



Essex County
Fire & Rescue Service

Data Analysis Report

[Deliberate Fires]

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About

This report provides analysis regarding deliberate fires recorded in Essex from January 2018 till March 2022. This has been commissioned by Will Newman and James Taylor and carried out by the Performance and Analytics department, Essex County Fire and Rescue Service (ECFRS).

This document should be used as a reference should the analysis be used for further work within Essex Fire and Rescue Service.

Background

It has been noted that deliberate fires attended by ECFRS have been increasing in recent months across Essex. Previous analysis indicates that deliberate fires are high during the summer periods. This analysis is being done to understand the main highlights and trends of deliberate fires over the past four and a half years to allow targeted prevention activity.

Data used

Data from SQL Server was used from the NeRF star database. Three tables within this database were joined together to gather the relevant data and this was saved in a view so this analysis can be repeated in future years.

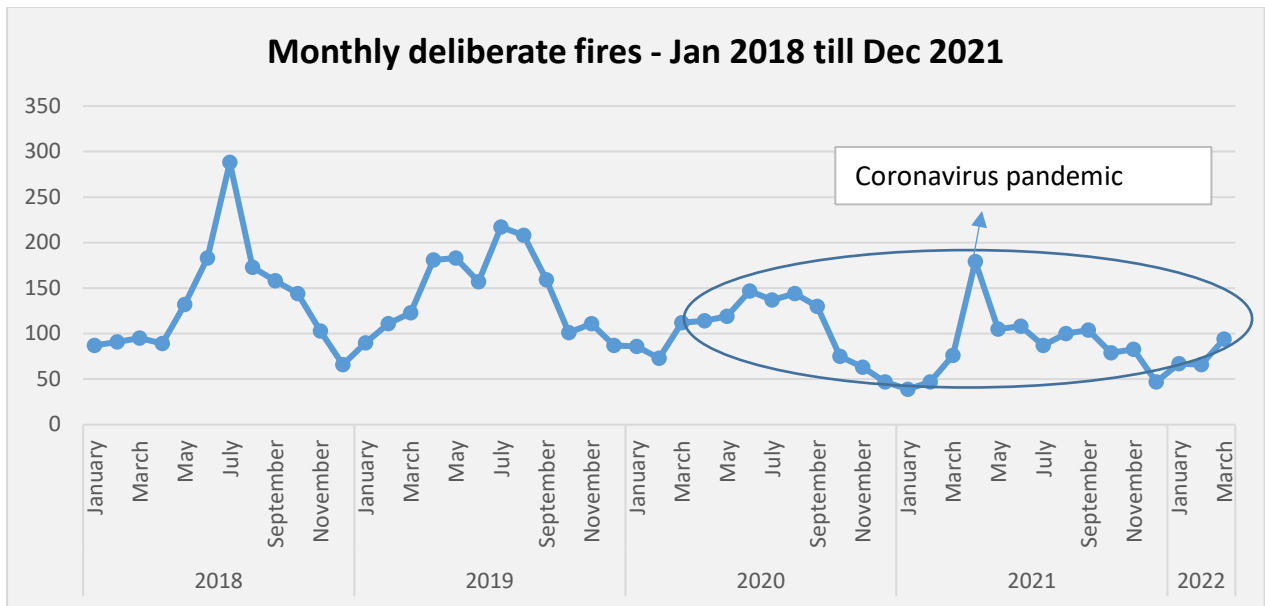
An analysis has been done for all deliberate fire incidents recorded on IRS and available on the databases between the 1st January 2018 and 31st March 2022.

Findings

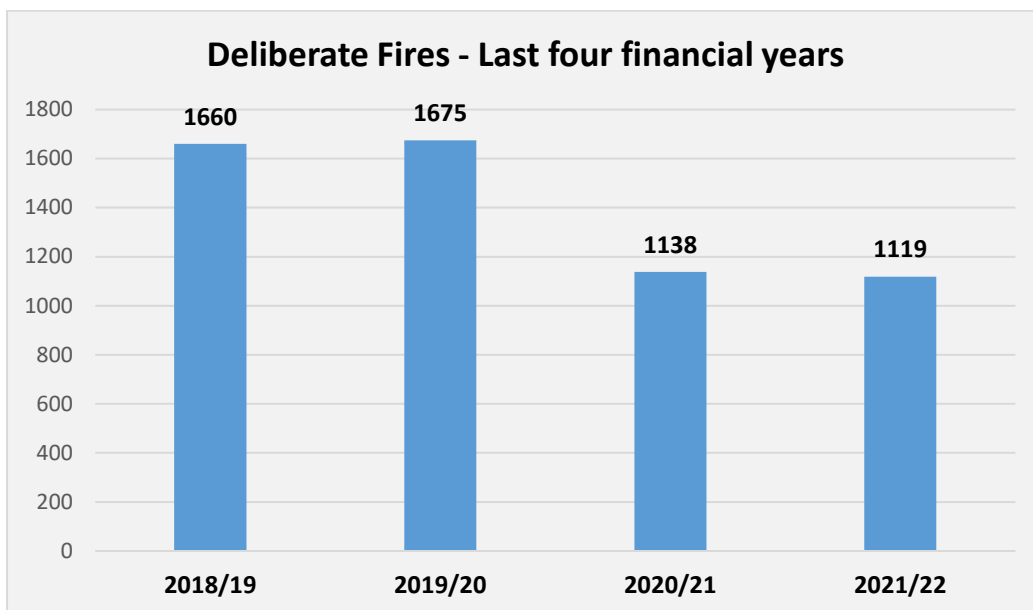
Deliberate fires monthly trends

The volumes of deliberate fires tend to stay at around the same levels before and after the pandemic.

The highest peak was around July 2018 when 300 instances of deliberate fires were recorded across Essex. Since then, levels have fallen but fluctuate between 50 and 200 deliberate fires every month.



So, we know there are higher frequencies of deliberate fires in the 2018/19 and 2019/20 financial years then these levels drop. In the last two financial years of 2020/21 and 2021/22, volumes have remained stable and lower. The graph below illustrates this.



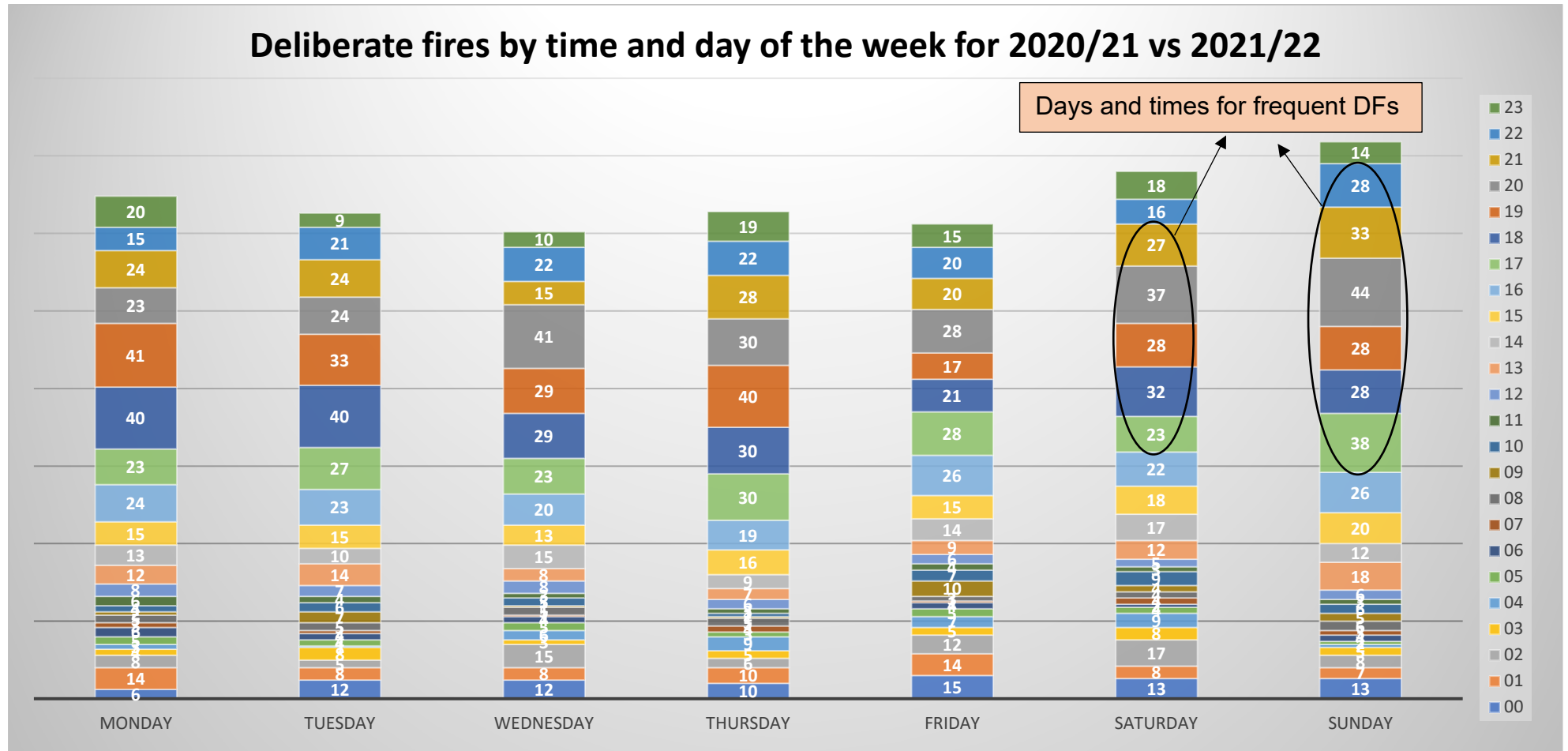
Days and times for highest frequencies of Deliberate fires

Since volumes of deliberate fires have fallen substantially in 2020/21 compared to the last two financial years of 2018/19 and 2019/20, it was decided that days and times when volumes of deliberate fires are the highest should be analysed over the last two financial years. This includes the financial years of 2020/21 and 2021/22 only. This was done to provide a better understanding of what deliberate fire volume trends are looking like in recent years.



Based on the last two financial years of data, the highest numbers of deliberate fires tend to happen between 5 pm and 10 pm on Sunday and the least numbers tend to be in the mornings on all days of the week. The bar chart below highlights this case.

Deliberate fires by time and day of the week for 2020/21 vs 2021/22





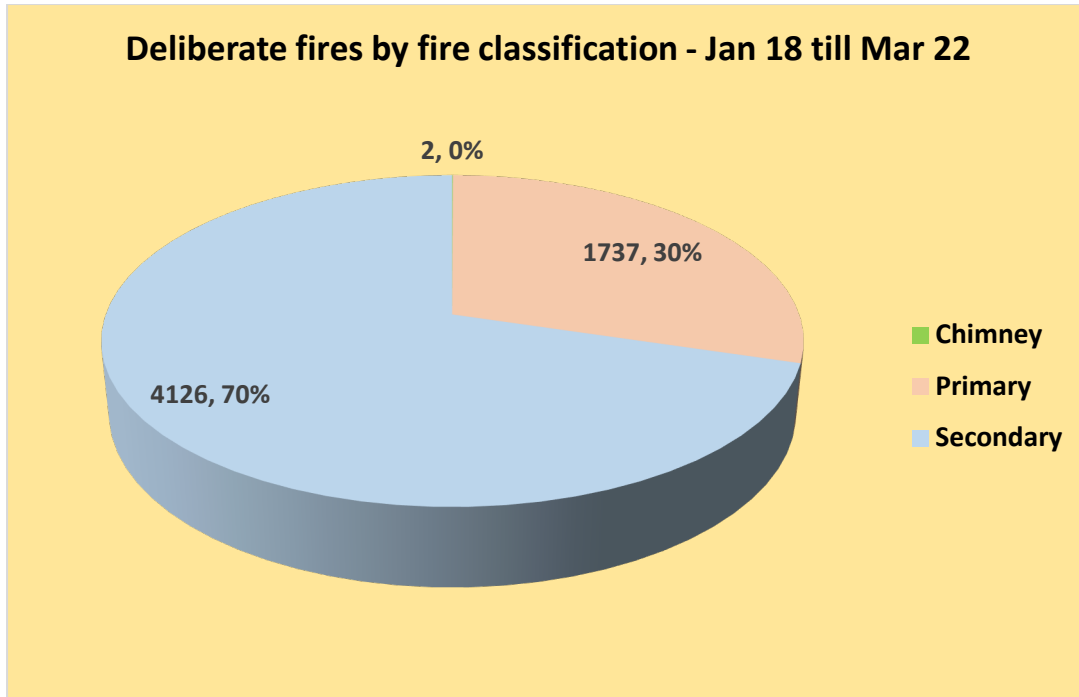
A summary of the above results is given in the table below. This table shows the days of the week and times of the day when the volumes of deliberate fires are the highest. Please note that this data is based on the data from the last two financial years of 2020/21 and 2021/22 only.

Deliberate Fires hotspot times and days of the week for across Essex - Last two financial years		
Days of the week	Times of the day (when numbers are highest)	Overall Numbers
Sunday	5pm to 6 pm, 8pm to 10 pm	359
Saturday	6 pm to 9 pm	340
Monday	6 pm to 8 pm	324
Thursday	5 pm to 9 pm	314
Tuesday	6 pm to 8 pm	313
Friday	4 pm to 6 pm, 8 pm to 9 pm	306
Wednesday	6 pm to 9 pm	301

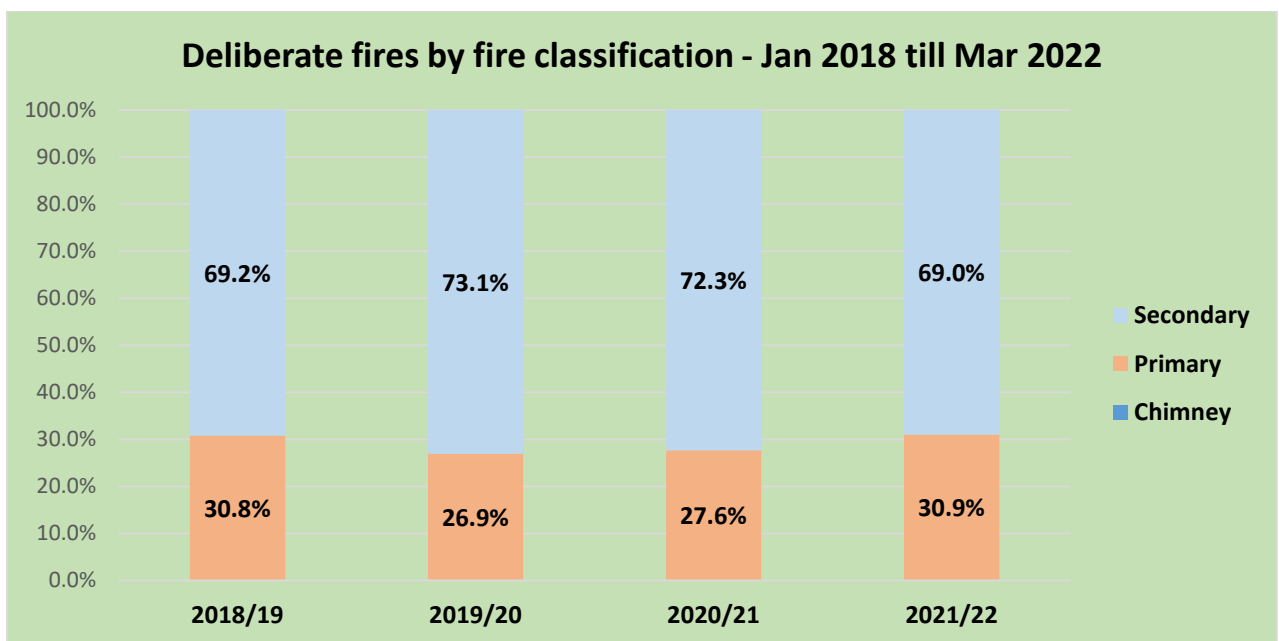
As seen above, Deliberate fire incidents tend to be more frequent in the evenings on all days of the week. There are very few deliberate fires happening in the morning and afternoon until 3 pm. From 4 pm onwards, the numbers of deliberate fires go up.

Deliberate fires by classification type

Between January 2018 and March 2022, 70% of deliberate fire incidents have been classified as Secondary fires with the remaining 30% consisting of Primary fires. No Deliberate fires are classified as chimney fire types. This can be seen in the chart below:

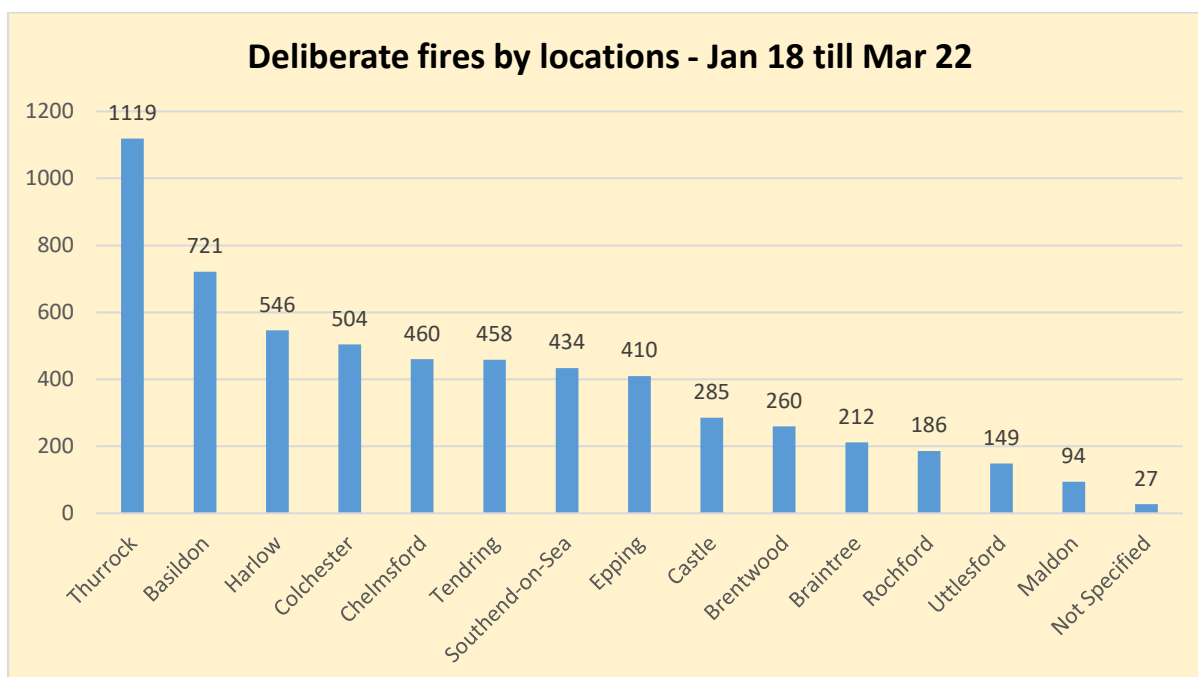


Focusing on the yearly trends, the % of secondary and primary classified deliberate fires every year stay relatively stable over the past four financial years from 2018/19 till 2021/22. This is seen in the chart below:



Locations of deliberate fires

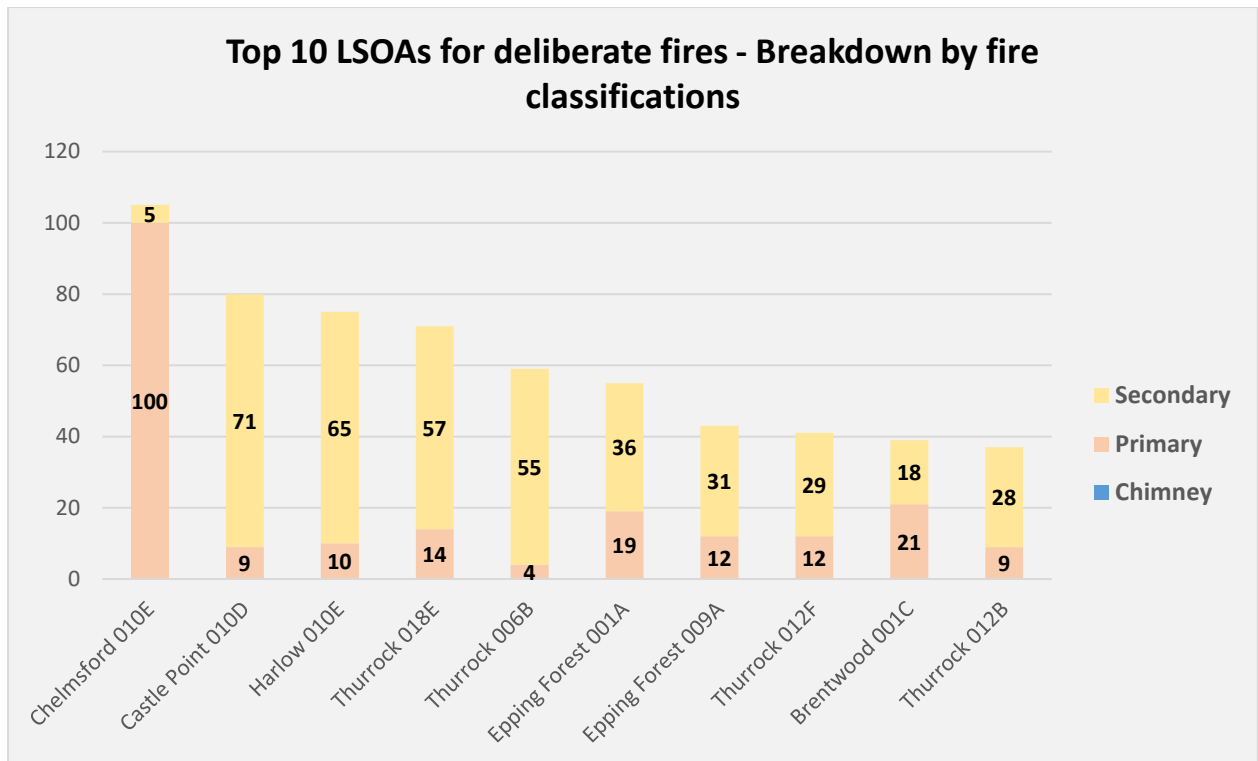
Thurrock experiences the highest number of deliberate fire incidents between January 2018 and March 2022. A total of 1,119 deliberate fires take place at Thurrock representing just over 19% of all deliberate fires during this period. This is substantially higher than for all other districts. The chart below shows the distributions of deliberate fire volumes by districts from January 2018 to March 2022:



The top 10 LSOAs for deliberate fires across Essex include four LSOAs in the district of Thurrock and two in Epping district. This is shown in the below table:

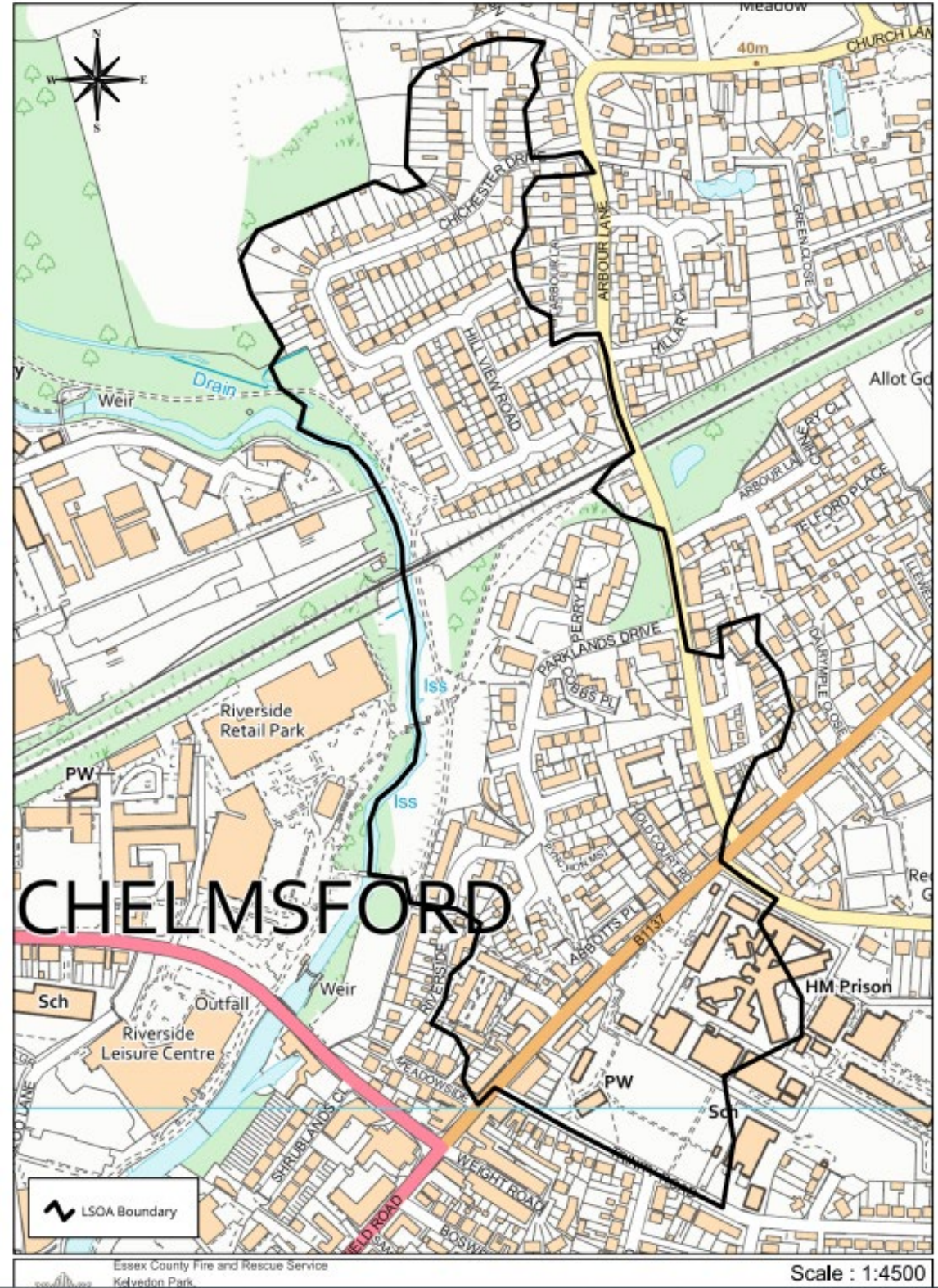
Top 10 LSOAs for Deliberate Fires - Jan 18 till Mar 22			
LSOA Name	Corresponding Ward	Corresponding District	Number of deliberate fires
Chelmsford 010E	Trinity	Chelmsford	105
Castle Point 010D	Canvey Island West	Castle	80
Harlow 010E	Staple Tye	Harlow	75
Thurrock 018E	Tilbury St Chads	Thurrock	71
Thurrock 006B	Ockendon	Thurrock	59
Epping Forest 001A	Hastingwood, Matching and Sheering Village	Epping	55
Epping Forest 009A	Waltham Abbey High Beach	Epping	43
Thurrock 012F	Chadwell St Mary	Thurrock	41
Brentwood 001C	Brizes and Doddinghurst	Brentwood	39
Thurrock 012B	Chadwell St Mary	Thurrock	37

Chelmsford 010E has the highest recorded numbers of deliberate fires. The overwhelming majority of fires, at this location, are primary classified fires. Except Brentwood, most of the deliberate fires in all the other top 10 LSOAs are classified as secondary fires. This characteristic is highlighted in the below chart:



The location of the Chelmsford 010E LSOA is given in the map below. This LSOA does include a Prison which may be why most deliberate fires in this specific location are more serious and are classified as primary fires.

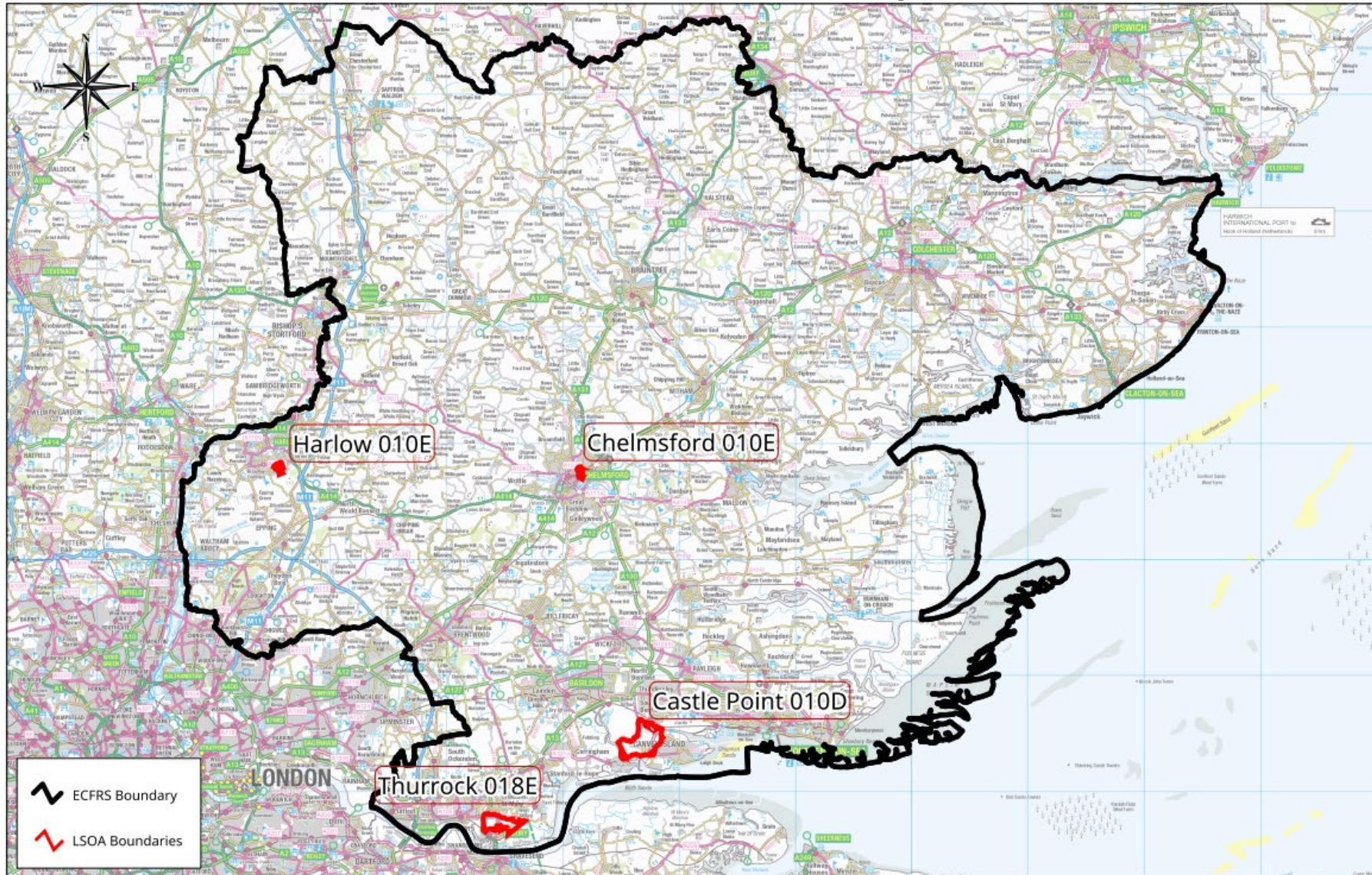
Chelmsford 010E



The locations of the leading four LSOAs for deliberate fires across Essex are given below:



Locations of the 4 LSOA Hotspots





Rates of Deliberate Fires by locations

The Rate of fire is calculated as the number of deliberate fires occurring for every 100,000 people. This was done to have a reliable way of comparing the frequency of deliberate fires for various locations across Essex relative to their population.

The rate of deliberate fires for every district was calculated as follows:

$$\text{Rate of Deliberate fires (for district)} = \frac{\text{Number of deliberate fires for district}}{\text{population of district}}$$

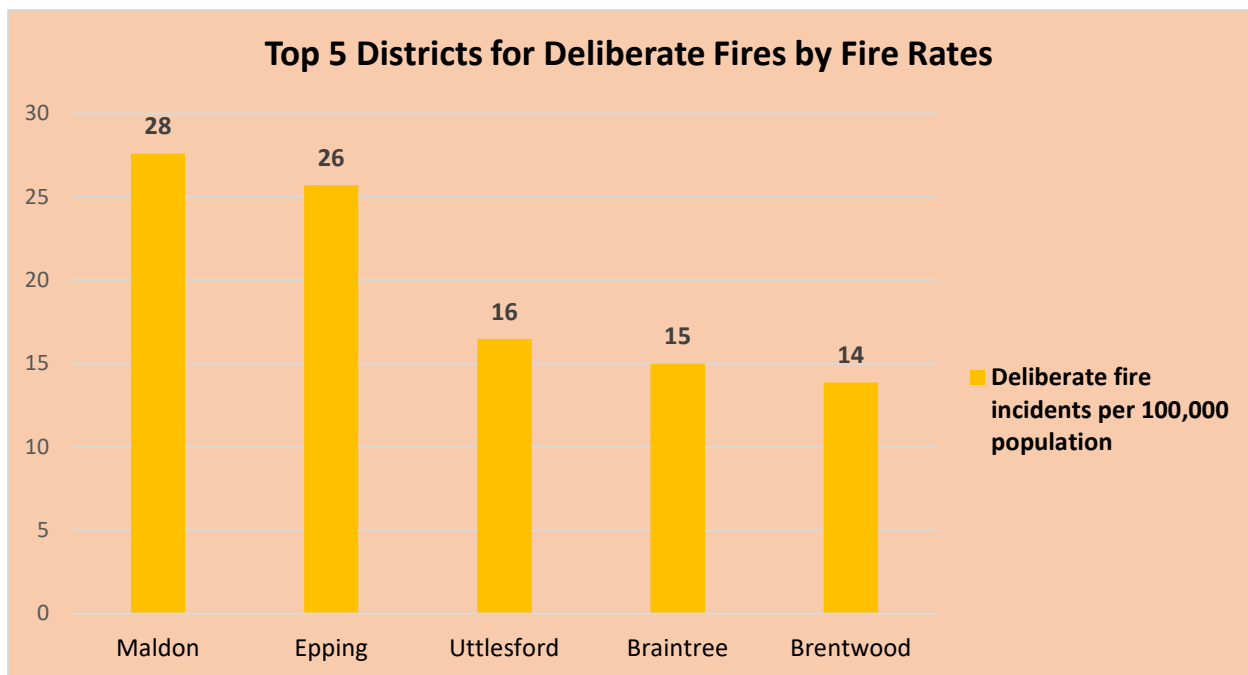
In a similar way, the rate of deliberate fires for every Ward was calculated as:

$$\text{Rate of Deliberate fires (for Ward)} = \frac{\text{Number of deliberate fires for Ward}}{\text{population of Ward}}$$

Where:

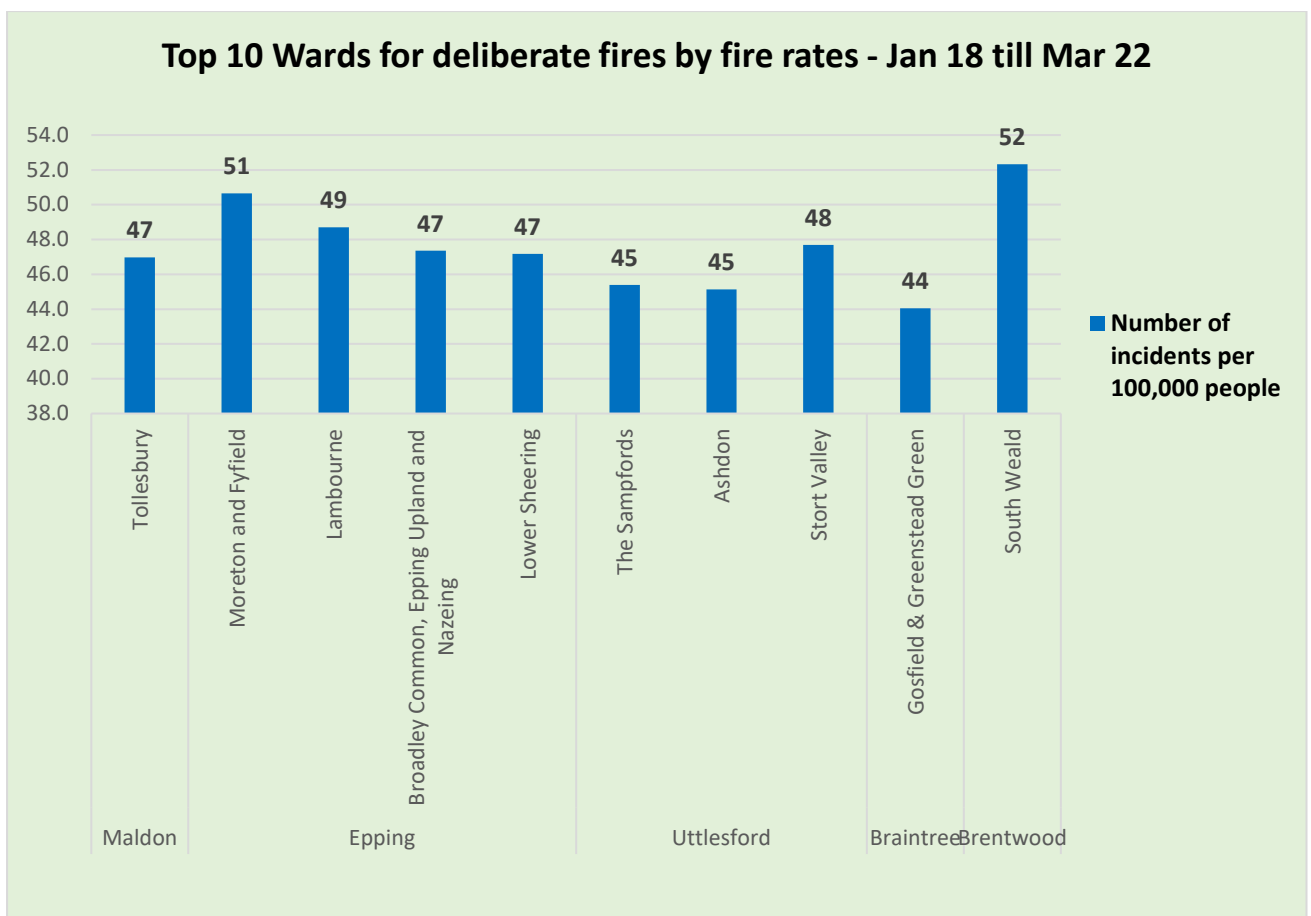
- The number of deliberate fires was obtained from the incident numbers recorded on ECFRS databases.
- The population numbers were the mid-2020 population figures from the office of national statistics. (More recent population figures were not available)

The top 5 districts with the highest rates of deliberate fires are shown below:



As seen above, Maldon and Epping have had substantially higher rates of deliberate fires than all other districts. In fact, four of the top 10 wards for deliberate fires are within Epping. The distribution of the wards with the highest rates of deliberate fires, by their districts, are presented in the table and chart below:

Top 10 Wards for Rates of deliberate fires matched to their districts - Jan 18 till Mar 22		
District Name	Ward Name	Rate of fires (incidents per 100,000 people)
Maldon	Tollesbury	47.0
Epping	Moreton and Fyfield	50.7
	Lambourne	48.7
	Broadley Common, Epping Upland and Nazeing	47.3
	Lower Sheering	47.2
Uttlesford	The Sampfords	45.4
	Ashdon	45.1
	Stort Valley	47.7
Braintree	Gosfield & Greenstead Green	44.1
Brentwood	South Weald	52.3

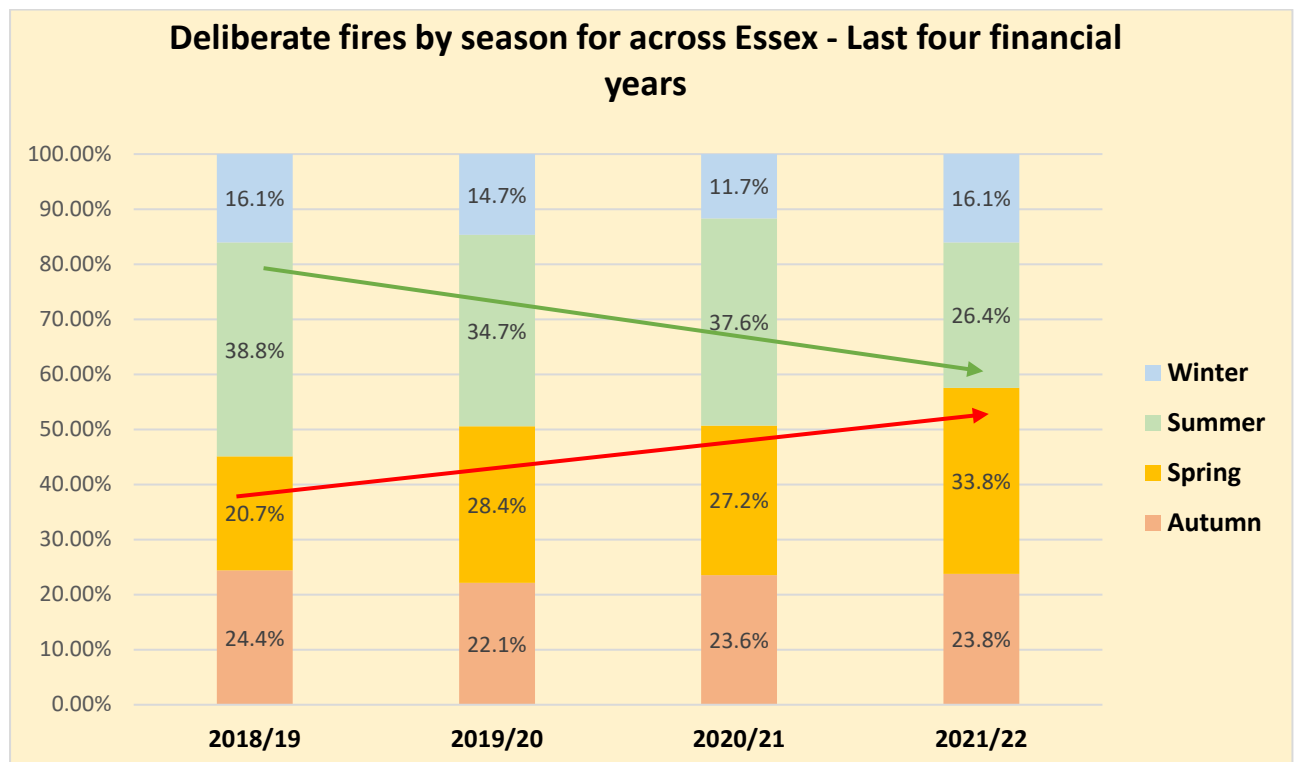


Deliberate fires by seasons

Between January 2018 and March 2022, just over a third of all deliberate fires across Essex happen during the summer season. The % of overall deliberate fires in every season for Essex is shown in the below table:

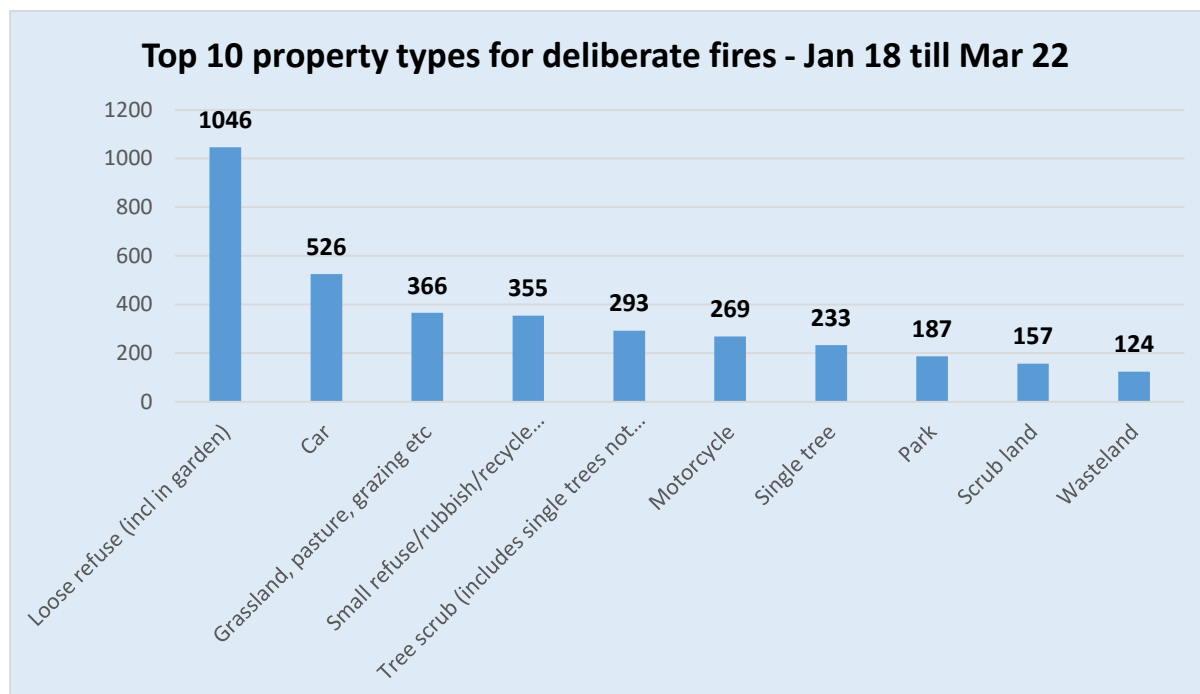
Deliberate fires across Essex by seasons - Jan 18 till Mar 22		
Season	Number of deliberate fires	% of total
Summer	1,949	33.2%
Spring	1,602	27.3%
Autumn	1,310	22.3%
Winter	1,004	17.1%
Total	5,865	100.0%

However, the trends of deliberate fires by season are shifting every year. The % of yearly deliberate fires reported to ECFRS in the Autumn and Winter months stays relatively consistent. However, the % of deliberate fires sees a big rise every spring over the last four years while the % of deliberate fires sees a big drop every Summer over the past four years. In fact, in the last financial year of 2021/22, 33.8% of deliberate fires happen during the spring months (March, April and May) while only 26.4% take place during the summer months (June, July and August). This is a big change from previous years. Hence, the highest % of deliberate fires last year happened during the spring season and not the summer season. The chart below illustrates these findings:



Deliberate fires by property types

The loose refuse and car are the leading property types for deliberate fires between January 2018 and March 2022.



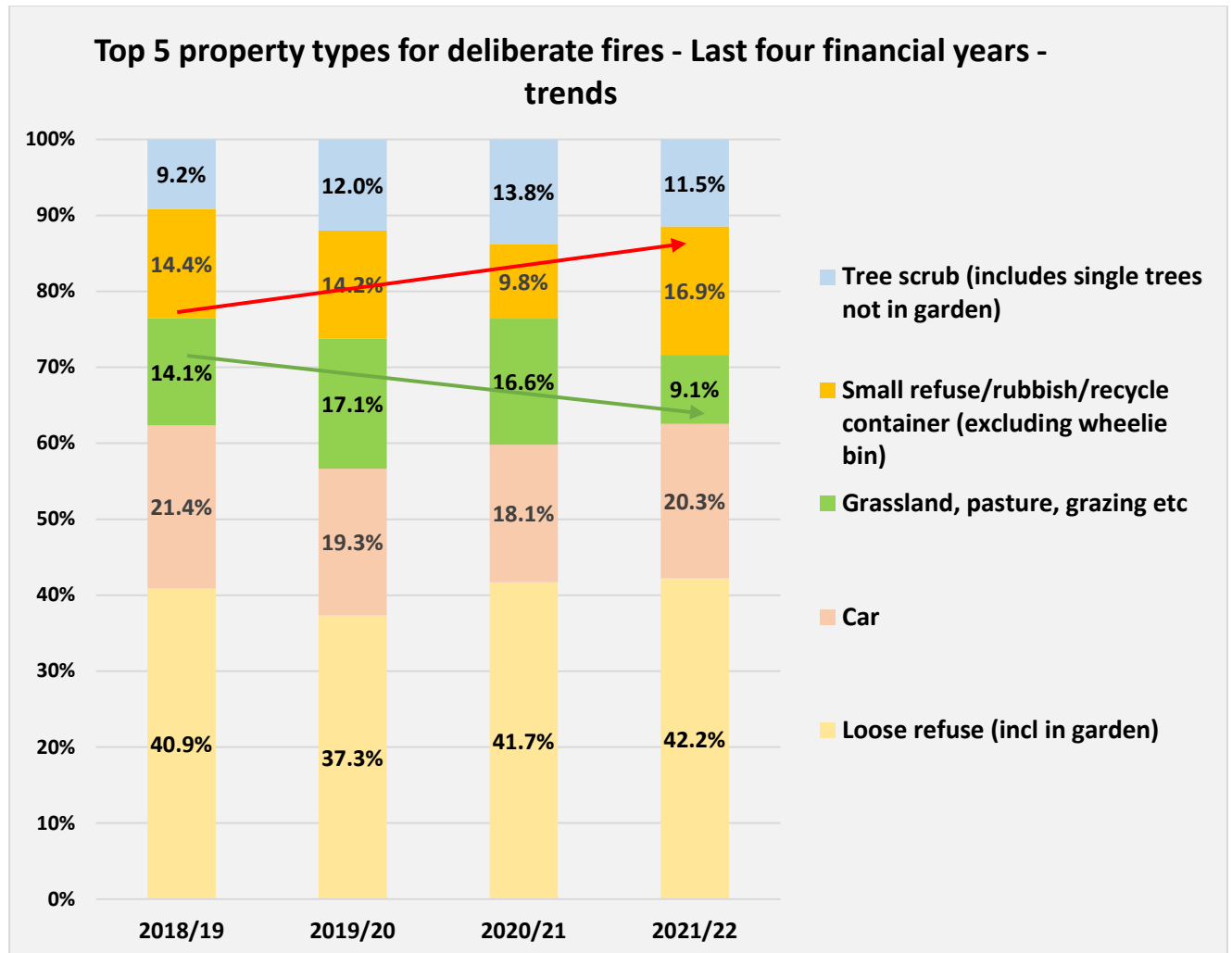
Over 17.7% of all deliberate fires take place on loose refuse property types.

Over 9% of deliberate fires take place on cars.

A summary of the above stats is briefly shown below:

Leading property types for deliberate fires - Jan 18 till Mar 22		
Property type	Number of deliberate fires	% of overall fires
Loose refuse (incl in garden)	1046	17.8%
Car	526	9.0%
Grassland, pasture, grazing etc	366	6.2%
Small refuse/rubbish/recycle container (excluding wheelie bin)	355	6.1%
Tree scrub (includes single trees not in garden)	293	5.0%
Motorcycle	269	4.6%
Single tree	233	4.0%
Park	187	3.2%
Scrub land	157	2.7%
Wasteland	124	2.1%
Others	2309	39.4%
Total	5865	100.0%

Visualising the yearly trends for the top 5 property types for deliberate fires, we see that, in the last four financial years, the property types of cars, loose refuse (including in the garden) and tree scrubs see little to no change every year. But the proportion of deliberate fires happening on the 'Small refuse/rubbish/recycle container' property type goes up while the % of deliberate fires on 'Grassland, pastures and grazing' property type goes down. These trends are highlighted in the below chart:



The leading property types responsible for deliberate fires in the summer are different from other seasons. Looking at the data, the leading property types for deliberate fires in the summer season tends to be Grassland, pasture, grazing and loose refuse (including in the garden). In the winter, spring and autumn months, most deliberate fires take place on Cars or loose refuse (including in the garden).

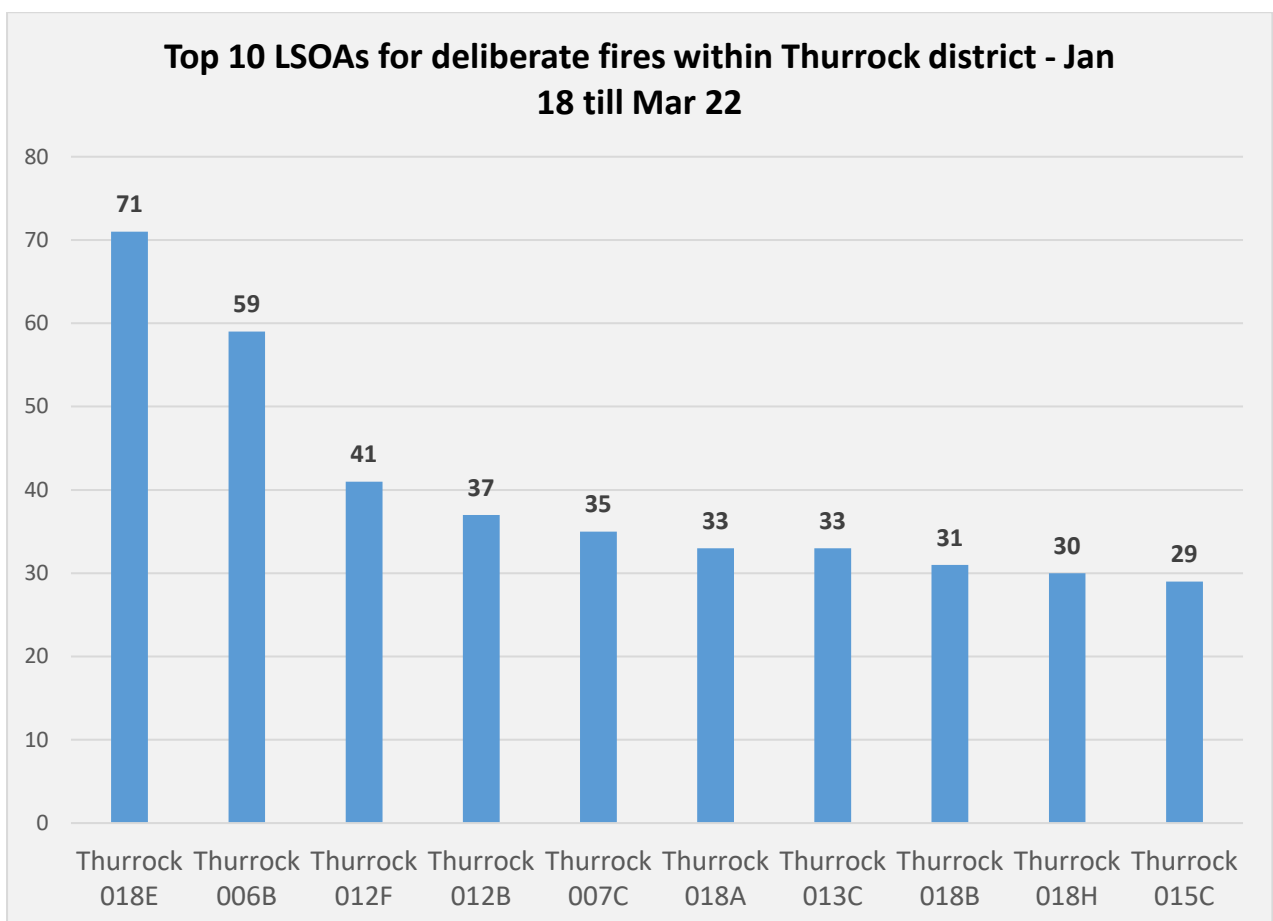
The most common property types for deliberate fires, in each season, are highlighted in the table below:

Leading property types for deliberate fires by season - Jan 18 till Mar 22	
Season	Leading Property types
Summer	<ul style="list-style-type: none"> • Grassland, pasture, grazing • Loose Refuse (including in garden)
Winter, Spring and Autumn	<ul style="list-style-type: none"> • Car • Loose refuse (including in garden)

Deep dive into Thurrock

Highest deliberate fires by locations

As mentioned above, Thurrock experiences a substantially higher number of deliberate fires than for any other district. So doing a deep dive into the data for Thurrock, we find the top 10 LSOAs within Thurrock district to be:



Top 10 LSOAs for Deliberate Fires within Thurrock district only - Jan 18 till Mar 22		
Name of LSOA	Corresponding Ward Name	Number of incidents
Thurrock 018E	Tilbury St Chads	71
Thurrock 006B	Ockendon	59
Thurrock 012F	Chadwell St Mary	41
Thurrock 012B	Chadwell St Mary	37
Thurrock 007C	Belhus	35
Thurrock 018A	Tilbury Riverside and Thurrock Park	33
Thurrock 013C	East Tilbury	33
Thurrock 018B	Tilbury Riverside and Thurrock Park	31
Thurrock 018H	Tilbury St Chads	30
Thurrock 015C	West Thurrock and South Stifford	29

The top 3 Wards for deliberate fires in Thurrock are found to be:

Top 3 Wards for Deliberate fires in Thurrock only - Jan 18 till Mar 22	
Ward Name	Number of deliberate fires
Tilbury St Chads	137
Chadwell St Mary	124
Ockendon	100

Days and times of deliberate fires within Thurrock

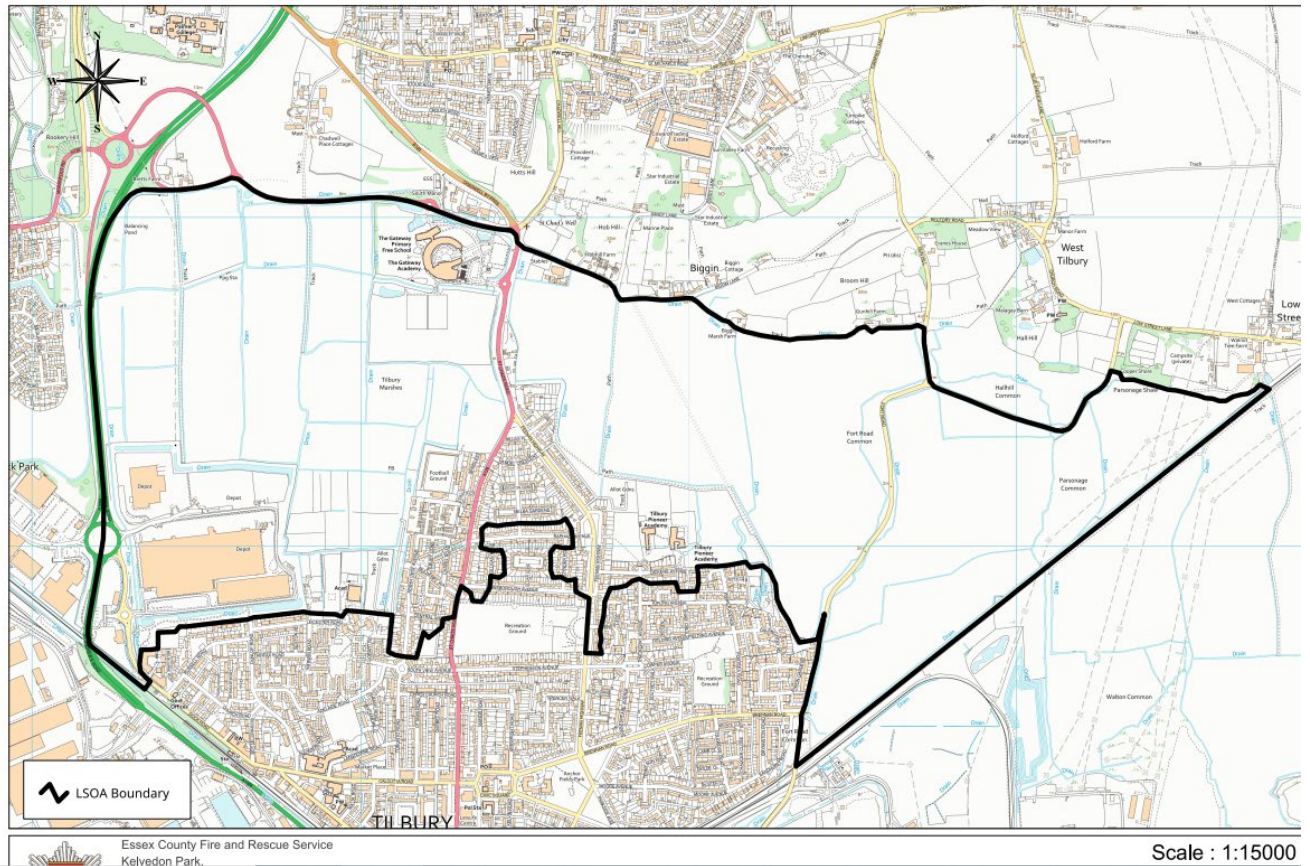
As discussed above, the days and times when volumes of deliberate fires are the highest have been analysed over the last two financial years of 2020/21 and 2021/22 only. This was done to provide a better understanding of what deliberate fire volume trends are looking like in recent years.

The times and days of the week when the volumes of deliberate fires are the highest for Thurrock 018E are presented below:

Deliberate Fires hotspot times and days of the week for Thurrock 018E - Last two financial years		
Day of the week	Times of the day (when numbers are highest)	Overall numbers
Wednesday	8 pm to 9 pm	4
Sunday	No clear pattern	3
Tuesday	6 pm to 7 pm	2
Friday	9 pm to 11 pm	2
Monday	No clear pattern	2
Saturday	No clear pattern	1
Thursday	No clear pattern	1

The location for Thurrock 018E is presented in the map below. Note that this is the leading LSOA for Deliberate fire incidents across Thurrock over the last two financial years of 2020/21 and 2021/22. This is located just north of Tilbury.

Thurrock 018E



The times and days of the week when the volumes of deliberate fires are the highest, in the last two financial years, for Tilbury St Chads (the leading Ward for Thurrock), are presented below:

Deliberate Fires hotspot times and days of the week for Tilbury St Chads - Last two financial years		
Day of the week	Times of the day (when numbers are highest)	Overall numbers
Tuesday	5 pm to 8 pm	7
Friday	8 pm to midnight	6
Wednesday	8 pm to 10 pm	6
Sunday	9 pm to 11 pm	5
Monday	7 pm to 9 pm	4
Thursday	No clear trend	3
Saturday	4 pm to 6 pm	2

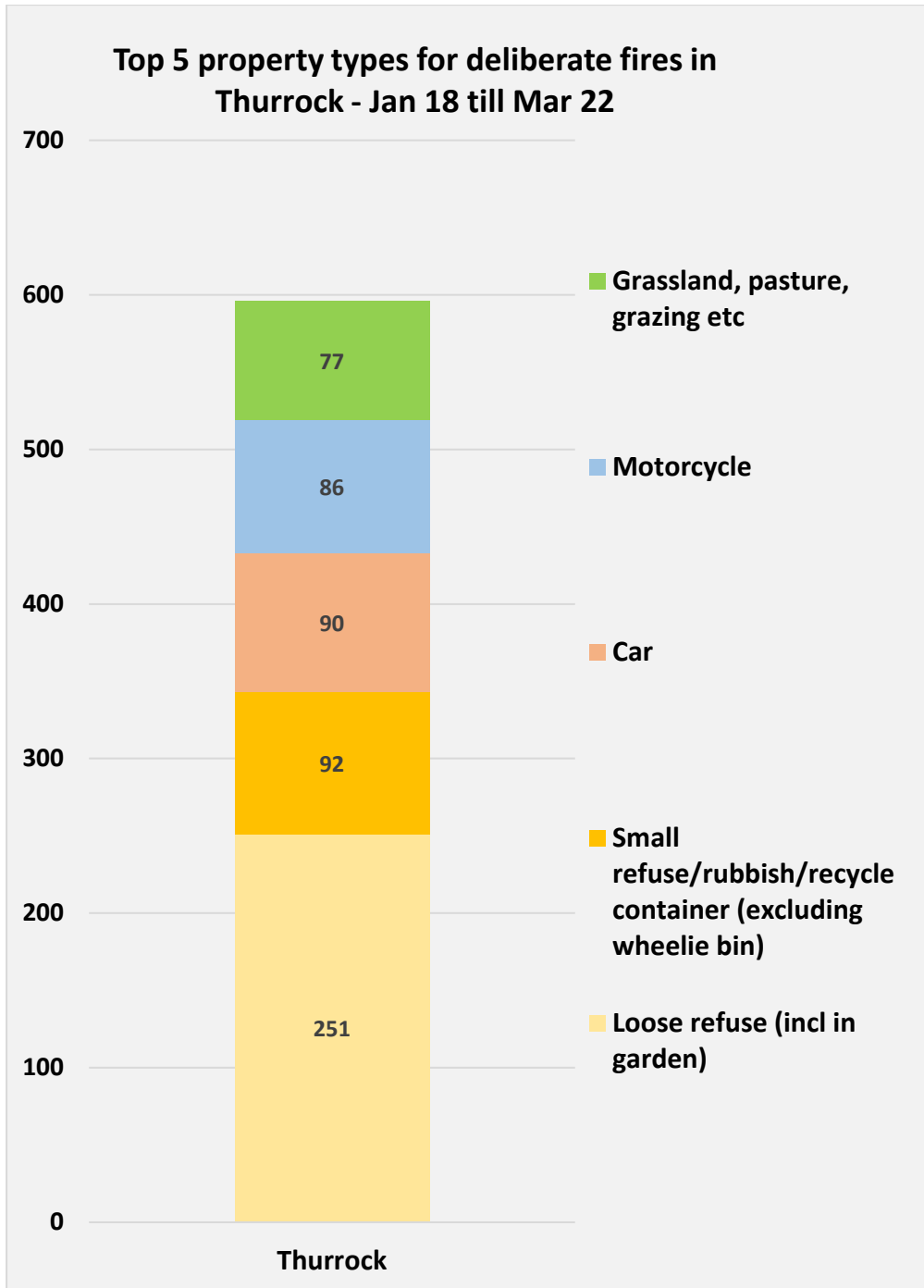
The times and days of the week when the volumes of deliberate fires are the highest, in the last two financial years, for Chadwell St Mary (the ward with the second highest numbers of deliberate fires within Thurrock) are presented below:

Deliberate Fires hotspot times and days of the week for Chadwell St Mary - Last two financial years		
Day of the week	Times of the day (when numbers are highest)	Overall numbers
Tuesday	8 pm to 10 pm	8
Wednesday	5 pm to 6 pm, 7 pm to 8 pm	8
Monday	6 pm to 9 pm	7
Saturday	7 pm to 9 pm	4
Sunday	midnight to 1 am	4
Thursday	No clear trend	3
Friday	5 pm to 7 pm	2

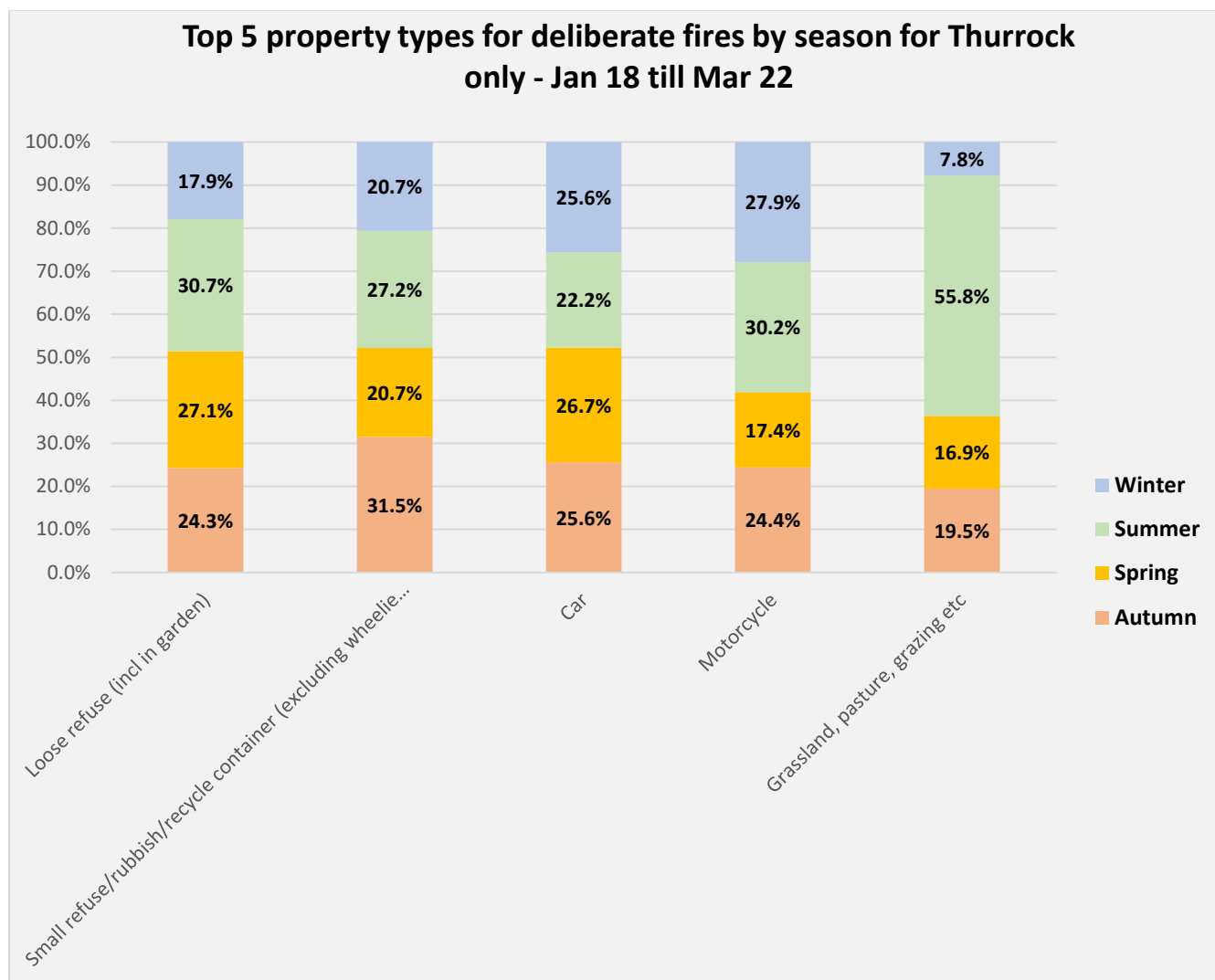
It is interesting to note that Tuesday and Wednesday are the days of the week when deliberate fires seem to be the most frequent across the leading Wards in Thurrock. Lesser incidents seem to happen on the weekend for both these places.

Leading property types for deliberate fires within Thurrock

The leading property type behind deliberate fires across the whole of Thurrock district is loose refuse (including in the garden). This is shown in the graph below:



Of the top 5 property types for deliberate fires, over 55% of deliberate fires on Grassland, pastures and grazing happen during the summer season. The numbers and proportions of deliberate fires by seasons for the top 5 property types are shown in the table and chart below:



Property Type	Season				Total
	Autumn	Spring	Summer	Winter	
Loose refuse (incl in garden)	24.3%	27.1%	30.7%	17.9%	100.0%
Small refuse/rubbish/recycle container (excluding wheelie bin)	31.5%	20.7%	27.2%	20.7%	100.0%
Car	25.6%	26.7%	22.2%	25.6%	100.0%
Motorcycle	24.4%	17.4%	30.2%	27.9%	100.0%
Grassland, pasture, grazing etc	19.5%	16.9%	55.8%	7.8%	100.0%
Total	25.0%	23.3%	32.0%	19.6%	100.0%

Deliberate fires vs Accidental Fires

Times and days of week

Based on the data for the last two financial years, **the number of Accidental fires tend to be more common between 3 pm and 7 pm on a Friday** whereas **Deliberate fires tend to have the highest volumes between 5 pm and 10 pm on a Sunday**. A summary of the times and days of the week for both types of fires, in the last two financial years, are shown in the tables below:

Accidental Fires hotspot times and days of the week - Last two financial years		
Days of the week	Times of the day (when numbers are highest)	Overall Numbers
Friday	3 pm to 7 pm	627
Saturday	4 pm to 6 pm then 7 pm to 8 pm	614
Monday	3 pm to 4 pm then 5 pm to 6 pm then 7 pm to 8 pm	602
Tuesday	3 pm to 4 pm, 6 pm to 7 pm and 8 pm to 9 pm	579
Sunday	4 pm to 7 pm	573
Thursday	4 pm to 7 pm	558
Wednesday	5 pm to 7 pm, 8 pm to 9 pm	557

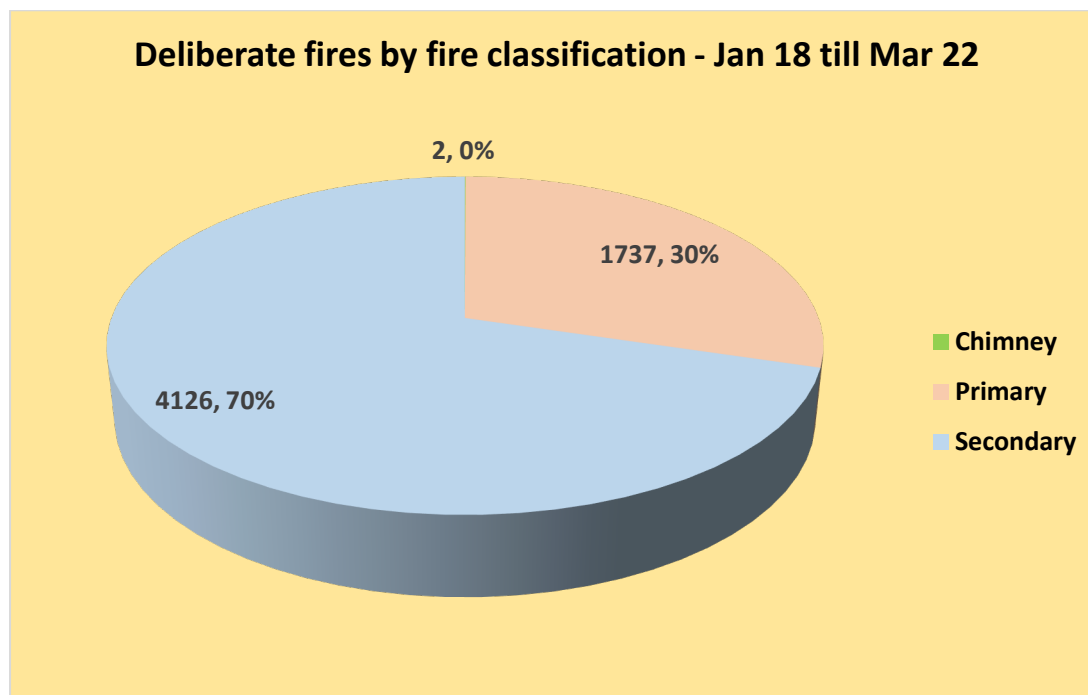
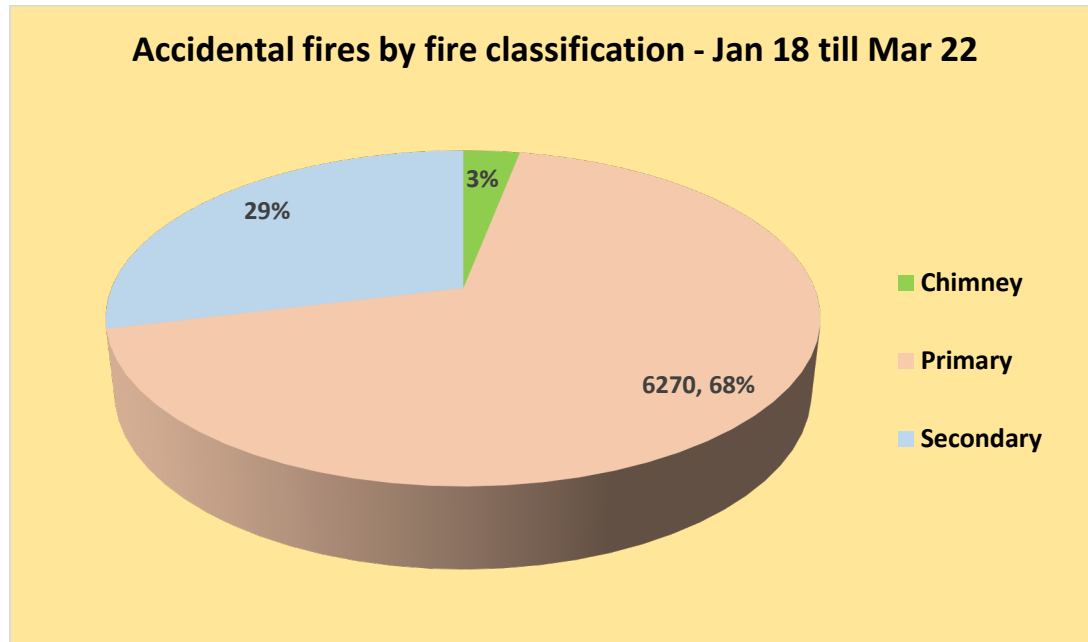
Deliberate Fires hotspot times and days of the week - Last two financial years		
Days of the week	Times of the day (when numbers are highest)	Overall Numbers
Sunday	5pm to 6 pm, 8pm to 10 pm	359
Saturday	6 pm to 9 pm	340
Monday	6 pm to 8 pm	324
Thursday	5 pm to 9 pm	314
Tuesday	6 pm to 8 pm	313
Friday	4 pm to 6 pm, 8 pm to 9 pm	306
Wednesday	6 pm to 9 pm	301

Location

As with Deliberate fires, Thurrock seems to be the most popular district where the highest numbers of accidental fires take place.

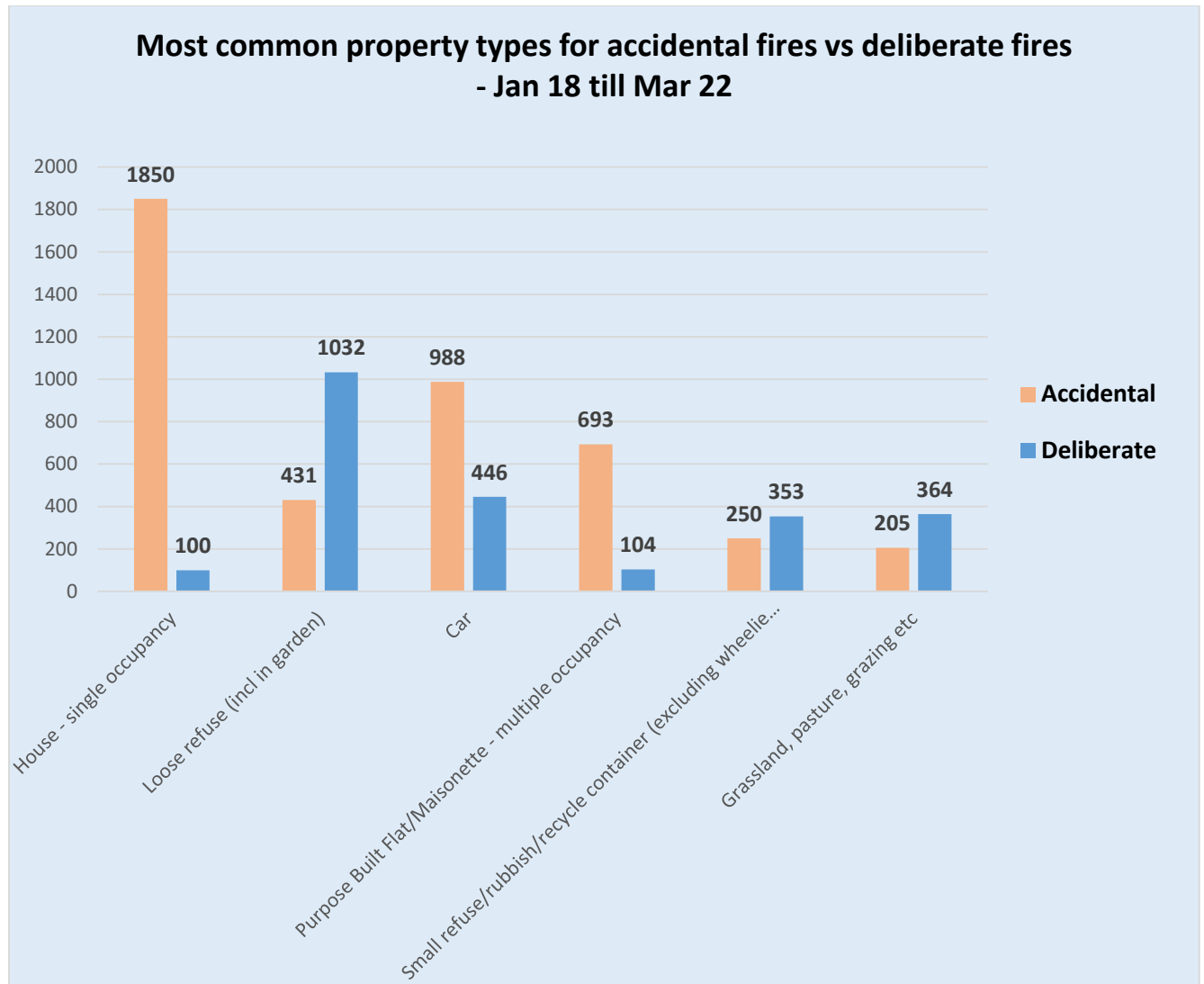
Fire Classification

From Jan 18 till March 22, **68% of accidental fires are primary classified fires.** But in the case of deliberate fires, **70% of deliberate fires are classified as Secondary fires.** The pie charts below clearly show this:



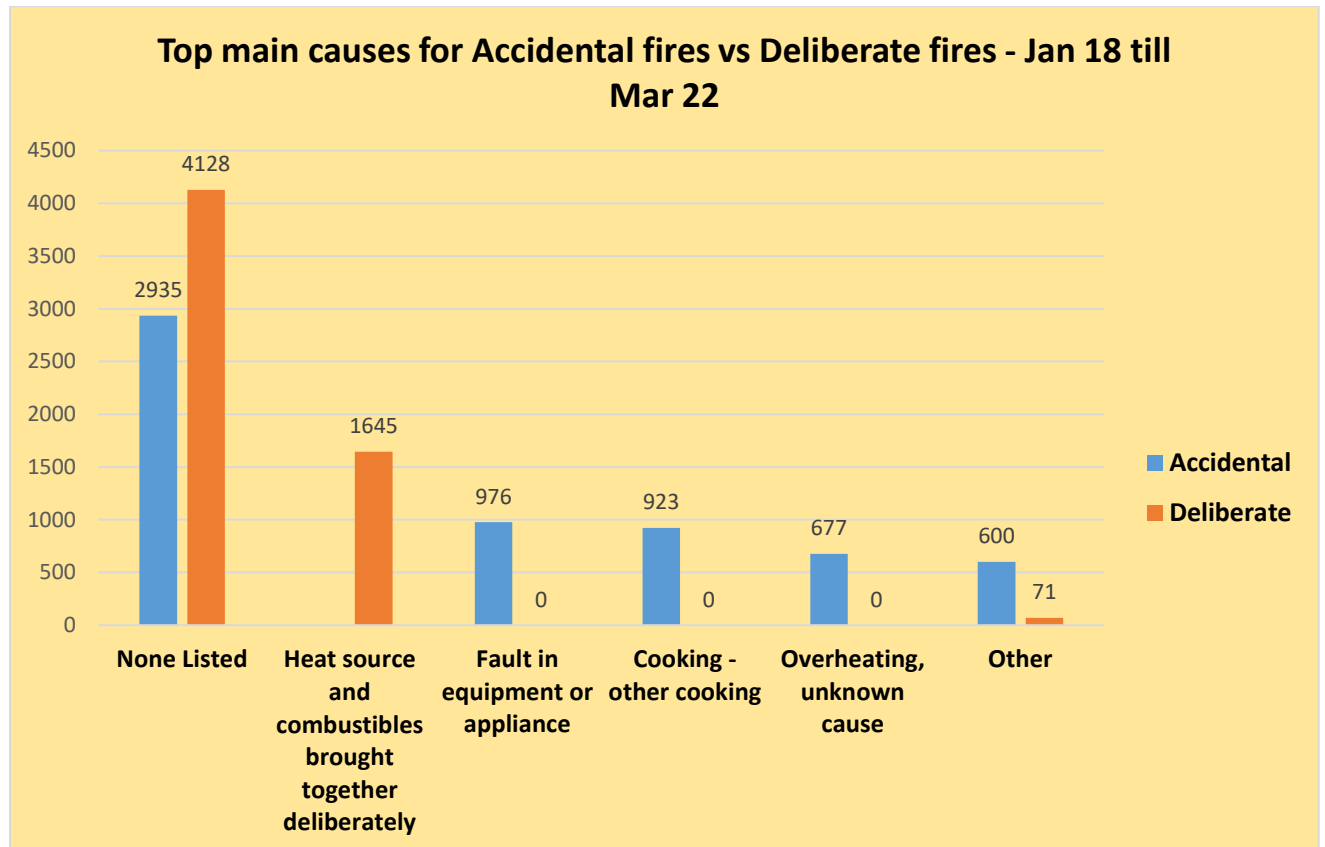
Property types

The highest numbers of Accidental fires are found to happen on single occupancy houses whereas for deliberate fires, the leading property type is loose refuse (including in the garden). It is interesting to note that Accidental fires on cars are more common than deliberate fires. The chart below shows these findings:



Main Causes

Just over half of all fire incidents recorded between January 2018 and March 2022 do not have a main cause recorded for the fire. But of the most common main causes for fires that are recorded, we find there are differences between those for deliberate fires and accidental fires. For accidental fires, the most common causes tend to be: 1) Fault in the equipment or appliance. 2) Cooking or other cooking 3) Overheating. Whereas, for deliberate fires, the only leading main cause that stands out seems to be that the 'Heat Source and combustibles have been brought together deliberately.' These findings are clearly illustrated in the bar chart below:



Conclusion

Deliberate fire incidents continue to happen across Essex and, therefore, remain a challenge for ECFRS to address. However, numbers have fallen in 2021/22 and 2020/21 compared to previous years. Unlike Accidental fires, most deliberate fires are classified as Secondary fires and are more likely to happen in the later hours of the afternoon from 5 pm onwards. Historically speaking, the largest % of deliberate fires happen in the summer season every year. However, this trend seems to be changing every year. Over the course of the last four financial years, the % of yearly deliberate fires in spring have been increasing but decreasing in summer. In fact, in the last financial year, the highest proportion of deliberate fires happened over the Spring season, and not the Summer season, as we would expect. From January

2018 till March 2022, just over a quarter of all deliberate fires happen on loose refuse (including that in outdoor gardens) and cars. In all the seasons, deliberate fires tend to occur mostly on both these property types (loose refuse and cars) but in the summer months, a much higher % of deliberate fires take place on grasslands, pasture and grazing grounds. From January 2018 till March 2022, Thurrock is the district experiencing the highest numbers of deliberate fires. Specifically, within Thurrock, Tilbury St Chads and Chadwell St Mary are the Wards where the most numbers of deliberate fires take place. Thurrock 018E, Thurrock 006B and Thurrock 012B are the hotspot LSOAs within Thurrock where the highest volumes of deliberate fires happen. Therefore, prevention activities should be targeted in these specific areas within Thurrock.

The LSOAs in Essex with the highest volumes of deliberate fires include Chelmsford 010E, Castle Point 010D and Harlow 010E. Therefore, prevention activities should be targeted at these specific locations.

In terms of deliberate fires by population levels between January 2018 and March 2022, Maldon and Epping have the highest rates of deliberate fires with 28 incidents per 100,000 people and 26 incidents per 100,000 people respectively. Specifically, within Maldon, Tollesbury is the Ward with the highest deliberate fires rate where a massive 47 deliberate fires per 100,000 population happen. Within Epping, four Wards have deliberate fire rates greater than or equal to 47 deliberate fires per 100,000 people. These are Moreton and Fyfield, Lambourne, Broadley Common, Epping Upland and Nazeing.

Also, unlike most other LSOAs, Chelmsford 010E stands out as most of the deliberate fires at this location are Primary classified fires. This may be because the main prison is located within this LSOA and so it is likely that a very high proportion of fires are deliberately started by offenders and criminals within the Prison and this results in casualties or injuries over there.

The most common reason for deliberate fires seems to be that the heat source and combustibles are brought together deliberately by the perpetrators or person responsible for this act.

I hope this report highlights the main insights and trends that can be used to inform prevention activity in high-risk areas and be used to create awareness about the main risk factors associated with deliberate fires.

Future Analysis

Further work and analysis can be done to understand Deliberate fires and its associated impacts, risk factors and distributions across Essex.

I plan to create interactive maps in Power BI showing hotspot locations of deliberate fires across Essex to support further preventative work and activities by ECFRS.

Relevant data obtained from Essex Police could be used for investigating the victims and suspects involved in Deliberate fire incidents. Analysis can be done to find out the age and gender of victims and suspects and any relevant trends and interesting findings over the course of the period from January 2018 to March 2022.

There is currently a very severe summer heatwave in the UK. There has been a similar heatwave in the UK within the past few years. Future analysis could focus on the effect of these heatwaves on starting deliberate fires across Essex. The frequencies and types of deliberate fires between both periods of heatwaves can be compared and understood in detail.