

Risk Based Evidence Profile 2018



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Executive Summary

As a key supporting document for the Integrated Risk Management Plan 2019-23, the Risk Based Evidence Profile 2018 (RBEP) is a strategic document which aims to support service design and delivery through optimising risk identification and mitigation.

The top three priorities identified for prevention and protection activity are (i) Primary Fires (ii) Road Traffic Collisions (iii) Flooding and Water Incidents. These incident types place the highest levels of demand on the service, alongside the highest risk to life (based on rates of deaths and serious injuries).

For each of these incident categories, the RBEP profiles levels of demand by mapping historical incidents, alongside determining future risk based on a standard 'likelihood x severity' model. Risk levels are profiled against geographical areas, and are relative (rather than absolute) to determine where to best prioritise resource.

Primary Fires Levels of risk and demand for primary fires show a decreasing trend. Safe and Well visits are effectively targeting key areas of risk with dwelling fires decreasing. However car and other property fires are increasing and prevention and protection activities require constant monitoring to ensure effective intervention.

Injury Road Traffic Collisions (IRTCs) Levels of demand for Injury RTCs show an increasing trend, with relatively stable levels of risk. On average Cumbria Fire and Rescue Service (CFRS) attend 8.5% of all Injury RTCs recorded by Cumbria Constabulary, however CFRS attend a much higher number of the more serious RTCs and on average have attended 47.5% of fatalities that have occurred across Cumbria and 20.5% of all Killed and Seriously Injured RTCs¹.

Although CFRS attend only 47.5% of all fatal Injury RTCs and 20.5% of all Killed and Seriously Injured RTCs this is the total number that required CFRS specialist skills and equipment. A significant number of Injury RTCs attended by the police include fatalities to pedestrians, cyclists and motorcyclists that would not require CFRS attendance.

The rate of RTCs has increased over the past 5 years. CFRS will continue to provide targeted Road Awareness Training to 18 to 25 year olds and those aged 55 years plus. CFRS will continue to work in collaboration with partners to deliver targeted action.

Water and Flood Risk The longitudinal view of flooding across Cumbria is extremely variable due to extreme weather events. The number of incidents ranges from 468 in 15/16 to 161 in 17/18. The Environment Agency's Cumbria Flood Action Plan (1 June 2016) details 65 areas of action for implementation across Cumbria to help mitigate this risk.

The relative risk and demand across stations for Primary Fires and IRTC highlights those with highest levels of risk and demand (Barrow, Carlisle East, Carlisle West, Whitehaven, Workington, Penrith and Kendal). These are also the stations with highest levels of resource (either Wholetime or Day-crewed stations). Water and flooding incidents are most prevalent in Ambleside, Grasmere and Keswick Wards, which are supported by specialist appliances and equipment in neighbouring Wholetime stations (Workington and Kendal).

The levels of demand are also shown to be significantly higher during the day (8am to 8pm) for all 3 high priority incident types; Primary Fire 64% of incidents occur during the day, Injury RTC 78% and Flooding and Water 73% of incidents.

¹ This refers to a 3 year average over the period 2015, 2016 and 2017.

It is important to note that risk and demand are aligned to nominal fire station areas. These areas are coterminous with LSOA² boundaries and are not necessarily reflective of the station that has the nearest response time to an incident.

Future risk is considered in relation to the development of key infrastructure projects, including the development of the West Coast Railway Line and A595 corridor enhancements along the West Coast. However, whilst individual infrastructure and developments bring increased risk associated with that site, Cumbria's population over the next 5 years (to 2023), remains relatively stable with limited impact on demand and risk across the service.

Cumbria has a very strong tourism sector that significantly swells the population of the County, and in 2017 the Lake District National Park was awarded UNESCO's World Heritage Status adding to the growth of tourism. In 2017 Cumbria received over 47 million visitors throughout the year, made up of 40.7 million day trippers and 6.6 million overnight visitors, increasing the sleeping risk of fire across the County.

Cumbria's profile provides insight into on-going risks, with an ageing population and high levels of tourism. Key areas of deprivation are highlighted, and Cumbria's rurality has inherent difficulties in ensuring response times are met within limited resources.

² Lower Super Output Areas are geographic areas created by the Office for National Statistics to support statistical analysis at a more detailed geographical level. Each LSOA is designed to have similar population sizes of up to 1,200 households.



Introduction

The information in the Risk Based Evidence Profile (RBEP) 2018 has been developed to support strategic decision making across the service. The document is produced by Cumbria Fire and Rescue Service (CFRS) in order to inform the development of the Integrated Risk Management Plan 2019-23 (IRMP 2019-23). This document is supported by 38 individual station profile documents (see Appendix A).

The refreshed IRMP 2019-23 and supporting RBEP reflects up to date risk analysis and evaluates how CFRS are currently performing. The IRMP outlines the People, Prevention, Protection and Response Strategies that will be used to control and mitigate risk across Cumbria.

Central to the delivery of the IRMP is the recognition that if CFRS are to be successful, we must work with a wide range of partners across Cumbria. We must put the prevention agenda at the heart of everything we do, and consider wider risks than we have previously considered to allow us to protect some of the most vulnerable in our society.

It is essential that CFRS resources are used most efficiently and effectively; targeted to areas of greatest demand and risk to the community.

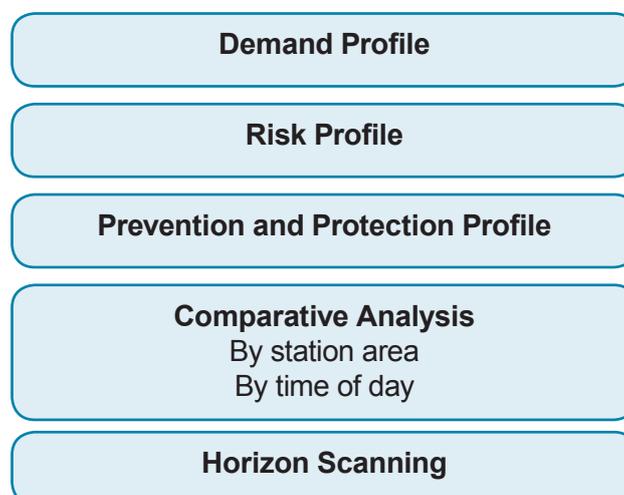
The objective of the RBEP is to identify and quantify these areas of risk and demand in order to support strategic decision making for service design and delivery. Service resource and response requirements are based on:

- **Geographical cover** – The area of service provision. This is driven by the geographical dispersion of potential incidents and the distance to travel by our response vehicles.
- **Workload** – The likely number of independent responses required, taking into account historical incident data.
- **Type of response** – The characteristics of the risk which determine the resource requirement within that area.
- **Weight of attack** – The amount of equipment and staff required to deal with an incident based on an analysis of the potential impact of each emergency situation.

As such, the RBEP provides profiles of high risk incident types to understand absolute levels of demand and relative levels of risk, at both a County level and at the level of individual station profiles.

The diagram below outlines the structure of the RBEP and associated 38 station profile documents.

Diagram: Content of RBEP 2018 and 38 station profiles



Each of the areas above are further profiled by response priorities (primary fires, injury road traffic collisions, and flood and water incidents) and geographic area (at both County and station level).

Response Priorities

CFRS responds to a wide range of incidents, from household fires to animal rescues. However, in terms of service delivery CFRS prioritises life-risk; prevention and protection from death, injury and environmental impact; across Cumbria's communities.

In order to identify and prioritise where prevention, protection and response activities are best focussed a CFRS 'Response Profile' has been developed (see table below, page 7) to understand which incident types have greatest demand and pose the greatest risk to communities.

The CFRS Response Profile categorises CFRS responses into key incident types, detailing the number of incidents (demand) and their risk (number of fatalities and serious injuries). It should be noted that the profile does not include every incident attended by the service - those that fall outside any category or with very low levels of demand and risk are not shown.

The profile highlights three high priority incident types:



Injury RTC

Road Traffic Collision where an individual has been killed or rescued with injury



Primary Fire

Fires in buildings, vehicles and outdoor structures or any fire involving casualties, rescues or fires attended by five or more appliances



Flood and Water

Flood or incident where individual has been rescued or evacuated from water

Each of these incident types places a relatively high level of demand on the service, alongside a higher rate of fatalities and seriously injured casualties than other incident types. Primary fires³ places an average annual demand of 649 incidents on the service, which is just under 6 times the amount of Injury Road Traffic Collisions (IRTC) attended (an average of 109 per year). However, based on the incidents attended by CFRS IRTCs have a significantly higher risk of fatality (17 times as high) or serious injury (69 times as high) than primary fires, and are therefore a key priority for service provision.

On average, flooding and water incidents place a relatively high demand on service provision, which can significantly increase at times of extreme weather conditions. Storm Desmond in December 2015 raised CFRS attendance to 468 flooding and water incidents that year, compared to 89 the following year.



³ Primary fires include all fires in buildings, vehicles and outdoor structures or any fire involving casualties, rescues or fires attended by five or more appliances

Table 1: CFRS Response Profile: Prevention, Protection and Response Priorities

Fire, Rescue and Road Safety Priorities 2018/19	Incidents			Fatalities			Seriously Injured Casualties				PRIORITY	2017/18 compared to 3yr average ³
	2015/16	2016/17	2017/18	2015/16	2016/17	2017/18	2015/16	2016/17	2017/18	Average per 100 incidents		
Injury Road Traffic Collisions ¹	88	133	106	15	9	14	41	45	49	41.3	41.3	↔
Primary Fires ²	699	627	623	8	3	2	2	6	4	0.6	0.6	↔
Flooding and water incidents	468	89	131	1	1	0	3	1	2	0.9	0.9	↓
Gas including Carbon Monoxide	20	19	15	0	0	0	1	0	0	1.9	1.9	↓
Automatic Fire Alarms	1949	1916	1779	0	0	0	0	0	0	0.0	0.0	↓
Wildfires	5	9	6	0	0	0	0	0	0	0.0	0.0	↓
Animal Assistance Incidents	39	44	41	0	0	0	0	0	0	0.0	0.0	↔

Datasource: FireCore

¹ Injury Road Traffic Collisions include RTCs attended by CFRS where there was a fatality or a rescue with injury

² Primary fires include all fires in buildings, vehicles and outdoor structures or any fire involving casualties, rescues or fires attended by five or more appliances

³ Increase or decrease if greater than 5% of three year average

⁴ Wildfire is defined as any uncontrolled vegetation fire which requires a decision, or action, regarding suppression, plus any one of the following criteria (i) involves a geographical area of greater than 1 hectare (ii) has a sustained flame length of 1.m (iii) requires a committed resource of 4 or more appliances (iv) requires resources to be committed for over 6 hours (v) presents a serious threat to life, environment, property and infrastructure

Primary Fire Response Profiles

To understand the level of demand and risk, alongside mitigating actions, a profile of incidents, risk and prevention and protection activities for fire are detailed at both a County and a station level.

The definition of a 'primary fire' includes all fires in buildings, vehicles and outdoor structures or any fire involving casualties, rescues or fires attended by five or more appliances. These are defined this way in order to identify the fires that pose the greatest risk to households and communities.

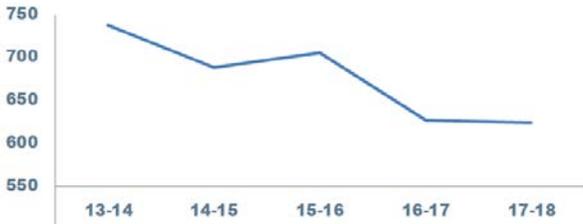
Demand Profile – Primary fires



2013/14
738



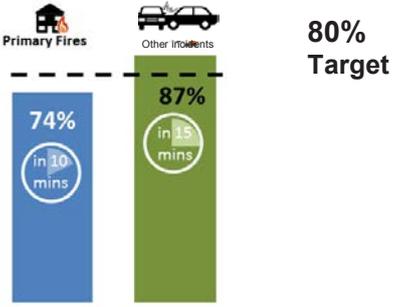
2017/18
623



Primary fires in Cumbria

Response standards 2017/18

	Response Standard	Target
1	First appliance response time to primary building fires within 10 minutes	80%
2	First appliance response time to all other incidents within 15 minutes	80%



Response Times

Changes in different types of fire against 5 year average



Dwelling Fires

2013/14: **284** 2017/18: **239**

↓ 15.8%



Car Fires

2013/14: **211** 2017/18: **185**

↓ 12.3%



Other Building

2013/14: **165** 2017/18: **137**

↓ 17.0%

What we have delivered



10,432 Safe and Well Visits conducted to households across Cumbria in 2017/18



85% on-call fire engine availability (on average) across the service for 2017/18



Firefighter operational training programme developed and embedded

All figures quoted are based on incidents attended by fire and rescue personnel between 01/04/2013 and 31/04/2018 and are taken from our Incident Recording System (IRS).

Primary Fire - Risk Profile

CFRS Risk Profile identifies the levels of risk within an area (Lower Super Output Area⁴) (LSOA) of incident types occurring – this based on the likelihood of an incident occurring but also on the likelihood of that incident being of a life-threatening or serious nature. Full details of the risk model calculations used are in (Appendix B).

The fire risk model shows a longer term trend of decreasing fire risk across the County with one High Risk LSOA in 18/19 (Castle Ward in Carlisle). The number of Medium Risk LSOAs has decreased from 101 in 15/16 to 89 in 18/19.

Table: 18/19 Primary Fire Risk – Cumbria

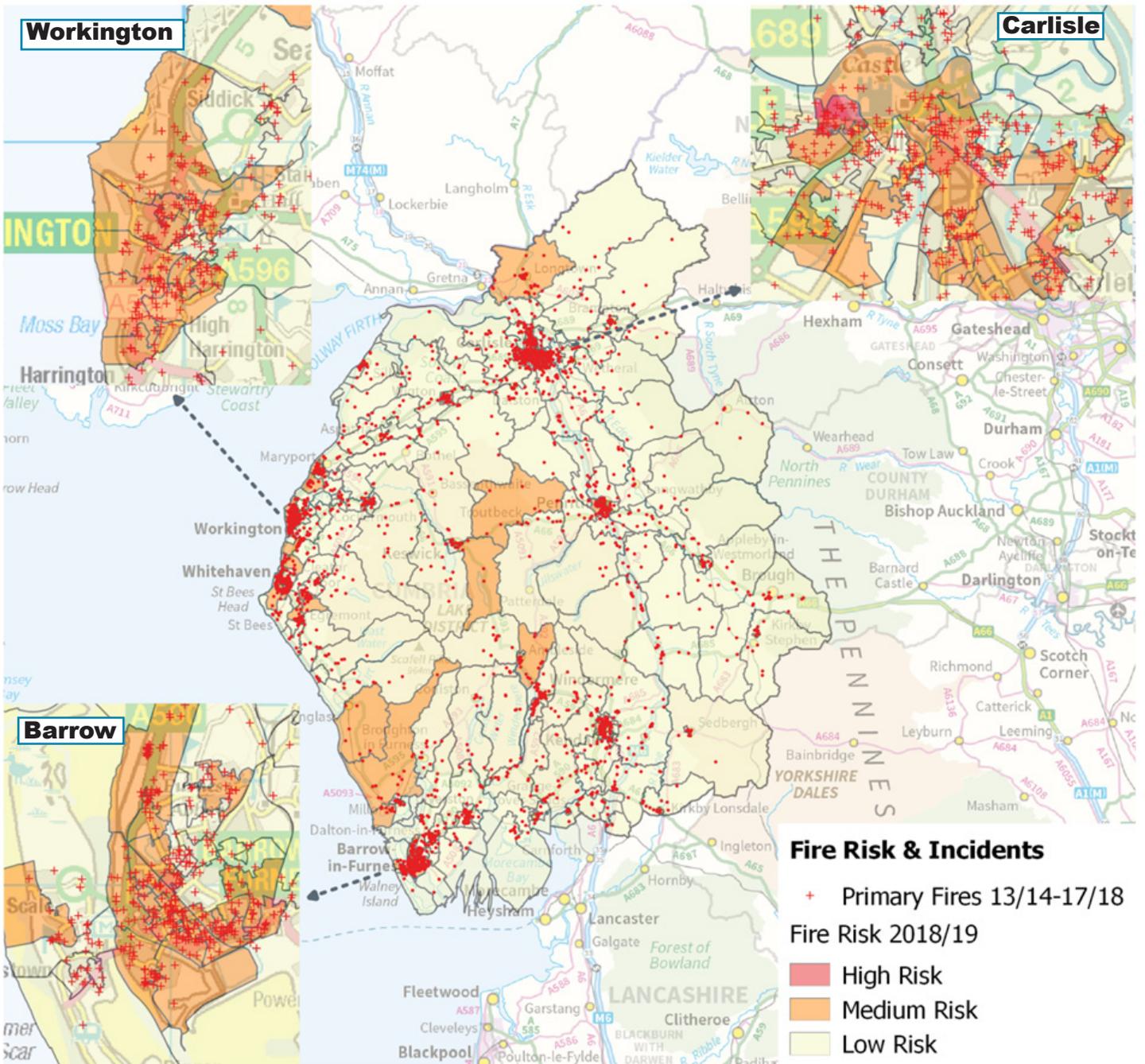
Cumbria Risk Profile	Incidents 2009/10 - 13/14		Incidents 2010/11 - 14/15		Incidents 2011/12 - 15/16		Incidents 2012/13 - 16/17		Incidents 2013/14 - 17/18	
	2014/15 Risk		2015/16 Risk		2016/17 Risk		2017/18 Risk		2018/19 Risk	
Risk Grade	Risk Score	No. Of LSOAs								
High	230	3	78	1	78	1	78	1	80	1
Medium	5006	108	4618	101	4364	97	4284	96	3908	89
Low	4818	210	5132	219	5272	223	5306	224	5476	231
TOTAL	10054	321	9828	321	9714	321	9668	321	9464	321

Data Source: Incident data from FireCore, Index of Multiple Deprivation 2015

⁴ Lower Super Output Areas are geographic areas created by the Office for National Statistics to support statistical analysis at a more detailed geographical level. Each LSOA is designed to have similar population sizes of up to 1,200 households.

The map of Fire Risk below shows levels of fire risk by LSOA, overlaid with the last 5 years of primary fire incidents clustering around urban conurbations.

Map: 18/19 Primary Fire Risk –Cumbria



Data Source: Incident data from FireCore, Index of Multiple Deprivation 2015

Primary Fire - Prevention and Protection Profile

CFRS targets prevention and protection activity to areas of highest risk.

Prevention

In 2017/18 CFRS provided a total of 740 fire prevention campaigns and initiatives. This included 191 interventions including; Young Firesetter, anti-social behaviour schemes and other youth diversion projects.

In April 2017 CFRS introduced their new Safe and Well visits. The Safe and Well visits have an extended remit to provide prevention activity not only fire related issues but also support and advice around Falls Prevention, Alcohol Reduction, Smoking Cessation and Social Isolation.

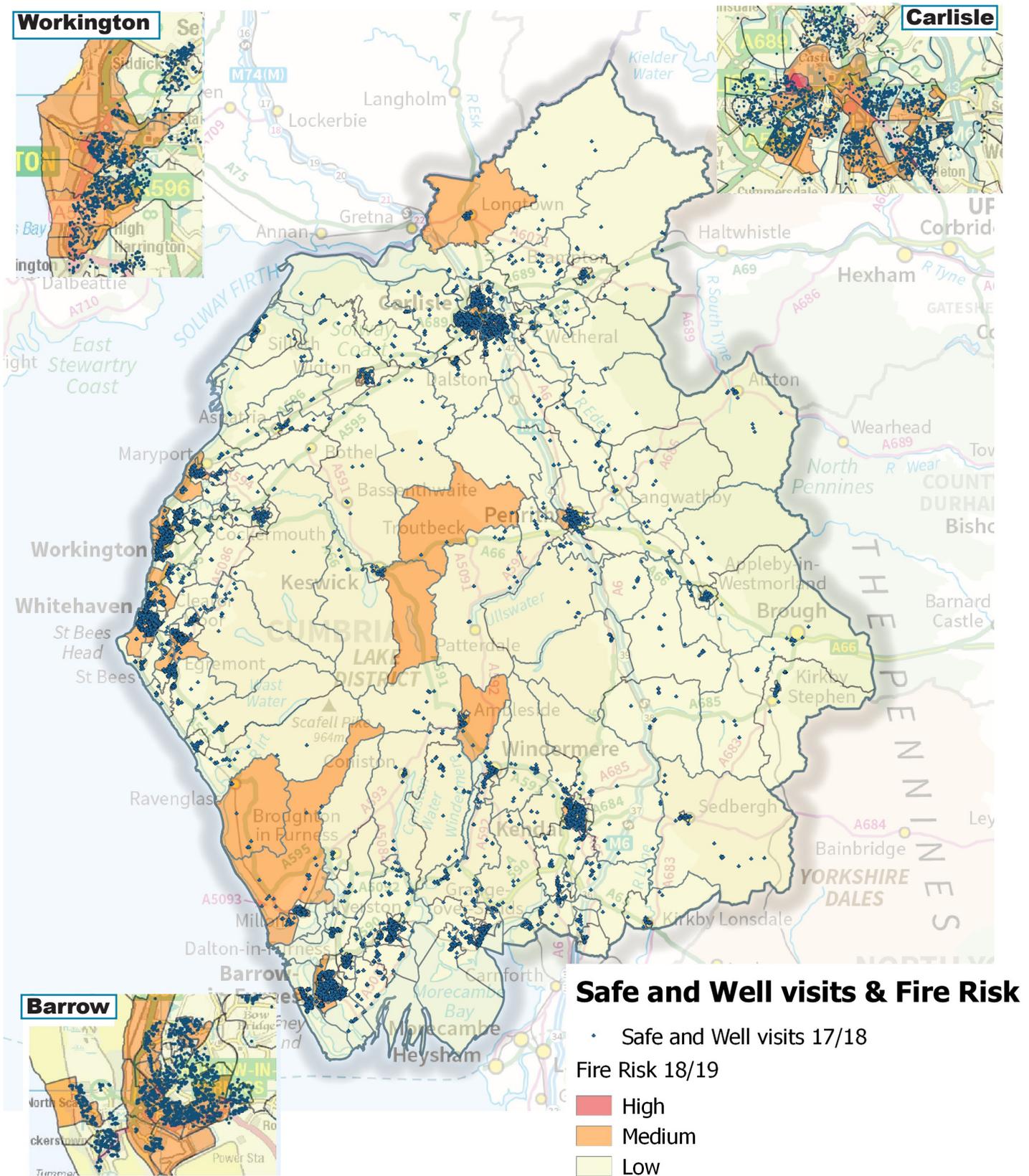
Safe and Well visits are targeted at individual households that are at highest risk of fire. Every household is given a risk rating based on key fire risk predictors. Those households at the highest risk of fire are prioritised and visited by operational firefighters within the service. This risk rating is based on a wide range of data sources including ONS Addressbase data, MOSAIC geodemographic data, NHS Exeter data, and response time mapping data. Referrals from partner agencies are considered highest priority.

Safe and Well visits are also provided by Safe and Well Technicians, Home Accident Reduction Technicians and Volunteers – these teams target the more rural properties.

As older age groups and living alone are key predictors in fire risk, this aligns with delivering the health and well-being support that is now provided by firefighters as part of the Safe and Well visit.

In 2017/18 CFRS conducted 10,432 Safe and Well visits across Cumbria. These are shown in the map below. Individual station profiles allow more detailed mapping of Safe and Well visits against demand and risk.

Map : Safe and Well Visits 17/18 – Cumbria



Injury Road Traffic Collision (IRTC) Response Profiles

To understand the level of demand and risk, alongside mitigating actions, a profile of incidents, risk and prevention and protection activities for IRTCs are detailed at both a County and a station level. The criteria of IRTCs include only RTCs attended by CFRS where there was a fatality or a rescue with injury.

On average CFRS attend 8.5% of all IRTCs recorded by Cumbria Constabulary, however CFRS attend a much higher number of the more serious RTCs, and on average have attended 47.5% of fatalities that have occurred across Cumbria and 20.5% of all Killed and Seriously Injured RTCs⁵.

Although CFRS attend only 47.5% of all fatal IRTCs, and 20.5% of all Killed and Seriously Injured IRTCs this is the total that required CFRS specialist skills and equipment. A significant number of IRTCs attended by the police include fatalities to pedestrians, cyclists and motorcyclists that would not require CFRS attendance.

⁵ This refers to a 3 year average over the period 2015, 2016 and 2016

Demand Profile - Injury road traffic collisions

Injury road traffic collisions –annual average based on last 5 calendar years



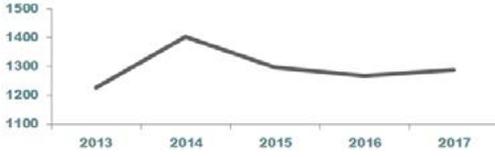
1,297 Injury Road Traffic Collisions



234 Seriously Injured



27 killed



Injury road traffic collisions in Cumbria 5 year trend

Trends and causes of injury road traffic collisions

Where known:

-  **Failed to look properly 24.2%**
-  **Slippery road (due to weather) 10.0%**
-  **Failed to judge other persons path or speed 18.4%**
-  **Poor turn or manoeuvre 7.8%**
-  **Careless/ Reckless/ in a hurry 6.9%**



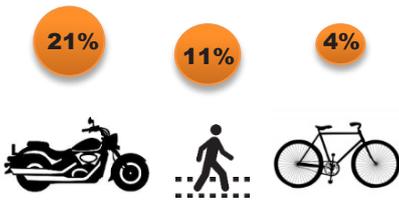
47% of all RTCs happen between 12pm and 6pm

*all figures quoted are based on the last 5 calendar years

Priority groups

Priority groups:

- **Motorcyclists 21%**
- **Pedestrians 11%**
- **Cyclists 4%**
- **Younger and older drivers**



36% of all road traffic deaths are among pedestrians, cyclists and motorcyclists

* annual average based on the last 5 years

What we have delivered



Procured new battery operated cutting equipment and improved PPE for firefighters



Blue Light Collaboration continues under Policing and Crime Act 2017, including delivering Joint Incident Command Units.



82 Road Awareness Training Courses conducted across Cumbria for 18-25 year olds in 2017/18

All figures quoted are based on incidents attended by Cumbria Police personnel between 01/01/2013 and 31/12/2017 and have been provided by Information Management Section at Cumbria Police.

Injury Road Traffic Collision – Risk Profile

The number of IRTCs across Cumbria has increased over the last three years from 88 in 2015/16 to 106 in 17/18, with the number of fatalities remaining stable at 15 in 2015/16 to 14 in 17/18.

The IRTC Risk Model shows a relatively stable risk of IRTC risk across the County, with 37 High Risk LSOAs in 14/15 and 18/19. The number of Medium Risk LSOAs decreased slightly from 94 in 14/15 to 87 in 18/19.

Table: 18/19 Injury RTC Risk – Cumbria

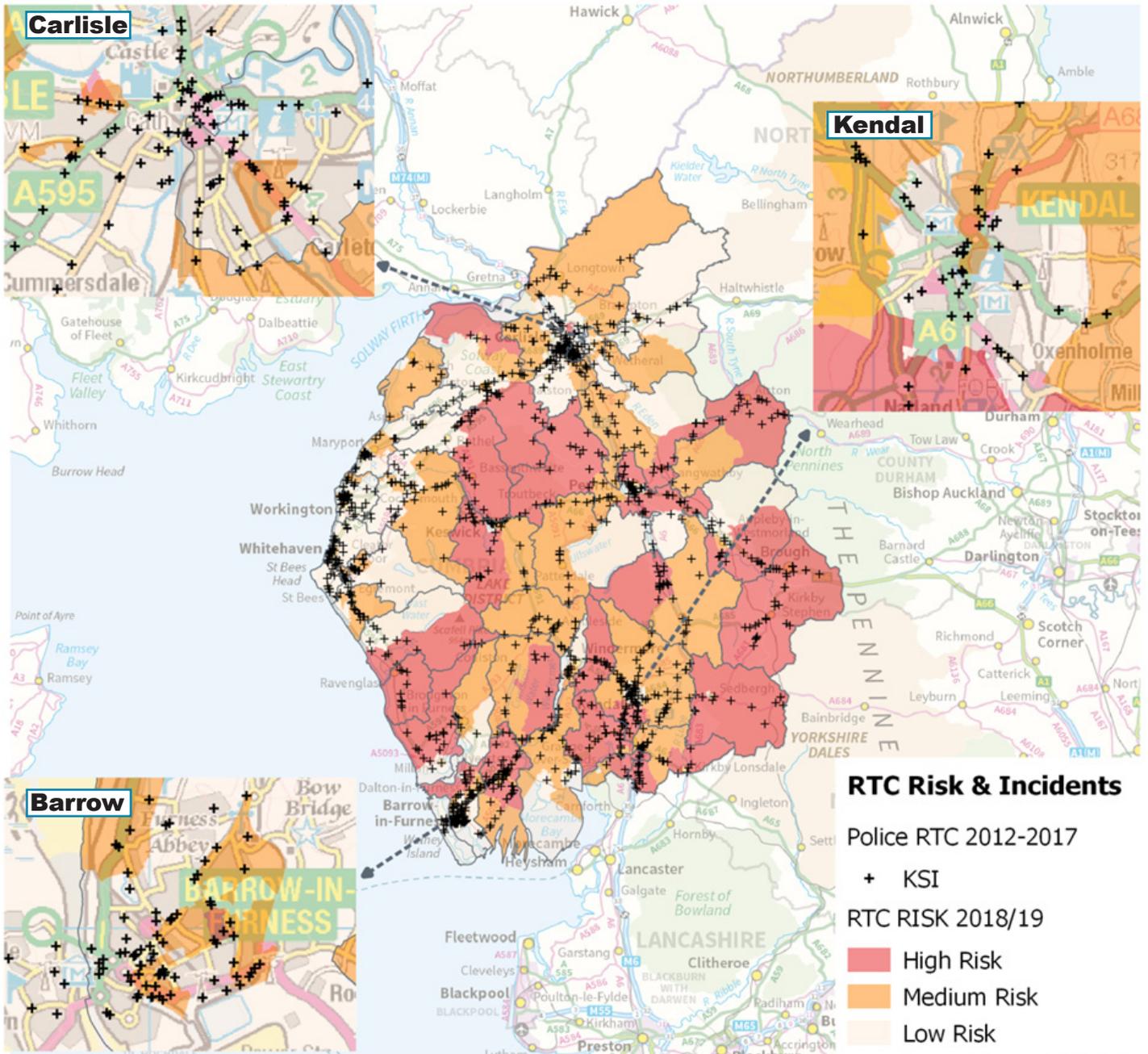
Cumbria Risk Profile	Incidents 2009 - 13		Incidents 2010 - 14		Incidents 2011-15		Incidents 2012-16		Incidents 2013-17	
	2014/15 Risk		2015/16 Risk		2016/17 Risk		2017/18 Risk		2018/19 Risk	
Risk Grade	Risk Score	No. Of SOAs	Risk Score	No. Of SOAs	Risk Score	No. Of SOAs	Risk Score	No. Of SOAs	Risk Score	No. Of SOAs
High	3700	37	4000	40	4400	44	3500	38	3700	37
Medium	6864	94	5980	81	6284	86	10428	94	6240	87
Low	4096	190	4668	200	4172	191	780	189	4740	197
TOTAL	14660	321	14648	321	14856	321	14708	321	14680	321

Datasources: Cumbria Constabulary RTC Data, FireCore Incident data

The map below shows the risk levels by LSOA for Cumbria, overlaid with Killed/Seriously Injured (KSI) incidents between 2012 and 2017. The main road arteries and urban conurbations show the highest number of KSI incidents; which (after unclassified roads) are the A595, A66, A590 and the M6. Further details are provided in individual station profiles.

Risk is shown by a colour scale for each LSOA geographical area. These LSOAs are based on number of properties within them and therefore are disproportionately large in rural areas, though equally populous as smaller urban LSOAs. However it is important to note that the actual incidents relating to that risk level are predominantly on one or more roads that will run through that LSOA as shown by the incident pattern in the map below.

Map: 18/19 Injury RTC Risk –Cumbria



Datasources: Incident data is Cumbria Constabulary RTC Data for Killed and Seriously Injured, RTC Risk Model also uses FireCore Incident data

Injury Road Traffic Collision – Prevention and Protection Profile

CFRS provide Road Awareness Training (RAT) Sessions targeted at drivers aged 18 to 25 years, as these are at highest risk of being involved in a collision. RAT sessions also target those aged 55 years and older.

Table: Number of RAT sessions 2017/18 by District

Road Traffic Awareness Training Sessions completed 2017/18		
District	Number of RATs	Number attended
Allerdale	27	305
Barrow-in-Furness	7	257
Carlisle	24	629
Copeland	11	329
Eden	3	120
South Lakeland	10	507
Cumbria	82	2,147

Datasource: CFRMIS

CFRS continues to work with its partners to target 'risk' groups. CFRS are working with partners to try and reduce the number of Killed / Seriously Injured (KSI) on the roads and are represented at both the Cumbria Road Safety Partnership (CRSP) and the Casualty Reduction and Safer Highways (CRASH) meetings. CFRS are involved in the national Road Safety Week campaign schedule and provide a range of road safety events across the County including the established RAT to Schools, Colleges and to those over 55 years old. Work is on-going with Cumbria Constabulary and North West Ambulance Service to provide local road safety initiatives including Operation Orwell, to provide road safety education to drivers.

Flood and Water Response Profiles

The longitudinal view of flooding across Cumbria is extremely variable due to extreme weather events. The number of incidents ranges from 468 in 15/16 to 161 in 17/18.

During the first week of December 2015, Cumbria was subjected to its third extreme flood event in a decade, and the impact of Storm Desmond on the County was unparalleled in many respects: i.e. in terms of record rainfall and river flows, the number of properties flooded and flood affected.

The demand profile below highlights key statistics in relation to flooding and water incidents.

Demand Profile - Flooding and Water incidents

Flooding and water incidents – annual average based on last 5 financial years



186 Flooding and water

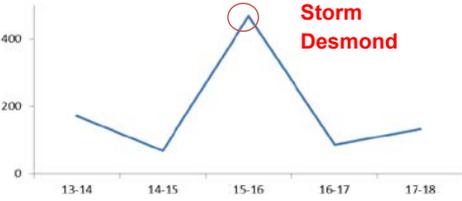


2 seriously injured

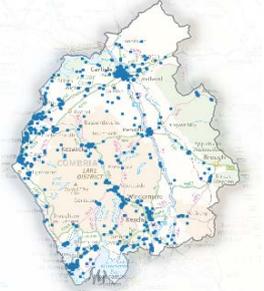


2 killed

5 year trend and extent of 2015 floods



Flood and water incidents in Cumbria – 5 financial



Water Incidents (5 yrs)

2015/16 floods account for 50% of all flood and water incidents recorded in Cumbria in the last 5 financial years - 468 incidents out of the total 928

Areas most affected by floods and types of special service provided

Top 5 types of special service

Evacuation from water - flooding	6%
Rescue from water -river, canal, loch, sea etc.	8%
Make safe (e.g. electrics effected by flood water)	19%
Pumping out flood water	24%
Advice only	24%

Top 5 Wards affected by flood in the last 5 financial years

- Ambleside and Grasmere Ward (5.5%)
- Keswick Ward (3.2%)
- Castle Ward, Carlisle (2.5%)
- Harbour Ward, Whitehaven (2.2%)
- St. Aidan's Ward, Carlisle (2%)

What we have delivered



Worked with Local Resilience Forum and Environment Agency to develop Local Flood Plan



Investment in new boats, PPE and Water Rescue Training

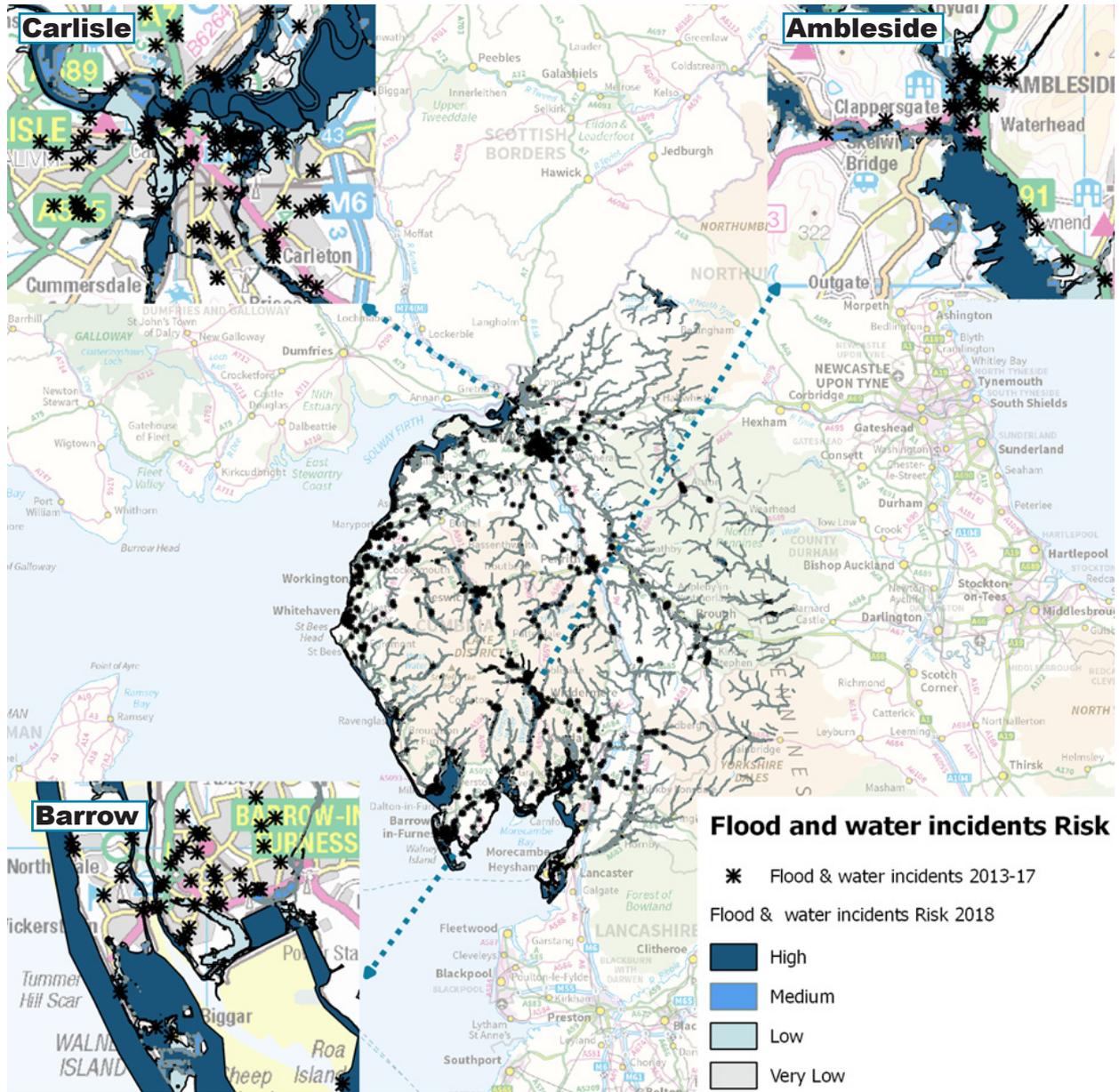


25 rescued without injury

All figures quoted are based on incidents attended by fire and rescue personnel between 01/04/2013 and 31/04/2018 and are Incident Recording System (IRS).

Flood Risk is taken from the Environment Agency’s Risk of Flooding from Rivers and Seas (Aug 2018). The risk of flooding is categorised into high, medium, low and very low areas (see Appendix C for more detail). Incidents responded to by CFRS are mapped on top of the risk areas. The map below shows the areas across Cumbria at risk of flooding.

Map: Risk Map of Flooding based on Rivers and Seas (Aug 2018) - Cumbria



Contains Environment Agency information © Environment Agency and/or database right

Flood and Water – Prevention and Protection Profile

The Environment Agency’s Cumbria Flood Action Plan (1 June 2016) details 65 areas of action for implementation across Cumbria, Eden, Derwent and Kent and Leven Catchment areas. These proposed actions fall into five key themes

- Strengthening Defences
- Resilience
- Upstream Management
- Water Level Management Boards
- Maintenance

Full details of the Cumbria 2015 Flood Events are available in the Flood Impact Assessment Dec 2015.

Medium and Standard Risk Response Profiles

Outside the 3 priority incident types, there are a range of other incidents that are attended by CFRS. A demand profile of those that are medium and standard risk are shown below, highlighting the high incidence rate of false alarms.

Demand Profile – Medium and Standard Priority Incidents



16 Gas (including Carbon Monoxide) incidents



46 Animal Rescues



1848 False Alarms



17 Wildfires

*Annual average based on the last 5 FY

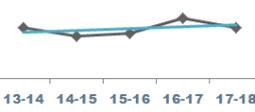
Contributory Factors

47% of Wildfires are deliberate.

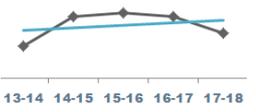
Only 3% of all False alarms are malicious

*Annual average based on the last 5 FY

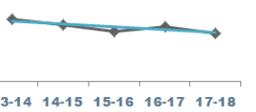
Trend lines



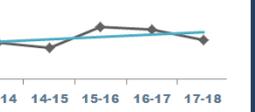
Wildfires



False alarms



Animal Rescues



Gas incidents

Resources

Number of vehicles deployed:
*Annual average based on the last 5 FY

- **Animal Rescues – 112**
- **Wildfires – 59**
- **All False Alarms – 2369**
- **Gas (including Carbon Monoxide) incidents - 42**





Number of firefighters attending by incident type:
*Annual average based on the last 5 FY

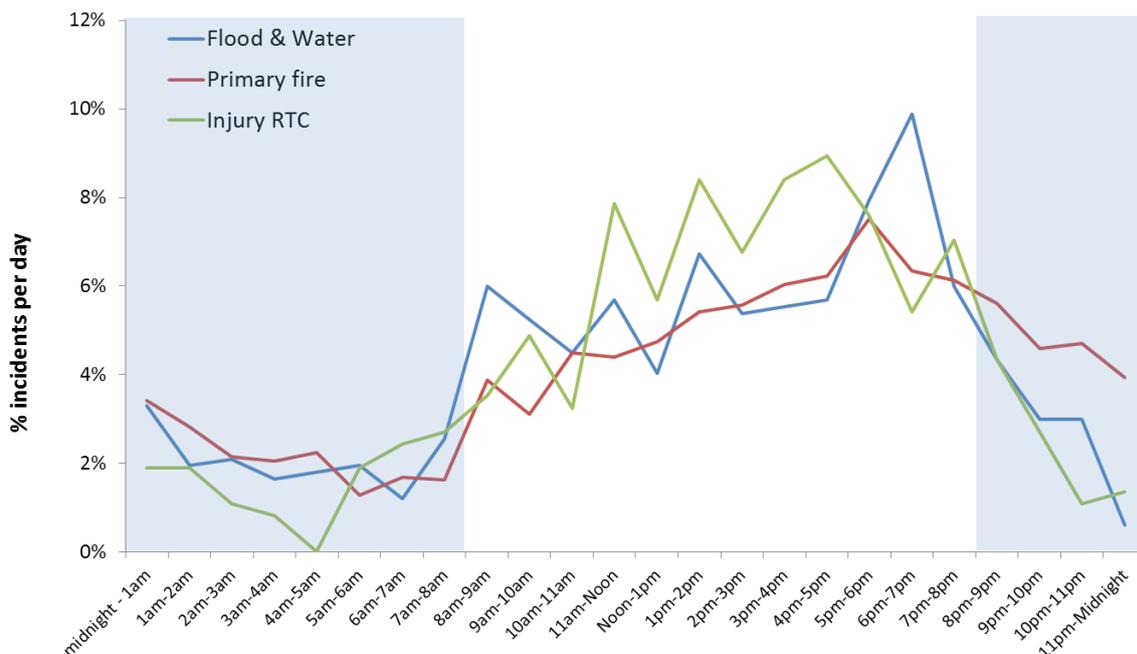
- **Animal Rescues – 348**
- **Wildfires – 208**
- **All False Alarms – 9638**
- **Gas (including Carbon Monoxide) incidents - 139**

All figures quoted are based on incidents attended by fire and rescue personnel between 01/04/2013 and 31/04/2018 and are taken from our Incident Recording System (IRS). These do not include incidents not reported or attended.

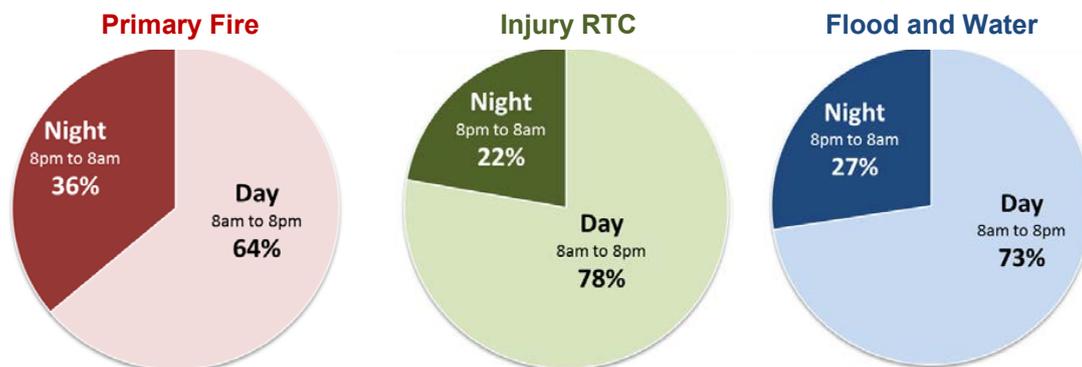
Medium and Standard Risk - Incident Profile Risk Profile by Time of Day

There is a significant difference in demand on the service depending on time of day. As the chart below shows, for the high risk incident types the number of incidents per hour starts to increase from early morning and then peaks late afternoon.

Chart: Number of incidents by hour of the day



Across all the high priority incident types the majority of incidents occur during the day time, with 78% of incidents occurring in the day for IRTCs, 73% flood and water incidents and 64% of primary fires.



Specific Risks

Cumbria has five Radiation Emergency Preparedness and Public Information Regulations (REPPiR) sites and top-tier Control of Major Accident Hazard (COMAH) sites that require the production of off-site emergency plans. These are:

- Sellafeld
- MOD Longtown
- Vertellus (Workington)
- BAE Maritime
- Spirit Energy (Barrow)

Some of these sites have dedicated onsite firefighters, in addition to CFRS. CFRS works closely with these firefighters, who form part of the wider risk management and emergency response arrangements. There are a number of lower tier COMAH sites and other risk sites within the County. These risks are covered within the Cumbria Community Risk Register www.cumbria.gov.uk/emergencyplanning/supportingpages/crr.asp. CFRS assist with the development of the risk register and have plans in place to deal with incidents in the risk register.

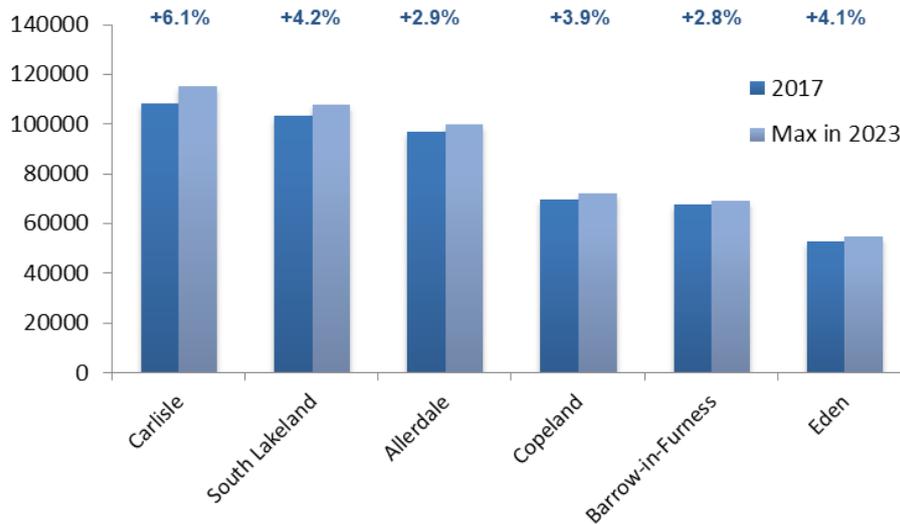
Table: Future Projects and Developments for Stations and Districts

District	Station	Project	Investment Impact
West Coast	West Coast	Cumbrian Coastal Railway Enhancement	Improvements to increase capacity, usage and resilience
		A595 Corridor Enhancements	Improvements to support economic growth in West Cumbria
Allerdale	Maryport	Tidal Lagoon	£5 billion investment
	Workington	Port of Workington Improvements	Ensure access and facilities support investment
		Lillyhall	Enabling future development areas
		Corus Site	650 homes
Barrow	Barrow	BAE Systems Programme	Sustain 1,400 employees
		Port of Barrow Improvements	Ensure access and facilities support investment
		Barrow Waterfront	Ensure port supports marine engineering projects
		Marina Village	500 homes
	Walney	Walney Offshore Windfarm	£1.3 billion investment
Carlisle	Carlisle East & West	Carlisle Station Improvements	Improvements to passenger & freight
	Carlisle West	Carlisle Airport Enhancements	Improvements to allow scheduled air services
		Kingmoor Park	Bring forward future development
		St Cuthbert's Garden Village	10,000 homes
	Longtown	MOD Longtown	Improve transport links to site
Copeland	Egremont	Westlakes Science Park	Enabling future development areas
	Egremont & Seascale	Sellafield Decommissioning	£10 billion to 2030
	Whitehaven	West Cumbria Coal Mine	2-3 million tonnes of coal pa
		Mirehouse	2500-4,000 new homes
Eden	Penrith	Gillwilly Phase 2	Bring forward future development
		North Penrith	500 homes
South Lakeland	Staveley	Scroggs Wood	Ensure site is deliverable
	Ulverston	South Ulverston/ Swarthmoor	700 homes

The impact on population numbers as a result of infrastructure developments can be estimated for Cumbria. These remain stable, within a growth range of between -1% up to +4%. This equates to a decrease of 3 primary fires across the County up to an increase of 24 primary fires. If this worst case scenario occurred (i.e. 24 additional fires), then this would lead to a projected 2 additional fire casualties (fatal and/or injured) across the County by 2023.

The maximum projected increase in population using economic growth forecasts ranges from +2.8% in Barrow in Furness to +6.1% in Carlisle.

Chart: Current population 2017 and maximum projected population in 2023



Cumbria Community Profile

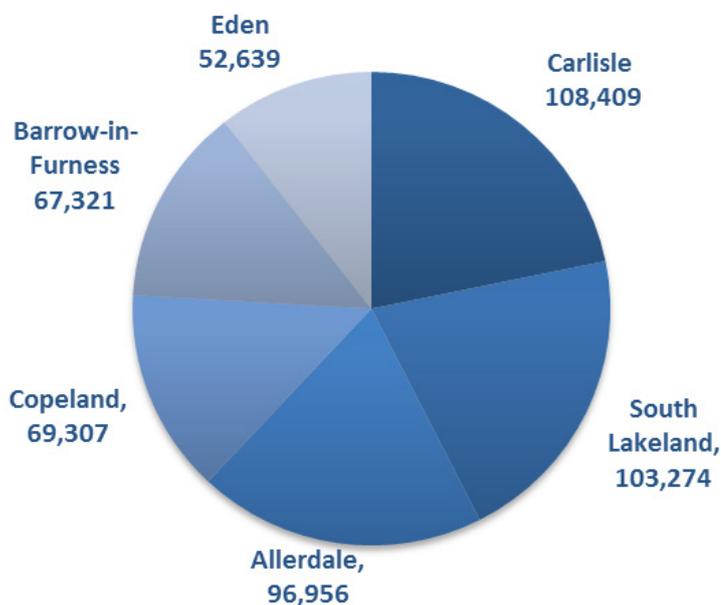
The following information provides a more detailed profile of Cumbria’s community and some of the characteristics that shape the work of CFRS. A full profile of Cumbria is available on the Cumbria Observatory⁶.

Population⁷

Cumbria is England’s second largest County and is much less densely populated than the national average. Cumbria’s population is estimated at 498,375 people in 2017, of which 49% are male and 51% female. Male life expectancy at birth is 79.2 years and female life expectancy is 83 years old.

There is a significant difference in population across the districts within Cumbria, from 52,639 in Eden in 2017 to almost double that in South Lakeland with 103,274 people.

Chart: Population in 2017 by District



⁶ Cumbria Observatory - www.cumbriaobservatory.org.uk

⁷ ONS Population Estimates (2016)

Rurality

54% of Cumbria's residents live in rural areas compared to 18% nationally. Of Cumbria's districts, Allerdale and Eden have the greatest proportions of residents living in rural areas (72% and 71% respectively) while Carlisle has the smallest proportion (27%).

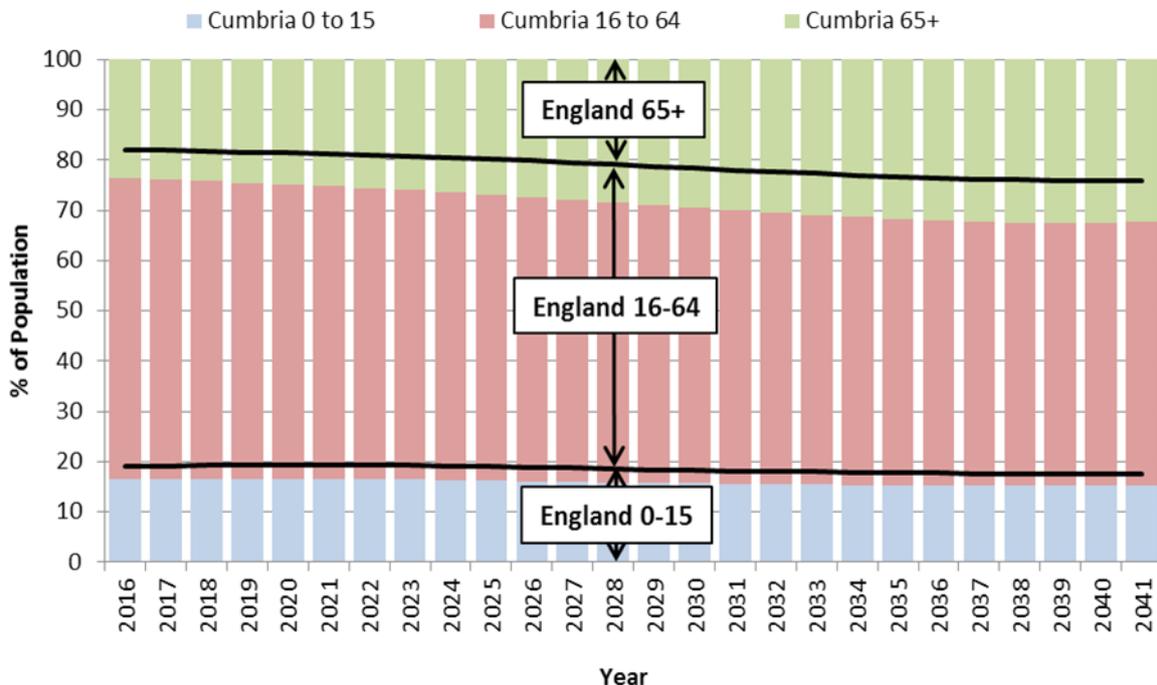
Population density varies across Cumbria's six districts; from 25 people per km² in Eden to 870 people per km² in Barrow-in-Furness. Allerdale is the only Cumbrian district to become less densely populated during the workday. Inversely, Carlisle, Copeland and Barrow-in-Furness become more densely populated during the workday.

Age Profile

When compared to the national average, Cumbria has an older age profile with 23.8% of the population aged 65 years and over compared to 18.0% in England. Older people, particularly those living alone are at an increased risk of experiencing a dwelling fire, with people aged over 80 years five times more likely to be killed in a house fire⁸.

Projections of recent demographic trends⁹ suggest that by 2021 Cumbria's residents aged 65+ will increase by 7,700 persons (+6.6%). All of Cumbria's districts have older age profiles than the national average, with Allerdale, Eden and South Lakeland having the smallest proportions of younger residents and the greatest proportions of older residents.

Cumbria: Projected Population: 2016-2041: By Broad Age Category



This changing demographic will impact on fire services in a range of ways, decreasing the available recruitment population available to become firefighters, and increasing the most vulnerable age group to being a casualty from fires (65+).

⁸ Source: Accidental exposure to fire or flame - External causes of morbidity and mortality, Office for National Statistics (2009)

⁹ ONS 2016-Based Subnational Population Projections

Deprivation

A range of research projects have established the link between socio-economic inequality, or deprivation, and the increased risk of having a fire . For example, children from the most disadvantaged families (whose parents have never worked or are long-term unemployed) are 37.7 times more likely to die in accidents than children of parents in higher managerial and professional occupations .

84 of Cumbria's LSOAs rank amongst the 10% most deprived in England in relation to geographical barriers to services.

LSOAs within Crummock (Allerdale), Seascale (Copeland), Lyne (Carlisle) and Skelton (Eden) rank in the top 25 most deprived out of 32,482 LSOAs in England in relation to geographical barriers to services.

Cumbria's average travel times to key services are longer than the national average; Eden had the 2nd longest average travel times to key services out of all Local Authorities (LAs) in England. Eden's average travel times were longer than similarly sparsely populated LAs.

Cumbria has 29 LSOAs that rank within the 10% most overall deprived in England; LSOAs within Moss Bay (Allerdale), Barrow Island (Barrow-in-Furness), Central (Barrow-in-Furness), Hindpool (Barrow-in-Furness), Ormsgill (Barrow-in-Furness) and Sandwith (Copeland) rank within the 3% most overall deprived nationally.

Health and Well-Being

There is a strong correlation between certain health issues and the risk of having, or being injured in a fire, such as hoarding which can lead to increased risk of fires or mobility restrictions which impede escape from a fire.

Cumbria's proportion of residents reporting that their day-to-day activities are limited by a health problem or disability illness is higher than the national average (20.3% vs. 17.9%).

Of Cumbria's districts, Barrow-in-Furness had the greatest proportion of residents with day-to-day activities that were limited (24.6%).

Cumbria has a higher proportion of residents providing unpaid care than the national average (11.3% vs 10.3%).

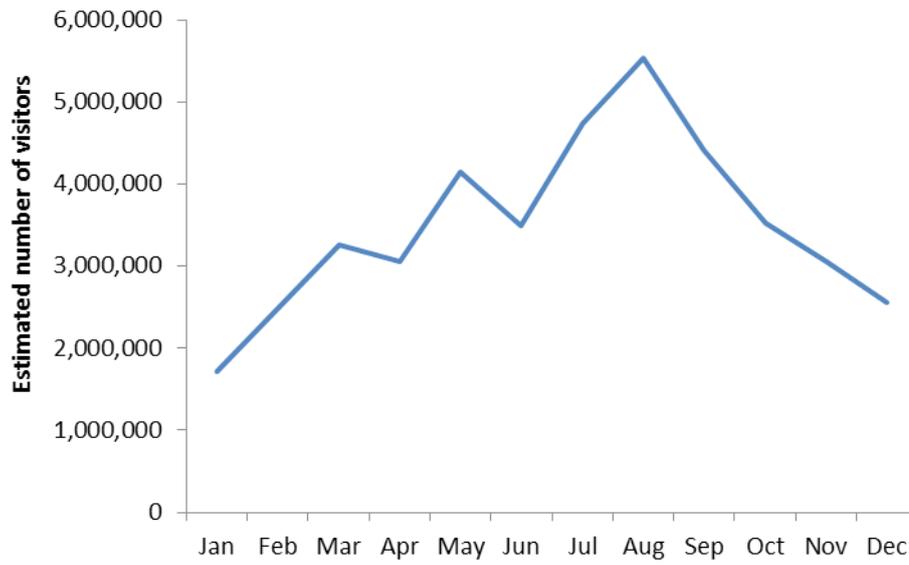
Barrow-in-Furness also had the greatest proportion of residents providing unpaid care amongst Cumbria's districts (11.9%).

Tourism

Cumbria has a very strong tourism sector that significantly swells the population of the County. In 2017 Cumbria and the Lake District received over 47 million visitors throughout the year, made up of 40.7 million day trippers and 6.6 million overnight visitors, increasing the sleeping risk of fire across the County.

The Lake District National Park was awarded UNESCO's World Heritage Status in 2017, which is anticipated to attract additional tourists.

Chart: Estimated number of visitors to Cumbria (2016)



Data source (Cumbria Tourism: Steam Model)

Between 2016 and 2017 there was an increase of 4.8% in tourist numbers, with staying visitors growing faster than day visitors at 6.2% compared to 5% respectively.

Appendix A: Station Risk Profiles

Individual Station Risk Profiles provide detail of the demand and risk for each station alongside a profile of operational resources available on each fire station.

Our prevention activity in terms of the number of Safe and Well (SAW) visits carried out within each LSOA is also mapped

All of this information will be looked at critically in order to improve the efficiency and effectiveness of our operational response and inform the refreshed 2019-23 IRMP.

Each station area profile contains:

- **Station Area and Resources**
 - Fire Engine Availability
 - Station Fire Engine Response Times
- **Station Area Response Priorities**
- **Primary Fire Response Profile**
 - Incident and Risk Profile
 - Prevention and Protection Activity
- **Injury Road Traffic Collision Response Profile**
 - Incident and Risk Profile
 - Prevention and Protection
- **Flooding and Water Rescue - Response Profile**
 - Incident and Risk Profile
 - Prevention and Protection Activity
- **Other Risk information**
- **Horizon Scanning**

Appendix B: Risk Modelling Methodology

Levels of risk for each of the three highest priority incident types; (i) Primary Fire (ii) Injury RTC and (iii) Flood and Water Incidents; have each employed a methodology considered most appropriate for that risk type. The three methodologies used are detailed below:

Fire Risk Model

Cumbria FRS risk model for fire uses a quantitative risk analysis based on the standard model of severity x likelihood = risk.



The fire risk model places emphasis on loss of life, and takes into account the four risk factors listed below:

- Dwelling Fire Rate – Number of dwelling fires/ Number of dwellings
- Casualty Rate – Number of casualties (injured and fatalities)/ Number of residents
- Non-dwelling Fire Frequency – Total number of fires over 5 years
- Index of Multiple Deprivation Score – Total of IMD 2015 for each LSOA

For each of the above measures, five year periods are used to calculate risk to ensure the overall risk classifications are not adversely affected by annual 'spikes'. The two rate scores above are calculated for each Lower Super Output Area¹² (LSOA) in Cumbria.

Each LSOA is then allocated a risk score for the four measures listed above. This risk score is based on the Entec Risk Assessment Toolkit Report (1997) commissioned by the Home Office. This was designed to be used by Fire and Rescue Services' to categorise risk. The following tables provide details of the risk scores allocations which are applied in bandings.

Dwelling Fire Rate (per LSOA)

Calculation	Description	Banding	Risk Score
Number of dwelling fires/ Number of dwellings (averaged over 5 yrs)	Annual rate of fire per 'n' dwellings greater than 1 in 200	Greater than 0.005	12
	Annual rate of fire per 'n' dwellings between 1 in 200 and 1 in 300	0.005 to 0.003334	10
	Annual rate of fire per 'n' dwellings between 1 in 300 and 1 in 400	0.003333 to 0.0026	8
	Annual rate of fire per 'n' dwellings between 1 in 400 and 1 in 600	0.0025 to 0.001667	6
	Annual rate of fire per 'n' dwellings between 1 in 600 and 1 in 800	0.001666 to 0.00125	4
	Annual rate of fire per 'n' dwellings less than 1 in 800	Less than 0.00125	2

¹² LSOAs are geographic areas created by the Office for National Statistics to support statistical analysis at a more detailed geographical level. Each LSOA is designed to have similar population sizes of up to 1,200 households.

Dwelling Fire Casualty Rate (per LSOA)

Calculation	Description	Banding	Risk Score
Number of casualties and fatalities/ Number of residents (averaged over 5 yrs)	Annual rate of fire casualty per 'n' residents greater than 1 in 1000	Greater than 0.0001	12
	Annual rate of fire casualty per 'n' residents between 1 in 1000 and 1 in 1500	0.001 to 0.0006668	10
	Annual rate of fire casualty per 'n' residents between 1 in 1500 and 1 in 2000	0.0006667 to 0.0005	8
	Annual rate of fire casualty per 'n' residents between 1 in 2000 and 1 in 3500	0.0005 to 0.0002858	6
	Annual rate of fire casualty per 'n' residents between 1 in 3500 and 1 in 5000	0.0002857 to 0.0002	4
	Annual rate of fire casualty per 'n' residents less than 1 in 5000	Less than 0.0002	2

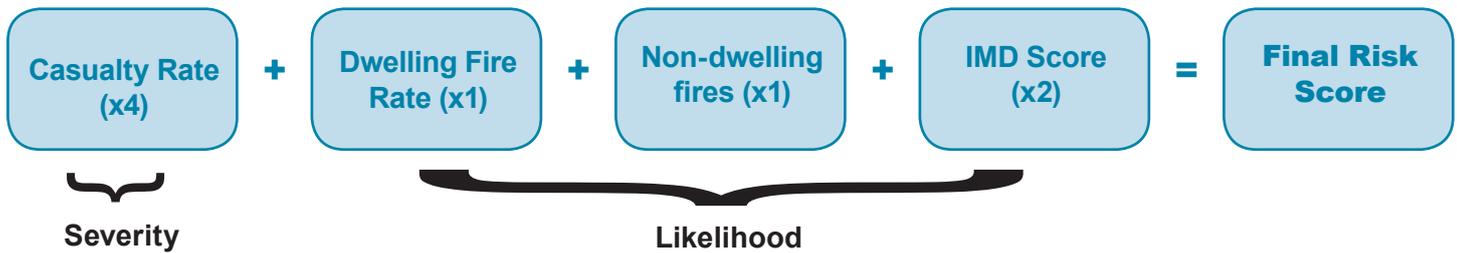
Non-Dwelling Fire Rate (per LSOA)

Calculation	Description	Banding	Risk Score
Frequency of fires occurring in buildings other than dwellings (5 year period)	Number of fires in buildings other than dwellings; 15 or more	15 or more	12
	Number of fires in buildings other than dwellings; Less than 15	Less than 15	10
	Number of fires in buildings other than dwellings; Less than 10	Less than 10	8
	Number of fires in buildings other than dwellings; Less than 6.67	Less than 6.67	6
	Number of fires in buildings other than dwellings; Less than 5	Less than 5	4
	Number of fires in buildings other than dwellings; 3.33 or less	3.33 or less	2

Dwelling Fire Casualty Rate (per LSOA)

Calculation	Description	Banding	Risk Score
Number of casualties and fatalities/ Number of residents (averaged over 5 yrs)	IMD2015 Score greater than 33.8	Greater than 0.0001	12
	IMD 2015 Score between 33.8 and 24.7	0.001 to 0.0006668	10
	IMD 2015 Score between 24.7 and 19.5	0.0006667 to 0.0005	8
	IMD 2015 Score between 19.5 and 14.8	0.0005 to 0.0002858	6
	IMD 2015 Score between 14.8 and 11.25	0.0002857 to 0.0002	4
	IMD 2015 Score less than 11.25	Less than 0.0002	2

Each risk score for the risk factors is then combined, with the weightings applied as shown below, to provide a final risk score for the LSOA as shown below.



The formula is weighted (as above) to provide emphasis on casualties to ensure consequence as well as likelihood is taken into account.

Risk scores have been calculated for the previous five years, from 2014/15 Risk to 2018/19 Risk to provide a longitudinal view of risk.

Injury RTC Risk Model

As with fire risk, Cumbria FRS risk model for Injury RTC uses a quantitative risk analysis based on the standard model of consequence x likelihood = risk

Risk rating for Injury RTCs is based on the severity of incidents combined with the likelihood of those incidents occurring.



The quantitative measures used for the above risk are:

Severity

- Rate of fatality and serious injury as a proportion of all RTCs recorded by police for that LSOA

Likelihood

- Likelihood of RTC - Proportion of CFRS RTC incidents occurring within an LSOA across Cumbria as recorded in IRS
- Likelihood of Injury RTC is Likelihood of RTC multiplied by casualty rate

For each of the above measures, five year periods are used to calculate risk to ensure the overall risk classifications are not adversely affected by annual ‘spikes’. Each of the measures above are calculated for each Lower Super Output Area¹³ (LSOA) in Cumbria.

Severity and Likelihood are then allocated into risk bandings based on quintiles of risk and each banding given a score depending on which quintile they are in.

Total Injury RTC Risk Score is then calculated by multiplying Severity and Likelihood quintile risk scores to provide an overall risk score for each LSOA. Risk scores were then categorised using the risk matrix below.

¹³ LSOAs are geographic areas created by the Office for National Statistics to support statistical analysis at a more detailed geographical level . Each LSOA is designed to have similar population sizes of up to 1,200 households.

Table: Risk Matrix for Injury RTC

	Low	Medium			High
10	20	40	60	80	100
8	16	32	48	64	80
6	12	24	36	48	60
4	8	16	24	32	40
2	4	8	12	16	20
Severity Likelihood	2	4	6	8	10

Risk scores have been calculated for the previous five years, from 2014/15 Risk to 2018/19 Risk to provide a longitudinal view of risk.

Flood Risk Model

The Environment Agency¹⁴ provides a national assessment of flood risk for England produced using local expertise. The dataset shows the chance of flooding from rivers and/or the sea based on areas (cells) of 50 meters square. Each cell is allocated one of four flood risk categories described below, taking into account flood defences and their condition.

High risk means that each year this area has a chance of flooding of greater than 3.3%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

Low risk means that each year this area has a chance of flooding of between 0.1% and 1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

Very low risk means that each year this area has a chance of flooding of less than 0.1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

¹⁴ © Environment Agency copyright and/or database right 2017. All rights reserved.

Appendix C: Data Sources and References

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References and Links to Data Sources

Environment Agency – link to Flood Maps

Cumbria Intelligence Observatory

Cumbria County Council, Joint Strategic Needs Assessment (2015-17)

Cumbria Local Enterprise Partnership (LEP)

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Cumbria Fire and Rescue Service, Intervention Standards Review (2010)

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Cumbria Fire and Rescue Service, Community Safety Strategy (2016-20)

Community Risk Register (2017-18)

Crime and Community Safety Strategic Assessment (2016-17)

Cumbria County Council, Flood 2015 – CCC Impact Assessment

Analysis of fire and rescue service performance and outcomes with reference to population socio-demographics, Communities and Local Government - Fire Research Series 9/2008

Edwards P et al, Deaths from injury in children and employment status in family: analysis of trends in class specific death rates, BMJ, 333: 119-121, 200

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