

## Using drones in fire and rescue services in the United Kingdom



The Greater Manchester Fire and Rescue Service (GMFRS) added a drone to its emergency response toolkit in July 2015. The primary objective was to improve the safety of personnel. The GMFRS are one of the world's first Fire and Rescue Services to have adopted an around-the-clock drone capacity to respond to a range of crises, and they appear to be motivating other fire departments across the United Kingdom to do the same.

### Background

The Aerial Imagery Reconnaissance Unit, known as the AIR Unit is the only one of its kind in the United Kingdom and possibly in the world. The AIR Unit responds to incidents on a nearly daily basis, from aerial imaging of incidents to carrying out search and rescue with thermal cameras.

To determine if a drone would add value to the firefighting teams and gauge whether or not it was possible to justify the cost, the GMFRS began by running an initial trial with a drone and a few trained pilots. The GMFRS initially had temporary contracts with drone companies to lease equipment. Firefighters were trained to operate the drone and analyse the data collected.



**Figure 1** A view of the Floods that ravaged England's West Midlands region in June 2016. GMFRS, June 2016

## Implementation

At one point during the trial, a drone accompanied several firefighters inside a building and was able to detect that the firefighters were working on an unsupported wall – which could have had disastrous consequences. The drone operator informed the team, and they took measures to ensure their safety. This instance proved the concept of drone use in firefighting, but the greater challenge lay ahead. It would be critical that the Manchester team was able to roll out the use of drones in a valuable way. According to Station Manager Mark Fairclough, “The challenge after that, was to get the management to agree. They had to come up with a team model of 24/7 human resources. It was never about whether or not we should buy the drone; there was no existing model, so since it was brand new, it is always nerve-wracking to invest money into something that could fail.”

One of the reasons the GMFRS was interested in adopting drones was the Future Firefighters Project, an initiative to continually improve the safety of fire and rescue service personnel. Given the changes in their operating environment and the risks posed, ‘any effort that can improve safety standards should be seriously considered. Accordingly, the GMFRS decided that “investing in research around new technologies and equipment, therefore, and through the potential for amending operational processes and tactics to take advantage of these technologies, it may be possible to provide enhanced levels of service delivery with fewer/different resources.”’<sup>2</sup>

1 <https://www.fbu.org.uk/publication/briefing-firefighter-fatalities-fires-uk-2004-2013-voices-fireground>

2 Future Firefighting Project: [A briefing paper http://authority.manchesterfire.gov.uk/documents/s1602/114.02.02.12.FUTURE%20FIREFIGHTING%20PROJECT%20BRIEFING%20PAPER.pdf](http://authority.manchesterfire.gov.uk/documents/s1602/114.02.02.12.FUTURE%20FIREFIGHTING%20PROJECT%20BRIEFING%20PAPER.pdf)



**Figure 2** The Aeron SkyRanger, made in Canada.

The drone used by the GMFRS is an Aeryon SkyRanger, which can fly up to 50 minutes, at a range of some 122 m (400 feet) above the ground. It has the capacity to fly up to 5 km away from the controller, but GMFRS will fly it a maximum of 500 m (1 640 feet) away from the controller. The UK Civil Aviation Authority has a code of practice that drone pilots must adhere to. Before flying, the GMFRS applied for operating permission and developed terms and conditions on how they would operate the drone. According to Mr Fairclough, “A lot of the current guidance is for hobbyists and not conducting search and rescue like we are.”

The SkyRanger is equipped with a dual-use camera (standard definition and an infrared camera). The imagery can be downloaded to a secure digital card or be streamed to a tablet, if the tablet is within 100 metres of the drone.

The GMFRS chose the SkyRanger because it can fly in up to 35 mph winds, even with 55 mph gusts and it is waterproof. Speaking about this choice, Mr Fairclough highlighted that it was important that the drone would be seen as an asset by his fellow firefighters. “When [the drones] attend an incident, they have to be able to fly. If the weather conditions are poor, and they couldn’t fly just because of that, then the firefighters would lose confidence in the tool.”

The SkyRanger is used to respond to a range of incidents, from fire to flooding to search and rescue. Before each deployment the incident commander makes a decision whether to activate the AIR Unit.

## Evaluation

“There is a fair amount of pre-deployment engagement with interlocutors and partners,” says Mr Fairclough. “You’ve got post-deployment follow-up as well to ensure that all procedures are respected.” Over time, several best practices have been developed – taking five extra batteries in the deployment vehicle, each of which allow for an extra 20 to 30 minutes of flight, for example. There are other rules as well, according to Mr Fairclough. “You only fly around 150 metres within your visual line of sight, 400 feet above the ground. You can only go to extended visual line of sight when you have another observer/pilot there with you, so that’s another consideration.”

One example given was search and rescue for a missing person. Often such a search will require teams to cover a wide area, normally with dozens of volunteers on the ground. “A large grassy area takes 1 – 2 hours to search,” says Fairclough. “A drone [with infrared] can fly over a field 100 times to see if it’s clear. This cuts the time in half.” There are limits however, he adds, notably that thick forests limit visibility on the ground. Nonetheless, he says, “drones, along with the rescue dogs work together in partnership.”



**Figure 3** Two images taken by the GMFRS compare a standard definition camera with a night vision camera. GMFRS, December 2015



**Manchester Fire** @manchesterfire · 11 juin

Here are some photos of the flooding caused by today's storm. For info visit our website: [goo.gl/nQOjtf](http://goo.gl/nQOjtf)



Retweets 12, Likes 4



**Manchester Fire** @manchesterfire · 11 juin

For more information on the floods around Greater Manchester today visit our website: [goo.gl/QDUhv7](http://goo.gl/QDUhv7) Please drive safely!

Retweets 5, Likes 2

**Figure 4** A snapshot of how the GMFRS communicates on social media during the June 2016 floods.



**Figure 5** An aerial view of a damaged building can help fire fighters make decisions before entering. GMFRS, November 2015.



**Figure 6** A fire severely damaged a historic building, the Wythenshawe Hall on 15 March 2016.

### **Community Engagement and Social Acceptance**

Sharing information with the communities remains important as well. The GMFRS actively share information when a drone is deployed to ensure communities are informed and to mitigate any negative sentiment. “There’s been a lots of national coverage of the negative issues pertaining to [drone] hobbyists,” says Mr Fairclough. “The Sussex police did a number of assessments of perceptions of the use of drones and there is a slight negative effect. From the fire service perspective, we activate the fire service communications department and send a tweet out on Twitter when the SkyRanger is deployed.”

The GMFRS has become accustomed to having drones as part of their search and rescue toolkit. The AIR Unit flew 161 missions in the last 12 months (as of May 2016), with up to three flights per day. With the regular flights comes greater concern for issues such as data protection, which the GMFRS holds to high standards. “Within the UK, there are data protection laws that are very stringent,” says Mr Fairclough. “Most of it’s pitched for the hobbyists and not especially for emergency services. However, for us, data is stored in a secure environment, on a secure central database. We are very aware of data protection laws.”

### **Plans for adaptation**

A live-streaming solution has been in a trial phase, and initial results show that a live-streaming service to a remote server may be considered for the AIR Unit’s toolkit.

While the AIR Unit is unique, it appears to be inspiring other fire and rescue teams elsewhere in the UK. The use of drones has been adopted for occasional use in Kent, but as of June 2016, no fire and rescue services have yet adopted a 24/7 unit like the GMFRS. More widespread adoption by other fire and rescue forces is likely. To date some 43 fire and rescue forces have successfully completed trials using SkyRanger drones.

# Resources

Greater Manchester Fire and Rescue Service (GMFRS) AIR Unit:

<https://www.youtube.com/watch?v=Qcifnb9IVCM>

<https://www.aeryon.com/blog/greater-manchester-fire-and-rescue-brings-an-air-unit-perspective-to-fire-response>

Manchester fire service uses drone to fight blazes (with video):

<http://www.bbc.com/news/34637892>

<https://www.aeryon.com/in-the-news/drones-could-soon-be-used-to-patrol-protests-and-catch-criminals-in-uk>

BBC - Counter-terrorism exercise at Trafford Centre:

<http://www.bbc.com/news/uk-england-manchester-36227143>

## Technical Specifications & Credits

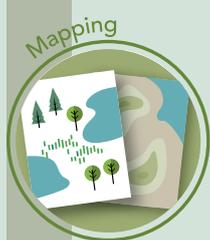
Type of system: Aeryon SkyRanger

Deploying Agency: Greater Manchester Fire and Rescue Service

Piloting Agency: Greater Manchester Fire and Rescue Service

Dates of Deployment: July 2015 - Present

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