



OAKLAND POLICE DEPARTMENT

Surveillance Impact Report: Unmanned Aerial Systems (UAS)

1. Information Describing Unmanned Aerial Systems (UAS) and How They Work

An Unmanned Aerial System (UAS) is an unmanned aircraft of any type that is capable of sustaining directed flight, whether pre-programmed or remotely controlled and all of the supporting or attached components designed for gathering information through imaging, recording, or any other means. Generally, a UAS consists of:

- An unmanned aircraft which consists of the chassis with several propellers for flight, radio frequency and antenna equipment to communicate with a remote-control unit, control propellers and other flight stabilization technology (e.g. accelerometer, a gyroscope), a computer chip for technology control, a camera for recording, and a digital image/video storage system for recording onto a secure digital card (SD card);
- A remote-control unit that communicates with the unmanned aircraft via radio frequency; and
- A battery charging equipment for the aircraft and remote control.

UAS are controlled from a remote-control unit (similar to a tablet computer). Wireless connectivity lets pilots view the UAS and its surroundings from a bird's-eye perspective.

UAS have cameras so the UAS pilot can view the aerial perspective. UAS record image and video data onto a secure digital (SD) memory cards. SD cards can be removed from UAS after flights to input into a computer for evidence.

2. Proposed Purpose

UAS offer to significantly improve the capacity of law enforcement (LE) to provide a variety of foundational police services. This technology has already been used with many law enforcement agencies to save lives and help capture dangerous criminal suspects. UAS can support first responders in

hazardous incidents that would benefit from an aerial perspective. Responding to violent crime in Oakland often requires officers to face risks to their safety – in addition to the clear risks faced by members of the public when violent crime is present. In 2019 Oakland saw 75 homicides, 3,334 aggravated assaults (284 with firearms), 189 rapes, and 2,789 robberies. Technology such as UAS can play a vital role in mitigating these omnipresent dangers, by providing a greater view into the immediate surroundings of crime scenes and active pursuits.

Searches for armed and dangerous suspects are more effective and controlled with UAS support; an armed suspect can be hiding in a tree or on a roof. LE can respond accordingly and more safely when provided with this critical information (see Section #10 below “Alternatives Considered” for more information on how UAS compares to alternatives for situational awareness). More informed responses also lead to less injury and less uses of force.

LE agencies have successfully used UAS to locate missing persons, especially in more remote areas – as well as for rescue missions. UAS is also being used during disasters and during any hazardous material releases. The situational awareness UAS provides has also become an important tool for large events (e.g. sport events, parades, and festivals); the aerial view provides information that would otherwise require a much larger deployment of LE personnel to maintain the same level of public safety support. Additionally, UAS offer LE a more efficient system for documenting vehicular collision as well as crime scenes. Furthermore, smaller UAS can be equipped with a loud speaker to communicate (e.g. hostage situations/providing verbal commands and directions to the subject).

As Bryan Smith, AP¹SA Safety Program Manager explains in “Working Together: Deploying Manned and Unmanned Aircraft Safely and Successfully” in Air Beat²-July-August 2019 Issue, “What if we (LE) had the ability to coordinate tasking, splitting the airborne support responsibilities between manned (helicopter) and unmanned crews so one could watch the perimeter while another searches below treetop level in the courtyards and windows and a third went head of the entry team?” In the same AirBeat Issue, Charles L. Werner, Chairman, National Council on Public Safety U.S. explains in “Public Safety Drones: The Past, Present, and Future,” “Virginia’s public safety UAS team in York County used one of its drones to fly into a hostage situation to determine when police could safely enter.” The article also details how the Alameda County Sheriff’s Office (ACSO) is using its drones for traffic incidents, tactical operations, and search and rescue.

OPD does have access to ACSO UAS. However, OPD must make a formal request for each use. This approval process takes several hours when situations require immediate action. Circumstances may proceed without any

¹ AP¹SA = Airborne Public Safety Association

² The Official Journal of the Airborne Public Safety Association

time for advance planning and conditions may involve individuals believed to be armed and dangerous. OPD can better respond to such dangerous situations where UAS offers useful intelligence and mitigates officer danger – by having a separate UAS program; a standalone OPD UAS program will allow for much quicker deployment options.

3. Locations Where, and Situations in which UAS may be deployed or utilized.

OPD proposes to use UAS as outlined in OPD Department General Order (DGO) I-25 “UNMANNED AERIAL SYSTEM (UAS),” Section III “General Guidelines” A “Authorized Use” only for the following situations:

- a. Mass casualty incidents (e.g. large structure fires with numerous casualties, mass shootings involving multiple deaths or injuries);
- b. Disaster management;
- c. Missing or lost persons;
- d. Hazardous material releases;
- e. Sideshow events where many vehicles and reckless driving is present;
- f. Rescue operations;
- g. Special events;
 - i. Such as large gatherings of people on city streets, sporting events, or large parades or festivals; (see authorization for “large or special events under Deployment Authorization below);
- h. Training;
- i. Hazardous situations which present a high risk to officer and/or public safety, limited to:
 - i. Barricaded suspects;
 - ii. Hostage situations;
 - iii. Armed suicidal persons;
 - iv. Arrest of armed and/or dangerous persons (as defined in OPD DGO J-04 “Pursuit Driving” Appendix A, H “Violent Forcible Crime”;
 - v. Scene documentation for evidentiary or investigation value (e.g. crime, collision, or use of force scenes);
 - vi. Operational pre-planning (prior planning for services of search and arrest warrants. This is would provide up-to-date intelligence (e.g. terrain, building layout) so that personnel allocate appropriate resources and minimize last minute chance

- encounters and uses of force);
- vii. Service of high risk search and arrest warrants involving armed and/or dangerous persons (as defined in OPD DGO J-04 “Pursuit Driving” Appendix A, H “Violent Forcible Crime”; and
 - viii. Exigent circumstances
 - i. A monitoring commander (Lieutenant or above) may authorize a UAS deployment under exigent circumstances. A report shall be completed and forwarded to the Chief of Police and the OPD UAS Coordinator for all UAS deployments authorized under exigent circumstances, for a full review to determine policy compliance.

Potentially, UAS could be deployed in any location in the City of Oakland where one or more of the above situations occur and where the proper authorizations are provided. Fortunately, several of these situations rarely occur – but some do occur regularly, such as arresting armed/dangerous person, and crime scene documentation. OPD regularly needs to document crime, use of force, and/or vehicular collision scenes for evidentiary and/or investigation value. UAS can greatly aid in this documentary process, to memorialize a scene from an aerial or overview perspective. In 2018, OPD made 8,239 arrests that included either a felony charge, a misdemeanor charge that required an arrest (warrant, domestic violence, firearms violation), or both. In 2018 there were 70 homicides, 2,624 robberies, and 2,338 reported cases of aggravated assault. Additionally, OPD continues to authorize the use of armored vehicles several times each month where officers attempt to safely locate and arrest individuals suspected in homicides and other violent crimes – UAS can provide situational awareness in all of these critical incidents to provide a greater level of safety for officers, as well as for nearby civilians.

4. Privacy Impact

OPD recognizes that the use of UAS raises privacy concerns. UAS are becoming ubiquitous in the United States, and there is a growing concern that people can be surveilled without notice or reason. There is concern that UAS can be utilized to observe people in places, public or private, where there is an expectation of privacy. The level of potential privacy impact depends upon factors such as flight elevation and camera zoom magnitude, as well as where the UAS is flown.

The results of the research study titled, “Mission-based citizen views on UAV usage and privacy: an affective perspective³,” published in February 2016 found that people’s perceptions of how UAS impacts privacy relate to use type. The researchers from College of Aeronautics, Florida Institute of Technology, and the Aeronautical Science at Embry-Riddle Aeronautical University (ERAU), College

³ <https://www.nrcresearchpress.com/doi/abs/10.1139/juvs-2015-0031#.XkHEAWhKiUl>

of Aviation UAS Lab found that people tend to be less concerned about police UAS use when the technology is only used for specific uses - “concerns for privacy were less in the condition where the UAV was only used for a specific mission than when it was operated continuously.” DGO I-25.III.A “General Guidelines, Authorized Use” explains that OPD personnel can only use UAS for specific missions, detailed above in Section 3 “Locations Where, and Situations in which UAS may be deployed or utilized.”

5. Mitigations

OPD’s DGO I-25 restricts OPD’s use of UAS in several ways to promote greater privacy protections.

OPD will only use UAS for specific missions rather than operating continuously, mitigating concerns raised in the February 2016 study cited above.

DGO I-25.III “General Guidelines,” A. Authorized Use” Part 3 lists the only allowable uses of UAS (e.g. mass casualty incidents, Arrest of armed and/or dangerous persons (as defined in OPD DGO J-04 “Pursuit Driving” Appendix A, H “Violent Forcible Crime”)). DGO I-25.III.A.4 “Deployment Authorization” articulates that an Incident Commander must approve all uses of UAS. DGO I-25.III.A.4 “Deployment Authorization for Large or Special Events” lists the additional requirements for using UAS during these situations; this additional deployment list is required so that OPD considers the need for situational awareness in the context of not restricting the rights of Oakland residents and visitors to freedom of expression in the public domain.

The Federal Aviation Administration (FAA) sets strict flight regulations for all UAS users, including for law enforcement. The FAA provides two law enforcement options for creating acceptable UAS programs (see Attachment A: “Drones in Public Safety: A Guide to Starting Operations”), under 14 Code of Federal Regulation (CFR) part 107, subpart E, Special Rule for Model Aircraft; the agency can designate individual members to earn FAA drone pilot certificates and fly under the rules for small UAS, or receive a FAA certificate to function as a “public aircraft operator” to self-certify agency drone pilots and drones. Either way, these options allow for OPD to use systems under 55 pounds, for flying at or below 400 feet above ground level . Absent an emergency situation warranting a FAA COA/Part 107 waiver-permitted law enforcement response, law enforcement is also restricted from using UAS to fly over or near the following locations:

- Stadiums and Sporting Events;
- Near Airports; and
- Emergency and Rescue Operations (wildfires and hurricanes).

DGO I-25.III.A.”Authorized Use,” Part 7 “Privacy Considerations,” outlines several other protocols for mitigating against privacy abuse:

- OPD UAS personnel must adhere to FAA altitude guidelines – flying below 400 feet helps to ensure that UAS is not used for surveilling overly large geographic areas; OPD will use UAS to focus specifically on specific areas.
- OPD UAS operators shall not intentionally record or transmit images of any location where a person would have a reasonable expectation of privacy (e.g. residence, yard, enclosure, place of worship, medical provider’s office).
- Operators and observers shall take reasonable precautions, such as turning imaging devices away, to avoid inadvertently recording or transmitting images of areas where there is a reasonable expectation of privacy.

DGO I-25.III.B “Restricted Use” explains that:

- UAS and remote control units shall not transmit any data except to each other.
- Data shall only be recorded onto removable SD cards.
- UAS shall not be used for the following activities:
 - Targeting a person based on their individual characteristics, such as but not limited to race, ethnicity, national origin, religion, disability, gender, clothing, tattoos, and/or sexual orientation when not connected to actual information about specific individuals related to criminal investigations;
 - For the purpose of harassing, intimidating, or discriminating against any individual or group; or
 - To conduct personal business of any type.

The technology itself also provides privacy mitigations through information security. The DJI Matrice 210 and DJI Mavic 2 Enterprise systems both use DJI’s “OcuSync 2.0” protocol and are encrypted using the leading AES-256 standard as well as password login protection. DJI⁴ uses this encrypted software to turn off the radio transmission to all devices except the paired unit controller. However, there is no guarantee that these drone-to-controller radio transmissions cannot be potentially hacked by bad actors (higher grade military level encryption would be cost-prohibitive for OPD). . DJI has produced a “Commitment to Data Security” document (see **Attachment B**). The document explains protocols undertaken to ensure that flight data is not transmitted back to DJI or other sources (e.g. storing data on a U.S.-based AWS server). DJI’s “Implementing Mitigation Measures Recommended By The DHS” (see **Attachment C**) recommends mitigations that mirror OPD UAS mitigations:

⁴ The lead UAS manufacturer for equipment used by police agencies throughout the U.S.

- Deactivate Internet Connection from Device Used to Operate the UAS
- Take Precautionary Steps Prior to Installing Updated Software or Firmware
- Remove Secure Digital Card from the Main Flight Controller/aircraft
- If SD Card is Required to Fly the Aircraft, Remove All Data from the Card After Every Flight

OPD will also commit to using UAS such as from DJI that do not directly connect to the internet; rather, the controllers will use a separate mobile device for possible remote transmission. The UAS have local data built into the controller firmware for flight control.

6. Data Types and Sources

UAS will record using industry standard file types such as (e.g. jpeg, mov, mp4, wav or RAW). Such files may contain standard color photograph, standard color video, or other imaging technology such as thermal. Although UAS can transmit one-way audio from OPD, the UAS technology available today does not currently record sound⁵.

7. Data Security

OPD takes data security seriously and safeguards UAS data by both procedural and technological means. The video recording function of the UAS shall be activated whenever the UAS is deployed. Video data will be recorded onto Secure Digital (SD) Cards. OPD DGO I.25.4.B "Data Retention" states video recording collected by OPD UAS shall be deleted from the device within five (5) days unless:

- The recording is needed for a criminal investigation;
- The recording is related to a City of Oakland Police department administrative investigations (Internal Affairs Investigation).; or
- Retention of data is necessary for another organizational or public need when OPD is requested for outside agency criminal investigations, administrative investigations, and/or aiding in natural disasters; the program coordinator shall develop procedures to ensure that data are retained and purged in accordance with applicable record retention schedules (in accordance with DGO I-25, Section IV, Sub-Section B "Data Retention."). Outside agency assist would only be conducted if it is within OPD policies.

The program coordinator shall develop procedures to ensure that all UAS SD card data intended to be used as evidence are accessed, maintained, stored

⁵ Microphones could be installed, but the sound of the propellers would make sound indecipherable in current models available to OPD.

and retrieved in a manner that ensures its integrity as evidence, including strict adherence to chain of custody requirements.

Electronic trails, including encryption, authenticity certificates, and date and time stamping shall be used as appropriate to preserve individual rights and to ensure the authenticity and maintenance of a secure evidentiary chain of custody.

OPD's Electronic Services Unit (ESU) shall be responsible for the maintenance and storage of UAS equipment. Members approved to access UAS equipment under these guidelines are permitted to access the data for administrative or criminal investigation purposes.

UAS image and video data may be shared only with other law enforcement or prosecutorial agencies for official law enforcement purposes, using the following procedures:

- The agency first makes a written request for the OPD data that includes:
 - The name of the requesting agency.
 - The name of the individual making the request.
 - The basis of their need for and right to the information.
 - A right to know is the legal authority to receive information pursuant to a court order, statutory law, or case law. A need to know is a compelling reason to request information such as direct involvement in an investigation.
- The request is reviewed by the Chief of Police, Assistant Chief of Police, or Deputy Chief/ Deputy Director or designee and must be approved before the request is fulfilled.
- The approved request is retained on file, and incorporated into the annual report pursuant to Oakland Municipal Code Section 9.64.010 1.B.

8. Costs

Costs for a UAS program can vary from thousands to hundreds of thousands and beyond. Different types of systems exist that would support police services, and technology continues to evolve. However, OPD personnel have procured some initial bids to start an OPD UAS program. UAS technology updates at a fast pace and we do not want to commit to a current model. The following costs (\$46,800 total), provided here as an example, are based on an actual bid for one large UAS and four smaller UAS for different types of missions:

UAS System	Components	Cost
DJI Matrice 210 V2 (one system) – large drone for standard use	Rugged commercial enterprise drone that carry a payload of 5.07 pounds (enough for the powerful zoom camera and infrared camera). System comes with drone body, landing gear, monitor, propellers, battery packs and chargers, cables.	\$9,600
	Powerful Zoom lens Camera: Zenmuse Z30 (30x Optical Zoom)	\$2,999
	Infrared Camera: DJI Zenmuse FLIR XT2 Dual Sensor 640x512 30Hz 13mm Radiometric	\$13,200.00
	Six extra batteries: DJI TB55 Intelligent Flight Battery (Extended); \$369 x 6	\$2,214
	Matrice 200 Series Case	\$739
DJI Mavic 2 (four systems) – smaller drone for lighter use as well as for indoor use	Drone body with protection kit, controller, batteries, battery chargers, propellers, cables, other related accessories such as spotlights and one-way speakers; \$2,949 x 4	\$11,796
	Additional batteries; \$169x24	\$4,056
	DJI Smart Controller; \$549x4	\$2,196
		\$46,800

OPD will utilize one-time General Purpose Funds and/or look to grant funding such as from the United States Department of Homeland Security Urban Area Security Initiative (UASI).

9. Third Party Dependence

OPD is currently reliant upon the Alameda County Sheriff's Office (ACSO) when exigent circumstances occur that warrant UAS requests. OPD has requested and received UAS support from ACSO four times in 2019. "Use of Unapproved Surveillance Technology Under Exigent Circumstances – January 28, 2019" (see Attachment B) explains the use of ACSO UAS on January 18, 2019 in connection with an OPD observed murder suspect. "Use of Unapproved Surveillance Technology-December 17, 2019" (see Attachment C) December 17, 2018 explains the use of ACSO UAS on

December 15, 2018 in connection with a residential (home invasion) robbery in progress with a suspected armed suspect.

OPD values its relationship with ACSO and the UAS support provided in 2019; However, OPD now hopes to join the growing list of municipal police agencies developing their own UAS programs. The “Proposed Purpose” Section 2 above explains the benefit and local need for such situational awareness. There are several vendors currently manufacturing law enforcement enterprise quality systems. Section 8 “Cost” above details a possible purchase from DJI – a leading manufacturer. However, OPD will solicit competitive bids and reevaluate vendors when this Surveillance Impact Report and connected DGO I.25 Use Policy are approved by the City Council.

10. Alternatives Considered

OPD could continue the status quo by relying on its partnership with ACSO UAS; however, OPD will be able to more efficiently deploy UASs when needed in priority situations, by having its own UAS program. OPD currently relies on ACSO for UAS access, as noted in Section 2 “Proposed Purpose” above. OPD must make a request to ACSO in each time a situation arises that would benefit from UAS use and meets all requirements outlined in the OPD UAS Policy. These requests can take several hours in which case OPD’s ability to respond is greatly diminished. In cases such as hostage situations, missing persons, or pursuit of homicide investigation suspects, a two or more-hour request period can lead to negative outcomes.

Helicopters also offer sky-view situational awareness during some of the situations described in the Purpose and Impact sections above, but UAS costs are lower and UAS can be used in more situations. Helicopters cost several million dollars as well as \$200-\$400 per hour for manned flight. Currently OPD only has one functional helicopter because the high cost to maintain them. There are situations where UAS do not offer an alternative - UAS can never replace the helicopter for missions such as active vehicle pursuits, sustained flight, active observations and communications from the helicopter. UAS can only be compared in terms of some situations where a local above-ground perspective is needed.

The much lower costs of UAS however means that they can potentially be deployed in more situations where the cost of maintaining helicopters is too prohibitive. UAS can also provide utility in ways beyond the capabilities of much more expensive helicopters:

- Support during fire and emergency operations – UAS can be flown in lower elevation positions such as near fires to locate possible trapped people where helicopters cannot fly; infrared cameras on UAS can also be used to identify heat spots for fire department attention.

- Finding suspects – UAS can be used to find dangerous violent crime suspects, by being flown in locations such as to view roof tops, in trees, or between buildings.
- Crime and vehicle collision scene investigation – UAS can be used to collect evidence that may be difficult to reach from the ground; UAS can easily be used to provide maps and 3D images within minutes using 3rd party software specifically designed to produce such maps and 3D images using photographic data captured by the UAS; this data is also valuable during court testimony.

Another alternative to the use of UAS or helicopters would be to deploy many officers to events described in DGO I-25. Section III “General Guidelines” A. “Authorized Use.” However, a greater deployment of sworn personnel would at times be less effective; A missing persons’ event would require many more officers to provide the same information as UAS. Additionally, the use of UAS can also allow OPD to minimize its physical presence in situations where more officers may actually be perceived as unnecessary and even threatening, during large or special events. Furthermore, large officer deployments can cause a greater use of overtime funding and cause negative impacts to OPD’s general fund budget.

11. Track Record of Other Entities

Many cities and counties in California and nationwide have begun to implement UAS programs due to the numerous uses cases for law enforcement. The Alameda County Sheriff’s Office (ACSO) and Sacramento County Sheriff’s Office have developed programs with several types of UAVs and full time deputy positions, and Stanislaus County is beginning to develop their program. Cities such as Citrus Heights, Fremont, Pittsburg, and Torrance all now have UAS programs as well.

Interviews with Citrus Heights PD, Pittsburg PD and the Sacramento County Sheriff’s Office all testify to the high use value of developing a UAS program for law enforcement. These agencies have all used UAS for search and rescue missions, emergency situations (e.g. natural gas explosions and fires), and to search for suspects considered armed and dangerous. UAS are also being used by these agencies on a regular basis to document fatal vehicle collision scenes as well as for gunshot scenes to develop 3D models that provide great value for investigations – such capabilities were only possible prior to UAS technology with much more human staff time as well as expensive 3D camera technology.

Citrus Heights PD reported that initially they experienced community concerns around privacy. However, the department was able to explain their

plan to community groups, to show how the program is used and the safety and privacy mitigations they employ. The department reports that this approach has led to greater community support. Pittsburg PD also reported that their community did not express any privacy concerns about their UAS program - but that they ensured transparency through proactive UAS Program communications.