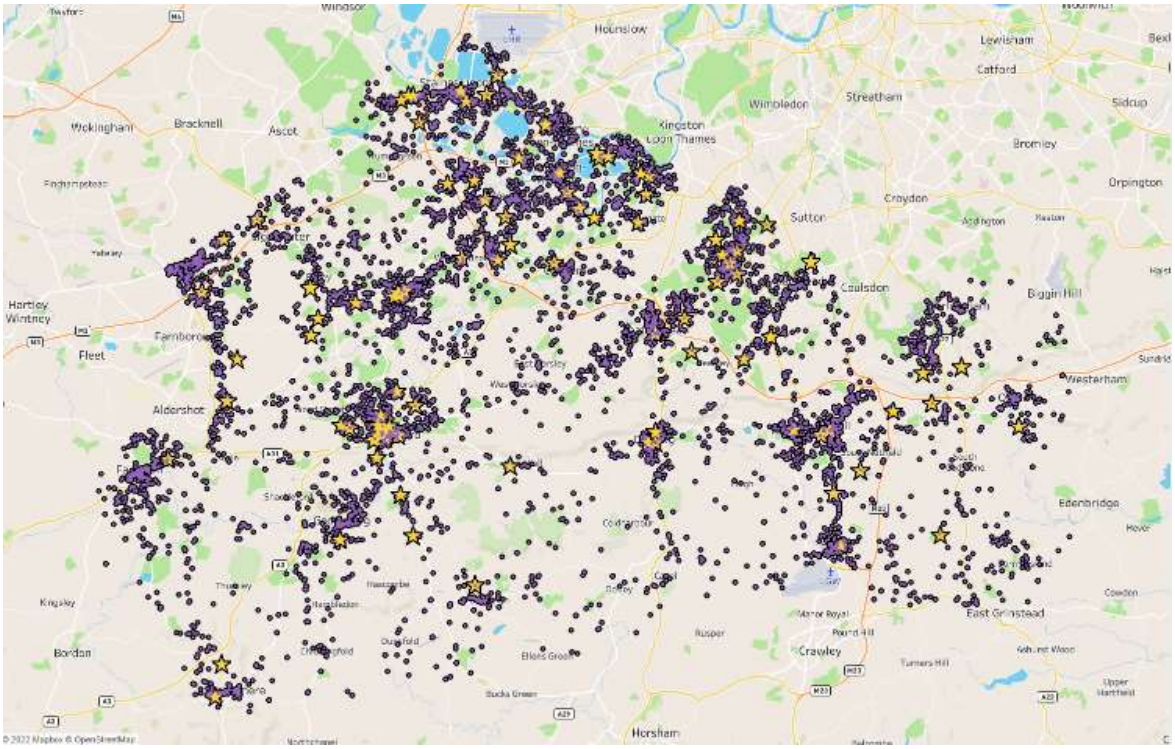
In Appendix 5 we have some graphs that show the number of fires per 1000 non-domestic premises in Surrey over the period 2002 to 2021. These show a reducing rate of both primary and other fires per 1000 premises.

We have data about the location of approximately 75,000 non-domestic premises in Surrey. This comes from a data set provided by Experian. Many of these premises are in areas of high-density population because they are there to serve the population. When we plot them on a map together with our fire stations, we can see that our fire stations are in the places with the highest concentration of non-domestic premises.

Heatmap showing density of non-domestic premises (businesses, public buildings, residential care homes etc) in Surrey (Experian data 2019)

The Experian data set rates premises on the likelihood of fire occurring. There are 13,265 premises within the top 20% for risk. The small purple dots on the map show the 13,213 premises that have not had a significant (‘primary’) fire incident between April 2018 and March 2022, whilst the 52 yellow stars show those premises which have. This means that 0.39% of these higher risk premises have experienced significant fires in the last four years. The map shows that these premises reflect the main centres of population in Surrey, such as towns and larger villages.

Primary fire incidents between 1 April 2018 and 31 March 2022 in the top 20% risk non-domestic premises in Surrey (Experian data 2019)



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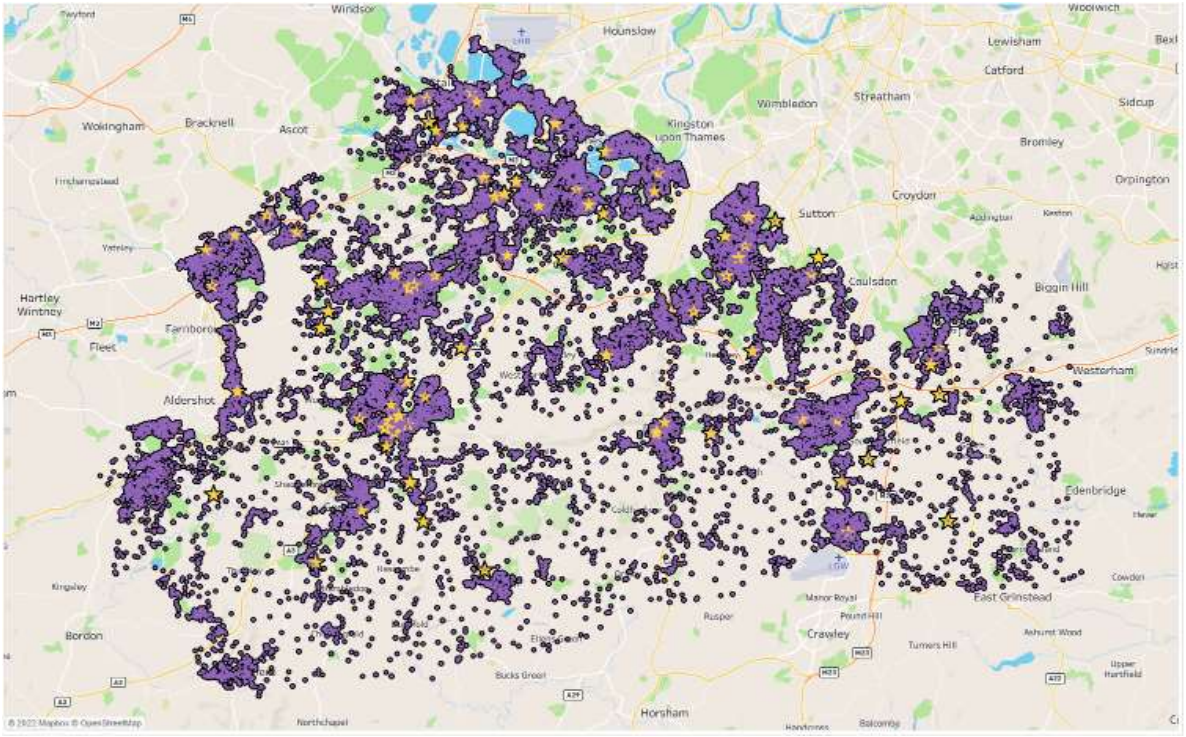
The next map shows the remaining 61,062 premises which are not in the top 20%. The small purple dots show the 60,624 premises that have not had a significant ('primary') fire incident between April 2018 and March 2022, whilst the 438 yellow stars show those premises which have. This means that 0.72% of these lower to medium risk premises have experienced

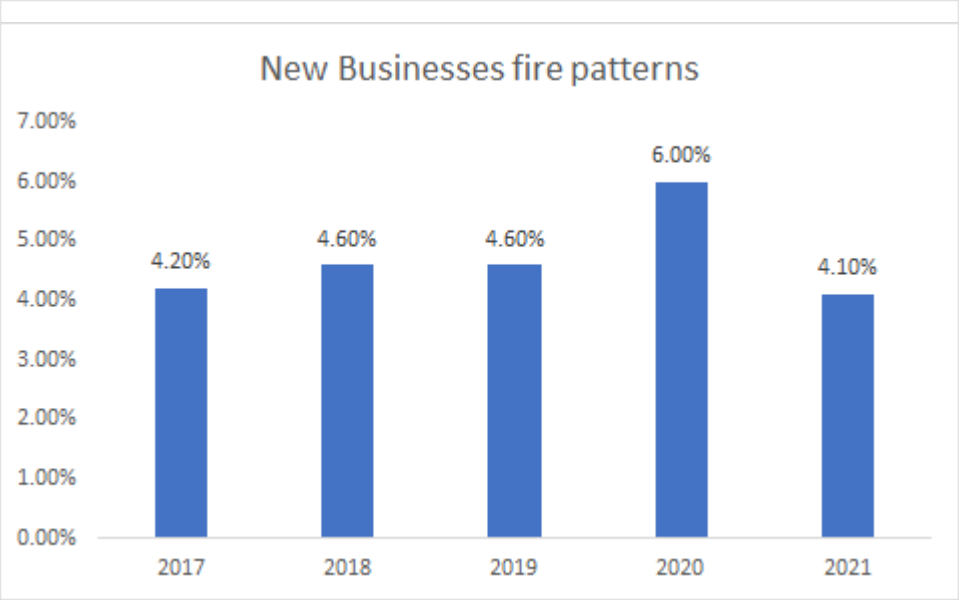
significant fires in the last four years. The yellow stars are distributed broadly in line with the main centres of population.

Primary fire incidents between 1 April 2018 and 31 March 2022 in the lower to medium risk non-domestic premises in Surrey (Experian data 2019)



We have done some analysis on fires that occurred in non-domestic premises between 2017 and 2021. We found that the percentage of new businesses that experienced fires was significantly higher than the percentage of established businesses that experienced fires. Please note the charts below that show peaks in fire patterns at around 0.9% in 2019 and 2020 for Established Businesses, and 6% in 2020 for New Businesses.

In terms of anticipating where future incidents might occur, we know that they are more likely to be at the premises of new businesses.



We also know that where compliance with one set of regulations is poor, it can be an indicator that compliance is poor in other areas, such as fire safety. For instance, the Environmental Health Food Hygiene Rating is a simple indicator of compliance at premises which are required to meet certain standards of fire safety. Using compliance data from other regulators helps us identify premises where fire safety might be an issue.

What are the consequences if a fire does occur?

We consider there to be a high risk to life in non-domestic premises where people sleep who are deemed vulnerable due to factors such as age, physical or mental impairment, unfamiliarity with the premises, or other characteristic that presents risk to those individuals. Or, where the premises present risk to the occupants due to the type of construction, its use, or other inherent characteristic (such as high-rise residential buildings).

Awareness and reaction times are greatly reduced during sleep and if the correct fire safety measures are not in place, occupants may be subject to a much higher risk of death or injury in the event of a fire. The table below is an analysis of the different types of non-domestic premises in Surrey.

Type of premises	Number of these premises in Surrey at 30 June 2022
Hospitals	214
Care Homes	800
Houses of Multiple Occupancy (HMOs)	647
Purpose Build Flats 1-3 storeys	3052
Purpose Build Flats 4-5 storeys	442
Purpose Build Flats > = 10 storeys	54
Hostels	56
Hotels	342
Houses converted to flats	788
Other Sleeping Accommodation*	3536
Further Education	545
Public Buildings	273
Licensed Premises	1328
Schools	875
Boarding schools	203
Shops	6886
Other Premises open to Public	1877
Factories or Warehouses	2073
Offices	2435
Other workplace	1103

*Other sleeping accommodation includes B&Bs, Sheltered housing and Halls of Residence.

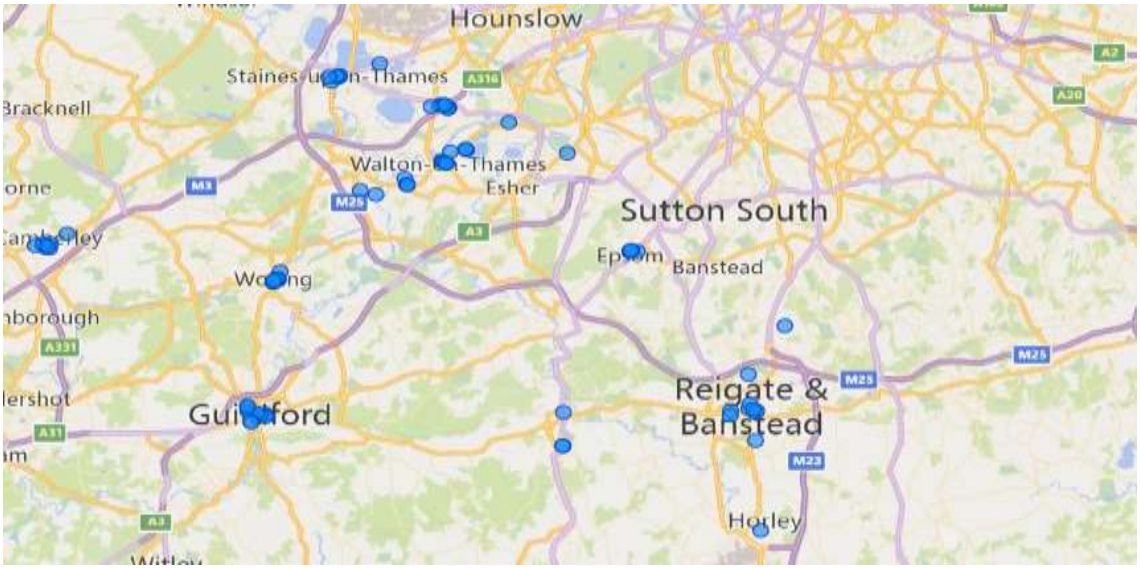
A distinct aspect of risk around business premises fires, is the risk to safety of firefighters attending such premises in the event of a reported incident. Our operational crews gather risk information for firefighter safety by visiting high-risk premises. We store the data on a customer relationship management platform, and it is available to crews attending incidents via the mobile data terminals on our fire engines.

High-rise premises

High-rise buildings are designed to resist fire and stop the spread of smoke. Most fires are contained and don't spread beyond the flat they originated in. However, because they are high rise, they require specialist firefighting strategies and equipment.

The map that follows show the location of high-rise buildings in Surrey, which are around the main towns.

Location of high-rise premises in Surrey

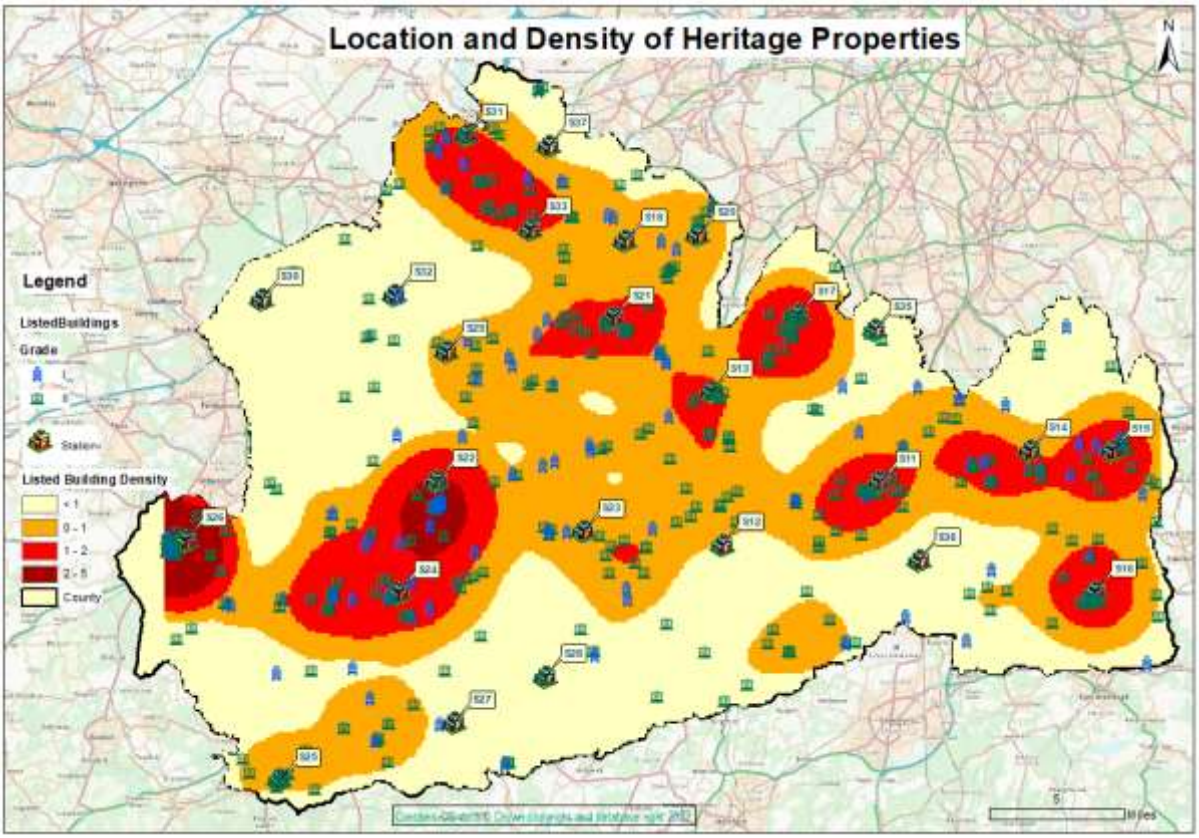


Heritage premises

Surrey has 105 Grade I and 352 Grade II listed buildings. The age of some of these buildings means that their design allows fire to spread rapidly. Co-ordinated planning is needed to prevent fires occurring and to mitigate the effects if they do.

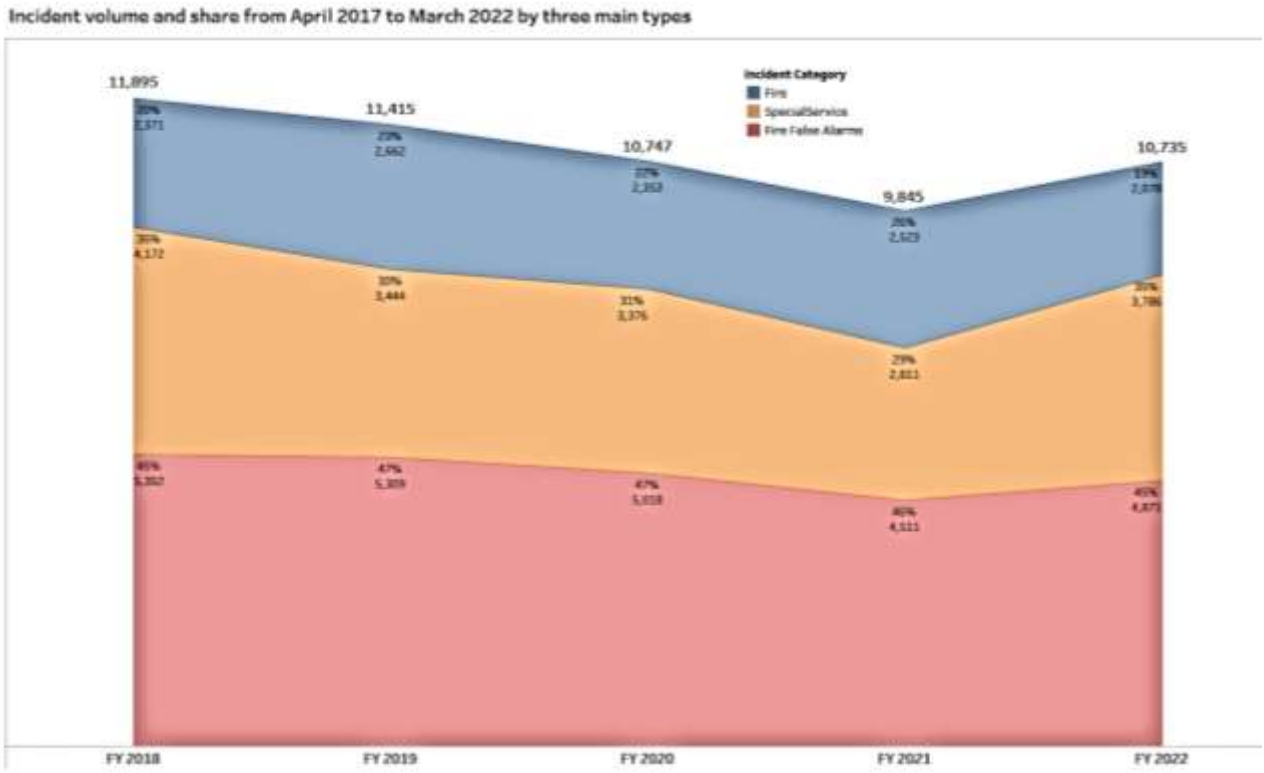
The map below shows the locations and densities of heritage properties, defined as both Grade I and Grade II listed places. The Service's fire stations are shown with numbers next to them, eg S31. There is a list of the names and numbers of the fire stations in Appendix 4.

The areas of greatest clustering of heritage properties, shown in red and brown on the map, are around Guildford, Godalming and Farnham, where there are also fire stations.



Fire false alarms and risk

Fire false alarms represent the biggest main type of incident which the Service attends. They are shown in red in the figure below.



This area chart shows that over the last five financial years the incident share of fire false alarms has ranged from 45 to 47% (although there has also been a gentle decrease in the overall number of incidents over that period). Non-fire incidents (special services, e.g. road traffic collisions, lift rescues, water rescues etc) are the next biggest category. Fires represent about a fifth of all incidents over this time.

We receive false alarms for fire incidents for three main reasons:

- Due to apparatus, i.e., an automated signal sent by a fire alarm system (67% in 2020/21)
- Good intent, i.e. the caller believed in the probability of an uncontrolled fire (32% in 2020/21)
- Malicious, ie the caller did not think there was a fire (1% in 2020/21)

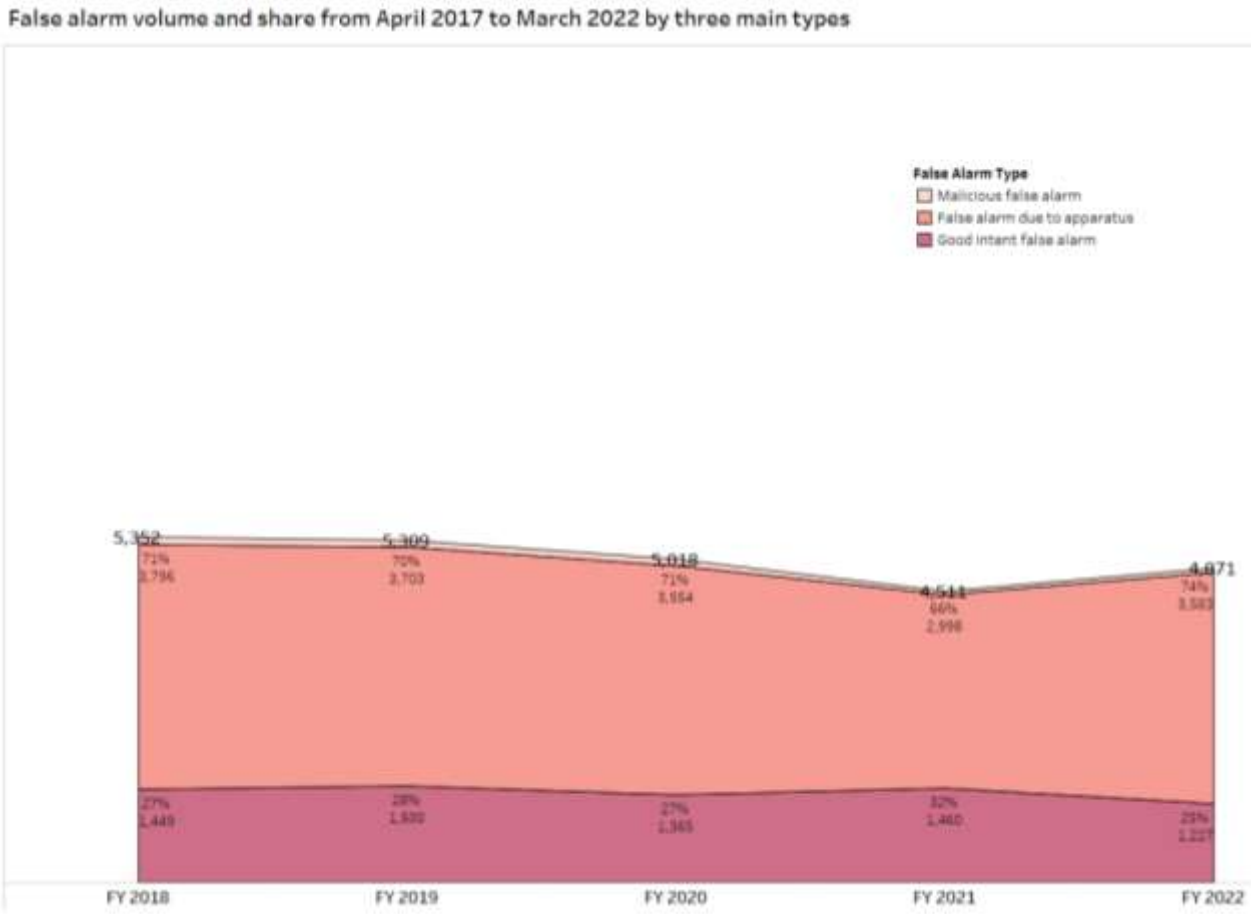
The number of fire false alarms we received in Surrey during the year ended 31 March 2021 was similar to those received by other fire and rescue services in England.

Incident Type	**Comparison to English average**
Due to apparatus	Average
Good intent	Average
Malicious	Below

Appendix 5 contains some graphs which show the number of fire false alarms received in every year from 2002 to 2021 per 1000 non-domestic properties in Surrey. The figure for all fire false alarms has dropped from 271 per 1000 non-domestic properties in 2002 to 127 in 2021.

The Service does not want to discourage 'good intent' false alarms as it is better to check out such concerns raised in person. On the other hand, fire false alarms raised maliciously or due to faulty or over-sensitive apparatus have no value. If a fire false alarm results in us despatching resources to that (false) incident, those resources become unavailable to respond to any other incident. This increases the risk of longer response times to those other incidents.

The area chart below shows the share of the different types of fire false alarm incidents and illustrates very clearly that the number of maliciously motivated fire false alarms is so small that the risk impact because of resource diversion is minimal.



This chart shows that fire false alarms due to apparatus represented between 67 and 74% of all fire false alarms over the last five years. The graph "fire false alarms due to apparatus/non-doom prop" in Appendix 5 shows how many fire false alarms we received in every year from 2002 to 2021 per 1000 non-domestic properties in Surrey. In 2002 it was 195 per 1000 non-domestic properties; in 2021 it was 85.

The change in approach to dealing with automatic fire alarms in some non-domestic properties (starting in 2022) has the potential to reduce false alarm attendances by 1,000 a year.

Conclusion

Using the Experian data, we know the location of non-domestic premises that are most likely to have a fire, or where the consequences of a fire will be most serious or require special firefighting strategies. Looking at them on a map, we can see that we have fire stations near to these premises. Having detailed information about the location and layout of particular buildings eg heritage buildings helps us plan to mitigate the effects of fire.

Our analysis of historic incidents and using data from other regulators enables us to identify types of premises that might be at an increased risk of fire. We can take this into consideration when we are planning our business safety activities aimed at preventing fires in non-domestic premises.

The fact that the proportion of fires in higher-risk premises where we focus our business safety and inspection activity is less than in medium to low-risk premises suggests that our activity is succeeding in reducing the number of fires.

A significant proportion of all incidents to which the Service is called are fire false alarms due to equipment. The actual number of fire false alarms has remained fairly consistent over the last five years, but the number received per 1000 non-domestic premises continues to decline. A growing number of non-domestic properties is not generating additional false fire alarms.

Product Risks

There are two categories of products that create risks:

- Existing products which can cause risk if not used with proper care eg candles, cigarettes.
- New product developments with a unique profile of risk, or specific makes of a product being recalled due to known occurrences of incidents eg mobile phones or chargers overheating, faulty tumble dryers, alternative fuelled vehicles.

Safe products but unsafe use

The Home Office identified the following factors across England in 2020/21 as the cause of accidental dwelling fires:

- 30% due to misuse of equipment or appliances
- 14% due to placing articles too close to heat

- 6% due to chip/fat pan fires.

With these products, the problem is not with the products themselves, but with how they are being used.

The knowledge of which type of products are causing fires when used without appropriate care informs the education and awareness campaigns we run and the advice we give householders and businesses when we make Safe and Well visits.

Unsafe products

The Home Office identified the following factors in the cause of accidental dwelling fires across England in 2020/21:

- 15% due to faulty appliances and leads
- 10% due to faulty fuel supplies.

Many products of potential concern will be those with a fuel supply, most often electrical but sometimes gas.

Our Fire Investigation team monitors product safety alerts through channels such as:

- Association of Manufacturers of Domestic Appliances
- Electrical Safety First
- Office of Product safety
- Fire Investigation Workplace site
- Fire Investigations
- Trading Standards investigations.

Any emerging trend or issue is then highlighted to partners for joint investigation and notice to the media team for informing the community if appropriate.

One such example was where the Service attended a fire involving a gas barbeque. The Fire Investigation Team identified the cause as a faulty regulator purchased from Amazon. The Team fed this into Trading Standards which then took the case forward for having the product removed from Amazon, removing the risk from sale.

Conclusion

Understanding which products have caused fires enables the Service to educate and inform residents about their safe use and to get dangerous products withdrawn from sale.

Emerging risks are those that occur from products and practices that are developing due to advances in technology or societal change. Battery storage of electricity collected using solar panels in domestic premises is an example of bringing new equipment into homes for which there is no historic data to analyse risk. Other examples include alternatively powered vehicles (eg electric cars, hydrogen busses, electric scooters), working from home, and unlicensed products (eg substandard battery replacement for consumer goods). Although SFRS cannot carry out analysis on these specific emerging technologies, we can use the monitoring described throughout the CRP to analyse the risk and act accordingly.

The Surrey Local Resilience Forum (SLRF) is a multi-agency partnership that provides a structure to help agencies plan and work together to prepare for major incidents and emergencies which may have a significant impact on the community. While emergencies of this nature are unlikely, it is useful to understand the types of risks. Within Surrey the SLRF undertakes a review of the national risks (linked here - https://www.gov.uk/government/publications/national-risk-register-2020) and those risks facing the county. A 'Community Risk Register' has been developed that highlights potential hazards in our area - https://www.surreycc.gov.uk/community/emergency-planning-and-community-safety/emergency-planning/surreys-local-resilience-forum. Information within both risk registers is monitored through work in SFRS and included where relevant in the CRP.

When Do Incidents Occur?

We have looked at different types of risks and the data that's available to help us see who is at risk and where they are. We also need to consider when people are at greatest risk. Looking at the time of day and the time of year when incidents have happened in the past is a useful indicator of when they might occur in the future.

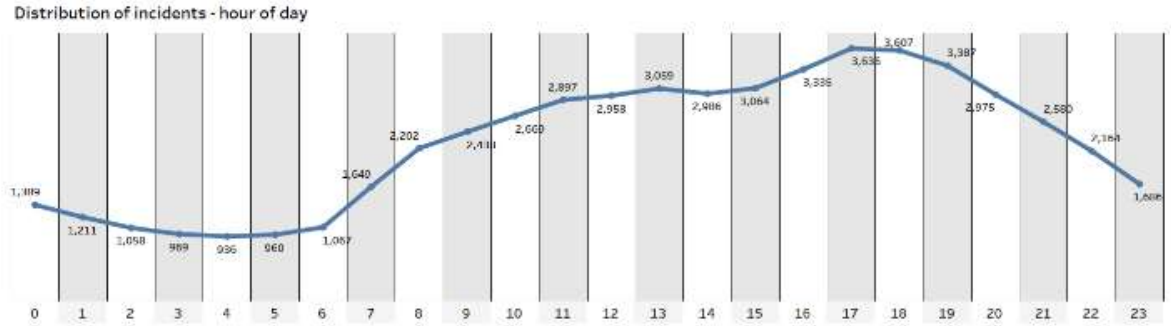
The following line charts show numbers of incidents and how and when they have occurred by hour of day, day of week and month of year. They also show the trend in numbers. All these are based on incidents attended within Surrey over the period from April 2017 to March 2022.

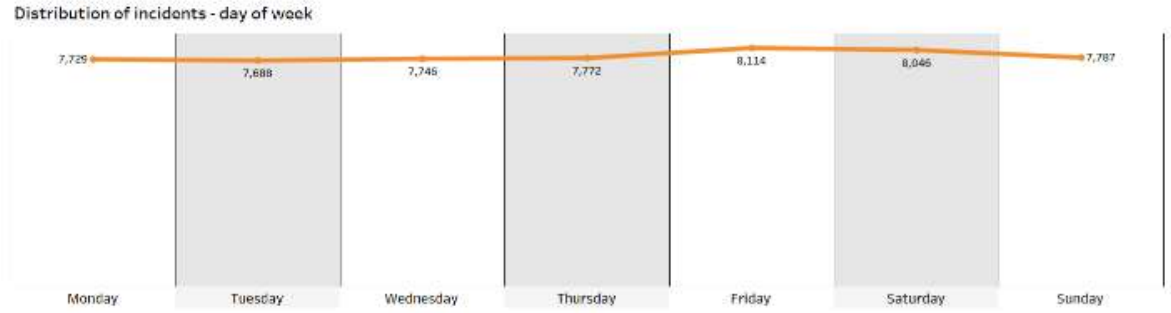
There are three main incident types:

- Fires (26% in 2020/21)
- Non-fire incidents (29% in 2020/21)
- Fire false alarms (45% in 2020/21).

We break these down into different sub-types based on extent of damage, motivation behind the incident (eg deliberate versus accidental fires), type of property involved where relevant and the nature of non-fire incidents.

Visualisations of distributions and trends – all incidents



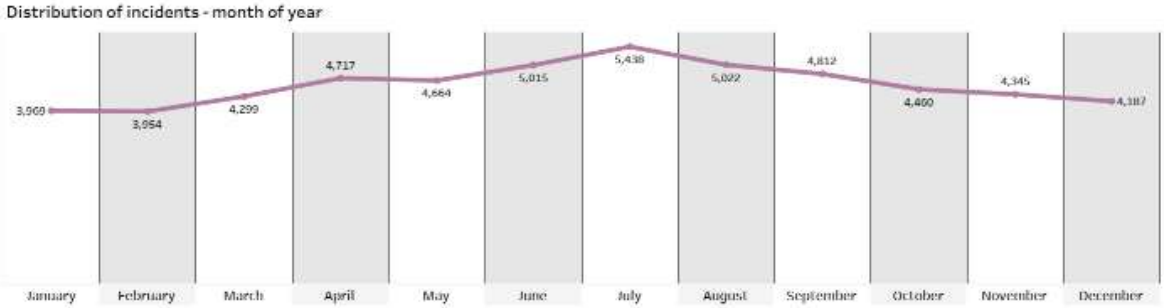


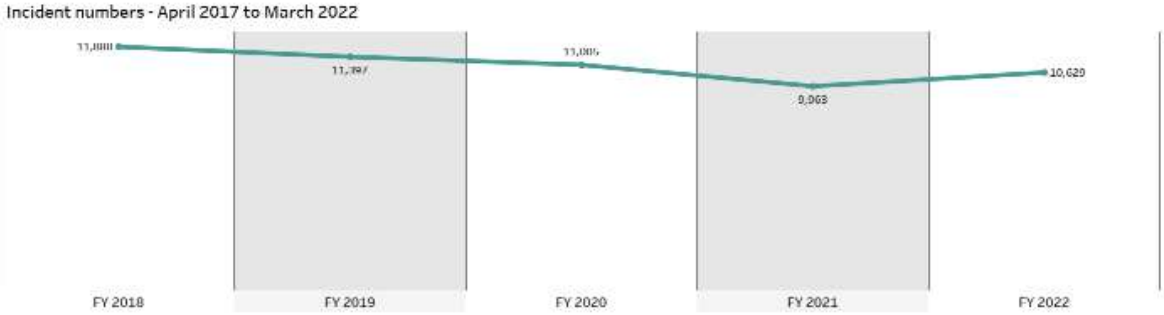
What the above chart shows

Analysis for hour of day: there is an uneven distribution of incidents over the course of a typical 24-hour period. The volume noticeably takes an upturn between the hours of 6am and 7am. The peak demand occurs between 5pm and 6pm, whilst the downturn noticeably happens between 7pm and 8pm. Over the course of a typical day, the number of incidents tends to increase when most people start getting up in the morning, peaks between 5pm and 6pm and begins noticeably dropping between 7 and 8pm.

63% of incidents occur between the hours of 7am and 7pm, and 37% occur between 7pm and 7am.

Analysis for day of week: there is no big variation in incident numbers between different days of the week. The highest number occurred on a Friday (15% of incidents), with Tuesday having the lowest number (14% of incidents).





What the above chart shows

Analysis for month of year: there is no strong seasonal variation, but there are moderate signs, for example the three months with the highest numbers all occur in the summer season. The month with the lowest number of incidents is December (7 %) and the month with the highest is July (10%). The seasonal distribution is as follows:

Summer (Jun/Jul/Aug) = 28%

Autumn (Sept/Oct/Nov) = 25%

Winter (Dec/Jan/Feb) = 22%

Spring (Mar/Apr/May) = 25%

The increase in the summer months is largely attributable to a greater volume of outdoor fires both primary and secondary. Road vehicle fires also tend to increase in this period. Other increases occur in good intent fire false alarms, animal assistance and other rescue/release of people.

Analysis volume trend over last five financial years: there are moderate signs of decline in incident numbers. The effect of the COVID-19 pandemic lockdowns and other restrictions to usual behaviours resulted in a larger than usual fall in incident numbers in 2020/21. Fewer road journeys meant fewer road traffic collisions. As restrictions eased in 2021/22, the number of incidents increased, but not back to pre-COVID-19 pandemic levels.

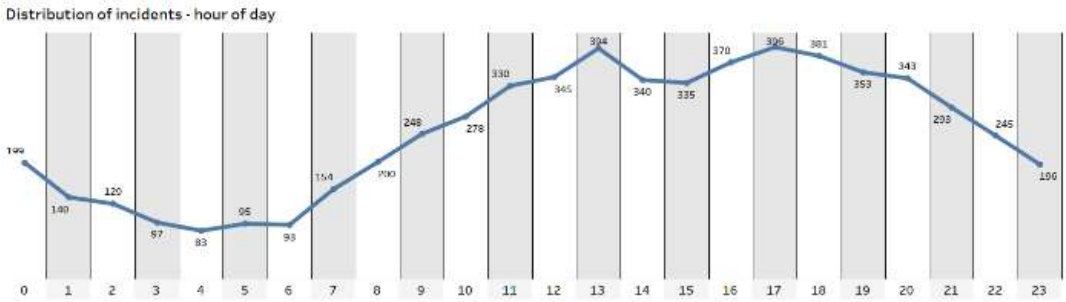
Visualisations of distributions and trends – fire incidents

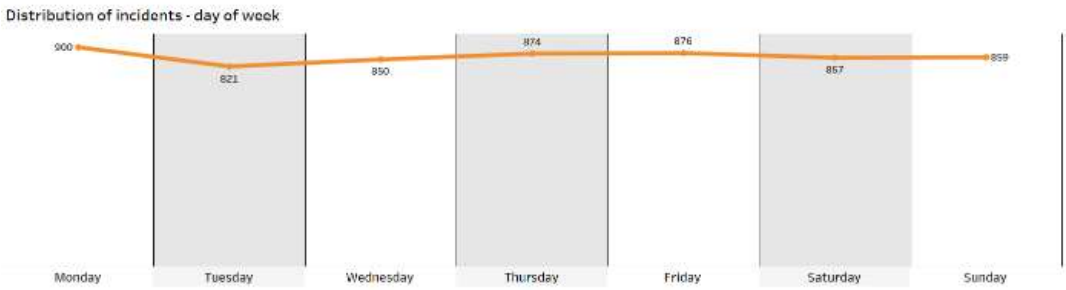
We categorise fire incidents into three main types:

- Primary fires (44% in 2020/21)
- Secondary fires (53%) in 2020/21)
- Chimney fires (3% in 2020/21)

Primary fires are the most serious type of fire incident. They involve fires to owned property and fires that have caused significant damage in any property. Secondary fires are all other fires apart from chimney fires, which are separately identified.

Primary Fires



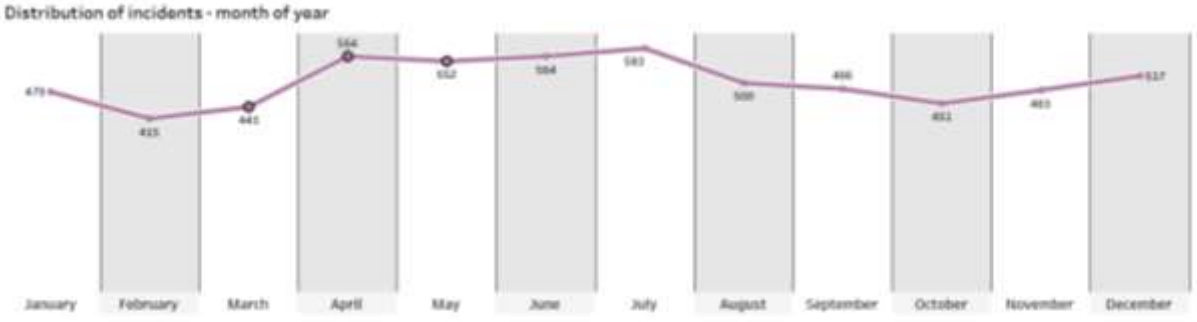


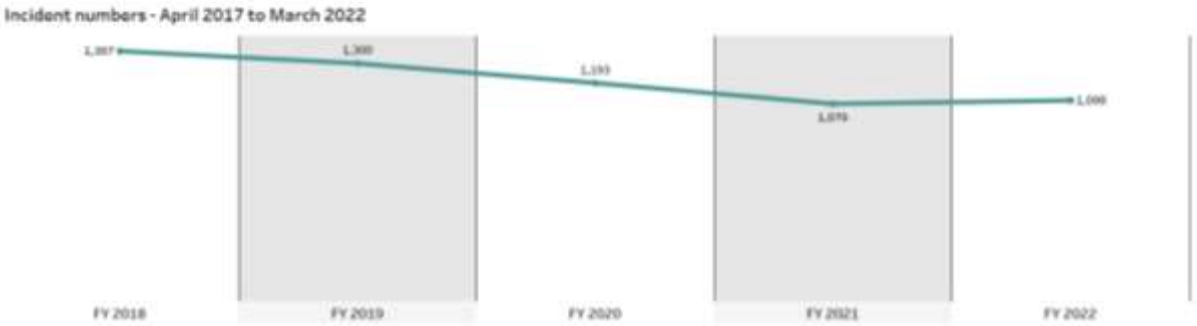
What the above chart shows

Analysis for hour of day: this is very similar to the distribution for all incidents. The only differences are that there are twin peaks around the hours of 1pm and 5pm and that the downturn occurs at a slightly earlier time between 6pm and 7pm.

Analysis for day of week: there is no big variation in incident numbers between different days of the week. The highest number occurred on a Monday (15% of incidents), with Tuesday having the lowest number (14% of incidents).

Primary Fires





What the above chart shows

Analysis for month of year: there is stronger seasonal variation compared to all incidents. There are twin peaks in April (9%) and July (10%). The month with the lowest number of incidents is February (7%). The seasonal distribution is as follows:

Summer (Jun/Jul/Aug) = 27%

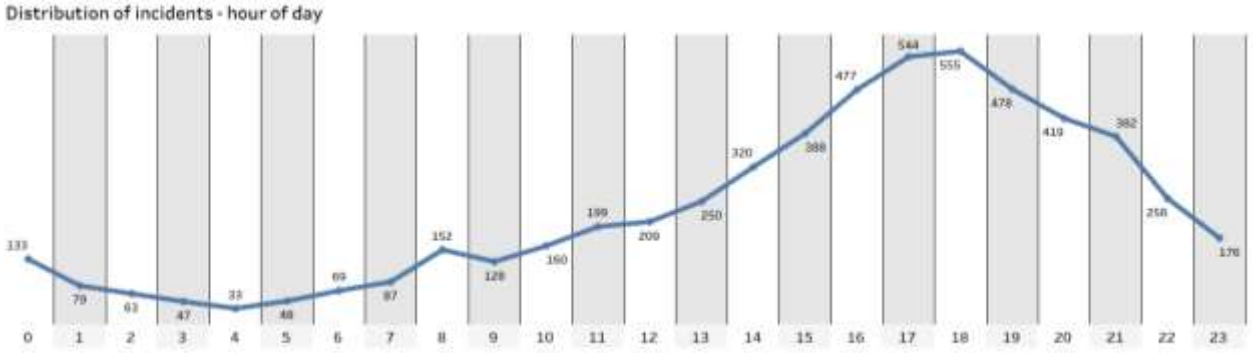
Autumn (Sept/Oct/Nov) = 24%

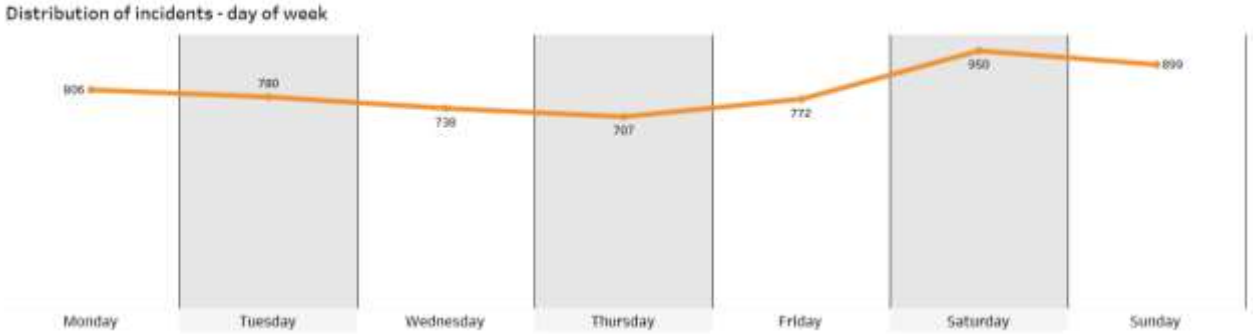
Winter (Dec/Jan/Feb) = 23%

Spring (Mar/Apr/May) = 26%

Analysis volume trend over last five financial years: there may be a downward trend showing in these numbers.

Secondary Fires



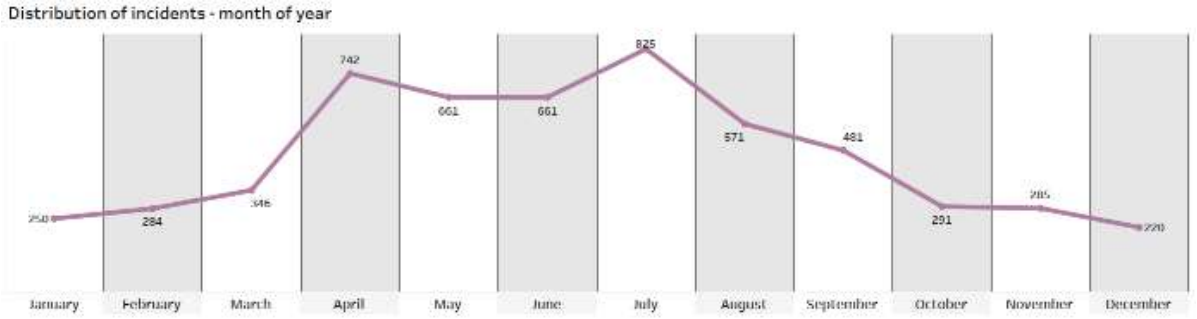


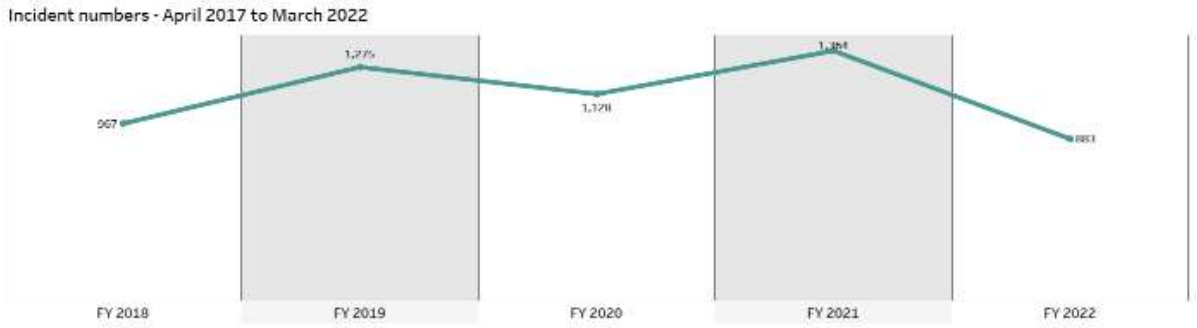
What the above chart shows

Analysis for hour of day: in contrast to primary fires this has a clearer single peak around 5pm to 6pm. The highs and lows are generally more distinct than with primary fires, suggesting that there is a greater correlation between secondary fires and when most people tend to be actively out and about.

Analysis for day of week: there is no big variation in incident numbers between different days of the week. The highest number occurred on a Saturday (17% of incidents), with Thursday having the lowest number (13% of incidents).

Secondary Fires





What the above chart shows

Analysis for month of year: there is a stronger seasonal variation than for primary fires. There are twin peaks in April (13%) and July (15%). The month with the lowest number of incidents is December (4%.) The seasonal distribution is as follows:

Summer (Jun/Jul/Aug) = 37%

Autumn (Sept/Oct/Nov) = 19%

Winter (Dec/Jan/Feb) = 13%

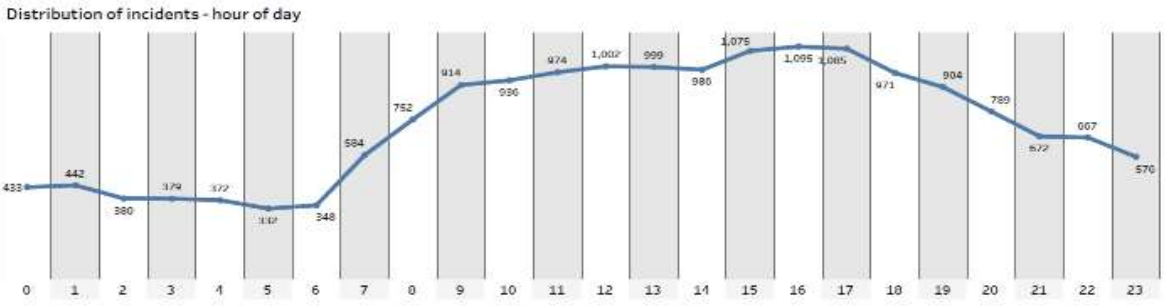
Spring (Mar/Apr/May) = 31%

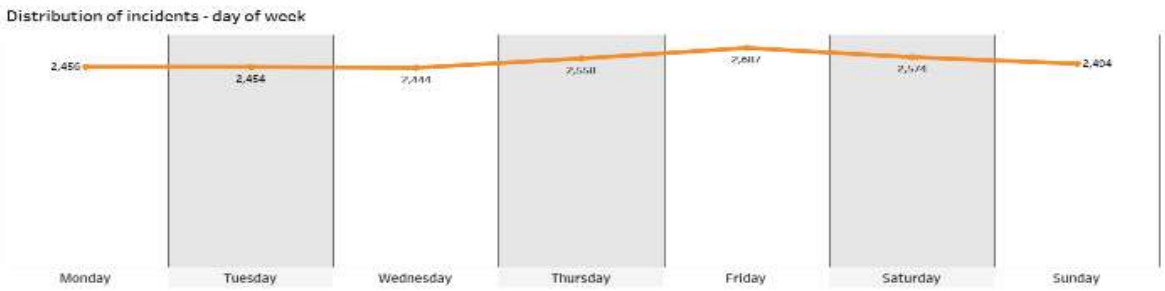
Analysis volume trend over last five financial years: there is no clear trend showing in these numbers.

Visualisations of distributions and trends – non-fire incidents

Non-fire incidents cover all the other situations that the Service is asked to attend to offer special services. There are 23 categories of non-fire incidents. The five most commonly occurring in 2020/21 were:

- Road Traffic Collisions – 34%
- Effecting entry / exit – 24%
- Assist other agencies – 9%
- Flooding – 9%
- Lift release – 5%



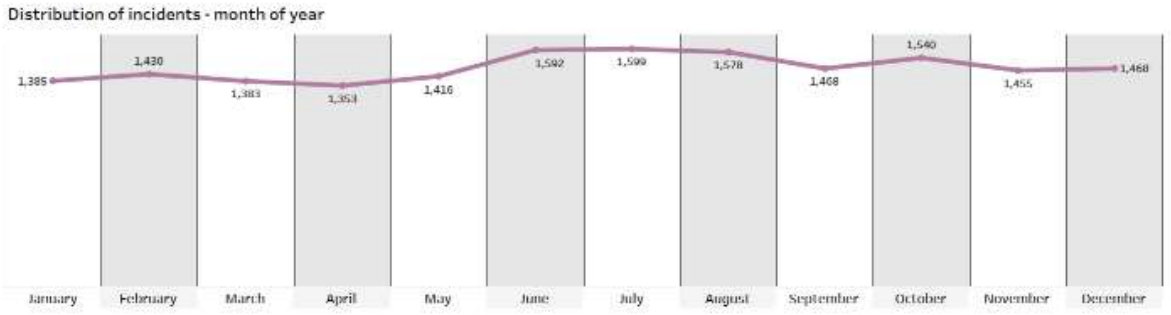


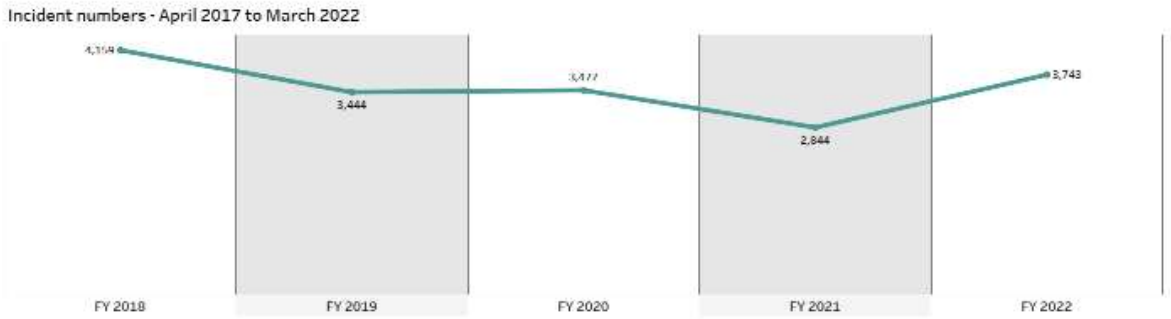
What the above chart shows

Analysis for hour of day: this is very similar to the distribution for all incidents. The only difference is that the downturn occurs at an earlier time between 5pm and 6pm.

Road traffic collisions have an initial peak at the start of the typical commuting period at around 8am, this then tails off for a while but begins to climb again around 3pm and has the highest peak by some margin at around 5pm (middle of the typical commuting period).

Analysis for day of week: there is no big variation in incident numbers between different days of the week. The highest number occurred on a Friday (15% of incidents), with Wednesday having the lowest number (14% of incidents).





What the above chart shows

Analysis for month of year: there is weaker seasonal variation compared to all incidents. There is a peak in July (9%). The month with the lowest number of incidents is March (8%). The seasonal distribution is as follows:

Summer (Jun/Jul/Aug) = 27%

Autumn (Sept/Oct/Nov) = 25%

Winter (Dec/Jan/Feb) = 24%

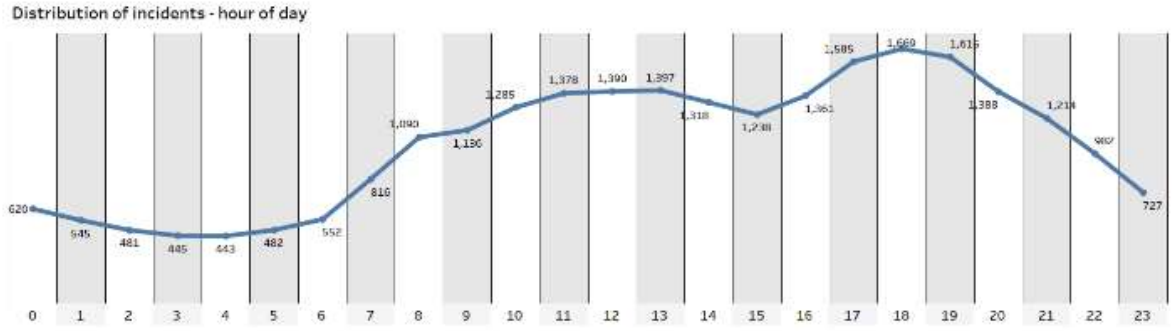
Spring (Mar/Apr/May) = 24%

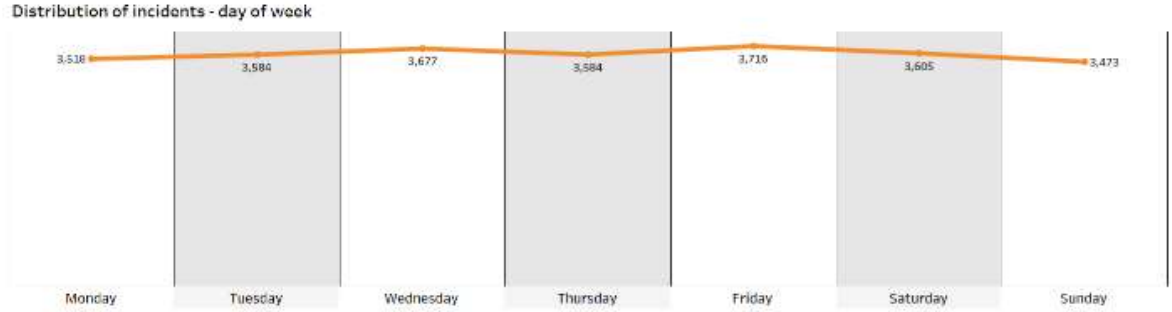
Analysis volume trend over last five financial years: there is no clear trend showing in these numbers. The more pronounced dip between 2019/20 and 2020/21 is due to fewer road traffic collisions in 2020/21, likely to have been an outcome of the COVID-19 pandemic measures to reduce travel.

Visualisations of distributions and trends – fire false alarm incidents

We receive false alarms for fire incidents for three main reasons:

- Due to apparatus, ie an automated signal sent by a fire alarm system (67% in 2020/21)
- Good intent, ie the caller believed in the probability of an uncontrolled fire (32% in 2020/21)
- Malicious, ie the caller did not believe in the probability of an uncontrolled fire (1% in 2020/21)

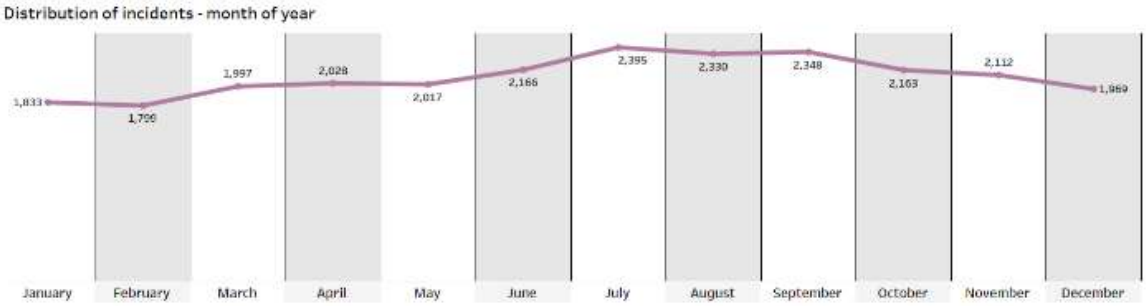


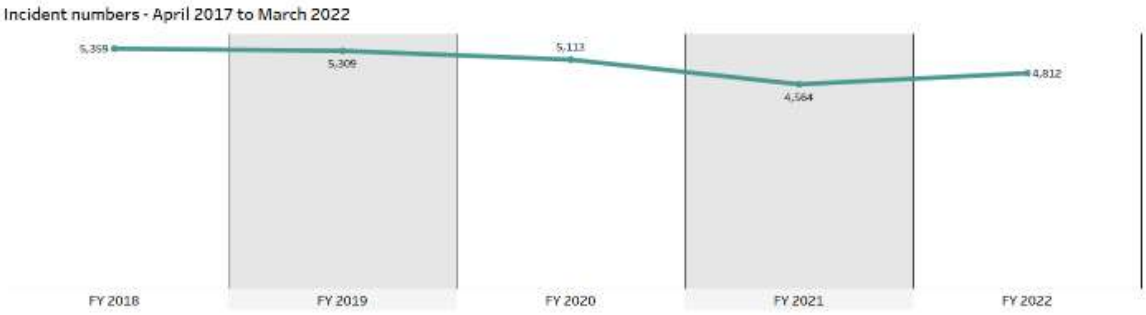


What the above chart shows

Analysis for hour of day: this is very similar to the distribution for all incidents.

Analysis for day of week: there is no big variation in incident numbers between different days of the week. The highest number occurred on a Friday (15% of incidents), with Sundays having the lowest number (14% of incidents).





What the above chart shows

Analysis for month of year: there is weaker seasonal variation compared to all incidents. There is a peak in July (10%). The month with the lowest number of incidents is February (7%). The seasonal distribution is as follows:

Summer (Jun/Jul/Aug) = 27%

Autumn (Sept/Oct/Nov) = 26%

Winter (Dec/Jan/Feb) = 22%

Spring (Mar/Apr/May) = 24%

Analysis volume trend over last five financial years: there is downward trend showing in these numbers. The COVID-19 pandemic impact during 2020/21 appears to have had a downward impact on these incidents, but it is not clear why.

Conclusion

The time of day rather than the day of the week is more significant in helping us predict when our services might be needed. Almost twice as many incidents occur between the hours of 7am

and 7pm as occur between 7pm and 7am. Time of year does not have a major influence on incident numbers, but slightly more incidents occur in the summer months.

Overall Conclusion

As a Fire and Rescue Service, we want to do all we can to prevent unnecessary loss of life. The greatest threat to life comes from the roads, bodies of water and from domestic dwelling fires.

The number of road traffic collisions (RTCs) has been declining in the last few years and those that do occur tend to be on the motorways and A roads in the north-west of Surrey. In the five years between 2016 and 2020, the average number of deaths caused by RTCs each year was 30. Drivers under the age of 25 are at greater risk of being injured in a road traffic collision than drivers in other age groups.

There are fewer water-related incidents than there are fire incidents, but the number of fatalities is about the same. For the nine years between 2010 and 2018, the average number of deaths caused by fire or by water for each of those years was 3.

The presence of smoke alarms reduces the extent of fire damage and improves the likelihood of self-rescue. Research and our own experience have shown that some residents are more likely to experience a fire and to be more affected by it. These are older residents and residents with physical or mental health issues, alcohol or drug dependency, residents who smoke and residents who live alone. The number of more vulnerable residents is expected to grow as the population ages. We can use data from different sources and apply modelling techniques to identify where more vulnerable residents live.

Certain types of non-domestic premises are more vulnerable to fire and we have found that newer businesses and those with lower compliance rates are at greater risk of fire. The design of some of the older heritage properties in Surrey increases the likelihood of fire spreading rapidly. We use a database which identifies the level of risk of all non-domestic premises in Surrey and gives their location.

The impact of major incidents on national infrastructure such as motorways, rail network and airports would be severe. We liaise with other agencies via the Local Resilience Forum to maintain our awareness of the likelihood, impact and potential location of major incidents.

Protecting the environment is a key part of our responsibilities. Surrey has approximately 64,000 households at risk of fluvial flooding and 15,500 hectares of land at risk of wildfire. The weather is a big factor in causing the right conditions for flooding and wildfire incidents to occur. The effects of climate change may create these conditions more frequently in future.

Appendices

Appendix 1 – data sources

Other Known Factors	Historical Data Sources
• The Index of Multiple Deprivation (2019) – scores broken down to small scale locations. This is a nationally recognised tool identifying locations that are more likely to be experiencing deprivation. • Office for National Statistics – Census (2011 and 2021) – population and household estimates data • Department for work and pensions – (2020) statistics on benefits, pensions, employment programmes, income distribution and other subjects we are responsible for. • Road accident hotspots – the frequency of road traffic collisions in relation to weight of traffic is monitored by Surrey County Council's Road Safety Team. Specific sections of road are then identified for particular attention. • The Environment Agency maps the flood zones. Flood zones are based on how likely it is that a location will flood from surface water, rivers, or sea. • The Service makes use of a commercial data set provided by Experian which gives non-domestic premises in Surrey a risk rating for fire. • The locations of high-rise buildings in Surrey.	• Accidental dwelling fire locations April 2017 to March 2022 • Deliberate fire locations April 2017 to March 2022 • Crime/antisocial behaviour locations April 2017 to March 2022 • Road Traffic Collision locations attended by the Service April 2017 to March 2022 • All Road Traffic Collision locations that occurred May 2017 to April 2022. • Rescues from water locations April 2017 to March 2022 • Flooding incident locations April 2017 to March 2022 • Non-domestic premises fire locations April 2017 to March 2022 • Unwanted fire signals April 2017 to March 2022

Other Known Factors	Historical Data Sources
• The locations of significant new building developments in Surrey – particularly those where previously there was very low density of housing. • The locations of grade I and grade II heritage sites in Surrey. • The highest risks at a Surrey level which the Service monitors in conjunction with other Local Resilience Forum partners. • We know that certain characteristics make people more vulnerable to fire. Information about socio-demographic attributes is available through Experian's Mosaic database. • Data from Dolby Vivisol and Air Liquide on where they are supplying oxygen cylinders helps identify people who would be more vulnerable if a fire broke out. • Age Data from NHS Exeter on residents in Surrey over 65 • Police UK – crime data • Local Insight – gives the latest data and analysis for your communities and services, with up-to-date open data matched to the areas you work in • Surrey if – is a one-stop source of data, information, specialist reports, summary analysis and headline statistics, covering Surrey's demographics (details about our population), our economy and public services.	

Appendix 2 – Surrey Index Model – identifying risks at Surrey County Council level

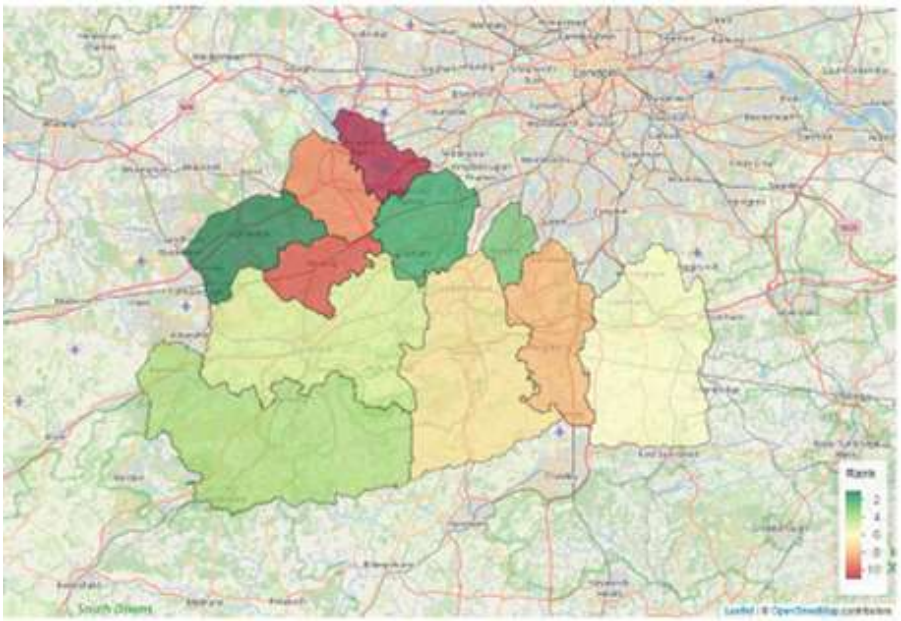
The Surrey Index Model uses 46 selected indicators to look at priorities aligned to the Community Vision 2030. A summary of the vision is that “By 2030 we want Surrey to be a uniquely special place where everyone has a great start to life, people live healthy and fulfilling lives, are enabled to achieve their full potential and contribute to their community, and no one is left behind.” To see more about the Community Vision for 2030 please see the link Community vision for Surrey in 2030 - Surrey County Council (surreycc.gov.uk). The indicators relate to three areas: Basic Needs, Opportunity and Inclusion; Wellbeing and Environment; and Prosperity and Growth.

We have matched indicators from the Surrey Index model with NFCC fire risk factors to produce a map showing how each area in Surrey is performing. The indicators we have used have equal weighting of .05 and are as follows.

- Anti-social behavior – Mar 20-Feb 21 Police UK
- Claiming out of work Benefits (Benefit combinations includes SDA, CA, PC, CA, UC, JSA, ESA, IB) – Aug 20 – Department for Work and Pensions
- Disability benefit (DLA) – Aug-20 Department for Work and Pensions
- Households in poverty – 2013/2014 Office for National Statistics
- Housing Benefit – November 2020 – Department for Work and Pensions
- Learning Disabilities prevalence – 2017/2018 House of Commons Library – NHS digital
- Overcrowded housing – Census 2011
- Pensioner living alone – Census 2011
- Pensioners in poverty (Pension Credit) - Aug 20 –Department for Work and Pensions
- People with mental health issues – Aug –20 – Department for Work and Pensions (IB)
- Population aged 65+ -2019 - Office for National Statistics
- Percentage of children in poverty (after housing costs)
- Social rented housing – 2011 – Census 2011
- Total crime offences – Mar 20-Feb 21 – Police UK
- Unemployment benefit – Department for Work and Pensions
- Universal Credit
- Violent Crime and sexual offences – Mar 20-Feb 21 – Police UK
- Working age Benefit claimants (Benefit combinations)
- Workless through sickness benefit (IB, ESA)

The dark green are areas that perform well on the chosen indicators. The red and orange areas are areas which perform badly on the indicators. Using these risk factors Surrey Heath is the best performing Local Authority while Spelthorne, Woking, and Runnymede are those areas that need to improve.

Surrey Index Flexible Map Local Authority



Appendix 3 – Met Office UK climate predictions

UK Climate Projections is a climate analysis tool that forms part of the Met Office Hadley Centre Climate Programme.

The UK Climate Projections 2018 (UKCP18) delivers a major upgrade to the range of UK climate projection tools designed to help decision-makers assess their risk exposure to climate.

The UKCP18 project uses cutting-edge climate science to provide updated observations and climate change projections out to 2100 in the UK and globally. The project builds upon UKCP09 to provide the most up-to-date assessment of how the climate of the UK may change over the 21st century.

The following extracts from the Projects document “caveats and limitations” gives some important context to the projections and headlines we have taken from them.

All simulations of the future are conditioned on both a limited number of scenarios of future greenhouse gas emissions and the methodologies we employ in UKCP18. For instance, while the global projections provide a range of climate futures, they cannot cover all potential future climate outcomes. The UKCP18 climate models, like all other climate models, have limitations in their simulation of the real world.

The change in climate projected by models in UKCP18 is strongly dependent on future global greenhouse gas emissions. UKCP18 uses scenarios for future greenhouse gases called the representative concentration pathways (RCPs) which cover a more up to date (compared to

UKCP09) range of assumptions around future population, economic development and to explicitly include the possibility of mitigation of greenhouse gas emissions towards international targets. Each pathway drives a different range of simulated global mean temperature increases over the 21st century. The RCP pathways lead to a broad range of climate outcomes but are neither forecasts nor policy recommendations. The four RCPs considered in UKCP18 attempt to capture a range of potential alternative futures, spanning a range of outcomes, further guidance is available on the UKCP18 website. The real world may follow a different pathway altogether. The scientific community cannot reliably place probabilities on which scenario of greenhouse gas emissions is most likely.

The relative probabilities indicate how strongly the evidence from models and observations, taken together in our methodology, support alternative future climate outcomes. There is more evidence for outcomes near the centre of the distribution than in the tails, so we see unimodal (single-peaked) distributions. In these, the relative probabilities for specific outcomes are typically much higher near the 50% cumulative probability level (median) of the distribution, than for outcomes lying either below the 10% cumulative probability level or above the 90% cumulative probability level.

Therefore, the following headlines are taken from these simulations for climate change projection over land for the South East of the UK, from 2020 to 2039 and looking at the 50% probability level which has more evidence behind the predicted outcomes (they hold for all four of the representative pathways):

- Winter rainfall predicted to be increasing by up to 10%
- Summer rainfall predicted to be decreasing by up to 10%
- Winter average temperature predicted to be increasing by up to 1^{o}C
- Summer average temperature predicted to be increasing by between 1^{o}C and 2^{o}C
- Winter average daily maximum temperature predicted to be increasing by up to 1^{o}C
- Summer average daily maximum temperature predicted to be increasing by between 1^{o}C and 2^{o}C

Appendix 4 – Surrey Fire and Rescue Service fire stations

Reference Number	Station
S11	Reigate
S12	Dorking
S13	Leatherhead
S14	Godstone
S15	Oxted
S16	Lingfield
S17	Epsom
S18	Walton
S20	Esher
S21	Painshill
S22	Guildford
S23	Gomshall
S24	Godalming
S25	Haslemere
S26	Farnham
S27	Dunsfold
S28	Cranleigh
S29	Woking
S30	Camberley
S31	Egham

Reference Number	Station
S32	Chobham
S33	Chertsey
S35	Banstead
S36	Salfords
S37	Fordbridge

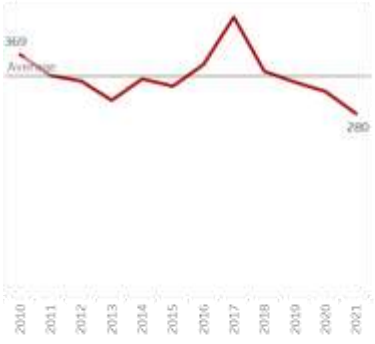
Appendix 5 – incident trends

Surrey incident trends by dwellings (per 1k)

Surrey incident trends by population (per 10k)

Surrey incident trends by non-domestic properties (per 1k)

Total incidents/non-dom properties

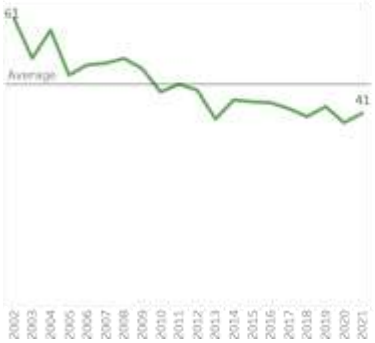


Other building fires/ non-dom prop

Primary fires in non-domestic buildings/non-dom prop

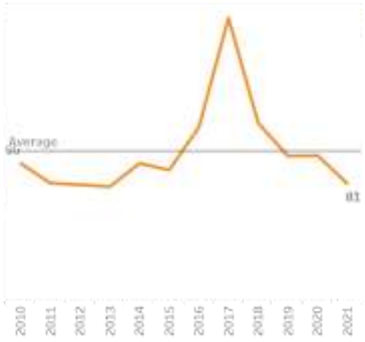
Total fire false alarms/non-dom prop

fire false alarms good intent / non-dom prop



fire false alarms due to apparatus / non-dom prop

Total non fire incidents / non-dom prop



non-fire false alarms / non-dom prop