

Professor Mary O’Kane AC and Dave Owens APM  
NSW Independent Bushfire Inquiry  
GPO Box 5341  
Sydney NSW 2000

25 March 2020

Dear Professor O’Kane and Mr Owens,

### **Submission to the NSW Independent Bushfire Inquiry, 2020**

The Ripper Group has witnessed the devastation caused by the recent unprecedented bushfires and strongly supports the detailed review that you are undertaking through the NSW Independent Bushfire Inquiry process.

In the Australian spirit of rising up to help in times of adversity, The Ripper Group has been able to rapidly adapt the drone technology pioneered in our surf rescue operations to the search and rescue of wildlife injured during the recent bushfires. Since January 2020, we have been working closely with RFS and NPWS to deploy our drones in the bushfire grounds to support WIRES in locating and safely accessing injured wildlife.

The Ripper Group quickly recognised that drones would be vital in the aftermath of the devastating bushfires. Our brand, being known in the community as “the drone you can trust”, enabled us to rapidly initiate an alliance of Australian technology companies (including Agronomeye, AUAV and Swoop Aero) to bring together leading specialists in search and rescue, drone operations, aerial mapping, Ai analysis and data analytics.

The collective technology of the Ripper Rescue Alliance has enabled the successful deployment of drones to locate koalas and other wildlife in fire devastated areas, transforming the search and rescue capabilities of the WIRES rescue crews and significantly improving their efficiency.

The Ripper Rescue Alliance has been able to provide accurate GPS locations for injured wildlife, identify safe access routes and live-stream drone footage to rescue workers anywhere in Australia, with the support of NBN and their Musta Trucks in remote areas. The drones have also enabled rapid survey of the fire devastated areas and the development of digital maps to inform wildlife rehabilitation experts of water availability and suitability of habitat for rerelease of treated wildlife.

The benefits of the drone technology include faster response times, improved safety for rescue workers, ability to cover large areas quickly, recording large quantities of data to inform front line responses, and ultimately enabling the rescue of more wildlife.

The drones are able to survey 100 ha of burnt bushland in less than 15minutes, saving the 4+ hours it takes rescue workers to cover the same area. The Ripper Rescue Alliance has now undertaken field operations to prove the technology in the Blue Mountains, Batemans Bay, Canberra and Eurobodalla fire grounds.

## **FIRE PREVENTION & PLANNING**

The Ripper Group believes there is significant opportunity for current cutting edge, but proven, drone technology to be deployed more broadly to advance outcomes in fire management. We have identified initiatives that could be undertaken by a specially equipped drone fleet, working with manned aviation operations and satellite overviews, to support fire prevention, firefighting and recovery operations.

### **1. Assessment of Fuel Loads by drone**

At the start of the fire season, drones can be deployed to undertake a consistent and precise assessment of fuel loads on the forest floor and canopy, particularly in national parks and inaccessible locations where manned aviation or satellite scans can't accurately provide the required data sets. Full-waveform LiDAR sensors register the complete returned backscattered signal and can provide three-dimensional information to quantify forest structural characteristics with high spatial accuracies. LiDAR also enables tracking and mapping of fire trails and their accessibility.

### **2. Fire Behaviour Modelling**

Drones enable the capture of data without the need to put humans and manned aviation assets in harm's way or in dangerous situations. Having drones assess fire fronts, model potential movements and identify fire severities will allow for early community engagement and warnings based on actionable intelligence as to how fires that are raging close to them are tracking and how it may impact them, giving them more time to prepare or evacuate.

### **3. Risk-based Aerial Monitoring**

Based on established protocols and risk-based triggers, drones can be used to monitor national parks and state forests on catastrophic fire warning days. Fixed cameras in highpoints can trigger inspection by autonomous drone platforms where smoke is suspected or identified.

This capability would allow authorities to monitor remote and inaccessible areas, as well as activities that may lead to fires on catastrophic days such as a fire in the camping grounds in state forests. Early identification of fires provides the opportunity for RFS response and suppression before a fire becomes out of control.

#### **4. Community Based Alerts**

An improved system of community-based alerts based on weather forecasts and fuel load modelling could alert communities of catastrophic fire risk days more than a week in advance improving opportunity for fire management preparations. This could include communities in bushfire prone areas having access to small, easily operated surveillance drones and the permission to fly them low level to ascertain that if a fire is close by, are exit routes compromised and what is the best way to evacuate the area before leaving the safety of their homes.

## **FIRE FIGHTING**

#### **5. Fire Front Monitoring**

Drones are able to capture live video of fire fronts, identify property at risk and provide other critical information live to fire fighters and decision makers in the RFS control centres. The drones are safer, particularly at night, and are able to get closer to the fire front than manned aircraft, negating the need for manned aviators to fly through smoke to access fire grounds.

Currently manned aviation assets that are best used for fire suppression are being used to monitor fire fronts taking a critical firefighting tool offline. An integrated drone program would allow for aerial suppression assets to focus on suppression where they are most needed.

We note that the Australian army used their small fixed wing drones to track fire fronts in some locations during the recent bushfire season. Military fly under DASA (rather than CASA) rules and so have greater freedom, however the military drones currently used have limited capacity due to their small size.

Since 2013, the US Fire Service has used a drone from the US Department of Defence for 24-hour monitoring of fire fronts in California. They capture live video of the blaze from 20,000 feet and can stay in the air for hours, identifying where the fire is spreading.

They have identified multiple benefits of using drone technology (Twidwell et al, 2016), including:

- Early spot fire detection and suppression than possible with ground crews
- Improved allocation of personnel and resources by avoiding false identification of new fires
- Ability to continuously map a fire's perimeter, size, spread, and intensity
- Enhanced visibility in high smoke and low light conditions.

#### **6. Aerial Fire Suppression**

Drones are able to deploy fire suppressant pods or retardant in small quantities with great accuracy that could be used as a first line of defence, prior to fire-fighting teams arriving. This approach could also defend critical infrastructure in inaccessible locations, such as mobile communication towers and power grid assets, and for the management of spot fires. Larger drones have the ability to become an aerial high-powered sprinkler system, tethered to the ground and pumping large volumes of water with 360° coverage.

#### **7. Backburning and Firebreak Creation**

Drones have the ability to carry 100 incendiary balls, to support backburning operations. The drones release the self-igniting balls to autonomously create firebreaks and start backburning without putting people in danger. An improvement in the safety and efficiency of backburning procedures in inaccessible areas may reduce the intensity of wildfire, and provide greater ability for wildlife to escape.

### **BUSHFIRE RECOVERY**

#### **8. Co-ordinated Wildlife Rescue Effort**

The current wildlife rescue operations undertaken by the Ripper Rescue Alliance and WIRES have been most effective when implemented with a co-ordinated approach with NBN, RFS and NPWS. The drone technology can then be utilised efficiently for multiple purposes including identifying injured wildlife to be treated by WIRES, surveying impacts to high value habitat for NPWS, identifying feral animals for control, inspecting infrastructure damaged by the fire and ensuring the safety of all workers.

It is also important to access the grounds immediately after the bushfire has been through and the area has been declared safe. Access to fire grounds within three days of the fire front passing provided maximum capability for the injured animals rescued to have the best chance of survival. We are now working with the NPWS and WIRES to develop a preapproved protocol for drone deployment in National Parks to enable a comprehensive and co-ordinated wildlife rescue effort immediately following a fire.

#### **9. Rapid Survey of Threatened Species & Critical Habitat**

The Ripper Group has developed AI to enable identification 22 different objects in the marine environment, specifically and best known for detection of sharks and crocodiles from a drone. We are currently working to develop similar AI to identify koalas and threatened species. We aim to be operational in a matter of months to support survey of Threatened Species in bushfire affected areas. In the interim, we are utilising infrared sensors to identify wildlife in areas of known Threatened Species habitat.

The Ripper Rescue Alliance is undertaking drone surveys of the areas of bushland in National Parks that were not burnt to assess habitat values. The recovery of critical habitat can also be tracked over time using drone video footage.

#### **10. AI to identify feral animals**

The Ripper Rescue Alliance was readily able to identify feral animals during the recent wildlife rescue field operations using infrared sensing. GPS coordinates and live video were provided to NPWS feral animal control officers to support their operations.

We are also working to develop AI that can identify feral cats, dogs, deer, foxes as control of feral predators is even more critical following a bushfire. We propose a drone program be incorporated in an ongoing way to assist with feral animal management by NPWS, State Forestry and Local Land Services.

#### **11. Safety Assessments**

Prior to National Parks reopening to the public following a bushfire, drones can undertake safety surveys and map areas of high erosion potential. In addition, heat maps surveys of buildings and structures can be undertaken to ensure public safety and minimise the potential of flare ups that could cause harm. Surveys of critical infrastructure like communication towers and power corridors can also be undertaken by drone to provide early damage assessments and increase the efficiency of repairs.

## REMOVING INSTITUTIONAL & OPERATIONAL BARRIERS

### **12. Operational Protocol for Aerial Firefighting**

As an industry, an integrated approach between manned and unmanned aviation assets will enable a targeted, swift and cost-efficient response to bushfire management, avoiding the devastation that was experienced in the 2019/2020 bushfire season.

The Ripper Group would work with CASA, NPWS and RFS to implement airspace management programs and provide real time intelligence to decision makers and teams on the ground, making this service vital to the overall control of fire fronts and hazardous situations.

### **13. Changes to CASA regulations**

Military fly under DASA rules and have the level of freedom required for a bushfire operation. The following regulatory changes are recommended to enable UAV bushfire operation:

- CASA to enable EVLOS (Extended Visual Line of Sight) and BVLOS (Beyond Visual Line of Sight) operations in coordination with manned aviation assets for fire management operations
- CASA to enable close proximity drone operations with manned operators on fire grounds
- CASA to implement all UAV's on fire response to have ADS-B (Automatic Dependent Surveillance Broadcast) out for collision avoidance
- RFS to engage certified operators of UAV's for fire ground use
- NPWS to preapprove drones to fly in National Parks for the purpose of firefighting and prevention, with ongoing communication with RFS and NPWS.
- Approval processes to be expedited for approved drone operators
- A drone coordinator to be included in the RFS headquarters for operational overview.

### **14. Quality Pilot Training**

The Ripper Group have a proven track record with CASA and can provide a manned/unmanned certification of training to ensure that drone operators on the fire grounds for vital response capability are trained to the highest level.

To provide the NSW Independent Bushfire Inquiry with an indication of the costs involved in implementing a drone strategy to augment bushfire management in NSW, The Ripper Group has prepared some indicative pricing.

It is proposed the fire prevention and firefighting strategy include a fleet of 50 specialised drones, high-level pilot training, detailed protocols, data management and sharing, and engagement with industry regulators, government, operators and the general community.

The Ripper Group estimate that an effective drone strategy for NSW bushfire management could be delivered at a cost of \$2,523,000, as detailed in Attachment 1.

The Ripper Group is the Australian leader in developing tailor made remotely piloted aircraft system strategies, including drone design, operational protocol, data management and pilot training. The Ripper Group has been recently recognised as leaders in search and rescue and Ai-enabled drone deployment solutions winning the following awards:

- National - Australian Information Industry Association iAwards - Artificial Intelligence or Machine Learning Innovation of the Year with our partner the University of Technology Sydney
- NSW state - Australian Information Industry Association iAwards - Artificial Intelligence or Machine Learning Innovation Project of the Year
- NSW state - Australian Information Industry Association iAwards - Research & Development Project of the Year
- NSW state - Australian Information Industry Association iAwards – Community Service Markets Project of the Year
- International – Asia Pacific ICT Alliance Awards 2018 – Merit Award Winner and First Runner Up.

To provide an example of a comparable UAV operation in NSW, The Ripper Group has trained more than 900 UAV pilots and has developed and implemented drone technology and drone strategies into organisations around the world. These technologies and strategies have now been undertaking search and rescue operations on beaches in NSW and QLD for 4 years in conjunction with Surf Life Saving Australia.

The Ripper Group is the only UAV company to have secured a CASA license to fly over people to perform a rescue operation. As there is some cross over in capability in firefighting and surf rescue operations, it is proposed that during a bushfire crisis capability could be drawn from the existing Little Ripper and or Ripper Rescue Alliance programs to supplement the NSW Bushfire Drone Strategy.



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To provide an example of current best practise in the use of UAV in firefighting, the Los Angeles Fire Department (LAFD) made a comparable investment in 2017 in a highly successful drone fire monitoring program.

Currently, 22 drones are deployed by LAFD to map wildfires and provide live information to support firefighting operations, mitigate risks and allocate resources. The LAFD requires intensive training for its drone pilots with a minimum 80 hours per firefighter (twice standard commercial drone training).

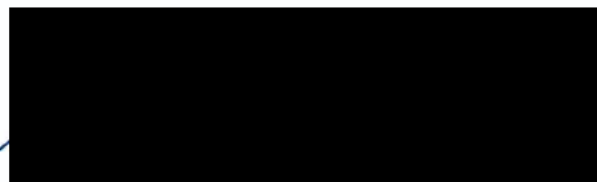
Big data analytics collected from LAFD drone platforms delivers accurate actionable field-based intel enabling firefighting assets to be assigned where best required. Across the United States, more than 1,500 state and local police, sheriff, fire and emergency services agencies have acquired drones and set up drone programs, with around one third of these programmes focused on firefighting.

*"Combining advanced drone technology with new software tools will help bridge the gap between helicopters and firefighters on the ground, allowing us to address life-threatening situations faster and more effectively than ever before."*

– Richard Fields, LAFD Battalion Chief

We thank you for the opportunity to brief the NSW Bushfire Inquiry directly and invite you and officers of the NSW Government to visit the operations of the Ripper Rescue Alliance in the field so you can see the effectiveness of the drone technology in supporting front line staff managing bushfires.

Yours sincerely  
The Ripper Group Pty Ltd



Kevin E. Weldon AM  
**Executive Chairman**