

*Lancashire  
Fire and  
Rescue Service*

# *Strategic Aerial Provision Review*

---

*November 2020*

## Table of Contents

Table of Figures.....	3
Introduction .....	4
History of Aerial Provision in Lancashire .....	4
National/Regional Direction of Travel .....	5
Current Provision .....	5
Drivers for Change .....	6
Grenfell .....	6
Hackitt Review .....	7
Building Risk Review .....	7
Built Environment Assessment Team (BEAT).....	8
Building Regulations.....	8
Buildings with Protection deficiencies and amendments to the Fire Safety Order (FSO) .....	9
Risk Profile in Lancashire .....	10
Key Risk and Location.....	11
Aerial Appliances.....	11
Aerial Ladder Platform (ALP).....	11
Water Tower (WT) (AT Stinger) .....	15
Utilisation of a WT as a Higher Volume Pump .....	15
Turntable Ladder (TTL).....	17
Case Studies .....	18
The Cube – Bolton.....	18
V10 Polymers - Blackburn .....	20
Analysis .....	21
Degradation Model .....	23
Finance.....	24
Fleet Asset Management Plan .....	24
Strategic Provision of Aerial Function.....	25
Primary Crewing.....	27
Conclusion.....	27
Relationship with other work areas in Service .....	28
Major Rescue Unit (MRU) .....	28

Bronto Replacement Working Group .....	28
Options.....	28
Papers .....	30
Reports.....	30

## Table of Figures

Figure 1 - Surrey Fire and Rescue Rosenbaur 43m ALP pitched on grass at Grenfell.....	9
Figure 2 - Mobilisation of ALP as a Water Tower 1st April 2017 - 31st March 2020.....	13
Figure 3 - Mobilisation of ALP as a high access asset 1st April 2017 - 31st March 2020.....	14
Figure 4 - Mobilisations of the AT Stinger 1st April 2017 - 31st March 2020.....	16
Figure 5 - The Magirus M42L-AS Turntable Ladder. ....	18
Figure 6 - The Cube, Bolton, 15th November 2019 .....	18
Figure 7 - TTL at The Cube, Bolton, 15th November 2019.....	19
Figure 8 - Stinger and ALP at V10 Polymers.....	20
Figure 9 - Photos showing ALP and TTL reach over an apex roof .....	22
Figure 10 - Pie Chart showing ALP use between 2017 and 2020.....	23

## Introduction

### History of Aerial Provision in Lancashire

The current LFRS provision of four specialist aerial appliances i.e. dedicated vehicles which are provided specifically for their high-rise capability, is based on a review conducted by LFRS in 2003/04, and which is still considered to be valid. The provision and maintenance of aerial appliances represents a major ongoing financial investment in the LFRS emergency response strategy, due to high capital and revenue costs; in particular, the recurring revenue costs of staffing the vehicles.

The outcome of the 2003/04 review resulted in specialist Aerial Ladder Platforms (ALP) being sited at:

- N12 Morecambe
- W30 Blackpool
- E70 Hyndburn
- C50 Preston

As part of this process, consideration was given to the introduction of Aerial Rescue Pumps (ARP) i.e. a combined vehicle offering both the functionality of a pumping appliance with that of an aerial ladder platform. The technology at the time did not provide sufficient capability or reassurance and therefore it was not taken forward. It was later revisited in a review in 2008.

This review acknowledged that ARP's were now a proven concept and highlighted how they might be introduced into Service. A further review of the ALP replacement strategy in 2015/16 again highlighted the potential benefit of Combined Aerial Rescue Pumps (CARP). The result of this report was the renewal of 3 out of 4 ALP's and the extension of the 4<sup>th</sup> whilst further review work was undertaken. Lancashire Fire and Rescue Service alongside Greater Manchester Fire and Rescue Service (GMFRS) completed a tender process to establish a framework which the region could use to procure aerial appliances; LFRS established the most suitable as being the ALP and GMFRS the TTL. This framework recently expired but the research work completed provides a detailed evaluation of the vehicles reviewed and will inform future decisions in both Services.

The Executive Board approved a report in March 2016 to hire a Rosenbauer Water Tower Fire Appliance (WT) (aka 'Stinger' due to its ability to penetrate compartments) for 12-months to evaluate the new concept vehicle. The appliance was commissioned into Service at Blackburn fire station in February 2017. The Head of Fleet and Engineering Services produced a briefing report in August 2017 which details incidents that evidences the benefits and successes of the concept vehicle.

The WT successfully operated as a B-type fire appliance and achieved acceptable response times. Having water tower capability on first arrival at the incident proved to be very beneficial, particularly when fed from open water. The WT remote control function enables firefighters to work away from the fire front, enhancing their safety. The speed of fire knock down and higher pump capability has reduced the need for additional support, which achieves efficiency savings from resources employed

and maintains emergency cover elsewhere. As a result of this, a second WT vehicle was approved and is now positioned at S56 Skelmersdale.

A mid-term evaluation of the Stingers was written and shared with Executive Board in 2019 detailing a case for a further number of combined vehicles but any decision delayed pending a Strategic Aerial Review across the various appliance types. As such this review considers some of the elements of that earlier report.

### **National/Regional Direction of Travel**

In 2016/17, GMFRS completed a tender process that created a framework for the procurement of Turntable Ladders (TTL). At that point GMFRS had 6 Hydraulic Platform Vehicles (HPV) that were all getting close to end of life and due replacement. Through that framework GMFRS procured 2 TTL's (1 x 32m and 1 x 42m). After these vehicles had been in service for just over 12 months, an evaluation was conducted on both, which has led to an order for a further 1 x 32m and 1 x 42m TTL.

During the evaluation, despite the 10m height advantage that the 42m gives, the 32m was found to be a more versatile vehicle. It is more manoeuvrable, only having one rear axle, as opposed to the 42m which has two rear axles. Also, due to the weight of the additional ladder extension on the 42m, the 32m actually has a better horizontal reach. The other clear performance advantage that we have seen with the TTL's, over the HPVs, is the time it takes to get to work. This was especially important at the Cube incident in Bolton, during which an individual was rescued from a balcony. The rescue was captured on CCTV, showing that in less than 2 minutes after the rescue, the room adjacent to the balcony became fully involved in fire. Although anecdotal, the crew who performed the rescue stated that the HPV would probably not have reached the balcony and the speed of the TTL was vital to effecting a swift rescue from height.

GMFRS have taken some learning from the initial two vehicles procured and made some small design changes with Emergency One (E1) for the two they currently have on order.

London Fire Brigade has recently purchased 3 x 64m TTL and 15 x 32m TTL's in response to criticism after the Grenfell Tower incident.

### **Current Provision**

The Service replaced an ALP in 2019/2020 and has another due for replacement in 2020/2021. Two ALP's are due for replacement in 2031/32.

ALP's are presently sited at N12 Morecambe, W30 Blackpool, E70 Hyndburn and C50 Preston. Water Towers (WT) are at E71 Blackburn (due for replacement in 2029/30) and S56 Skelmersdale (due for replacement in 2031/32).

Following several evaluations on WT usage since initial purchase in 2017, a mid-term report has been produced which highlights the benefits of increasing the uplift of WT provision. In doing so it briefly acknowledges the benefits of WT's in terms of their ability to supply large volumes of water to appliances such as ALP's.

*“Several tests have been carried out which show ALP's that are provided water from the Stinger can deliver much higher quantities of water allowing*

*for further throw, optimising the benefits of a base pump and fireground aerial appliance where a suitable water supply can be found”*

---

## Drivers for Change

### Grenfell

The Grenfell Tower fire occurred on 14 June 2017 claiming the lives of 72 people at the North Kensington tower block. Over 70 others were injured and 223 people escaped. It is the deadliest structural fire in the U.K. since the 1988 Piper Alpha disaster and the worst U.K. residential fire since the Second World War. The fire is currently subject to a Public Inquiry, police investigation and Coroner’s inquests.

Building regulations are currently under review in the light of the fire due to concerns with the rules and their enforcement, and concern has spread to fire safety issues with many other buildings.

The Grenfell Tower Inquiry: Phase 1 discusses the relevance of high reach aerials. At the time of the Grenfell incident, London Fire Brigade (LFB) only had 32m ALPs. The Inquiry made comment that it was wholly unacceptable that LFB did not have access to 42m ladders and poses the open question as to if LFB had deployed a 42m ladder earlier into the incident, whether it could have contained the earlier spread of the fire on the exterior of the building (Grenfell Inquiry: Phase 1, p.632).

Subsequently LFB have purchased equipment that can reach up to 23 floors.<sup>1</sup> A spokesperson for LFB regards the procurement noted that:

*“Exactly which aerial appliance the brigade would benefit from is still being reviewed. The final decision will take into account the range of crucial tasks aerial ladders perform at incidents which include providing high level lighting, for use as observation platforms and as a way of delivering water from height onto a fire. It should be noted that fires in high rise buildings are usually fought internally which is why the building’s fire safety measures are so crucial and why the longest ladders available are rarely the most effective way of responding. Rescues from fires in high rise premises are almost always undertaken by firefighters working within the building”*

---

A key factor in ‘firefighting at height’ is delivery of water pressure at the height required. ALP’s, TTL’s and WT’s are all key components in this evaluation but it is worth noting that the delivery of ‘litres per minute’ (lpm) at the branch is dependent on the supply. In LFRS, the standard firefighting pumps deliver 2000 lpm at 10 bars of pressure. Unless an aerial appliance has an independent pump it can only deliver the amount that is supplied, less the friction loss applied by the hose and elevation. Therefore in Lancashire, the ALP’s can only supply a theoretical maximum of 2000 lpm unless they are supplied by a WT appliance, which can deliver far greater volumes. There is ongoing

---

<sup>1</sup> <https://www.independent.co.uk/news/uk/home-news/grenfell-tower-london-fire-brigade-aerial-ladders-block-flats-upper-floors-reach-a8142431.html>

work within Fleet and Engineering Services to gauge the achievements that can be made by supplying the ALP via the WT appliance.

## **Hackitt Review**

On 30 August 2017, the Department for Communities and Local Government published the terms of reference for the Independent Review of Building Regulations and Fire Safety. This independent review was led by Dame Judith Hackitt, who is a senior engineer and civil servant with experience as the Chair of the Health and Safety Executive. The two main aims of the review were firstly to develop improved building regulations for the future, with a focus on residential high-rise blocks, and secondly to provide reassurance to residents that their homes are safe.

On 18 December 2017, Dame Hackitt published her initial report. She described the entire building regulatory system as "not fit for purpose" and made interim recommendations for significant change. The final report was published on 17 May 2018, outlining a number of key failings and recommendations. Those recommendations will be reconsidered at the conclusion of the public inquiry.

Currently running parallel to the Hackitt review is the Industry Response Group (IRG) that is tasked with assuring competence across the sector of those involved with high rise buildings. This ranges from product procurement (cladding, building materials etc.) to architects and designers to fire safety officers. There is a wide range of working groups established to analyse the competencies required within each area.

## **Building Risk Review**

Lancashire Fire and Rescue Service (LFRS) Protection department is currently undertaking a review of all high-rise premises of 18m or above within the county as part of the second Building Risk Review requested by central government. The first review took place in 2017 and focused upon investigating the extent of Aluminium Composite Material (ACM) cladding (as identified at Grenfell Tower), on high rise buildings 18m and above in the UK. All residential buildings six storeys and above were inspected in Lancashire as part of this first review and fire safety advice was given where required. At the time of the initial review, no buildings 18m or above were identified as having ACM within Lancashire. There were however two buildings that were identified as having areas of ACM cladding, but both are under 18m and therefore were not in scope for the returns to central government (as part of the initial review).

The second part of the Building Risk Review is focused upon identifying which other external wall systems are present upon all residential buildings 18m and above within the UK, and what the scope and extent is of any remedial works required to remediate external wall systems that are combustible. This review is not focused upon one cladding type (such as ACM) but whether the whole of the external wall system from the outer wall or rain skin, to the inner wall, contains combustible elements within it which will promote fire spread. This review therefore covers all cladding types e.g. High-Pressure Laminate (HPL), brick slip, render etc.



The information obtained will not only be utilised to report back to central government, but will be utilised in Site Specific Risk Information plans (SSRI's)<sup>2</sup> where appropriate to assist in service delivery preparedness activities.

To date, six premises 18m and above in Lancashire have been identified as having unsafe external wall systems (none of which are ACM) requiring interim measures, which include a wakeful watch and a move to simultaneous evacuation. In addition, in the last two months, three timber framed blocks of flats in the western area of the county, have had the same interim measures introduced due to their poor construction (choice of materials including the cladding system fitted to them).

It should be noted that the current focus on combustible cladding or external wall systems is focused solely upon residential type buildings of 18m or above. There are therefore significant numbers of lower rise residential buildings and low and high-rise non-residential buildings in Lancashire that may be fitted with combustible cladding or external wall systems.

### **Built Environment Assessment Team (BEAT)**

There have been several subsequent incidents where buildings have not performed as expected when a fire occurred. Therefore, LFRS established a team that would look holistically at the built environment from protection, operational and training perspectives. This team is known as the Built Environment Assessment Team.

The team has been tasked with looking at the risk profile from the built environment in Lancashire, both at present and in the future, and to make recommendations that encompass the three thematic areas of operational response and preparedness, training of personnel and the provision of prevention and protection functions. The initial report has been submitted for consideration of the Executive Board and highlights a number of areas that are essential considerations for the strategic future-proofing of aerial response resourcing in Lancashire.

### **Building Regulations**

It is the responsibility of those carrying out building works to meet the requirements of the Building Regulations. The first building regulations were introduced in 1966 and they have been updated regularly since. The current building regulations for fire focus upon the need to meet the functional requirements in Schedule 1, B1 to B5 of the Building Regulations 2010<sup>3</sup>, which cover all aspects of the 'building fire safety' provisions required.

B5 of these functional requirements covers access and facilities for firefighters and requires that fire appliances can get to the building and that firefighters have facilities such as dry risers, protected staircases and lifts where necessary, in order to fight fires and undertake rescues.

In order to comply with these functional requirements, guidance documents have been produced over the years which provided solutions to meeting the Building Regulations requirements. The most recognisable of these is Approved Document B, produced by HM Government.<sup>4</sup>

---

<sup>2</sup> SSRIs are a type of response plan for buildings with a more complex firefighting response. They typically identify isolation points for electricity and gas and water provision for firefighting purposes.

<sup>3</sup> <https://www.legislation.gov.uk/uksi/2010/2214/contents/made>

<sup>4</sup> <https://www.gov.uk/government/publications/fire-safety-approved-document-b>

Approved Document B guidance on access and facilities for firefighters, is in its simplest form, either to provide access to a certain percentage of the external envelope of the building for fire appliances and aerial appliances, or failing this, due to height or use of the building, provide internal firefighting facilities. Where internal firefighting facilities are provided e.g. dry risers, protected staircases, firefighting lifts etc., the only access required to the external part of the building for pumping appliances is to within 18m of the dry riser inlet. This standard has been consistent since the early 1960's when building regulations were first introduced.

The result of this is that most of the buildings over 18m have limited or no access for fire appliances next to the building on most sides, due to there being no requirement for it. There are also numerous other sleeping accommodation buildings from hotels to low rise flats that have internal firefighting facilities and therefore may have limited vehicular access next to the building.

There may however be roads, hard standing or open green field areas near to the building that would enable the pitching of an aerial appliance, but may require consideration of features such as off-road capability, greater outreach and greater height than is currently available in LFRS.



Figure 1 - Surrey Fire and Rescue Rosenbaur 43m ALP pitched on grass at Grenfell<sup>5</sup>

### **Buildings with Protection deficiencies and amendments to the Fire Safety Order (FSO)**

The Fire Safety Order will be amended early in 2021 to give FRS' the legal power to require building owners, leaseholders and management entities to remediate unsatisfactory external cladding systems. Enforcement in this area is complex and time-consuming as the costs are often significant and not fully covered by Government remediation schemes. In addition, the non-compliance being

<sup>5</sup> <https://www.dailystar.co.uk/news/latest-news/grenfell-tower-fire-death-toll-16960095>

found in high rise buildings is not limited to combustible cladding. Other non-compliance is continually being found in terms of the [absence of] fire resisting cavity barriers, combustible balconies or in-filling of balconies (the practice of fitting windows to enclose a balcony but leaving in place the original flooring material which may not be designed to prevent the spread of fire between floors). The relevance of these issues to the aerial appliance review is that there may be an assumption that, given enough time and enforcement action, the external fire spread risk in the high-rise built environment could be eradicated by Protection methods alone. History tells us that new flaws in building construction will continue to be identified and existing buildings [despite the new Building Safety Bill in 2022] may still be illegally modified, and consequently it is recommended that this review does not consider Protection legislation alone as the sole control measure to mitigate high rise fire risk in Lancashire. Having the capability to firefight externally at high levels remains a capability LFRS should have at its disposal.

## Risk Profile in Lancashire

The history of Lancashire is steeped in a varied assortment of industries; from the boom of the textile industry and cotton manufacturing which saw the birthplace of the industrial revolution, to coal mining and fishing; the county's industrial heritage is rich.

Whilst much has changed with many of the traditional cotton mills and coal mines no longer operating, the county is still home to a vast variety of industries including manufacturing, aerospace, agriculture and a thriving tourism industry.

As the county is home to such diversity, the risk for LFRS is varied, meaning that the Service has to have in place a multitude of resources to enable our crews to respond to any eventuality. The county has many older buildings that were historically used as mills or for manufacturing purposes and whilst some have been converted and will have had fire safety measures incorporated, others have sadly fallen into disrepair. Older buildings were not subject to the stringent fire safety regulations that apply today, meaning that fire separation and other safety measures are not necessarily in place. This may not pose so much of a risk to those who use the building on a day to day basis but should a fire occur, an older building may present a greater fire risk due to the way the building was constructed.

In 2016, there were over 2.8 million active VAT and/or PAYE registered enterprises in the U.K., of which 276,520 (9.8%) were in the North West. The Lancashire-14 area accounted for 19.5% of the regional total with 54,045 active enterprises. The Lancashire-12 area had 44,775 active VAT and/or PAYE registered enterprises.

Preston had the largest number of active VAT/PAYE registered enterprises (5,565) in the Lancashire-14 area in 2016; Hyndburn (2,455) had the lowest.

Statistics show that over the period of the last 10 years, LFRS has responded to twice as many accidental dwelling fires (ADF'S) than commercial building fires. However, commercial buildings still pose a significant risk as they have the potential to be larger than domestic fires, requiring significantly more resources, and with the possibility of inflicting a massive impact on the communities to which they belong.

The 2016 Joint Lancashire Structure plan supports the re-use of existing buildings and areas of concentrated development investment in Fleetwood, and areas around Preston.

In response to this, LFRS identifies these risks and undertakes SSRI's in addition to work undertaken by Protection teams. Where previously LFRS may have responded to typical mill fires or conventional commercial fires, the growing risk from change of use of buildings and/or buildings no longer performing as expected, requires LFRS to be resourced effectively in order to plan and respond to more complex and demanding situations.

## Key Risk and Location

Currently, Lancashire has 72 high-rise residential blocks that are 6 floors or above. Within our information system (CFRMIS) however, there are 150 further building types (hotels, offices, university teaching blocks etc.) that are six floors or above in Lancashire. These further building types may have external wall systems that are combustible but are currently not in scope of the governments Building Risk Review or remediation funds. They typically centre on the urbanised conurbations such as Preston, Blackburn and Lancaster.

According to the Office for National Statistics, between mid-2001 and mid-2017, Preston had an increase in population of 8.4%. This is higher than the region which has a rate of 7.2%. There has been significant investment in the University campuses at UCLAN and Lancaster; UCLAN has a £200m 5-year master plan<sup>6</sup> whilst Lancaster University, having already invested £170m, plans to invest a further £20m in the next 5 years.<sup>7</sup> Many buildings are being erected in these districts to accommodate the increase in student numbers, many falling under high rise building regulations and being under 6 storeys but still posing a significant firefighting risk. The highest residential buildings in the county are currently Avenham 1 & 2 in Preston at 18 floors and 54m. Furthermore, there are plans for a 15-storey high-rise (45m), 20-storey (60m) and 21-storey high-rise (63m) apartment block in Preston<sup>8</sup>.

## Aerial Appliances

### Aerial Ladder Platform (ALP)

An 'Aerials Review' was conducted in 2015 due to the planned replacement of 2 ALP's in 2015/16 and a further two in 2019/20, one of which has been delayed until 2020/2021.

A working group was tasked to research the market to identify suitable aerial appliances to replace the Bronto 32m ALP operated by LFRS at the time. The group considered all aerial products and different permutations of water towers (WT) in the market or in concept design.

---

<sup>6</sup> <http://www.visitpreston.com/invest/key-projects/current-investment-and-projects/uclan-masterplan/>

<sup>7</sup> <https://www.lancaster.ac.uk/facilities/about/masterplan/>

<sup>8</sup> <https://www.lep.co.uk/news/people/designs-ps26m-21-storey-high-rise-apartment-block-lofthaus-would-provide-299-flats-preston-957643> and further developments listed at <https://www.lancs.live/news/lancashire-news/projects-completely-change-preston-next-16866434>

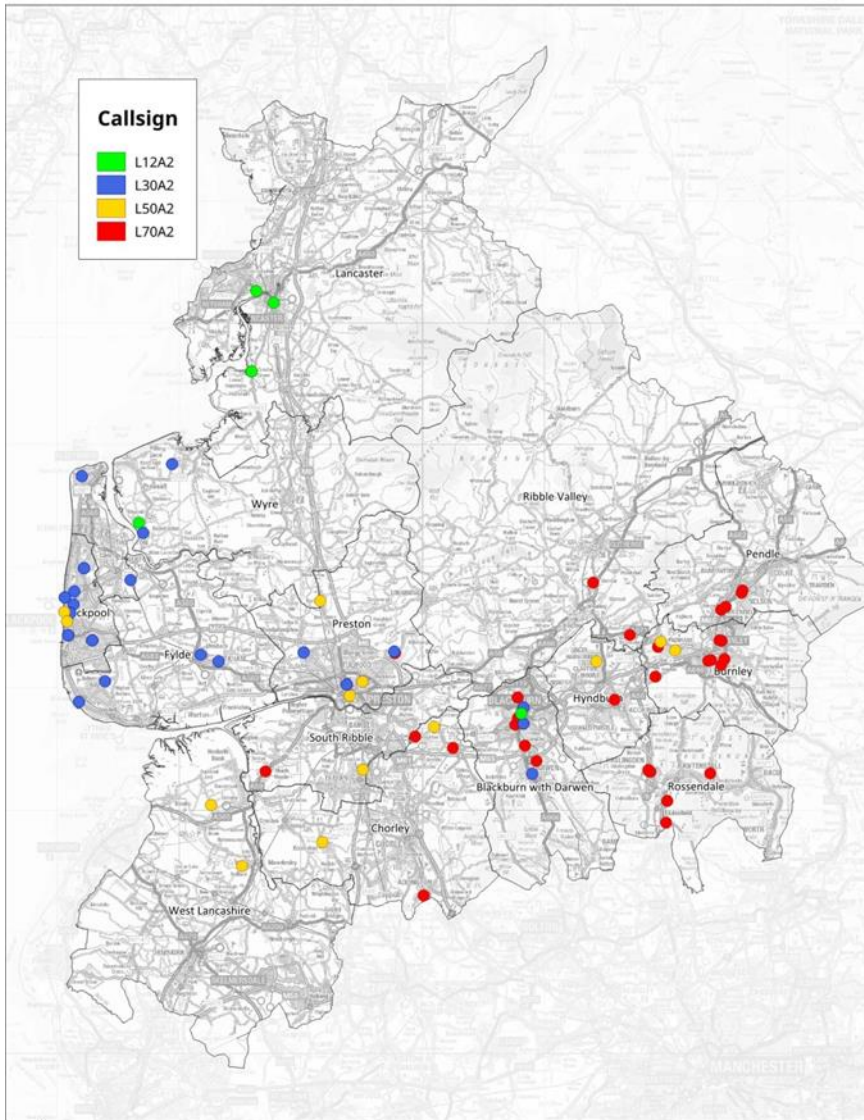
A total of five suppliers received an invitation to tender. Tender bids were received from three suppliers, Rosenbaur UK, WH Bence and Emergency One. No bids were submitted for CARP's or 18 tonne ALP's. It is also important to note that LFRS current ALP provider did not bid.


GMFRS evaluated submissions for lot 1 (WT products) and LFRS evaluated submissions for lot 3 (TTL and ALP products). Selection of the most suitable appliance for each lot and category was a joint decision.

Ultimately, due to functionality, the Metz ALP's won the bid and a total of 3 have subsequently been brought into service in LFRS.

ALP's have been the preferred choice in LFRS for a number of years. An ALP by definition has an aerial ladder, elevating platform, or water tower that is designed and equipped to support firefighting and rescue operations by positioning personnel, handling materials, providing continuous egress, or discharging water at positions elevated from the ground. They are not designed specifically for the FRS sector and therefore have associated set up times.

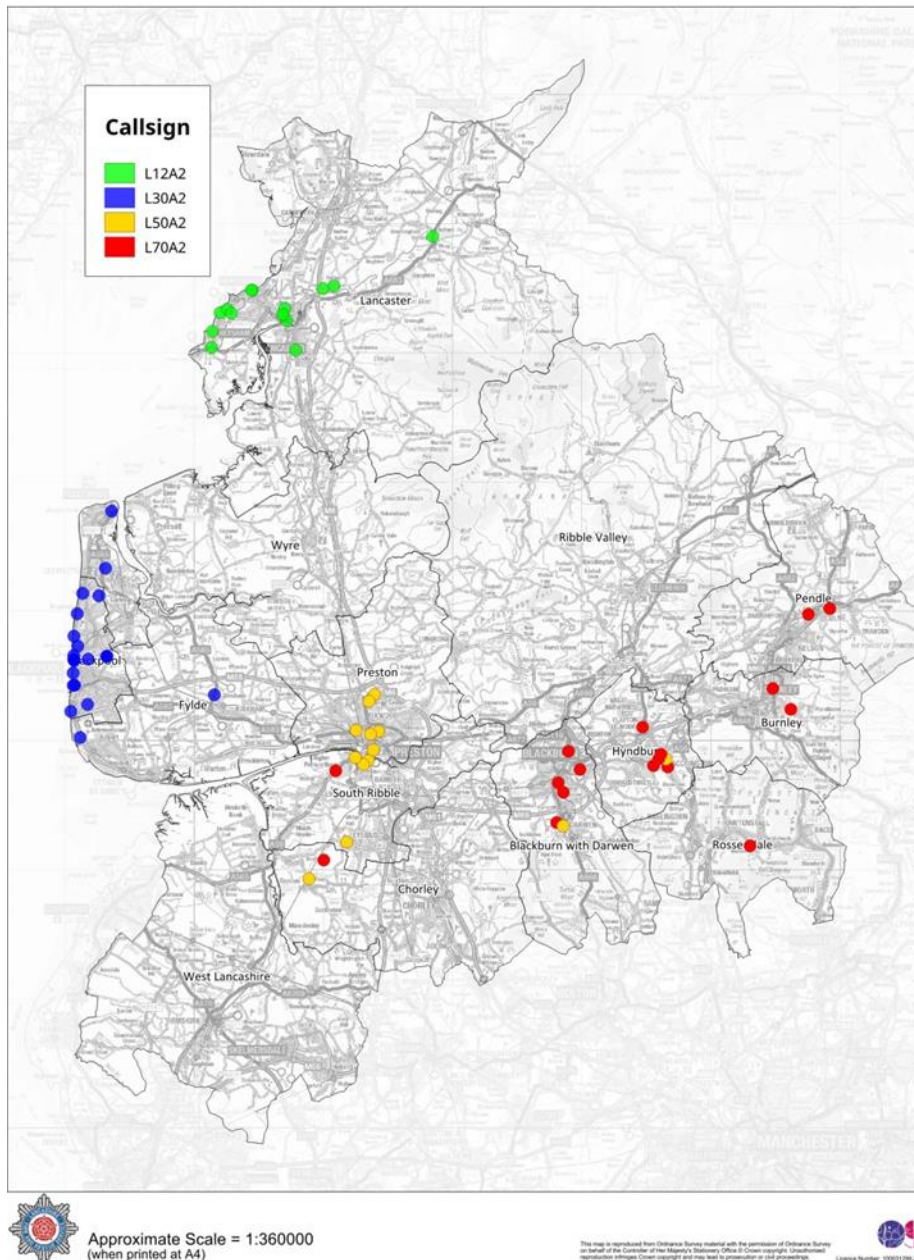
The current fleet of ALP's in Lancashire typically have a reach of 32m, an outreach of 20m, a lower reach of 5m and can deliver a water tower of 3800lpm. They are used for a variety of reasons (see Figure 10) but can be summarily defined into two uses; for use as a water tower and for use as a high access vehicle whether it be for rescue or scene safety.




 Approximate Scale = 1:360000  
 (when printed at A4)

This map is reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of the Map. The Ordnance Survey name is a registered trademark. Reproduction in whole or in part is prohibited without the prior written permission of Ordnance Survey. License Number: 100012306, 2018

Figure 2 - Mobilisation of ALP as a Water Tower 1st April 2017 - 31st March 2020



**Figure 3 - Mobilisation of ALP as a high access asset 1st April 2017 - 31st March 2020**

Currently, the ALP appears on the pre-determined attendance (PDA) for several incident types such as rescues from height, high rise buildings, buildings with a thatched roof, or as a high anchor point for incidents where access is confined or subterranean. Typically, station areas that have an aerial appliance use one more than those that don't. This is commonly attributed to 'convenience' and increased knowledge of the ALP in those stations. This is demonstrated in the data where the use of ALP's as a high access vehicle tends to be in the local station area as opposed to water tower usage where the vehicle is more likely to be requested in addition to appearing on PDA's.

LFRS operates a degradation model for ALP cover around the county. When all 4 ALP's are available, one can usually be in attendance at an incident within 30 minutes. Once at an incident, positioning and establishing the appliance typically takes around 20 minutes.

There are distinct advantages to ALP vehicles. The first being that they provide a stable working platform for above ground operations. This is particularly important for long duration incidents. They also provide transportation and storage area for tools needed to perform above ground operations and can provide a good water tower function of up to 3800lpm, dependent upon water supply.

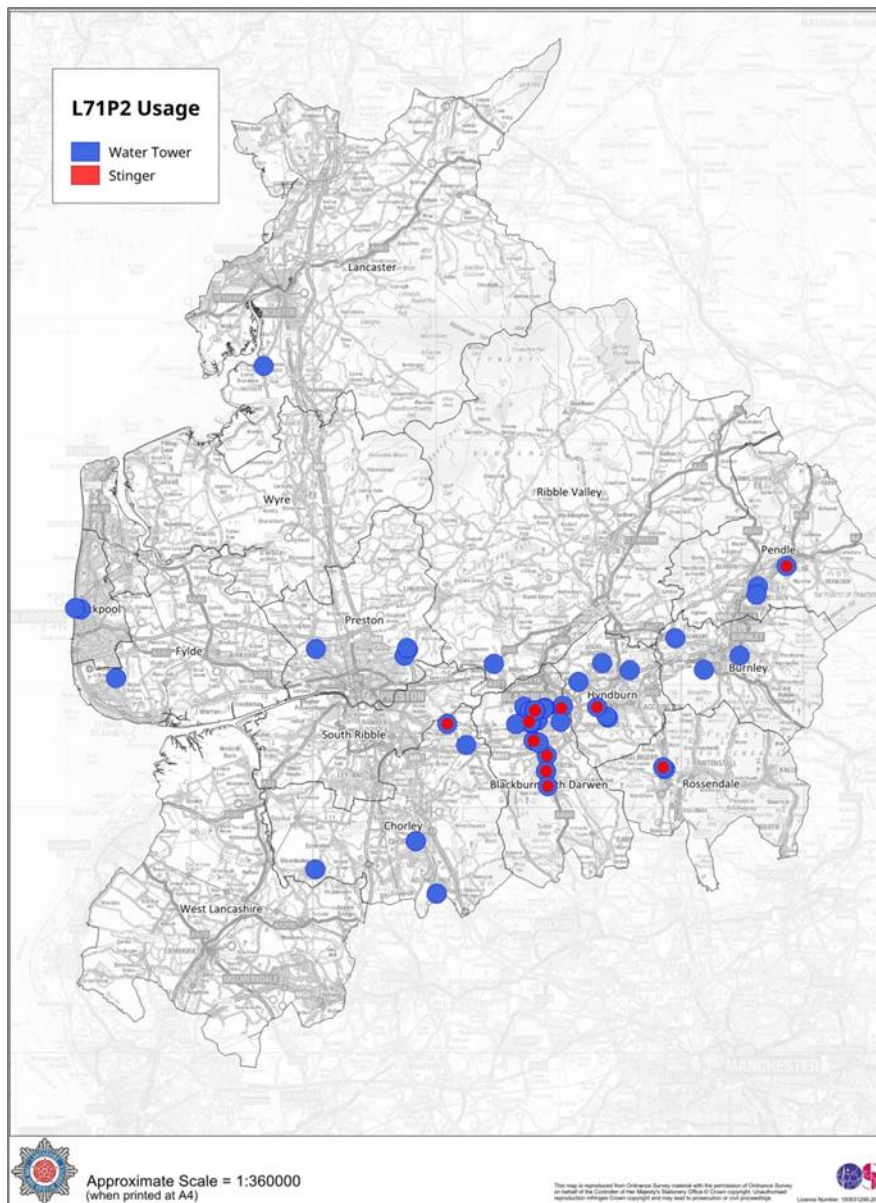
### **Water Tower (WT) (AT Stinger)**

The AT Stinger (WT) was introduced into LFRS in February 2017 and has operated successfully as a standard fire appliance, a higher volume pump and as a water tower. The Head of Fleet & Engineering Services produced a report following 6 months of use which highlighted 11 fire incidents (protracted in nature) during which the appliance had made a positive impact. During the subsequent period, the concept of operations was tested and proven, and the Combined Fire Authority determined that a second AT Stinger appliance should be brought into Service in September 2019, sited at S56 Skelmersdale.

### **Utilisation of a WT as a Higher Volume Pump**

This is evidentially the area least known about by operational crews currently; staff tend to associate the AT Stinger with its water tower capability and not necessarily the 5500 lpm major pump. Yet where the appliance has been used to provide water to firegrounds, or indeed pump water from flooded areas, the value can be quickly seen. This is a key feature which requires promulgation around the county to be considered alongside or instead of the high volume pump (HVP) which can move 7000 lpm.





**Figure 4 - Mobilisations of the AT Stinger 1st April 2017 - 31st March 2020**

As indicated in Figure 4 - Mobilisations of the AT Stinger 1st April 2017 - 31st March 2020, the appliances are more effectively used with the 'Stinger' function in their immediate turn out areas. Between 1<sup>st</sup> April 2017 and 31<sup>st</sup> March 2020, the Stinger function has been used a total of 18 times. Whilst this in part is due to local knowledge of the Stinger by those crews, the speed and weight of attack that it provides is most effective when it is on the initial attendance. When in use as a WT, this is often on incident make-up's and when firefighting is likely to be protracted. In the same time period, the vehicle was used as a WT on 62 occasions.

It has been proven that the AT Stinger is an effective vehicle as a WT in its own right, or as a base pump for the ALP due to its higher pumping capacity. Furthermore, the vehicle was mobilised as a standard appliance a total of 4946 times in the same period, highlighting its practical and effective role within the fleet.

Given the above, an interim report was prepared for Executive Board, and made the case that due to the effectiveness of the AT Stinger appliances, replacement of wholetime type B appliances with WT type vehicles could be made.

Consideration of the paper was delayed pending a more strategic review of LFRS' aerial capability, incorporating both WT and ALP's, in terms of water towers and high access vehicles. As such this paper incorporates the options from that earlier paper which proposed the following:

- 1) Increase the fleet of AT Stingers from 2 to 4. In addition to the 2 already in place, propose one to be based in Western Area and one in Northern Area.
- 2) Increase the fleet of Stingers from 2 to 6, with one located in each service area. In addition to the 2 already in place, propose one in Pennine Area, one in Central Area, one in Western Area and one in Northern Area.

A further Emergency One (E1) WT/Type B vehicle is due to be reviewed by Fleet and Engineering Services Department within the coming months and can further inform any potential uplift of WT's in Lancashire.

### **Turntable Ladder (TTL)**

Since the report concluded in 2016 there have been significant improvements in the sector in terms of technology in addition to the impacts and implications in a post-Grenfell firefighting landscape. Fleet and Engineering Department have been investigating TTL's with a view to adding one to the fleet.

Despite LFRS preference for ALP's, TTL's do have advantages. They can generally be placed in tighter situations because of the narrower width and typically weigh less and cost less. The foot print of the jacking system is typically smaller on a TTL and they are easier to operate and maintain.

The 2015/16 report also discusses the advantages of TTL's over ALP's commenting that they are generally safer for driving performance due to stability and agility. The report concludes that access to incidents is greatly improved as well as the speed of the equipment getting to work making the TTL a better 'rescue' option but less successful as a water tower.

GMFRS Operations Support Manager, also made comments that the TTL was adequate as a WT and that they were looking towards vehicles such as the Scorpion (similar to the AT Stinger) to improve their WT function.

Where TTL's do excel is in their reach; a greater reach is obtainable with some appliances able to access up to 68m. Furthermore, the speed of operation is significantly improved in comparison to ALP's, taking moments to site and deploy.

Figure 5 - The Magirus M42L-AS Turntable Ladder.

This particular model has a ladder of 42m and a water tower capable of delivering 2500 lpm. The jacks are lower than our existing ALP's and allow for set up in tighter spaces.



## Case Studies

### The Cube – Bolton

Figure 6 - The Cube, Bolton, 15th November 2019



On 15 November 2019, a fire occurred at 'The Cube', a multi-occupied residential building in Bolton, Greater Manchester. Rapid and unexpected fire spread was evident from the outset, severely affecting the building which featured a High-Pressure Laminate (HPL) external wall cladding system.

The incident was subsequently declared a Major Incident and at its peak had an attendance of 27 fire engines and special appliances. GMFRS have both a 32m and 42m TTL's in addition to ALP's.

A TTL was working to rescue persons in the evacuation sector of the building. In addition to that a further full PDA was sent to an adjacent building, 'Picture House' which included 5 appliances and a TTL. A person was subsequently rescued from the 6<sup>th</sup> floor via a window using the 42m TTL.

Anecdotally GMFRS have said that the CCTV footage from the incident shows the adjoining balcony becoming fully involved in fire 2-minutes after the rescue, and that had the ALP been used, the set-up time would likely have meant an unsuccessful rescue.



Figure 7 - TTL at The Cube, Bolton, 15th November 2019

## V10 Polymers - Blackburn

The Environment Agency has cited successes in regards to the AT Stinger use at V10 Polymers in Blackburn in November 2017. Following an incident in September 2017, a multi-agency approach was undertaken to respond to the site including making access for the AT Stinger. When a second fire broke out in November, the AT Stinger was on the initial PDA and the fire was confined to one building. Our attendance at the incident lasted for 3 days. At a similar incident elsewhere in the U.K., the local FRS maintained a presence for 30 days, which is not uncommon for waste fires.<sup>9</sup>



Figure 8 - Stinger and ALP at V10 Polymers

The AT Stinger based at E71 Blackburn has been used as a WT/Stinger on 62 occasions up to September 2019, however it has been mobilised to over 4946 incidents in the same period, as a standard fire appliance. Operators at Blackburn cite the increased water tank size and pumping capability, the larger diameter hose reels and the more agile and powerful, battery operated RTC equipment as very useful at incidents they have attended.

<sup>9</sup> Incident was in Staffordshire in the same year <https://www.bbc.co.uk/news/uk-england-stoke-staffordshire-38878262> Both Staffordshire and Lancashire FRS have trained Waste Fire Tactical Advisors. Due to the prevalence of waste fires being notoriously difficult to extinguish, the SM Waste Fire Tac Ad along with EA agreed to implementing several recommendations at V10 to break up stacks of waste, move them away from the building and identify access points for the AT Stinger.

## Analysis

The 2015/16 review took into consideration a range of factors in considering ALP's and TTL's but in terms of functionality concluded that:

*“Throughout the demonstrations and research undertaken by the working group over the twelve months, it has been difficult to underpin the benefits of the TTL against the ALP. The opinion and choice of other FRS varies and many different products have been used in the past, particularly within LFRS. In summary the TTL was designed for FRS and the ALP for the construction industry. The benefits of both aerials are summarised below which reflect the view of the working group;*

### *TTL benefits*

---

- *Driving performance safer due to better stability and agility*
  - *Access to incidents improved due to reduced size and weight*
  - *Speed of equipment is much faster to operate*
  - *Greater ability to work on gradients (up to 14°)*
  - *Lower purchase price*
- 

### *ALP benefits*

---

- *Best water tower performance*
  - *Greater reach over apex roofs (longer boom articulation)*
  - *Cage slewing improves functionality*
  - *Larger cage with drop down platform*
  - *Closer in-reach to place cage at vehicle sides*
-

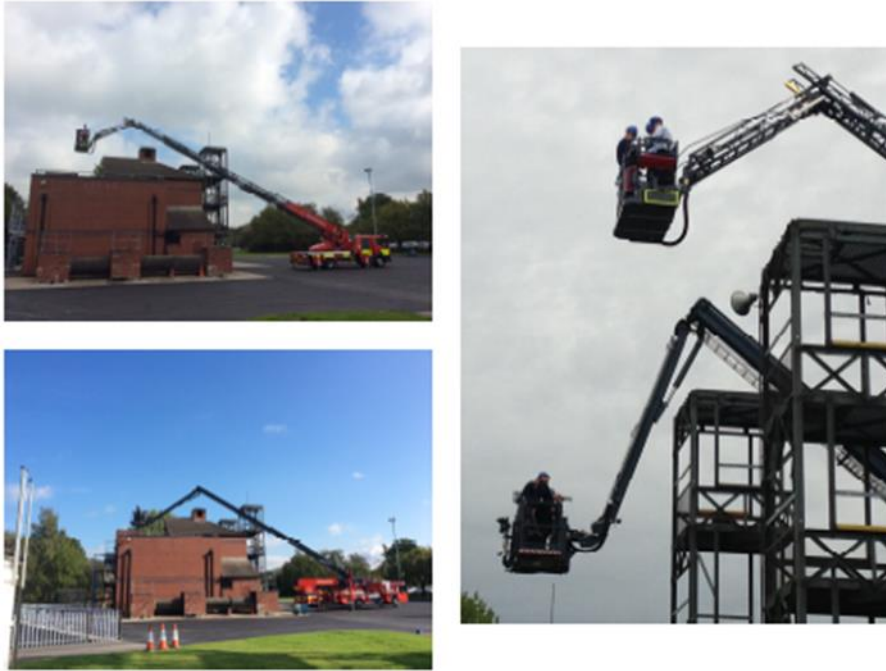


Figure 9 - Photos showing ALP and TTL reach over an apex roof

Whilst the ALP's clearly demonstrate the manoeuvrability and ability to work over an apex roof the direction of the built environment in the next 30 years indicates a greater high rise risk. The studentification of Preston and Lancaster has also seen a rise in buildings that are 6 floors or under, falling just short of high rise building regulations. Whilst some of these buildings have access on multiple sides, many only have access on one side, meaning that an appliance with a greater outreach should be considered to complement the existing fleet.

The capabilities of each model are summarised below.

	WT (AT Stinger)	ALP (Metz)	TTL (eg Magirus)
Water Delivery from boom (lpm)	4500	3800	2500 (on the 42m model but 4500 available)
Reach	16.5	32	42 (63 option from other suppliers)
Typical time to work	Fast	Slow	Moderate
High Access	No	Yes	Yes
Platform	No	Yes	Cage options exist

In short, the addition of a TTL would complement the high access function of the existing ALP's. The following chart considers the uses of ALP's at incidents from 2017/18 - 2019/20; use as a WT accounts for 99 of the total number of incidents (573 that arrived on scene). Rescues from height/below ground account for 81 and other uses such as lighting or making safe 127, meaning that the TTL could be as effective as the ALP in 68% of these incidents.

Data from the period 1<sup>st</sup> April 2017 – 31<sup>st</sup> March 2020 indicate that there has been a total of 16 high rise incidents, 3 of which were 'Persons Reported'. Since the incident at Grenfell, an ALP has been added to the PDA of all high rise incidents as a 'high access' vehicle. LFB has subsequently uplifted their fleet of TTL's to include (3x) 63m ladders. LFRS should not underestimate the requirement of

an aerial appliance to have a significant reach, be it out reach or height, in order to effect a rescue from not only a high rise but from buildings of 6 floors or under that have limited access to the side elevations due to urbanisation.

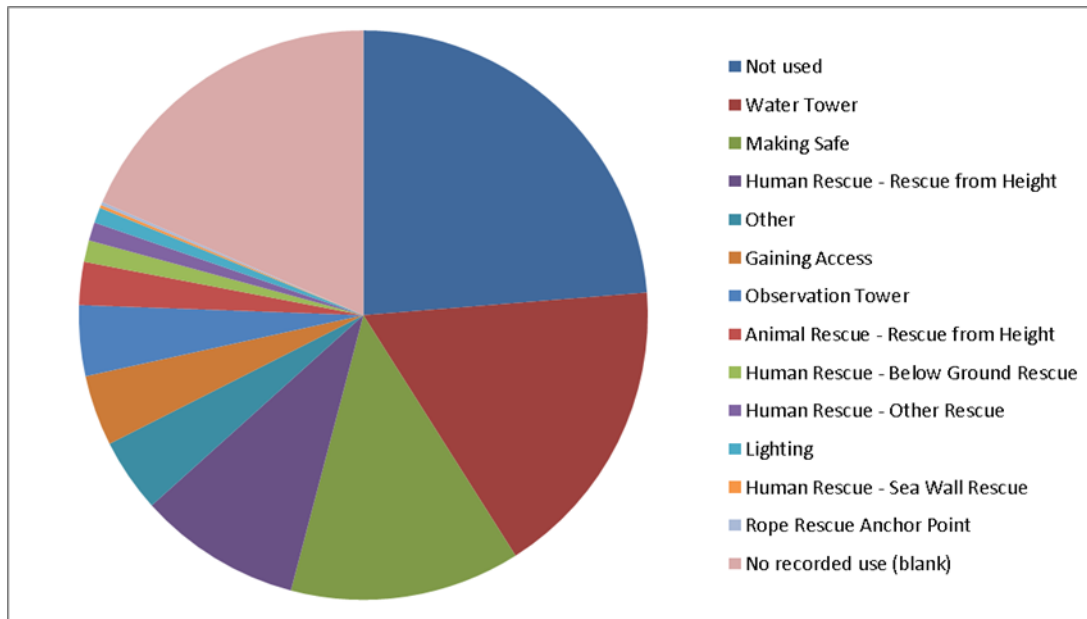


Figure 10 - Pie Chart showing ALP use between 2017 and 2020

### Degradation Model

A degradation model exists for the current ALP distribution in LFRS. At present, there are 3 Metz ALP's in service at W30 Blackpool, N12 Morecambe and E70 Hyndburn. There is one Bronto ALP based at C50 Preston. The crews do not cross train due to complexity in maintaining skills. Should a new ALP be purchased, the training implications should be considered. However, if a TTL is purchased, the degradation model would not be impacted inasmuch as the remaining distribution of the three ALP's would be consistent with the current model.

LFRS ALP Availability - Degradation Planning					
Bronto ALP	Metz (Rosenbauer) ALP	C50 Preston L50A2 (Bronto)	E70 Hyndburn L70A2 (Metz)	N12 Morecambe L12A2 (Metz)	W30 Blackpool L30A2 (Metz)
1 available	3 available	1	1	1	1
4 ALP's available – no requirement for primary crewing but if staffing permits it should be considered					



0 available	3 available	0	1	1	1
1 available	2 available	1	1		1
<i>3 ALP's available – no requirement for primary crewing but if staffing permits it should be considered</i>					
0 available	2 available	0	1	0	1
1 available	1 available	1	0	0	1
<i>Only 2 ALP's available across any of the 4 locations – Primary Crewing required at the above locations</i>					
1 available	0 available	1	0	0	0
0 available	1 available	0	1		
<i>Only 1 ALP available across the service – Primary Crewing required and the available ALP is to be relocated to C52 Fulwood (welfare considerations to be agreed)</i>					

## Finance

### Fleet Asset Management Plan

The Fleet Asset Management Plan projects vehicle and equipment asset replacement over a 20-year period. The plan is reviewed every 3-years to ensure it reflects business needs and that sufficient capital funding is available to continue with replacement as planned. LFRS operate four ALP's, two of which were replaced in the financial years of 2015/16, one was replaced in 2019/20 and the fourth is due for replacement in 2020/21 and has been allocated a budget of £590k.

When the work was completed on the aerial and water tower framework, Rosenbaur was awarded for the ALP and Magirus for the 32m TTL.

Although this framework has recently expired, costs provided by the supplier would be similar to other estimates for comparative vehicles and therefore a 42m TTL would cost in the region of £675k and a 32m articulating TTL around £600k.<sup>10</sup>

There exists a CFOA framework, completed by Devon and Somerset FRS, that can be used. This is the Framework Agreement for U.K. Fire and Rescue Emergency Response Vehicles DS183-15, Lot 6 Aerial Appliances (which includes TTL's).

The suppliers listed on the Framework are:

- Angloco Ltd
- Emergency One (UK) Ltd
- John Dennis Coachbuilders Ltd
- Rosenbauer UK Ltd
- W H Bence Coachbuilders Ltd

This covers the vehicles listed on the expired LFRS / GMFRS framework and could be awarded after a competition for bids.

In summary, the purchase of the 32m TTL would likely require an uplift in capital of £10k. The provision of a 42m TTL would likely require the uplift of approximately £85k.

A WT appliance cost is currently projected at £500k with standard B-type appliances at £212k (an uplift of £288k per standard B-type).

It is worth considering the impact of BREXIT as all suppliers are anticipating an additional increase in cost due to the impact of the U.K. leaving the E.U.

## Strategic Provision of Aerial Function

The value of the Stinger function of a WT is in getting it to work early and offensively in order to increase firefighter safety, minimise loss to commercial business and reduce resource requirements on the incident ground. The current provision of two AT Stingers is yielding an operational benefit to the organisation and whilst practically offering additional capability to Incident Commanders, the provision currently centres operational response in the east and south of the county.

It is also worth considering the value in increased pumping capability. The TTL and ALP having no internal pump are limited by their supply, which currently is provided by the pumps on the B-type appliance whose supply is limited to 2000 lpm at 10 bars if supplied from open water. This means that whilst they are capable of more, they perform at their optimum when there is a sufficient supply.

In order to strengthen operational response capabilities from both an aerial WT perspective and provide additional 'higher volume pump' capability in support of an ALP or a TTL, the Service must

---

<sup>10</sup> These figures are based on estimations requested from the existing suppliers in the recently expired framework and depend on specification

consider the most cost-effective distribution of such assets and how we effectively apply this disposition across Lancashire to provide the best response for our public. Evidentially, it is recognised that WT's support successful firefighting strategies both in their own right, and when used as a support pump for aerial appliances and to be able to site such assets in key risk locations around the county would further enhance the provision and speed and weight of attack to most significant building fires. The favoured solution would therefore be to uplift the number of WT's as part of our fleet strategy and geographically distribute them across the county.

The WT/B type appliances are significantly quicker to set up and alongside the existing ALP will shorten attendance times for a WT function as described above. There are no attendance time requirements for ALP's and as such, the attendance time depends largely on their availability and distribution across the county.

There is no doubt that the recommendations put forward to uplift the WT capability would require significant capital investment. However, considering the benefits realised from the current AT Stinger provision, such operational gains would be replicated across the geographical expanse of Lancashire which do not currently have the speed of response from such an asset (without a specific request for mobilisation onto the incident ground). This paper therefore recommends three options for distribution of aerial assets, including WT's, across Lancashire.

Alongside WT's, the replacement of the 4<sup>th</sup> ALP permits further consideration of the other emergent issues highlighted in this report. Those include the requirement to have an aerial appliance that provides a greater degree of accessibility and outreach, alongside the potential for shorter set up times to facilitate rescues from height in rapidly developing incidents. Given the impact of changes to the built environment and how this affects firefighting and rescue requirements, the replacement of the fourth aerial appliance should take into consideration the following:

1. The requirement for further 'aerial reach' due to restrictions to external firefighting in circumstances where there exists access to only one external side of the building.
2. Faster ability to conduct a rescue at height.
3. The potential for increased off-road capability for pitching, such as where crews may be reliant upon hard standing off-road or a grass covered court yard.
4. A greater reach function than currently provided by the 32m ALP's.
5. The training implications associated with the replacement vehicle.

By replacing the 4<sup>th</sup> ALP with a TTL the considerations above can be met with greater effect. This would be at the potential cost of a decrease in litres per minute (lpm) water delivery, however, the existing proposals to uplift WT provision in the county compensates for this loss and provides a greater provision across the county. The potential of a TTL means that in certain circumstances, as demonstrated at the Cube incident, an aerial that is quicker to set up and provides greater accessibility can be an essential asset. Ideally the Service would procure an appliance which will be able to carry out rescues at all floor levels in a way that the ALP's currently cannot.

It is therefore a recommendation of this paper to re-establish a working group with suitable persons to review provision of the 4<sup>th</sup> aerial appliance formed around the above considerations. The working group would also establish the precise costs of procurement, alongside the training implications and ongoing maintenance costs of the vehicle, presenting the best options.

## Primary Crewing

There is currently a trial in place at C50 Preston, wherein the Bronto ALP is primary crewed. Primary crewing as opposed to switch crewing ensures that provision is always available by moving the minimum ridership on each Watch from 9 to 10. In accordance with the degradation model, a decrease of ALP's available in LFRS means that the most strategic position in the service is in central area, as from here it has direct access to large areas of the county via the M6, M55 and M65.

This paper recommends that should the TTL be purchased, the primary crewing model at C50 Preston be made a permanent arrangement. This would ensure that the availability of the TTL is maximised; this is particularly significant in relation to speed of response to life critical incidents. Should the replacement vehicle be an ALP then the existing degradation model would suffice.

## Conclusion

To date, ALP's have provided a versatile option in regards to aerial provision in Lancashire. They are effective as both a water tower and a platform, however, the time taken to set up is lengthy and requires space. Whilst provision for firefighting within a roof cavity was provided in 2016 by the introduction of Fog Spikes (a manual means of punching through into a loft space) the equipment has low usage being used 3 times in a roof cavity since 1<sup>st</sup> April 2017 and has a significant set up time. The ALP is often used well into the incident after full or partial collapse. Furthermore, LFRS strives to introduce mechanical means to manual jobs, similar in comparing beaters to a branch, a manual fog spike has to be hammered through a wall and therefore has limitations. It is more effectively used against softer surfaces such as thatch, hay bales and waste.

In 2017, the AT Stinger was introduced in to the fleet and used not only as an effective WT but has provided evidence that it has prevented fire spread through speed and weight of the initial firefighting attack. There are examples from both S56 Skelmersdale and E71 Blackburn demonstrating this. A letter from a resident in Skelmersdale details how LFRS saved her property. Conversations with the crew detail how integral the Stinger functionality was in this incident. Further incidents are cited in the mid-term report.

The additional benefit of the increased pumping capability ensures that the aerial provision that we have alongside the WT vehicles is fully realised and optimised.

TTL's were designed for firefighting use and continuously demonstrate their worth in getting to work in challenging and time-constrained environments, something the ALP is not able to do as effectively. The benefits of TTL's have been documented in previous reports and considering recent developments in technology and recommendations and learning from incidents such as Grenfell and the Cube, this paper recommends the further investigation of TTL options to ensure that the Service procures an appliance which will be able to carry out rescues at all floor levels even at a height which currently exceeds the capability of ALP's.

In conclusion, a combination of high access aerial appliances that can be used as either a working platform or rescue function, or as a water tower in conjunction with a water tower type appliance that also functions as a B type appliance, provides the county with versatile assets and fleet options which can be flexibly deployed to achieve the swiftest and safest incident outcomes.

## Relationship with other work areas in Service

### Major Rescue Unit (MRU)

There is a current working group established, looking at the replacement of the Polaris at C50. This review also considers the potential replacement of the vehicle and a full review of its ancillary equipment. The MRU is sited at C50 Preston along with the BA Unit, ALP and boat.

### Bronto Replacement Working Group

A working group was due to be established but due to a number of the previous group retiring and Covid-19 related delays this has yet to be established. This paper recommends that a working group be established with the specifications decided upon from this paper to investigate options for the replacement vehicle.

## Options

This review proposes the uplift of the provision of WT's in the county alongside the provision of a TTL in replacement of the 4<sup>th</sup> ALP, using one of the following options:

### *Option 1 – 3 ALP, 1 TTL, 6 WT*

Maintain 3 ALP's at N12 Morecambe, W30 Blackpool and E70 Hyndburn (based on coverage provided by a 30-minute attendance).

Increase the fleet of WT's from 2 to 6, one located in each service area. The proposed uplift in provision should be for one within each of the following Areas – Pennine, Central, Western and Northern alongside the existing WT's at E71 Blackburn and S56 Skelmersdale.

The procurement of 1 TTL to C50 Preston on a primary crewed basis to ensure optimum availability. It would be on the pre-determined attendances (PDA) for all incidents that the ALP's are presently on and could be added to specific risk sites within the county such as high rise buildings and life risk calls.

This distribution of appliances would mean that the attendance of a WT would have a high likelihood of being on the attendance of the initial make-up request with ALP's or a TTL on request as per the existing degradation model.

There would be an associated approximate maximum uplift in capital spend of £1.237m (total spend £1.827m). This assumes that each Water Tower would cost an additional £288k (4 x £288k = £1.152m) and an additional £85k for a 42m Turntable Ladder.

If an ALP or 32m TTL was selected, then the existing ALP replacement budget of £590k would require an uplift of £10k representing a total uplift of £1.162m (total spend £1.752m).

### *Option 2 – 3 ALP, 1 TTL, 4 WT – Recommended.*

Maintain 3 ALP's at N12 Morecambe, W30 Blackpool and E70 Hyndburn (based on coverage provided by a 30-minute attendance).

Increase the fleet of WT's from 2 to 4, located mainly by paired areas. The proposed uplift in provision should be for one within Western and Northern Areas, in addition to those already placed at E71 Blackburn and S56 Skelmersdale.

The procurement of 1 TTL to C50 Preston, on a primary crewed basis to ensure optimum availability. It would be on the PDA's for all incidents that the ALP's are presently on and could be added to specific risk sites within the county such as high rise buildings and life risk calls.

This distribution of appliances would mean that the attendance of a WT would have a moderate likelihood of being on the attendance of the initial make-up request with ALP's or a TTL on request as per the existing degradation model.

There would be an associated approximate maximum uplift in capital spend of £661k (total spend £1.251m). This assumes that each Water Tower would cost an additional £288k (2 x £288k = £576k) and an additional £85k for a 42m Turntable Ladder.

If an ALP or 32m TTL was selected, then the existing ALP replacement budget of £590k would need uplifting by £10k representing a total uplift of £586k (total spend £1.176m).

### *Option 3 – 4 ALP/TTL and 2 WT*

Maintain existing arrangements, replacing the ALP at C50 Preston with an ALP or TTL deemed suitable by a working group based upon the above considerations. Maintain 2 WT appliances at E71 Blackburn and S56 Skelmersdale. The existing trial of primary crewing the ALP should be taken into consideration on procurement of the replacement vehicle<sup>11</sup>.

There could potentially be an estimated capital uplift of £85k if it was deemed that the 42m TTL vehicle was the most appropriate replacement. If an ALP or the 32m TTL was selected then the existing budget of £590k would be broadly sufficient.

### *Recommendation*

The recommended option from this report is to uplift the WT provision by 2 and investigate the procurement of a TTL. Such a distribution would mean that a WT is likely to be included in the initial resource requirements for an incident, facilitating both exceptional firefighting capabilities, alongside increased water pumping capability for use with other aerial assets. Such a blended approach towards LFRS aerial provision is deemed to provide the most cost effective arrangements in terms of balancing resources to risk and further developing our fleet in terms of versatility in response to the changing risk in our built environment.

## Papers

Lancashire Fire and Rescue Aerial Ladder Platform Replacement 2015-2016	
Lancashire Fire and rescue Service AT Stinger – Mid-term evaluation	
Water Tower Briefing Report 2017	
Lancashire Fire and Rescue Service Risk management Plan 2008/11 “The Deployment of Aerial Rescue Pumps in Lancashire Fire and Rescue Service”	
Executive Board Paper – Aerial and Water Tower Appliance Strategy 2017	
Executive Board Paper – The Deployment of Aerial Rescue Pumps in Lancashire Fire and rescue Service July 2008	
Strategic Assessment of Risk 2019	

## Reports

*The Cube Incident Report and Key observations* accessed at

[https://www.manchesterfire.gov.uk/media/2118/cube\\_report\\_v11\\_tagged.pdf](https://www.manchesterfire.gov.uk/media/2118/cube_report_v11_tagged.pdf) on 25/09/2020

*The Grenfell Tower Inquiry: Phase 1* Oct 2019 accessed at

<https://assets.grenfelltowerinquiry.org.uk/GTI%20-%20Phase%201%20full%20report%20-%20volume%204.pdf> on 25/09/2020