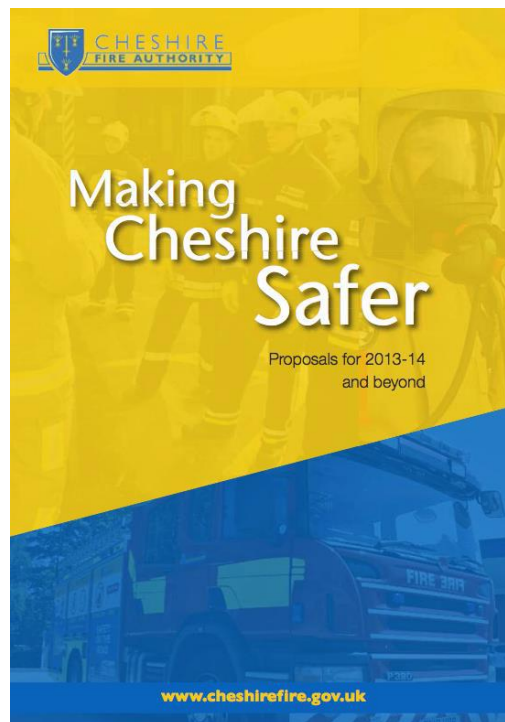




Independent assessment of ERP1 review

Crewe and Ellesmere Port

Our ref: CL3079



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Executive Summary

Background

Cheshire Fire Authority planned changes in stations, ridership and crewing systems between 2013-14 as part of Emergency Response Programme (ERP1). The changes were scheduled between 2013/14 and 2016/17. The plan included changing the Crewe and the Ellesmere Port second whole-time appliance to an on call crewing system, introducing the new on call crews in 2016/17. Cheshire Fire Authority decided to review these final two changes in 2017. They also requested an independent assessment of the data and analysis used by Cheshire FRS for the 2017 review. This report summarises the requested independent assessment.

Scope of independent assessment

The assessment aims to provide assurance on the validity and reliability of the data and assessment process completed by Cheshire FRS to inform the review of Crewe and Ellesmere Port parts of ERP1. The assessment focused on a) current and emerging risks, b) activity levels and response times, and c) on call crew recruitment and availability, along with additional issues raised by members and the Fire Brigades Union during the review.

The independent assessor

The review was completed by Michael S Wright of Greenstreet Berman Ltd (GSB). Michael Wright has advised central government and fire and rescue services since 1993, including supporting: the development of firefighter operational safety (dynamic risk assessment in the 1990s), and the 'Out of the Line of Fire' milestone report in 1995 (responding to the Audit Commission Report 'In the Line of Fire'). He went on to support the development of risk based fire cover and community fire safety.

Approach to the review

The approach to the independent assessment included:

- Attending planning days and consulted FBU and Cheshire East members to identify and understand questions and queries;
- Acquiring Cheshire FRS presentations and supporting analyses;
- Scrutinising Cheshire FRS information and requested additional information;
- Comparing of Home Office data to data provided by Cheshire FRS.

The criteria applied in this assessment included whether:

1. Suitable and sufficient assessment of risks and benefits had been completed;
2. The review used valid data for the assessment of risks;
3. The review had assessed the feasibility of plans;
4. Due account had been taken of review findings and data.

Findings

A detailed assessment is provided in this report. Key findings are noted below.

1. Suitable and sufficient assessment

Additional information and analyses was requested to ensure the issues identified from this assessment and from consulting members and the Fire Brigades Union were addressed in full. This included:

- a) Seeking and validating additional information on the number of Houses in Multiple Occupation (HiMOs) and evidence of fires in HiMOs;
- b) Additional data on trends in fire and a check of non-fatal fire casualty data;
- c) Clarification of reported response times of on call crew neighbouring Crewe to reach Crewe;
- d) Clearer reference to HS2 Hub plans for Crewe;
- e) Additional analyses of the numbers of people within five minutes travel times of Crewe and Ellesmere Port stations from whom on call crews could be recruited;
- f) Frequency of over the border deployments into Cheshire East;
- g) Clarification of how cover would be provided for crews whilst training, if Crewe and Ellesmere Port second whole-time appliance became on call.

Upon receipt of this additional information and analyses, it was concluded that Cheshire FRS had, by the end of the review, completed a suitable and sufficient assessment of risks and benefits of changes to public and FRS personnel.

2. The review used valid data for the assessment of risks

Validation checks were made on data for on call availability and mobilisation times, call handling times, response time standards and types of incidents attended. This prompted re-assessment of some points, including:

- The use of recorded, instead of predicted, travel times of neighbouring appliances into Crewe;
- The use of average recorded availability for proposed on call crews rather than an assumed 100%;
- A validation of the predicted response times was requested and provided by Cheshire FRSs Phoenix travel time simulator. This led to a revision of predicted (if the changes were implemented) response times and workloads of appliances.

The set of data used in the final review report was assessed as valid.

3. The review had assessed the feasibility of plans

On call recruitment and availability

As noted in the main report, the feasibility of recruiting on call crews and assuring their availability has been assessed at length.

Cover Area Moves (CAMs)

Cheshire FRS review indicated that, post ERP1, the capacity of the CAM strategic reserve appliances would be five times greater than the number of CAMs in 2017.

4. Has due account had been taken of review findings and data

Crewe on call crew

The independent assessment noted that account had been taken of:

- The neighbouring appliances being on call, crews with:
 - 85% or more availability; and
 - Travel times into Crewe of over 10 minutes plus mobilisation time.
- A secondary on call appliance at Crewe would have a relatively high workload (213 deployments per year, of which 47 would be life risk incidents), which may require and support a higher level of availability. It would be the second busiest on call appliance in Cheshire;
- There would be an increase in the average time lag between the first and second appliance from one minute 34 seconds to about 4.5 minutes. The current 2nd whole time appliance is part of the Strategic Reserve for CAMs with 95 CAMs per year on average, whilst an on call appliance would not be part of the CAM reserve.
- The HS2 Hub plans for Crewe state 7,000 new homes, 40,000 new jobs, town centre redevelopment and major redevelopment of large business areas;
- The number of people in the target groups for on call recruitment living within five minutes of Crewe station equals or exceeds the number living near existing on call crews with high levels of availability;
- Cheshire FRS have a 'trial and proof' plan for assuring satisfactory performance of an on call crew at Crewe before changing from whole time to on call at Crewe.

Cheshire FRS suggested, upon review, to consider a commitment to achieve (by special measures if necessary) the services' standard of 85% availability for the proposed Crewe on call crew if this option is implemented. This would be similar to the current availability of the second whole time appliance at Crewe, noting that it performs an average of 95 Cover Areas Moves per year.

Ellesmere Port on call crew

The independent review queried whether full account had initially been taken of:

- The life risk incident level of a second on call appliance at Ellesmere Port would be moderate (8 life risk incidents and 46 deployments in total per year) relative to other Cheshire on call appliances;
- Powey Lane is predicted (if Ellesmere Port second appliance was on call) to attend 119 incidents within Ellesmere Ports station area, 28 of these would be life risk.
- The on call appliance at Ellesmere Port would be ranked 16th out of 20 Cheshire on call appliances in terms of the number of deployments; and
- The Powey Lane whole time appliance would reach Ellesmere Port incidents, on average, within three minutes of the Ellesmere Port whole time appliance, i.e. at the same time or faster than an Ellesmere Port on call appliance.

The stated rationale for having a second on call appliance at Ellesmere Port was to maintain resilience for handling prolonged or major incidents and act as a standby appliance.

1 INTRODUCTION

1.1 Background

Cheshire Fire and Rescue Service (FRS) planned and agreed with Cheshire Fire Authority members a series of changes in stations, ridership and crewing systems between 2013-14. The majority of these changes have been implemented, including building four new stations, changing secondary whole time crews to on call and changing selected day crews to on call crews.

The two final changes were to switch the Crewe and the Ellesmere Port second whole time appliance to on call.

There is a policy of retaining all 35 fire and rescue appliances.

Cheshire Fire Authority decided to review the final two changes in 2017. They also requested an independent review of the data and assessment used for the 2017 review.

This report summarises the requested independent review.

1.2 The independent assessor

The independent assessment was completed by Michael S Wright, a Director of Greenstreet Berman Ltd (GSB). GSB are an independent small professional services company that provides analysis, assurance and advice on risk management. Michael Wright has provided risk assessment and research services to:

- Home Office;
- Department for Communities and Local Government;
- Fire Brigades Union;
- Some FRSs including Cheshire FRS, Greater Manchester, Scottish Executive, London Fire Brigade, Hereford and Worcester.

Michael Wright has advised fire services since 1993, including supporting the development of firefighter operational safety (dynamic risk assessment in the 1990s), 'Out of the Line of Fire' milestone report in 1995 (responding to the Audit Commission Report 'In the Line of Fire'). He went on to support the development of risk based fire cover and community fire safety.

1.3 Aim and scope of independent assessment

The assessment aims to provide assurance on the validity and reliability of the data and assessment process completed by Cheshire FRS to inform review of Crewe and Ellesmere Port parts of ERP1.

Review scope agreed by Fire Authority: April 2017

The scope of the independent assessment covered:

- Current and emerging risks;
- Current and anticipated activity levels and achievement of 10 minute response time

standard¹;

- Types of incidents dealt with;
- On call crew recruitment, training and availability.

Additional issues raised during the review

Additional questions were posed by members and the FBU during the review. These points were addressed as additional items.

The additional issues identified by consulting members, FBU and Cheshire FRSs included:

1. Validity of Gartan dynamic data for on call crew availability;
2. Crew mobilisation time data;
3. Crew safety:
 - a. Whether the policy of four riders had been risk assessed,
 - b. Time lag between appliances,
 - c. Reliance on 'on call' crews.
4. Impact on major incident capability;
5. Providing cover for training;
6. Potential impact on Home Safety Visits;
7. North West Fire Control call handling times;
8. Cheshire FRS response time standards;
9. Over the border services;
10. Validity of the Phoenix model used to assess changes in response times.

The independent assessment findings are reported per issue.

1.4 Points out of scope

The assessment did not provide an opinion on whether or not to proceed with the change in crewing systems.

The following points were also out of the scope of this independent assessment:

- Are there alternative sources of funding?
- Are the financial requirements to reduce spending valid?
- Are there other ways of reducing expenditure?
- Previous aspects of ERP1 plans.
- The rationale and policy of retention of the current fleet of appliances.

¹ This report uses the terms "response time" and "travel time" for the time from alert of an appliance to arrival at an incident. The time to respond to an incident from a person calling 999 would also include the "call handling time" by fire control.

1.5 Approach to the independent assessment

1.5.1 Approach

The approach to the independent assessment included:

- Attending planning days and consulted FBU and Cheshire East members to identify and understand questions and queries, to help focus and scope the detail of this review;
- Acquiring Cheshire FRS presentations and supporting analyses;
- Scrutinising Cheshire FRS information and requested additional information and analyses;
- Conducting checks on Cheshire FRS data and data processing;
- Comparing of Home Office data for response times and dwelling fire casualties to data provided by Cheshire FRS.

1.5.2 Additional information requested

The additional information requested for this assessment included:

- An assortment of additional data on trends in fires and over the border deployments;
- Additional data on call handling times and mobilisation times;
- A sub-division of data for on call crew availability;
- Data on the number of people in 'priority' groups for on call recruitment within five minutes of Crewe and Ellesmere Port stations;
- A data discovery exercise for fires in HiMOs;
- Copy of close out report for the introduction of the four rider policy;
- A rerun of the Phoenix model used to predict response times for ERP1 changes;
- Data on actual response times before and after ERP1 changes;
- Information on the scale, nature and timing of HS2 Hub developments at Crewe.

1.5.3 Assessment criteria

The criteria applied in this assessment included:

- Whether suitable and sufficient assessment of risks and benefits had been completed;
- Whether the ERP1 review had:
 - Recognised any significant changes since previous ERP1 assessments;
 - Consulted on & addressed issues cited by members/FBU;
 - Assessed impact of changes as a whole;
 - Assessed feasibility of plans;
 - Suitable checks within implementation plan;
 - Used valid data for the above points of the review;
 - Had taken due account of the findings and data.

2 ASSESSMENT FINDINGS

2.1 Assessment of current and emerging risks

2.1.1 Trends in incidents and population

Issue

Questions were posed regarding whether the data used to plot trends in life risk fires and RTCs and the data used to assess crew workloads was valid.

Data had been presented on trends in:

- Number of incidents;
- Number of casualties;
- Size of fires;
- Number of residents.

Data had been used by Cheshire FRS for 2007/08-2011/12 and for 2012/13-2016/17, i.e. a five year period before and after ERP1.

Assessment

The reported data and its interpretation was scrutinised. The assessor noted that:

- The non-fatal fire casualties differed from Home Office data;
 - The recorded number of non-fatal fire casualties was found to have risen due to a reported change in recording practices. Specifically, a policy towards recording more precautionary checks and minor injuries (attendances at hospital and first aid cases).
 - There was no upwards trend in the number of serious injuries (hospital overnight stays).
- Whilst data had been shown for the five before and after ERP1 on the size of fires, percent of fires put out on arrival and percent of fires with smoke alarms, comparable data was not shown for an earlier baseline period, such as 2000-2003;
- The rise in total number of incidents between 2016 and 2017 was checked and found to be associated with Cheshire FRS attending medical incidents, rather than a rise in fires and RTCs.

It was noted that:

- There was no major change upward or downward in the number of accidental fire fatalities;
- The number of RTCs in Cheshire has remained broadly the same since 2010-11 whilst the volume of traffic has increased.
- The change in the number of fires for the period reported by Cheshire FRS was small.

Additional data was requested for:

- Fires with and without smoke alarms;

- Time to detect fires and time to call FRS from ignition;
- Use of ladders by FRS to conduct rescues.

This additional data (for 2009-10 to 2016-17) indicated:

- There was no significant change in the size (dwelling fires confined to room of origin) of dwelling fires between 2009-10 (89%) and 2016-17 (87.5%);
- The proportion of dwelling fires with smoke alarms was 11% higher in 2016-17 (85%) than in 2009-10 (73.6%);
- The proportion of dwelling smoke alarms recorded as operable did not change significantly between 2009-10 (73%) and 2016-17 (72%).
- The time between estimated time of ignition and discovery of the dwelling fire and the time between estimated time of discovery of dwelling fire and first call (999).

There was no change in the time to discover or report dwelling fires in the period 2009-10 to 2016-18.

In this period about 60% of fires are discovered in under five minutes and 90% are reported (999 call) within five minutes.

- The use of ladders in dwelling fires (as an indicator of severity).

There was no significant trend in the use of ladders in the period 2009 to 2016.

Thus, overall there was in the period 2007/08 to 2016/17:

- Little evidence of a change in the number and severity of dwelling fires;
- Little change in the number of accidental fire fatalities and serious fire injuries;
- A decline in secondary fires and false alarms;
- Some evidence of an increase in smoke alarms.

Data period

It was noted that the baseline period 2007-11 was determined by the ERP1 start date.

The assessor suggested that an alternative baseline year would be 1997 (or thereabouts), given that fire stations and crewing systems are strategic decisions.

If the year 2000 or thereabouts is used as a baseline, then a much greater change in the number of fires and use of smoke alarms would be reported.

Home Office data indicates that:

- The number of fires attended by Cheshire FRS has fallen by 70% since 2002/03 from 9,070 to 2,585 by 2016/17.
- Dwelling fires in Cheshire halved in number between 2002/03 and 2016/17.

Thus, there have been large declines in the number of fires since 2002/03. The final reports by Cheshire FRS do make reference to the trend in dwelling fires since 2002/03.

2.1.2 Houses in Multiple Occupation (HiMOs)

Issue

Questions were posed regarding whether there is a rising trend in HiMOs and HiMOs

fires, particularly in Crewe, and whether due account had been taken of any such trends.

A further question was whether there has been a rise in privately rented accommodation with multiple residents that are not categorised as HiMOs, i.e. they are shared accommodation.

Assessment

Investigation by Cheshire FRS indicated uncertainties in the recorded number of HiMOs and HiMO fires in Crewe (and the rest of Cheshire).

A series of additional data gathering and verification was conducted. The verification initially focused on fires in multiple occupancy dwelling and multi occupancy buildings, comparing their addresses to recorded HiMOs. On scrutiny of this, the assessor asked for the data gathering to be extended further to include checking fires in 'single occupancy dwellings' against records of HiMOs. Cheshire FRS carried out further checks and requested checks from local authorities on their recorded HiMOs to update Cheshire FRS records.

This exercise identified for Crewe:

- 25 fires at HiMOs (10 related to garden or car and 15 to the buildings) over eight years. This is three HiMO fires per year in Crewe.
- There was no upward or downward trend in HiMO fires in Crewe since 2009/10.
- 415 unlicensed HiMOs in Crewe.
- 33 HiMO fires in Cheshire East over the eight year period.

This is:

- 7.5% of all dwelling fires in Crewe (40 dwelling fires per year between 2014/15 to 2016/17).
- 3% of Primary Fires in Crewe (98 primary fires in dwelling, non-domestic property fires, vehicle and other primary fires per year)

The assessor also asked for data on the trend in fires with multiple people self-evacuating and people evacuated with FRS assistance. This was a test of whether there is evidence of an increase in fires (possibly in HiMOs) requiring evacuation of many persons. The data (as per Figure 1 and Figure 2) did not indicate any upward trend in fires with many people being evacuated with or without FRS assistance.

Figure 1: Frequency of five or more persons evacuated with and without FRS assistance (Cheshire)

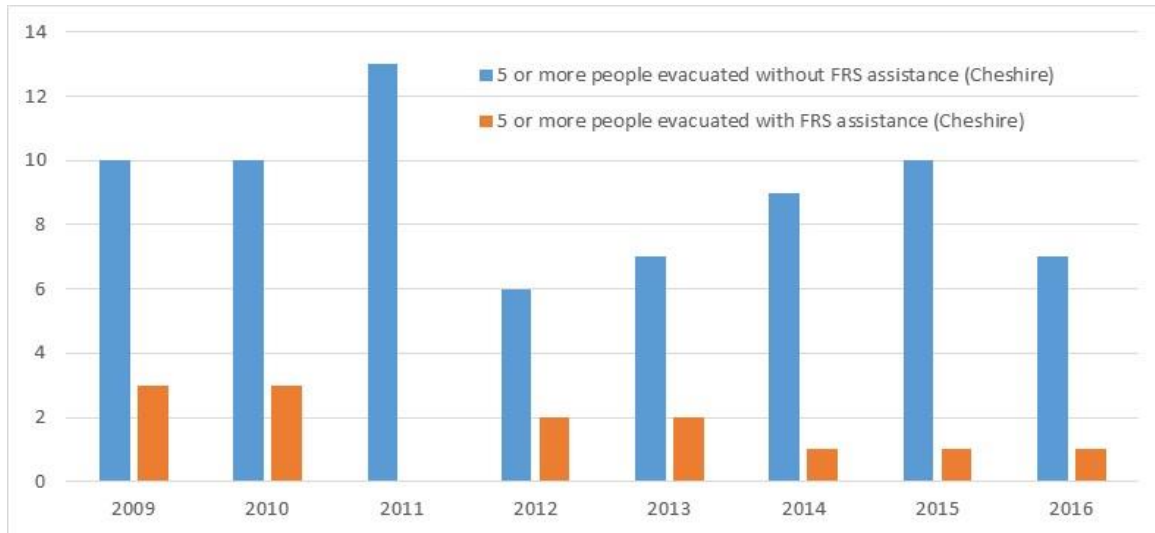
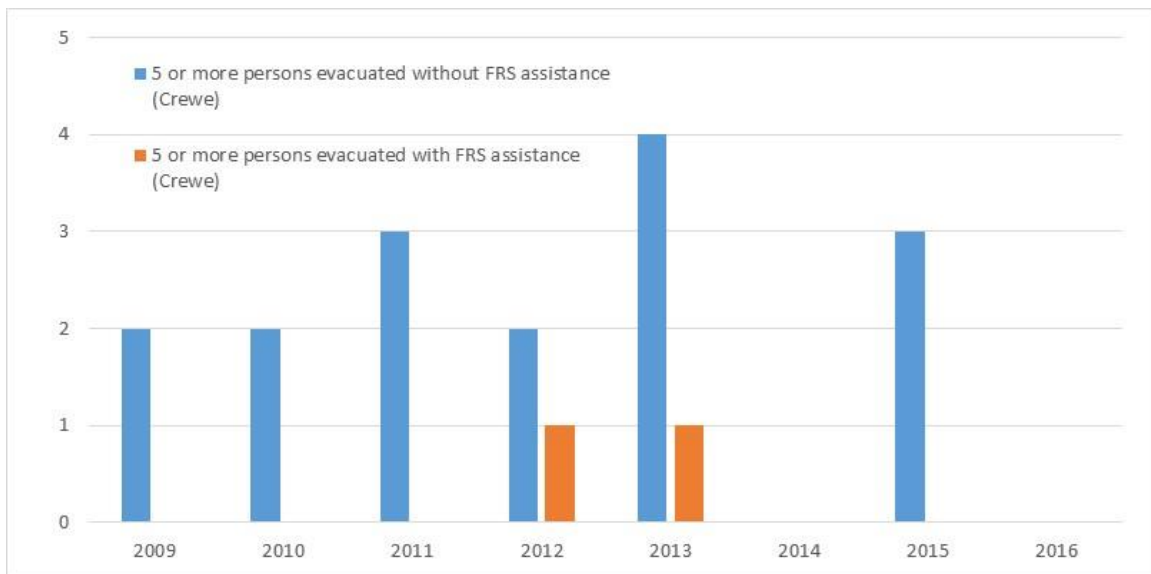


Figure 2: Frequency of five or more persons evacuated with and without FRS assistance (Crewe)



2.1.3 Emerging risks

Issue

Questions were posed regarding whether all significant emerging risks had been identified, assessed and taken into account, including:

- HS2; and
- New housing developments, especially in and round Crewe.

Assessment: Housing

Cheshire FRS has collated information on the number of new housing units planned and built for the Ellesmere Port, Cheshire West, Crewe and Cheshire East areas. The impact

of these on risk was assessed by comparing recent trends in the number of dwelling fires versus population/housing growth. The assessment noted that:

- The number of dwelling fires has declined whilst the number of dwellings has increased;
- As shown by Home Office data, there has been a 70% decline in fires since 2002 despite a growing population.

Cheshire FRS state that the increase in housing has not led to an increase in dwelling fires and that there is an expectation of a continued decline in dwelling fires due to ongoing community fire safety work and due to new housing being built to current building regulations (such as hard wired smoke alarms).

A similar profile was presented for non-domestic fires and building growth, i.e. an increase in commercial property and a decline in fires. The development of commercial property for HS2 was recognised by Cheshire FRS.

It was concluded that Cheshire FRS has assessed the impact of new housing and commercial property on fire risk in Cheshire and that there was no evidence that an increase in population or other buildings would be associated with more fires. The trend in fires is downward.

Assessment: HS2

The expected development of HS2 was noted by Cheshire FRS. The risk of railway incidents was assessed by Cheshire FRS by professional judgement and reference to the past frequency of major railway incidents in Cheshire. In addition, Cheshire FRS noted that the railway major incident response capability would be unchanged after ERP1.

It was initially unclear what information had been collated on the size, type and nature of developments proposed for the HS2 Hub at Crewe. Publicly available plans were identified and the assessor checked that Cheshire FRS had noted the plans, specifically Cheshire East local authority master plans. These noted the potential for 37,000 new jobs, 7,000 new homes and 120 hectares of development land.

It is understood that the HS2 Crewe Hub developments are in addition to current planning requests.

RTCs

The review did present data on the trend (broadly flat or slightly downward) in RTCs in each station area and potential growth in traffic was acknowledged.

2.2 Current and anticipated activity levels, and 10 minute response standard

2.2.1 Number of incidents in station areas

Issue

A question was posed whether the number of incidents in whole time stations areas had been underreported. This was related to the use, by North West Fire Control, of a 3.5 minute mobilisation time for neighbouring on call crews and the possibility that this artificially reduced the workload of Crewe and Ellesmere Port whole-time crews.

North West Fire Control (NWFC) policy is to mobilise the appliance that can reach the incident fastest.

Assessment

The actual mobilisation time used by North West Fire Control for on call crews was verified by scrutiny of a sample of call records and noted to be 3.5 minutes.

This was stated to be due to a policy of ensuring a sufficient workload for on call crews to maintain their employment.

The impact of this on neighbouring station workload was stated by Cheshire FRS to be low due to:

- The distance between stations tends to far outweigh the impact of a change in mobilisation times of on call appliances, as most incidents are in the built up area close to the station;
- The majority of fires are within the built up areas that whole-time crews would reach faster than neighbouring on call crews.

It was also noted that Cheshire FRS have reported the number of incidents within Crewe "station area" and within Ellesmere Port "station area", irrespective of which appliance attended. The mobilisation times used by NWFC would not affect the latter reported number of incidents.

2.2.2 Activity levels

Issue

The potential workloads of on call appliances at Crewe and Ellesmere Port were queried. The workload is important in respect of:

- A low workload may be associated with a lower availability of on call crews;
- A high workload may place higher demands on the on call crews.

Assessment

Cheshire FRS have provided, in stages, information on:

- The total number of deployments of current appliances;
- Predictions of the number of deployments and life risk incidents each appliance would attend if crewing arrangements changed to on call crews.

The data are given in Table 1. The total deployments were originally estimated assuming 100% availability of on call crews, giving 79 for Ellesmere Port and 242 for Crewe. This was revised as part of the review to 85% availability at Crewe and 40.4% day time and

63.7% night time at Ellesmere Port and iterated again after checking mobilisation times. A 5 minute mobilisation time was used for Ellesmere Port and Crewe on call appliances. This led to a reduction in predicted deployments of secondary on call appliances, especially for Ellesmere Port.

Table 1: Predicted activity levels for on call appliances

	Ellesmere Port	Crewe
Life risk incidents	8	47
Total deployments	46	213

The predicted workloads are based on a computer simulation of which appliance would reach incidents first, second and third. This takes account of the PDA (number and type of appliances required for an incident). For example, it will simulate three appliances for a dwelling fire and one for a (say) known small fire. Thus, it will only simulate one (fastest) appliance being deployed for those incidents with a PDA of one, and only two appliances for incidents with PDAs of two.

The analyses (as per Table 2) also noted how many life risk and total deployments within each station area would be by neighbouring stations, if Crewe and Ellesmere Port had a secondary on call appliance. This showed:

- No change in the deployments of neighbouring appliances in to Crewe;
- An increase from seven to 28 deployments of Powey Lane into Ellesmere Port for life risk incidents and to 119 incidents in total;
- Powey Lane would attend 2.6 times more incidents in Ellesmere Port than a secondary on call appliance stationed in Ellesmere Port.

Table 2: Predicted deployments into station area from neighbours (with secondary on call appliances at Crewe and Ellesmere Port)

	Crewe		Ellesmere Port	
	Life risk incidents	All incidents	Life risk incidents	All incidents
Powey Lane			28	119
Chester			4	15
Bromborough (OTB)			2	10
Deeside (OTB)			1	2
Runcorn			-	2
Frodsham			-	1
Widnes			-	1
Heswall (OTB)			-	1

	Crewe		Ellesmere Port	
Nantwich	14	70		
Sandbach	3	17		
Winsford	1	11		
Middlewich	1	7		
Alsager	1	4		
Congleton	1	3		
Audlem	-	1		
Holmes Chapel	-	1		

It was concluded that current and predicted activity levels had been assessed and presented for appliances affected by the proposals.

2.2.3 Time to reach life risk incidents

The pre-determined attendance for life risk incidents is unchanged by ERP1.

Issue

A question was posed regarding how the switch to on call crews at Crewe and Ellesmere Port may impact public safety.

Assessment

It was noted that the impact on achieving Cheshire FRSs response time (10 minutes from alert) standard for life risk incidents had been assessed using a computer travel time simulator (called Phoenix). As a whole-time appliance is proposed to be retained at Crewe and at Ellesmere Port, there would be little change in the proportion of incidents reached in 10 minutes by the first appliance in these two areas.

There is no Cheshire FRS response time standard for the second or subsequent appliances.

This issue is further addressed in section 3.10 of this document.

2.3 Types of incidents attended

Issue

The review sought a profile of the types of incidents attended in each of Crewe and Ellesmere Port.

Assessment

The types of incidents attended in each of Crewe and Ellesmere has been clearly presented, including:

- Data on incident type, such as dwelling fire vs Road Traffic Collision;
- Data on whether the incidents required, one, two or three appliances;

- Data on non-fatal casualties and fatalities;
- Frequency of extrications and rescues and methods; used
- Data on existence of COMAH sites, SSRI's;
- Life risk incidents per time period.

This data was based on incidents within the notional station areas and is drawn from Cheshire FRS databases. The data was based on five year averages before and after 2012. Data was also shown by appliance.

It was concluded that suitable information had been presented on the types of incidents attended in each area.

2.4 On call crew recruitment and training

2.4.1 Recruitment

Issue

The extent to which on call crew had been recruited and assessed/trained was posed. This query related to whether there is evidence that it is feasible to recruit and retain on call crews for Ellesmere Port and Crewe.

Assessment

Cheshire FRS have provided data on:

- The duration over which on call crew have been recruited (prior to recruitment being put on hold for this review);
- The number of people recruited and for which roles;
- The timescale (1.5 years) from recruitment to the on call crews 'going live'.

For Ellesmere Port, seven persons had been recruited (including crew and watch manager and five firefighters). For Crewe, nine persons had been recruited (seven firefighters and two transfers).

The review also described:

- The recruitment criteria and checks on the travel time from place of residence to the respective fire stations, including a test of drive time from residence to the station;
- Changes in recruitment arrangements for on call crews, such as more frequent intakes and training opportunities.

It was concluded that suitable information had been presented on this issue.

It was noted that recruitment had been paused after six months and so the target of 15 would not have been reached.

2.4.2 Number of 'qualifying' residents within five minutes

Issue

A question was posed about whether there is a large enough pool of people living or working within five minutes of Crewe and Ellesmere Port stations to enable recruitment of the minimum number (15 per appliance) of on call crew members. A particular

question was posed regarding whether Crewe station is located in an area of older persons from whom it might be difficult to recruit.

Assessment

Cheshire FRS considered the credibility of recruiting 15 persons per appliance from the estimated 'priority' population.

The Cheshire FRS review compiled and assessed the following data. The number of persons within five and within seven minutes travel time of Crewe and Ellesmere Port stations. This included using a drive time computerised simulator that predicts the travel time from place of residence to the station. This is validated by trial runs conducted by Cheshire FRS.

After scrutiny Cheshire FRS completed additional analyses. An assessment was completed by Cheshire FRS of the MOSAIC categories from which current Cheshire FRS on call crews are recruited from. This identified that most are recruited from a subset of six MOSAIC categories, namely A Country Living, D Domestic Success, E Suburban Stability, G Rural Reality, H Aspiring Homemakers and J Rental Hubs.

Next, the number of households within five minutes travel of the stations that are in these priority MOSAIC categories was noted. This independent assessment verified the number of households within the target travel times, as per Table 3, with the existing Nantwich on call station as a comparison.

Thus, both Crewe and Ellesmere Port have the same size of target population from which to recruit on call crew within five minutes of the station as existing on call stations that have high levels of availability.

Table 3: 'Target' MOSAIC households within 5 minutes

Station	Total number of households within 5 minutes travel of station	Total number of households from target MOSAIC categories within 5 minutes
Crewe	16,129	3,812
Ellesmere Port	15,133	3,550
Nantwich	8,566	3,473

2.4.3 Trial and proof

Issue

A question was posed about whether a robust process had been developed to test the feasibility of on call crews at Ellesmere Port and Crewe. This question was posed in the context of concerns about the ability to recruit and retain on call crews and their ability to a) be available and b) reach the stations within five minutes. These concerns are based in observations of traffic congestion around the stations and the distance from the stations to residence of on call crew.

Assessment - Has a process of checking crew availability prior to change in crew system been developed?

Cheshire FRS have defined a series of checks prior to any change from whole time to on call crews, including operating a 'shadow' on call appliance for one to two years:

- To test its availability and mobilisation times;
- To test the (short term) retention of on call crew.

It has been stated that the change to an on call crew is contingent on the 'shadow' appliance performing at a specified level.

In addition, Cheshire FRS have stated a commitment to achieve 85% availability for the Crewe on call appliance. If and as necessary this would be achieved by adopting alternative operational arrangements, such as detaching crew from other stations to Crewe to assure its availability.

2.5 On call availability

2.5.1 On call crew availability data

Issue

A question was posed regarding the day versus night level of on call crew availability and whether this is adequate to support a switch from whole time to on call crews.

Assessment

Data on the proportion of time that on call crews are available in Cheshire was compiled and presented. This data was initially presented on a 24-hour basis. Upon a request from this independent assessment, it was split into day versus night.

The data was shown for primary and secondary on call crews. A primary on call crew is where the on call crew would be the first (or only) appliance mobilised from a station. A secondary appliance is where there is another appliance. This was considered important because the Crewe and Ellesmere Port on call crews would be secondary crews.

The data transparently indicated that secondary on call crews tend to have lower availability than primary on call crews, as per Table 4. This was assumed to be due to secondary crews having lower rates of deployment and hence less incentive to be available. Data was also provided per on call appliance, as per Table 5.

Table 4: Cheshire FRS on call crew availability (% of period)

	Day time	Night time
Primary on call crew	56%	79%
Secondary on call crew	30%	56%

In the case of Crewe and Ellesmere Port:

- The two on call crews (Sandbach and Nantwich) neighbouring Crewe have high levels of availability (in the region of 85% to 90%);
- The Crewe secondary on call appliance is estimated to have a high workload. Also, Cheshire FRS have stated a commitment to achieve 85% utilisation by reasonable

means, such as detaching whole-time crew to this appliance;

- For Ellesmere Port, the whole time appliance at Powey Lane is likely to reach most of Ellesmere Port quicker than an on call crew at Ellesmere Port.

It was noted that there is a possibility of the secondary on call appliance at Ellesmere Port having a low workload and hence would be similar to other secondary on call appliances with low workloads and relatively low availability. It was stated by Cheshire FRS that additional duties may be identified for Ellesmere Port to retain crew, such as acting as a resilience appliance.

Table 5: Availability of on call and nucleus appliances (% of period)

Appliance	Day	Night
Nucleus		
Macclesfield 1		100%
Birchwood		98%
Wilmslow		94%
Stockton Heath	15%	79%
Primary on call		
Nantwich 1*	88%	95%
Poynton	67%	94%
Malpas	45%	94%
Sandbach*	77%	87%
Middleswich	68%	83%
Holmes Chapel	66%	80%
Audlem	39%	80%
Frodsham**	50%	77%
Tarporley	33%	71%
Bollington	51%	67%
Alsager	75%	60%
Knutsford	16%	56%
Secondary on call		
Runcorn	44%	72%
Northwich	22%	72%
Macclesfield 2	48%	71%

Appliance	Day	Night
Penketh	37%	56%
Nantwich 2	10%	38%
Winsford	19%	26%

*Crewe neighbouring on call appliance

**Nearest On call appliance to Ellesmere Port

2.5.2 Validity of on call crew availability data

Issues

A question was posed regarding whether the data for on call crew availability is valid or whether it over represents the true level of on call crew availability. This question was posed in the context that the proposed secondary on call crews at Ellesmere Port and Crewe may likewise only achieve a low level of availability. It was also queried:

- Whether the on call crew availability data includes Small Incident Units (SIUs) (who are not expected to handle life risk fires alone);
- Whether the Gartan on call crew availability system provides a valid representation of on call crew availability.

Assessment

Data was acquired and checked. The first batch of data showed availability for a 24-hour period, split by month for 2017. A second batch of data requested split by day versus night.

The process for compiling this data was checked. The process was found to be valid, comprising an extract from the Gartan on call data system. This system allows on call crew members to enter their availability per 15-minute time period. The availability is a simple percent of the day that (a minimum) crew enter themselves as available.

In the case of Wilmslow nucleus station, this has been classed as a Key station. As an exception, personnel or crews may be detached from other stations to maintain its availability.

It was verified that SIUs are not included in the on call crew availability data for life risk fires. The data for on call crew availability was assessed to be valid.

3 ADDITIONAL ISSUES

3.1 Screen shots of crew availability

Issue

Cheshire FRS operate a system called Gartan that displays in real time the availability of on call appliances. The displayed availability of on call crews changes in real time and any one screen shot will not represent average availability across a 24-hour period or across a seven day week.

The colours mean:

- Appliances coloured Red as not available;
- Pairs of appliances coloured Yellow mean that a single crew can operate one or other of a pair of appliances;
- White means the appliance is available;
- Grey means the appliance does not normally operate at that time, such as the night time on call crew for a nucleus crewed station;
- Blue and Green refer to small incident units.

A question was posed whether example screen shots from the Gartan system provide a reliable picture of on call crew availability.

Assessment

Two examples of these screens (see Figure 3 and Figure 4) were requested along with information of the content of the displays. It was noted that:

- The availability of on call crews is variable with:
 - Far more availability in evening and night (19:00 to 07:00), and at weekends;
 - Lower availability during daytime working hours (07:00 to 19:00).
- The displays include some spurious and potentially misleading information including (of the 32 vehicles shown):
 - Two on call crews that are not yet operational (Crewe and Ellesmere Port), i.e. they do not exist at this time;
 - Three stations are nucleus crewed (Wilmslow, Macclesfield and Birchwood) and hence:
 - The on call crew are only operational in the evenings but are shown in the day time screen shot;
 - The daytime nucleus crew is not shown on the screen;
 - The (night time) on call appliances are shown for day time and night time examples.
 - Two available units comprise a Red Cross welfare unit and a post fire support unit (which are not firefighting and rescue vehicles);
 - The aerial appliance at Macclesfield is shown as available. This is crewed by the on call crew;

- An alternatively crewed fire appliance, co responder unit and midi appliance (with the midi appliance and co-responder shown as unavailable) at one station. Only one of the three would be shown as available at any one time, whilst if the fire appliance is available so is the mini appliance. The co-responder unit may not be available due to lack of a specific competence, whilst the fire and rescue appliance could still be available.

Thus, 10 of the 32 vehicles shown do not represent the availability of on call fire and rescue appliances. The yellow colour at two stations means one crew is available to operate one or other of the alternately crewed appliances.

In addition:

- The Congleton on call crew is shown. This crew is being maintained for a period of 'natural wastage'. This is a day crewed station where the day crew live at the station and are available 24/7.
- There are two on call crews at stations with whole-time crews (Penketh and Runcorn). The available whole time crew are not shown.

Thus, there are three stations with on call crew where whole-time crew would be available (but which are not shown on this system).

There are 13 stations that are primary 'on call'. Of these 13 primary on call stations:

- Eight are available in the day time example, and;
- All 13 primary on call are available in the night time example, plus five secondary on call appliances.

It is concluded that the Gartan system does not clearly represent the availability of on call crews due to the inclusion of crews that do not exist, alternately crewed vehicles, night time (nucleus on call) crews shown for day time and non-fire and rescue units being shown.

Figure 3: On call crew availability - day time

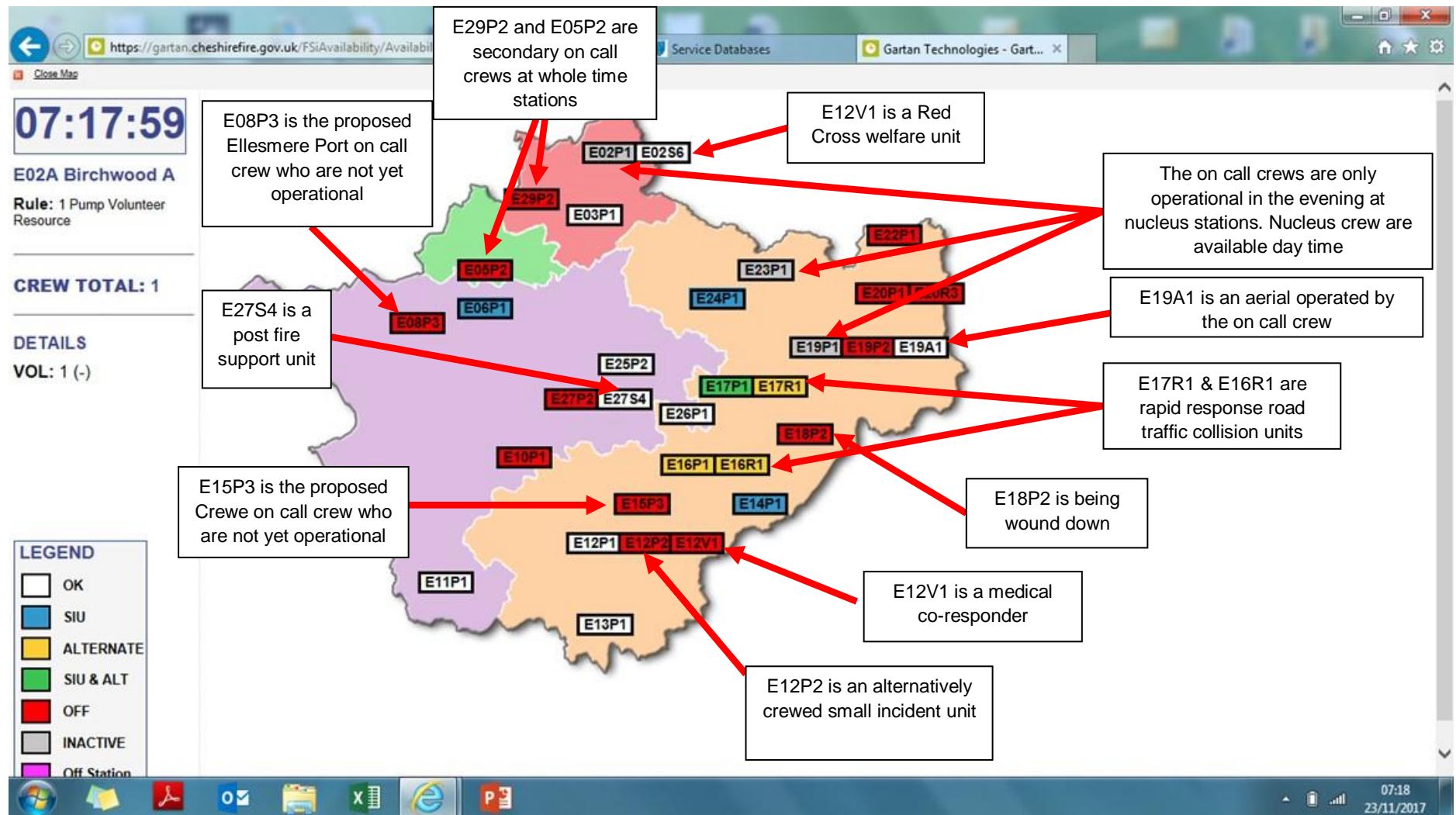
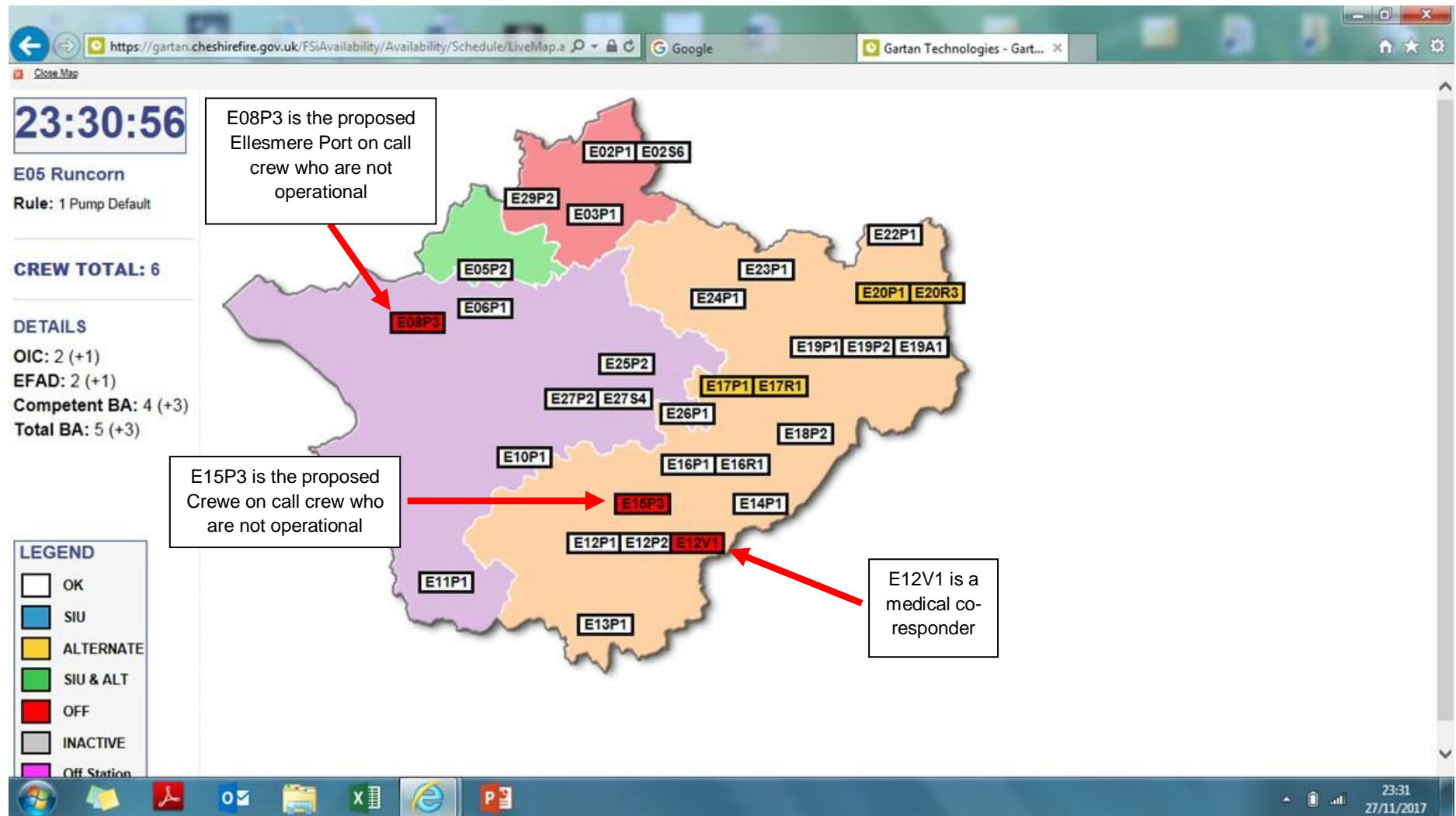


Figure 4: On call crew availability – night time



3.2 Crew mobilisation times data

Issues

Two issues were cited.

Firstly, a question was posed regarding what are the mobilisation times of on call crews and whether the data for this is valid.

A second question was posed regarding whether the mobilisation times used by North West Fire Control were correct, in particular, whether a time of 3.5 minutes was used instead of five minutes. This question was posed in the context of whether this would cause more incidents to be allocated to on call crews and fewer to whole time crews, thereby reducing the apparent workload and requirement for Crewe and Ellesmere Port whole time appliances.

North West Fire Control mobilise the nearest/fastest appliance to incidents, after checking it has required capability for the incident.

Assessment

Data for on call crew mobilisation times and assumed mobilisation times used by North West Fire Control was requested.

The data indicated an average mobilisation time of four minutes 53 seconds for on call crews. This data comes directly from mobilisation and Incident Recording System records. The data excluded day time nucleus crews.

It was confirmed that North West Fire Control use a 3.5 minute mobilisation time for on call crews. This would not affect the recorded mobilisation time for on call crews.

It was noted that the travel time from Sandbach to Crewe and from Nantwich to Crewe is over five minutes, and over 10 minutes for Sandbach. Most Crewe incidents are within Crewe town and within five minutes travel of the Crewe fire station. Thus, with Crewe whole-time crews assigned a one minute mobilisation time, the adoption of a 3.5 minute mobilisation time by North West Fire Control for neighbouring on call crews would have a minimal impact on the number of incidents assigned to Crewe's whole time crews.

Ellesmere Port's nearest neighbouring station is Powey Lane. This is a whole time appliance. Hence the mobilisation time used by North West Fire Control for on call crews would not significantly impact the current workload of Ellesmere Port's whole time appliances.

3.3 Crew safety:

3.3.1 Policy of four riders

Issue 1: Risk assessment

A question was posed whether a suitable and sufficient assessment had been completed of the four ridership policy. This question was posed in the context of whether the combination of a four ridership policy and a switch to on call crews with the introduction of a time lag between the first and second appliance, creates an undue risk to crews. It was also noted that research completed by the Home Office (2000) had used a detailed task and time line analysis to determine a minimum safe crew, based on a selection of

representative serious fire and rescue scenarios.

The four ridership policy is to have a minimum crew of four (with specified competence) operate fire and rescue appliances, with PDAs requiring second and (depending on the incident) third appliances also attending.

Assessment

The close out report for the four ridership policy was reviewed in addition to consultation with Cheshire FRS officers. It was noted that:

- It assessed the sequence of tasks and the crew risks, with a five minute lag to the next appliance;
- Physical trials had been conducted to assess operational procedures, identify improvements and to test the safety of a four person crew;
- The physical trials assumed a five minute lag between the first and second appliance;
- The trials included house fires with person reported, RTC, basement fire, water rescue and high rise fire (no persons reported);
- The trials entailed use of CABA;
- The adequacy of Pre-Determined Attendances (PDAs) had been benchmarked to other FRSs, with some changes in PDAs made.

The PDA for property fires with person reported is three appliances, for example. The PDA of three appliances for life risk fires was retained (giving a crew of 12), and two for life risk Road Traffic Collisions (RTCs), giving a crew of eight for RTCs (12 for Motorways).

The four ridership policy took account of:

- New technology reducing the workload, especially flow meters on pumps reducing pump operation workload and use of “hand held” radios (instead of in cab radio) by the OIC reducing communication workload;
- A new pre-planned operating procedure:
 - The ‘team approach’ where the officer in charge (OIC) assists with initial tasks;
 - New (faster) ways of deploying equipment and crews;
 - Crew worked in parallel;
 - Crew carry out pre-planned tasks without awaiting a briefing.
- A pre-defined set of drilled tasks that enable rapid initial tasking for common scenarios;
- Laying out of a jet as a safeguard for any BA entry;
- Revised PDAs.

The assessment report did not:

- State whether the four ridership policy *required* an average lag of no more than 5 minutes for the second appliance or state whether a greater time lag was or was not a safety concern;

- Specify the rationale for PDAs greater than one other than a brief reference to being able to conduct additional tasks.

The report did note that:

- “..on almost 80% of occasions the second appliance arrived within four minutes of the first appliance. This provides reassurance that further pumps support the initial crews swiftly”. (para 63).

Verbal feedback from Cheshire FRS indicated that:

- The trials assumed a five minute time lag to the second appliance, as a test of the feasibility of the procedure, rather than as a pre-requisite for a safe system of work;
- Dynamic Risk Assessment (DRA) completed by the first crew would indicate what tasks they can safely conduct prior to arrival of following appliances and which require additional crew. For example, the first crew of four may deploy a ladder for a rescue from a first floor window (especially if a fire is in another room), but may await a second appliance for other tasks;
- The policy and practice of the first crew assessing the risk and devising initial actions matches national command policy and procedure and is established practice in the UK fire and rescue service;
- The requirement for a DRA which might indicate that some tasks can be conducted immediately and some should await additional appliances, applies equally to a crew of three, four, five or more.

Therefore, the four ridership policy was not considered by Cheshire FRS to be dependent on second and third appliances arriving within a particular time period.

It was concluded that:

- A risk assessment had been completed of the four ridership policy and that the policy reflected assessed developments in technology and standard operating procedures;
- The four ridership policy had been tested against tasks completed by the first crew;
- Changes were made in Cheshire FRS’s PDAs;
- The implications of a shorter or longer time lag between the first and subsequent appliances was not elaborated in the four ridership report but has been fully addressed in DRA policy, practice and training.

Issue 2: Frequency of rapid BA deployment

A query was also posed regarding the frequency with which crews adopt the rapid BA deployment procedure. This was cited in the context of whether crews of four were finding it necessary to use a rapid deployment procedure frequently (too frequently) due to the four ridership policy.

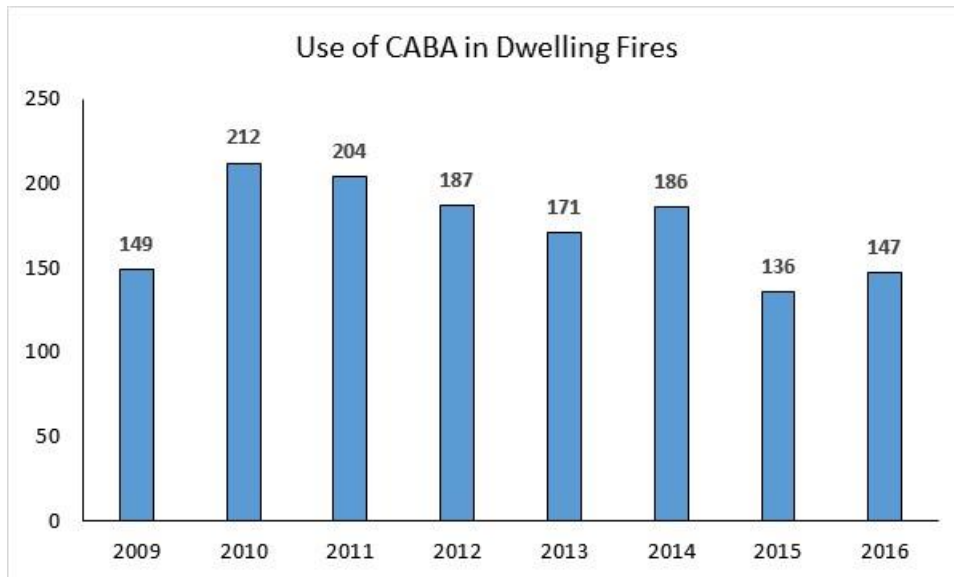
Assessment

The Cheshire FRS close out report found records of five rapid deployments in a two year period. However, it was uncertain whether rapid deployment was consistently recorded by Cheshire FRS and whether there is a clear process for extracting rapid BA deployment data from records. A process for more consistently recording and reporting rapid BA deployment is now being developed.

Data was provided on the use of CABA in dwelling fires, as per Figure 5. CABA is used in about one in three dwelling fires in Cheshire. With 35 appliances in Cheshire FRS this is about four uses of CABA per year per crew, although whole time, day crewed and nucleus would obviously have a higher average per year.

This does indicate that crews will be deployed using CABA multiple times each year and that a safe system of work is a requirement for operations using CABA.

Figure 5: Frequency of use of CABA in Cheshire FRS dwelling fires



3.3.2 Time lag first to second appliance

Issue

A switch of the second appliance from whole time to on call introduces a time lag to the second appliance. A question was posed on whether the risk to crews of this time lag had been assessed.

Assessment

Information from Cheshire FRS indicated that:

- The four ridership policy, which applies across Cheshire, indicates a safe system of work based on a five minute time lag between the first and second appliance;
- Cheshire FRS assessment indicates that:
 - The neighbouring (Powey Lane whole time appliance) would reach incidents within Ellesmere Port on average within two minutes and 57 seconds after the Ellesmere Port whole time appliance. The exact arrival time would depend where the incident is within Ellesmere Port, obviously with faster times to the south of Ellesmere Port and longer times to the north of Ellesmere Port;
 - An on call appliance in Ellesmere Port is predicted to reach incidents, on average, two minutes and 50 seconds after the Ellesmere Port whole time appliance;
 - An on call appliance in Crewe would reach incidents, on average, four minutes and 27 seconds after the Crewe whole time appliance. This would be three

minutes longer than the current second whole time appliance. The 2nd whole time appliance at Crewe is currently deployed on Cover Area Moves about 95 time per year and has an average lag of one minute 34 seconds behind the 1st whole time appliance at Crewe.

- The PDA for life risk fires is for three appliances, hence there is no change in PDAs. The existing PDAs assume a time lag between appliances.

Thus, Cheshire FRS analysis indicates that, switching to a whole-time plus on call crew at Crewe and Ellesmere Port, and having a whole time appliance come from a Powey Lane to Ellesmere Port, does not affect crew safety policy or practice in Cheshire.

It should be noted that the second appliance at Crewe would no longer be part of the Strategic Reserve for Cover Area Moves. Therefore, it would be positioned at Crewe fire station more often than the current whole time appliance. As the current whole time appliance performs CAMs, the current time lag between the first and second appliance at Crewe is recorded at 2.5 minutes.

3.3.3 Reliance on ‘on call crews’ in Cheshire East

Issue

A concern was expressed that with the switch to a secondary on call crew at Crewe there would place too much reliance on ‘on call crews’ to provide resilience and support to other crews.

Assessment

The availability of on call crews in stations adjacent to Crewe has been plotted on a map along with the area (predicted by Phoenix) that they can reach within 10 minutes of alert (i.e. call handling times need to be added). The maps show that:

- Nantwich’s 10 minute radius covers about two thirds of Crewe;
- Sandbach’s 10 minute radius covers a small part of north east Crewe.

Mobilisation times of five minutes were used in assessing the times for neighbouring on call appliances to reach Crewe.

Operational data was sourced showing average combined mobilisation and travel time to incidents in Crewe by neighbouring appliances for 2012 to 2017.

Table 6: Average actual combined mobilisation and travel time to Crewe

	Average combined mobilisation and travel time to Crewe (minutes and seconds)
Nantwich	12:17
Sandbach	14:38
Middlewich	14:28
Winsford	12:25
Holmes Chapel	15:18

Thus, the neighbouring on call crews would take over 10 minutes from alert of the appliance to reach incidents in Crewe.

Information has also been provided on the existence of day crewed and nucleus crew stations in Cheshire East, namely:

- Congleton (day crewed²);
- Macclesfield (nucleus); and
- Wilmslow (nucleus).

Thus, it has been indicated that there are four 'staffed' stations operating in the daytime in Cheshire East and two 'staffed' stations at night-time (Congleton and Crewe).

In addition;

- Lymm station is on the border of Cheshire East;
- Middlewich's neighbouring stations include a day crew at Winsford.

3.4 Major incident capability

Issue

A question was posed regarding how the switch to on call crews at Crewe and Ellesmere Port would impact the ability of Cheshire FRS to handle major incidents and prolonged incidents.

Assessment

It was noted that:

- The existence of COMAH sites has been noted by Cheshire FRS, including seven at Ellesmere Port and one at Crewe, as well as the existence of Sites of Special Scientific Interest.
- The expected development of HS2 has been noted.
- Cheshire FRS has provided maps showing which fire and rescue appliances would attend a major incident before and after ERP1.
- Major incidents would be attended by more than 10 appliances from across Cheshire (before and after ERP1).
- There is no proposed change in the number of fire and rescue appliances.
- ERP1 included basing specialist units (environmental protection, high volume pump) at the new Powey Lane station. This station is located on the M56 with the intent of enabling rapid deployment via M56 to the location of any major incident that does occur in Cheshire. This was intended as an improvement in major incident capability.

It was concluded that the potential impact of ERP1 on major incident capability had been assessed.

² The crew are in the station during the day and sleep in accommodation at the station at night. This is stated to be equivalent to a whole time crew in respect of mobilisation time and availability.

3.5 Providing cover area moves (CAMs)

Issue

A query was posed with regard to the impact of changing two whole-time appliances to on call crewing, on the ability to provide cover for crew training and appliance maintenance. It was noted that the Crewe second whole-time appliance is deployed elsewhere to cover for other crews whilst they are trained about 100 times per year, as per Table 7. Whilst the duration per cover move is not recorded, Cheshire FRS judge each cover move to last for the majority of a 12 hour day shift. Thus, the second appliance at Crewe is deployed elsewhere for about 13% of the time.

Table 7: Occasions per year Crewe second whole time appliance deployed elsewhere*

Year	Days
2015 Total	95
2016 Total	87
2017 Total	102
3 Yearly Totals	284
Yearly Average	95

*Data in Table 7 does not include occasions when the CFRS degradation plan was implemented or the loss of the pump due to crewing deficiencies. Nor does it include incidents related movements and pump defects/maintenance. The degradation plan is implemented when the Service has insufficient staff to crew all pumps and special appliances. This includes loss of resources due to periods of industrial action.

Assessment

Cheshire FRS noted that this issue had been identified and acknowledged. It was stated that:

- Cheshire FRS would change the number of appliances designated as Strategic Reserve for CAMs from four to three, providing a capacity for 1095 CAMs;
- During 2017 there were 221 CAMs;
- The proposed reserve would be five times greater than the number of required CAMs.

In addition, there are plans to reduce the demand for cover by rationalising training delivery, with more training in evenings and weekends, thereby spreading CAMs across more shifts.

3.6 Home Fire Safety Assessments

Issue

A query was posed whether the change to on call crews would reduce the volume of home safety assessments (HSAs) completed by Cheshire GFRS.

Assessment

Cheshire FRS adopted a more targeted approach to HSAs in 2011 since when the number of HSAs has increased. HSAs are categorised as Platinum/Gold (high risk households) and others. Cheshire FRS state a commitment to maintain the level of Platinum/Gold HSAs after changing to on call crews. These would be delivered by the remaining whole time crew.

3.7 North West Fire Control call handling times

Issue

A question was posed regarding what is the 'true' call handling time for Cheshire FRS incidents. A Freedom of Information (FOI) request had reported three minutes and 36 seconds (from time of call to fire control to time first appliance alerted) between 2016-2017 compared to under two minutes reported by Cheshire FRS.

This question was cited with the concern that a prolonged call handling time, combined with longer mobilisation and travel times cause extended times to reach casualties.

Assessment

Call handling data for NWFC was acquired and assessed. The calculation used for the FO response was replicated.

It was found that:

- Some of the NWFC recorded times between receipt of call and Alert are spurious.
- The FOI response included the latter spurious data.

The spurious data includes:

- If an incident involves a relief crew being deployed (for example) eight hours after the start of the incident, the time of alert for the relief crew overwrites the time of alert for the original deployment. This means (for example) a one minute call handling time might be overwritten by an eight hour call handling time.
- In the case of humanitarian incidents, an officer may first be deployed to the scene before alerting an appliance. The call handling time is recorded as the time from receipt of call to alert of the appliance, ignoring the intervening deployment of an investigating officer.

Assessment found that including a very small number of spurious records gave a call handling time of over three minutes.

The exclusion of spurious records gave a call handling time of under two minutes, as per Cheshire FRS calculations.

It was noted that Cheshire FRS use a 'mode' (most common call handling time) rather than a 'mean' call handling time after excluding spurious data. It was suggested that an option is to report the 'mean' call handling time after excluding spurious data although a 'mode' is a reasonable option.

3.8 Cheshire FRS response time standard

Issue

A question was posed regarding the definition of Cheshire FRS response times, particularly whether it covered call handling and attendance time, and how it compares to other FRSs.

Assessment

It was clarified that:

- The Cheshire FRS response time target of 10 minutes for life risk incidents is from alert to arrival, i.e. a travel (or attendance) time.
- A call handling time (from receipt to alert) target of 90 seconds is used by North West Fire Control.

Thus, the target for attending life risk incidents is 11.5 minutes from receipt of call, by North West Fire Control, to arrival at the incident location.

There is a wide range of response time and travel time performance standards in the UK. In some cases, these differ between urban and rural areas, and between areas assessed as lower and higher risk. Cheshire FRS response time standard is similar to some other standards, faster than some and slower than others.

It may be noted that Cheshire FRS previously used a risk based approach to response time standards. As 97% of Cheshire was assessed as medium or low risk, a response time of over 10 minutes was indicated by this previous risk based set of response time standards. Thus, the current 10 minute response time standard is consistent with previous risk based standards.

3.9 Over the border services

Issue

A question was posed regarding how many occasions fire and rescue appliances are called into Cheshire East from neighbouring FRSs. This was posed in the context of what if these neighbouring whole-time stations changed crewing systems and whether the frequency of over the border deployments into Cheshire East indicated inadequate level of fire and rescue resources in Cheshire East.

Assessment

The number of over the border deployments was checked (as per Table 8).

Table 8: Incidents where either a GMC, Staffordshire or Shropshire appliance has attended an incident in Cheshire

	2015	2016
Shropshire		
Day	5	11
Night	3	4
Staffordshire		
Day	8	5
Night	1	4
Greater Manchester		
Day	110	117
Night	68	79
All		
Day	123	133
Night	72	87
Total	195	220

Day was 07:00 – 19:00 with Night being 19:00 – 07:00.

The total incidents attended by Cheshire FRS is shown in Table 9 for Cheshire as a whole and for Cheshire East. Most over the border incidents involving Greater Manchester, Staffordshire or Shropshire would be in Cheshire East.

The over the border deployments is:

- 2.5% of all Cheshire FRS incidents between 2015 and 2017.
- 8% of Cheshire East incidents between 2015 and 2017.

Table 9: Total incidents attended by Cheshire FRS

	2015-16	2016-17
Incidents attended by Cheshire FRS (Home Office data)	7,727	8,555
Cheshire East (Cheshire FRS data)	2,485	2,932

3.10 Validation of the Phoenix model

3.10.1 Issue 1: Validation

Cheshire FRS use a computer programme called Phoenix to simulate the time taken from alert of an appliance to arrival at an incident. The programme uses five years of recorded life risk incidents and plots them in the simulator. It then simulates the fastest appliance (assumed to be starting from its fire station) to reach the incident.

The simulator is used to assess how changes in stations and appliances might impact achievement of the Cheshire FRS 10 minute (for 80% of life risk incidents) response time standard for the first appliance to life risk incidents.

The Phoenix model had been used to test the impact of ERP1 on achievement of the first appliance meeting the 10 minute response time standard. As there are not response time standards for the second or third appliance, the predicted second and third appliance response times had not been used or scrutinised.

A question was posed regarding whether the FRS travel times predicted by the Cheshire FRS computer model (Phoenix) had been validated. These times have been used to consider the impact of ERP1 on achievement of the life risk response time standard and impact of ERP1 on public safety. The prediction of the proportion of life risk incidents reached within 10 minutes had been validated.

It should be noted that the model was developed and used to simulate first response times. It was not developed or previously used to model second or third response times. Therefore, its ability to predict second or third response times had not been considered before. Given that changing second appliances to on call will affect second response times, the accuracy of these predictions was considered of importance in this review.

A question was also posed regarding what are the trends in Cheshire FRS response time post ERP1.

Assessment

It was noted that the initial runs of the model had a) not included the availability of crews, b) had applied the original ERP1 plans rather than the adjusted plans, c) used default rather than calculated mobilisation times.

A rerun of the model was requested comparing before the current ERP1 and after the complete ERP1 with:

- ERP1 as currently implemented:
 - Lymm and Powey Lane opened as whole time;
 - Stockton Heath and Knutsford on call not day crewed.
- 2011 to 2016 dataset;
- Crew availability data.

It should be noted that:

- Phoenix assumes that all appliances are at their home stations upon alert when in fact they may be away from the station, such as for Cover Area Moves, being on standby elsewhere, performing HSAs or other activities. Thus, the predicted response time might be faster than recorded, as the appliances may be away from

the station.

- Phoenix models response times to incidents and their locations within the chosen five years, 2011/12 to 2015/16 in this case. The actual response times for a period after this dataset (2017) may differ from the model due to them occurring in other locations;
- The 2017 data is a relatively short time period (relative to the five years used in the model) from which to collate recorded response times;
- The latest ERP1 stations (Lymm, Penketh, Alsager and Powey Lane) have not been in operation long enough for a valid set of recorded response times to be developed. This prohibits strictly validating the model against their actual performance at this time;
- The road network in the model may not be completely up to date, such as if a new 'no right turn' has been introduced to a junction.

The first, second, and third predicted and actual travel times (from alert to arrival) were requested and are shown below in Table 10 (minutes and seconds) for Cheshire as a whole. These exclude call handling time of about 1.75 minutes.

The predictions were only examined for Cheshire as a whole rather than specific stations. It is unlikely that there would be sufficient life risk incident data for any one station to support a validation assessment.

It can be noted that:

Dwellings

- The predicted first response times for dwelling fires are **very accurate**, within 18 seconds of recorded times pre ERP1 and within three seconds of the recorded 2017 times;
- The second and third response time for pre-ERP1 dwelling fires is also very accurate, whilst the current ERP1 predictions for dwelling fires are 14% and 11% faster than recorded in 2017. Phoenix predicted an increase in second and third response times to dwelling fires;

RTCs

- The model provides a **very accurate** estimate of first appliance response to RTCs for pre-ERP1 RTCs, but is 12% **faster** for the 2017 current ERP1 recorded times;
- The model:
 - Did predict faster first appliance times to RTCs for current ERP1, whilst the recorded first response to RTCs is slower in 2017 than pre-ERP1;
 - Predicted the second appliance to RTCs would take longer, which makes the 2017 recorded times;
 - Predicted the third appliance would be faster, which matches the 2017 recorded times.
- The second response predicted time for RTCs is **faster** by 12% and 11% for pre ERP1 and current ERP1;
- The third RTC response time is **faster** by 25% and 20% for pre-ERP1 and current ERP1. The difference is significant.

Consultation with Cheshire FRS noted that the model takes the fastest route to RTCs for all three appliances. In practice, for motorway RTCs, the third appliance is deployed to the opposite carriageway which will take longer to reach the incident. Thus, the predicted third response time to RTCs will always be faster than the recorded time. This may mean that the model is more accurate for towns and stations that are not part of the CAM strategic reserve, as the absence of motorways and CAMs would remove two complicating factors.

It was concluded that:

- The model provides a reasonable estimate of 1st response times;
- The predicted 2nd and 3rd response times would require a “correction factor” to match recorded response times when modelling Cheshire as a whole;
- The predicted reduction in first response times to RTCs for 2017 (current ERP1) is not validated by 2017 incident data. As the 2017 dataset is small, this is not a definitive finding;
- The Phoenix model predicts for post Crewe and Ellesmere Port changes, relative to pre ERP1 predicted times;
 - For RTCs:
 - No change in third appliance response time;
 - A 46 second longer second appliance time;
 - An 11 second faster first appliance time.
 - For dwelling fires:
 - Two second longer first appliance time;
 - one minute three seconds longer second appliance time;
 - 43 seconds longer third appliance time.

The trend in actual second and third response times could usefully be monitored henceforth to check the effect of ERP1 once a longer time period has passed.

Table 10: Predicted and recorded travel times to life risk incidents (all Cheshire)

		Predicted or recorded	1 st appliance response time	2 nd appliance response time	3 rd appliance response time
Pre ERP1	Dwelling fires	Predicted by Phoenix	7:05	8:47	12:09
		Recorded 2013/14	6:47	9:06	12:51
		Difference	4.4%	3%	5%
	RTCs	Predicted by Phoenix	8:02	9:43	11:25
		Recorded	8:03	11:04	15:17

		Predicted or recorded	1 st appliance response time	2 nd appliance response time	3 rd appliance response time
		2013/14			
		Difference	0%	12%	25%
Current ERP1 (2017)	Dwelling fires	Predicted by Phoenix	7:06	9:10	11:29
		Recorded 2017	7:09	10:38	12:55
		Difference	0.7%	14%	11%
	RTCs	Predicted by Phoenix	7:47	10:27	11:10
		Recorded 2017	8:49	11:42	14:00
		Difference	12%	11%	20%
Post Crewe and Ellesmere Port changes*	Predicted by Phoenix	Dwelling fire	7:07	9:50	11:51
		RTC	7:52	10:29	11:26

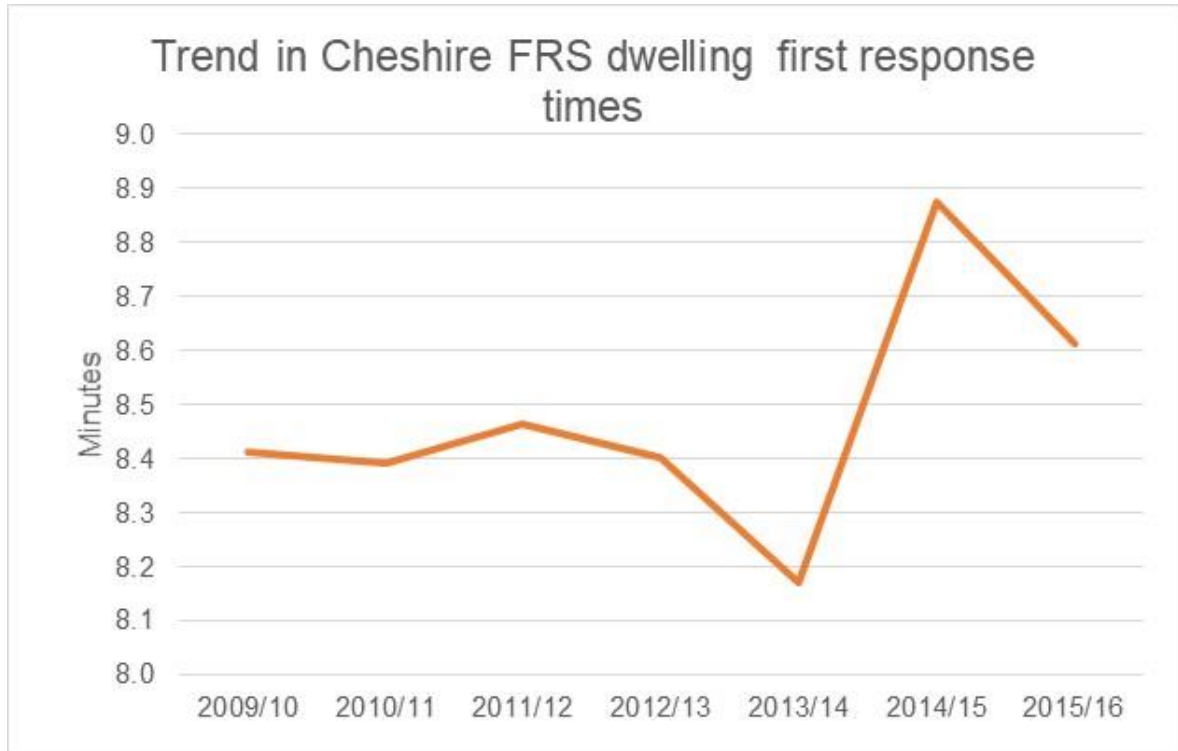
*Second appliances on call

3.10.2 Issue 2: Recorded response times

The average first appliance response time (**including** call-handling time) are reported by the Home Office for dwelling fires. It was 8.4 minutes in 2009 and 8.6 minutes for Cheshire in 2016 (the most recent year of Home Office reporting), as per Figure 6.

The industrial action between 2014 and 2015 renders the recorded response times for 2014/15 incomparable with other years.

Figure 6: Home Office recorded dwelling fire response times (call handling and travel time - minutes)



3.10.3 Issue 3: Impact on predicted response times and loss of life

Research for the Department for Communities and Local Government developed formula for predicting how changes in responses times impacts the risk of death in dwelling fires and RTCs. These can be applied to the actual and predicted changes in responses times for pre-ERP1 and current ERP1.

The application of these formula is made uncertain by the difficulty in validating the predicted changes in responses times. Nonetheless, the application of these formula would suggest:

- The change in predicted responses times between pre-ERP1 and 2017 arrangements would have no significant impact on loss of life in dwelling fires or RTCS in Cheshire FRS, reducing deaths by 0.6%.
- The change in recorded response times between pre-ERP1 and 2017 is estimated to increase deaths by 3.3%, from 22 per year to 22.7 per year.

The result is very sensitive to the first response time to RTCs. This is predicted to improve by the Phoenix model but slower times were recorded in 2017 than between 2013 and 2014.

The two estimates both indicate a small impact on public safety. Given the uncertainty concerning the time estimates, it is difficult to provide a single estimate of the potential impact of changed response times.

3.10.4 Recommendation

It is recommended that:

- The recorded response times are reviewed in 2017 onwards to help verify them and to provide an updated assessment of response times and their outcomes.
- The Phoenix model is further developed with respect to the accuracy of simulating second and third appliance response times, especially for RTCs.



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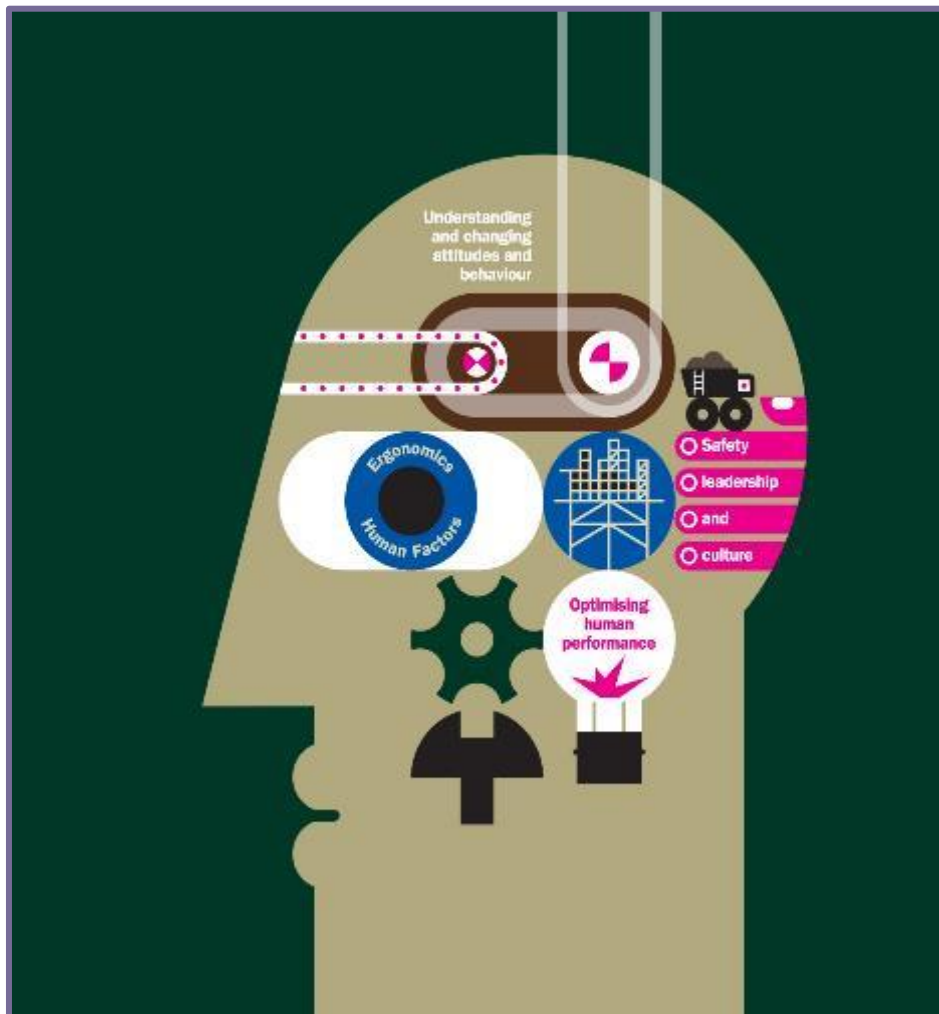
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