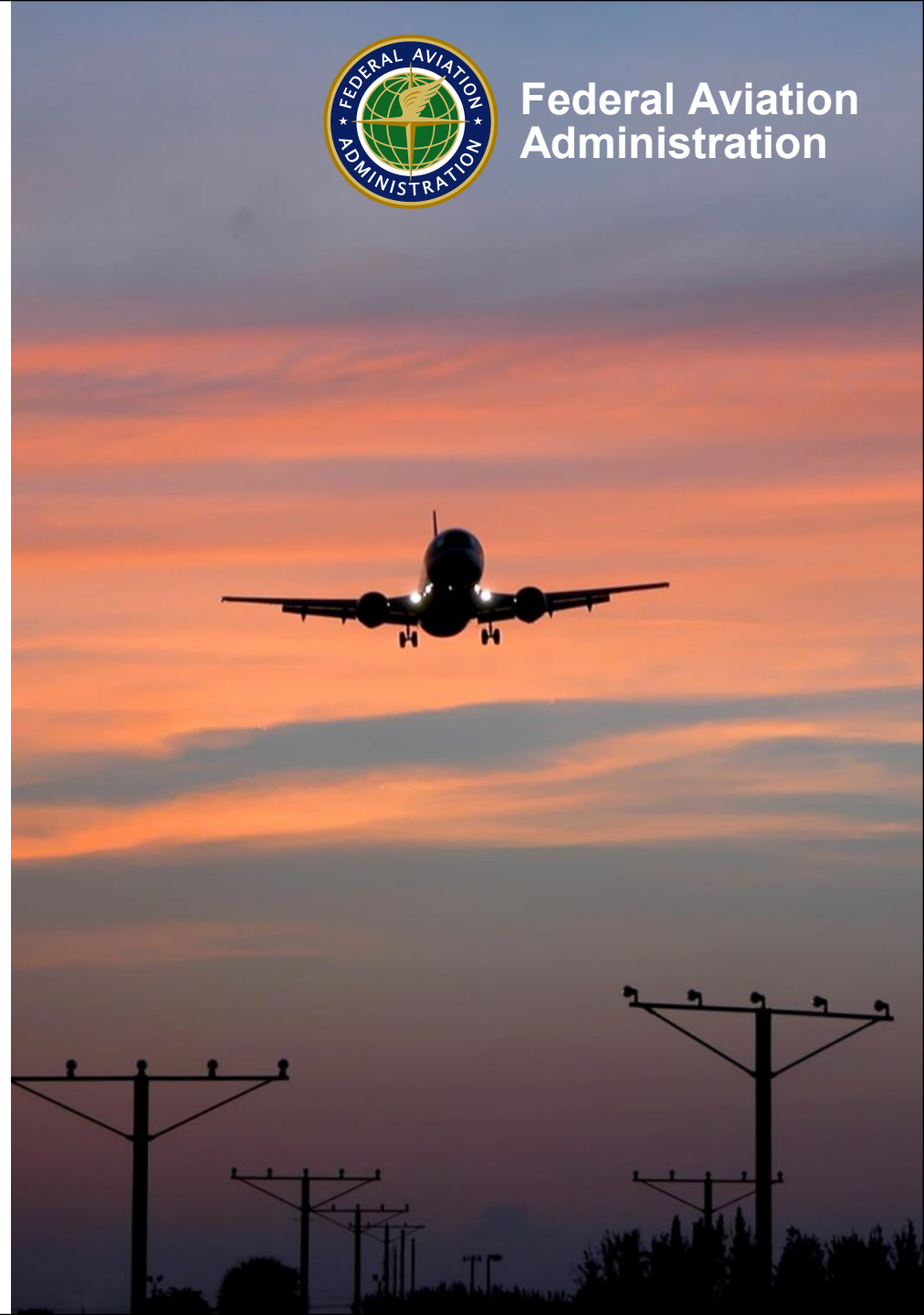
UAS Applications

Presented to: Office of Airports National Consultant Workshop

By: Mike Branum and Jim Patterson

Date: August 28, 2024

Federal Aviation Administration



Agenda

- Overview of UAS Airport Application Research
- Details on Ongoing Research
- Details on Planned Research
- Development of Guidance for UAS Applications on Airports

Overview of UAS Airport Application Research

UAS Airport Applications

The FAA is conducting research to determine minimum performance specifications and technical/operational considerations for the following airport UAS applications (use-cases).

Completed Research

- Obstruction Analysis – Phase 1
- Perimeter Fenceline Inspections
- Pavement Inspections
- Aircraft Rescue and Firefighting (ARFF) – Live Monitoring
- ARFF Accident/Incident Documentation (Visual Camera)
- FOD Detection
- Construction Monitoring

Ongoing Research

- Obstruction Analysis – Phase 2 (Point Cloud-Based Data Processing)
- Wildlife Hazard Management – Dispersal/Monitoring
- UAS-based Lighting Inspection

Planned Research

- Drone-in-a-Box
- Runway/Taxiway Safety Area Surveys
- ARFF Aircraft Fuselage Interior Searches
- ARFF Accident/Incident Documentation (Thermal Cameras)
- Wildlife Hazard Management – Dispersal/Monitoring – Testing at additional airports

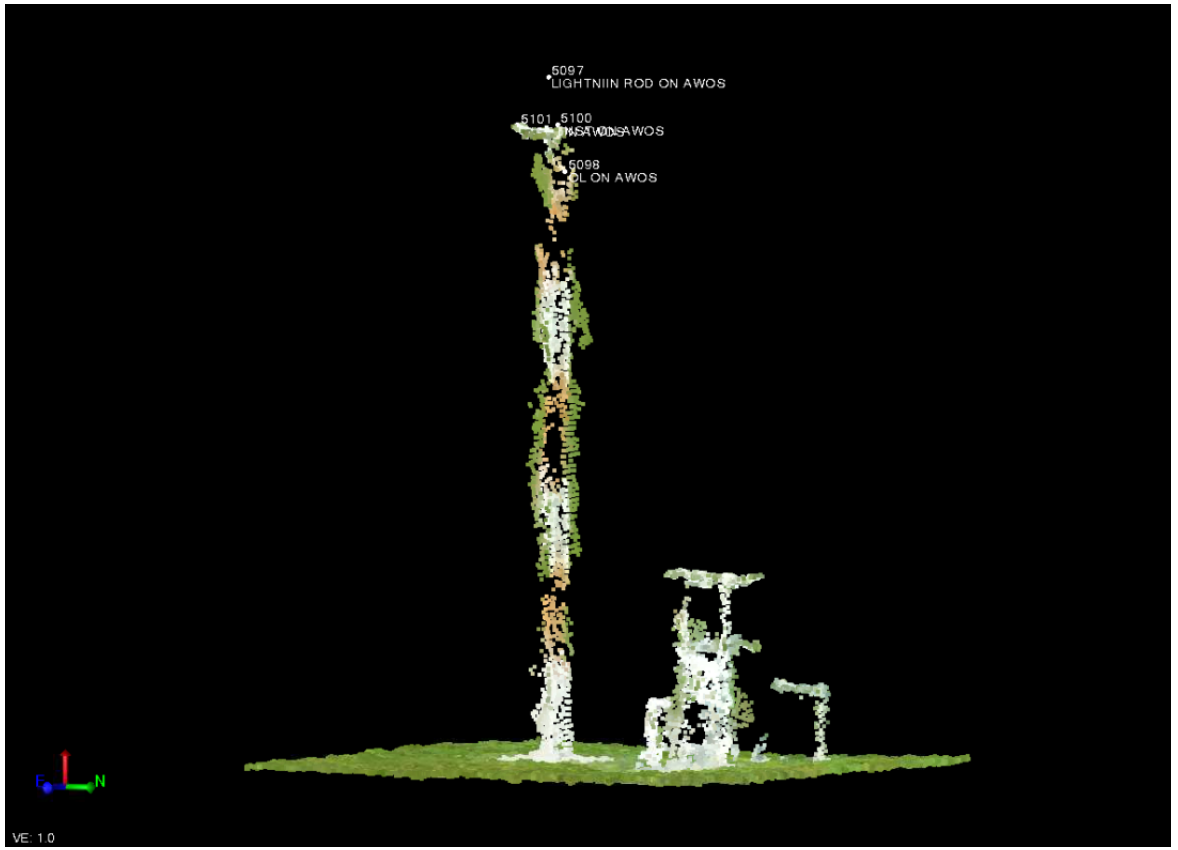
The FAA has concluded their initial research (in the 'completed applications') and have prepared final reports that summarize the research results and findings.

- Airport Safety Papers & Publications (faa.gov)
- On Airport Unmanned Aircraft System Operations | Federal Aviation Administration (faa.gov)

Ongoing
UAS Airport Applications

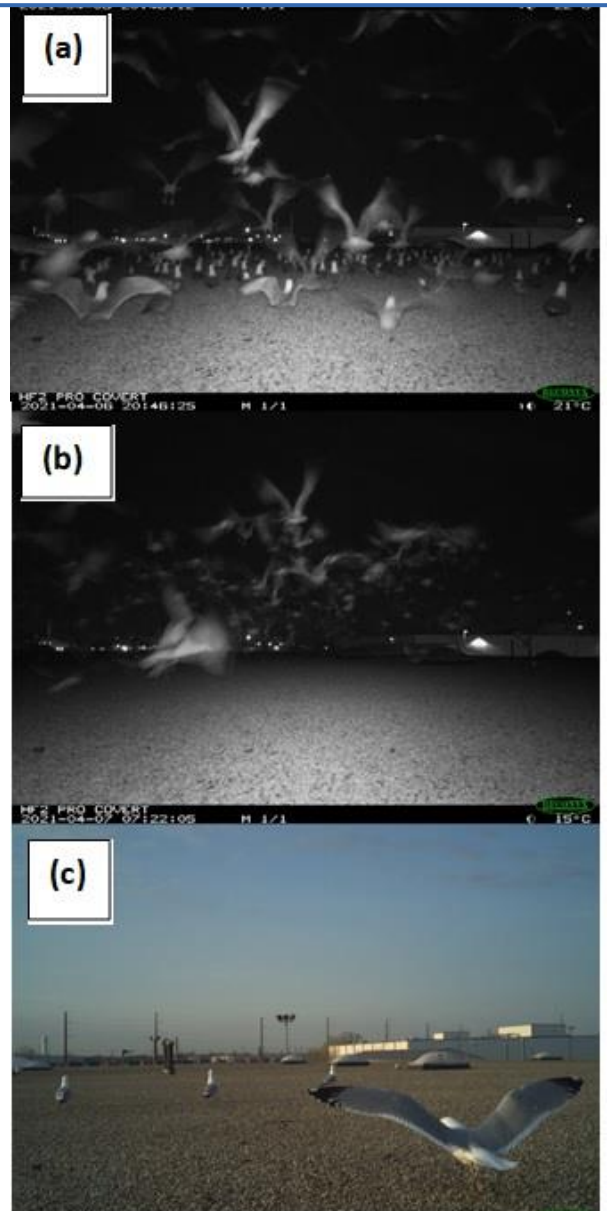
Point Cloud-Based Obstacle Data Collection and Processing

- **Research Approach:** ATR is conducting a research effort exploring the feasibility of using autocorrelated point cloud processing techniques and LiDAR to collect UAS obstacle data. This includes conducting testing at 5 airports.
- **Accomplishments**
  - Processed more than 40 previously-collected datasets (from three airports) with multiple software packages.
  - Interim report has been completed.
  - Initial field testing was completed at Atlantic City International Airport in July, 2024.
- **Next Steps**
  - The team will conduct UAS obstacle data collection at four additional airports in FY25.



Wildlife Dispersal

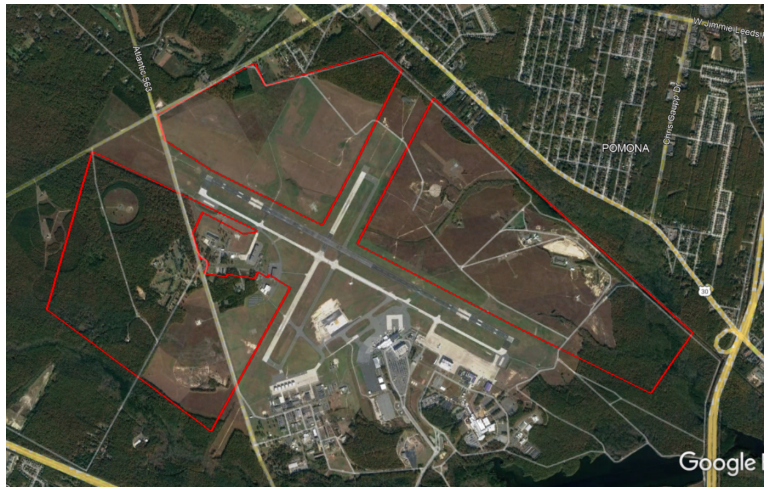
- **Purpose:** The FAA and U.S. Department of Agriculture – National Wildlife Research Center are collaborating to examine bird responses to various sUAS platforms.
- **Bird Responses Research Approach:**
  - Tested at four 'off-airport locations'
    - Controlled environment, landfill, two rooftop locations.
  - Tested various fixed wing, fixed wing 'predator model', quadcopter, and ornithopter (Robird®).
  - Subject birds: Turkey vultures, gulls, and red winged black birds.
- **Findings:**
  - The initial results from this research indicate that UAS can be used for dispersing specific species of birds.
    - Effectiveness varies between the bird species, UAS platform, and flight profile (direct v. overhead).
- **Accomplishments:**
  - Completed three peer reviewed journal articles



About 130 ring-billed and herring gulls flushed in response to an UAS hazing treatment (a and b). No gulls returned to the roof until the following morning (c).

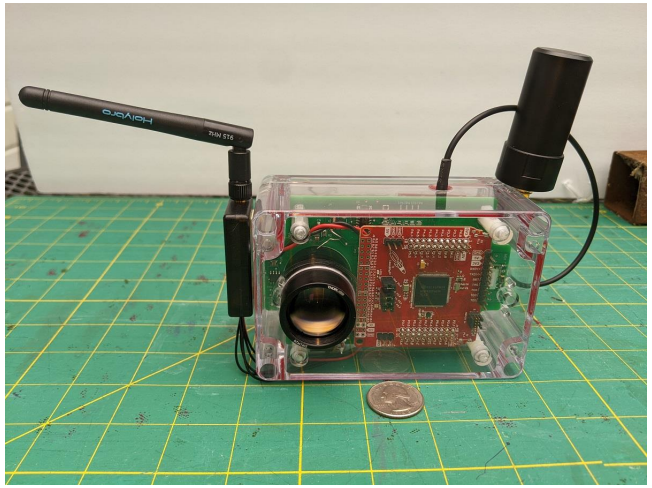
Wildlife Hazard Management 'Pilot Program' - ACY

- **Research Approach:** At the beginning of FY 24, in partnership with the US Department of Agriculture – Wildlife Services ATR initiated the 'Pilot Program' at Atlantic City International Airport (ACY) to evaluate the use of sUAS for wildlife dispersal and monitoring in an airport environment.
- **Accomplishments:**
  - A total of 123 UAS flights have been conducted by USDA at ACY, as of July 2024.
- **Next Steps:**
  - UAS operations will continue through the end of 2024.
  - A final report will be drafted by USDA summarizing pilot program results, lessons learned, and recommended procedures/best practices.



UAS-based Lighting Inspections

- **Research Approach:** ATR is working with the Rensselaer Polytechnic Institute (RPI) Lighting Research Center to conduct a research effort exploring the feasibility of utilizing UAS to measure airfield light fixture intensity.
- **Accomplishments:**
  - Worked to integrate a customized photometer payload developed by RPI with a commercial off-the-shelf UAS.
  - Initial integration testing was conducted in Troy, NY in December 2023.
  - Additional testing was conducted at the FAA's Research Taxiway at Cape May County Airport (WWD) in July 2024.
- **Next Steps:**
  - Data is currently being analyzed to determine if additional testing is necessary.
  - RPI will summarize the results in a final report at the conclusion of the project.



Planned
UAS Airport Applications

Drone-in-a-Box: Autonomously Deployed UAS

Purpose:

- Conduct research on the use of autonomously deployed UAS (i.e., ‘drone-in-a-box’) for conducting on airport applications.

Objective:

- The objective of this effort includes developing guidance to address the following :
  - Capabilities and limitations
  - Technical and operational considerations
  - Best practices

Research Approach:

- Start with ‘low risk’ applications such as Perimeter Fenceline Inspections (away from landing areas) and ARFF response (on closed surfaces)
- Conduct on-airport BVLOS operations
- Conduct testing at one towered and one non-towered airport
- Test for three months at each airport

Autonomously Deployed UAS System located at FedEx R&D Facility (Memphis, TN)

Drone-in-a-Box: Autonomously Deployed UAS (cont.)

Broad Agency Announcement (BAA):

- White paper 'call' was issued in January 2024.
  - BAA Call 009 ARAS0012 Revised 2 - SAM.gov
- Eleven white papers were submitted
- Soliciting proposals from companies that submitted most promising white papers (i.e., that met/exceeded all of the 'requirements' in the data call)

Next Steps:

- Initiate research in early FY 25

BAA 692M15-20-R-00004
White Paper Call 009
REVISIONS IN RED

Autonomously Deployed Small Unmanned Aircraft Systems "Drone-in-a-Box" for On-Airport Applications

February 7, 2024

This Call (01~~2~~09) for white papers is being issued in accordance with FAA Broad Agency Announcement (BAA) 692M15-20-R-00004, which was posted on FAACO.com on December 05, 2019 and last updated on sam.gov on February 7, 2024. Respondents must refer to the document entitled 692M15-20-R-00004 Rev R19, Amendment 018 (February 7, 2024) in conjunction with this Call to prepare and submit their white paper. All instructions set forth in the 692M15-20-R-00004 Rev R19, Amendment 018 solicitation document apply to the Call. This Call provides supplemental information and specific criteria to the Government requirements. Information included herein applies to this Call only.

The FAA has an immediate requirement in support of research Topic Number: ARAS0012 Autonomously Deployed Small Unmanned Aircraft Systems "Drone-in-a-Box" for On-Airport Applications as described below. White papers submitted under this call are due by close of business on February ~~15~~29, 2024. White papers received after that date will be considered under the BAA Topic related to this Call, however, selection of the technologies may already be complete for the specifics of this Call.

Topic Number: ARAS0012:
Autonomously Deployed Small Unmanned Aircraft Systems "Drone-in-a-Box" for On-Airport Applications

Technical POCs: Garrison Canter; Garrison.J.Canter@faa.gov
Michael DiPilato; Michael.DiPilato@faa.gov
Copy: 9-ACT-AAQ-600-BAA@faa.gov

Background:

The FAA's Airport Technology Research and Development Branch (ATR) is currently conducting research on how to integrate small-unmanned aircraft systems (sUAS) into the airport environment for various use cases (applications). These applications include: obstacle data collection, airfield pavement inspections, wildlife hazard management (dispersal and monitoring), perimeter inspections and surveillance, airfield lighting inspections, construction monitoring, foreign object debris (FOD) detection, and aircraft rescue and firefighting (ARFF). ATR is currently in the process of expanding their research portfolio to include additional applications that will improve airport safety.

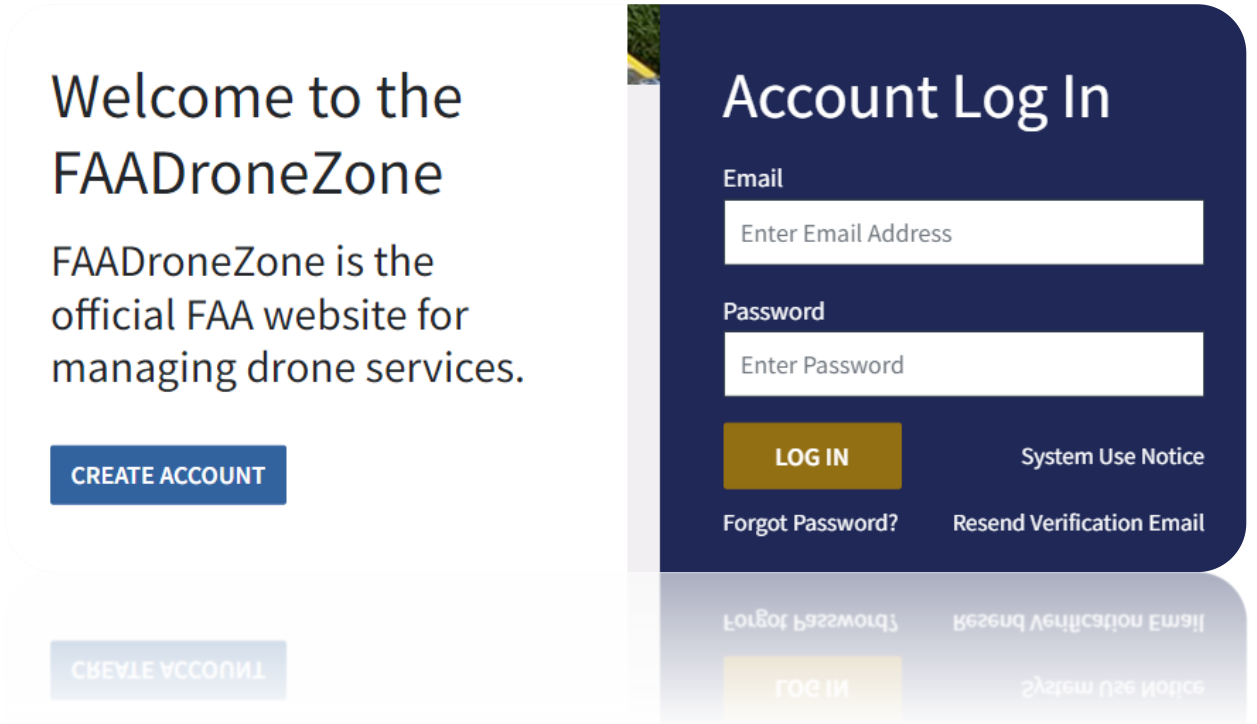
Development of Guidance for UAS Applications on Airports

Unmanned Aircraft Systems (UAS/Drones)

- Rapidly changing sector with immense changes expected over the next decade.
- Integrating drones in the National Airspace System (NAS) requires:
  - New regulations
  - Updates to existing regulations
  - New policies and procedures to safely and securely accommodate drones
- To meet industry and public demand, the FAA follows an integration strategy based on risk; that is, low risk operations are integrated first, followed by increasingly complex and higher-risk operations.

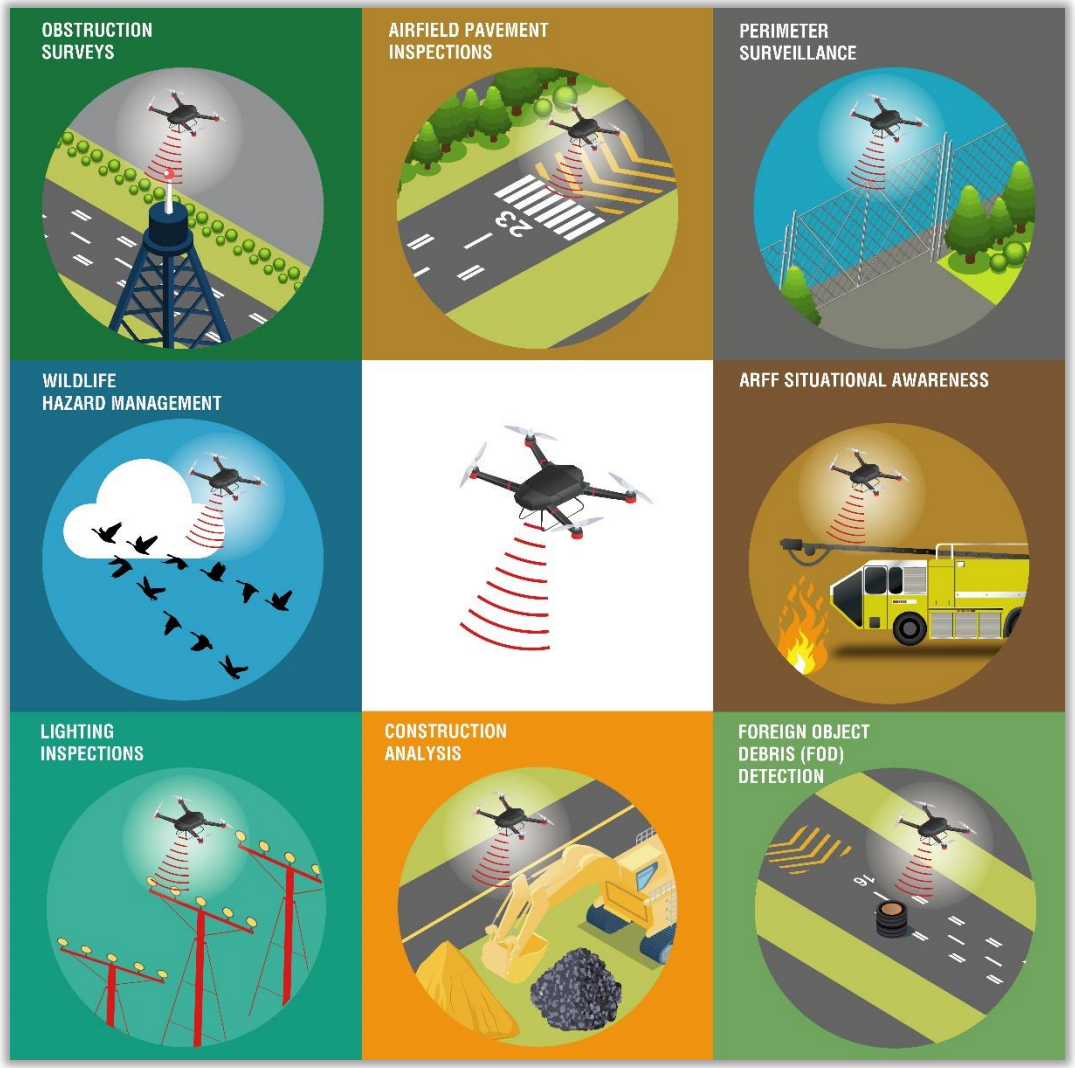
On-Airport UAS Operations

- sUAS authorizations at towered airports must use FAA DroneZone.
  - LAANC is not typically used for on-airport requests.
- Airport sponsors have the authority to approve/disapprove a sUAS operation requesting access to operate on an airport.
  - Careful consideration of grant assurances important for disapproval.
- ATO requires sUAS operators seeking authorization to fly under USC 44809, Part 107, and Part 91 COAs and from an airport to have confirmation of approval from the sponsor to access the airport



Small Unmanned Aircraft Systems (sUAS/Drones)

- Growing interest to leverage small UAS (sUAS) as a tool to supplement airport planning, construction, and operations.
- Based on initial research findings and ongoing collaboration with industry, ARP published a letter to airport sponsors with information to further assist with the safe integration and use of sUAS on airports.



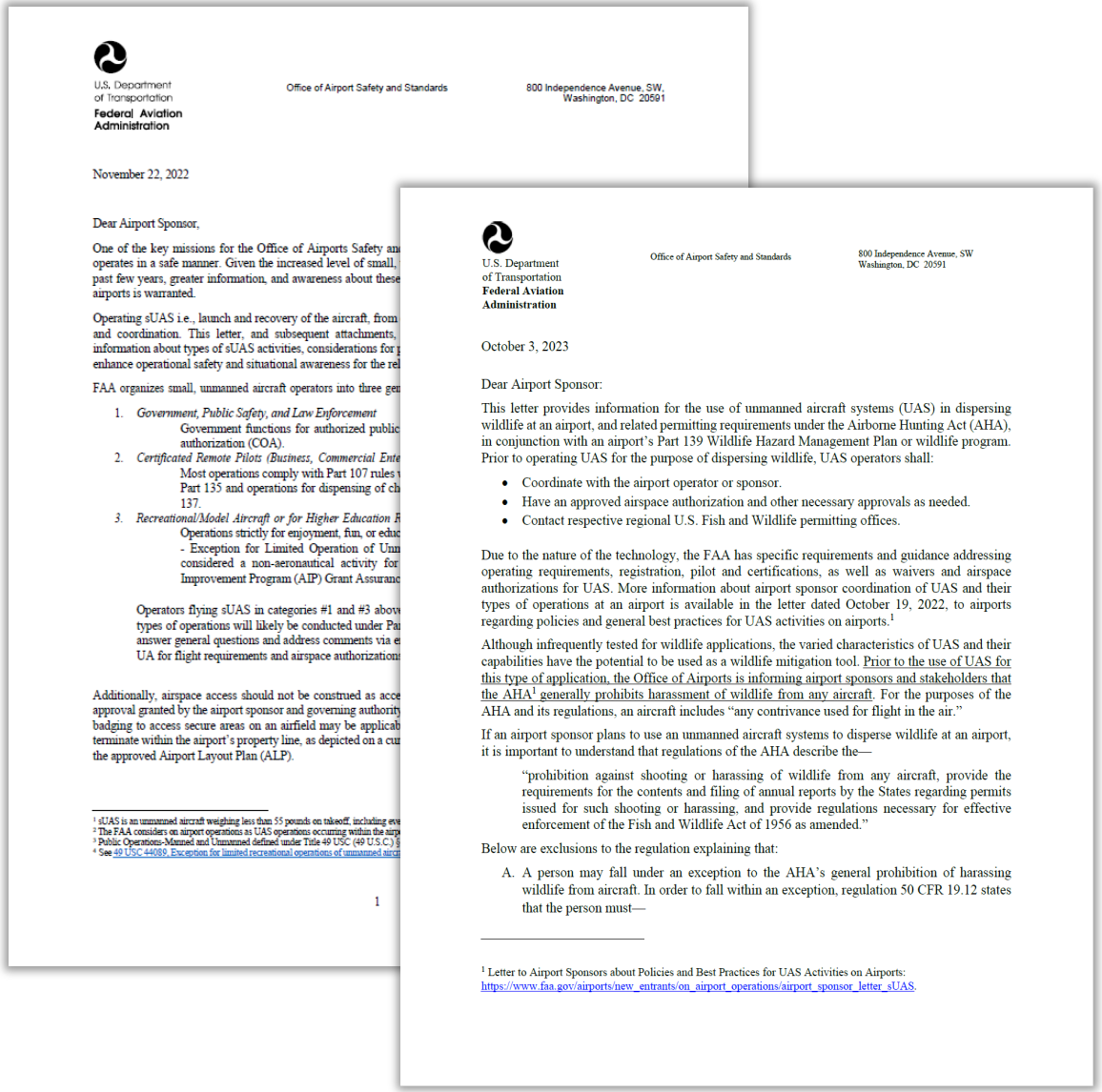
Summary of Recommended Performance Specifications for On Airport UAS Applications Based on Research		*Perimeter Inspections & Surveillance*	*ARFF Incident/Accident Documentation*	*ARFF Live Monitoring*
General UAS Performance Specifications				
General Item	**UAS Performance Specifications**	**Recommended Criteria**		
Flight Performance	Capable of stable and predictable flight behavior, including the capability to hover in a fixed position at a commanded altitude with no control input.	✓	✓	✓
Payload	If used solely for daytime inspections, the UAS is equipped with a visual camera payload. If utilized after dark the UAS is equipped with a thermal camera payload.	✓	—	—
	The UAS is equipped with both visual and thermal camera payloads.	—	—	✓
Flight Planning	The UAS is capable of operating utilizing preprogrammed waypoint flight plans.	✓	✓	—
Geofence	The UAS has the capability of restricting horizontal and vertical flight boundaries utilizing a programmable geofence.	✓	✓	✓
Return-to-home failsafe	The UAS includes a programmable return-to-home failsafe mode.	✓	✓	✓
Anti-collision beacon	The UAS is equipped with anti-collision lighting visible at a distance of at least 3 statute miles.	✓	✓	✓
Durability	When stored, ensure all UAS components are resistant to the typical shocks and forces a ground vehicle may be subjected to, including off-road driving.	✓	✓	✓
Live Streaming Performance Specifications				
General Item	**UAS Performance Specifications**	**Recommended Criteria**		
Resolution	The UAS can live stream payload footage at a minimum resolution of 1280 x 720 (720p).	✓	—	✓
Frame Rate	The UAS can live stream payload footage at a minimum refresh rate of 30Hz or 30 fps.	✓	—	✓
Visual Camera Payload Performance Specifications				
General Item	**UAS Performance Specifications**	**Recommended Criteria**		

On-Airport UAS Operations Guidance

November 22, 2022: Letter to *Airport Sponsors about Policies and General Best Practices for UAS Activities On Airports*

October 3, 2023: Letter to Airport Sponsors about Using UAS to Disperse Wildlife

Both letters available at:
www.faa.gov/airports/new_entrants/on_airport_operations



U.S. Department of Transportation
Federal Aviation Administration

Office of Airport Safety and Standards

800 Independence Avenue, SW,
Washington, DC 20591

November 22, 2022

Dear Airport Sponsor,

One of the key missions for the Office of Airports Safety an
operates in a safe manner. Given the increased level of small,
past few years, greater information, and awareness about these
airports is warranted.

Operating sUAS i.e., launch and recovery of the aircraft, from
and coordination. This letter, and subsequent attachments,
information about types of sUAS activities, considerations for
enhance operational safety and situational awareness for the rel

FAA organizes small, unmanned aircraft operators into three ge

1. *Government, Public Safety, and Law Enforcement*
   Government functions for authorized public
   authorization (COA).
2. *Certificated Remote Pilots (Business, Commercial Ente*
   Most operations comply with Part 107 rules
   Part 135 and operations for dispensing of ch
   137.
3. *Recreational/Model Aircraft or for Higher Education F*
   Operations strictly for enjoyment, fun, or educ
   - Exception for Limited Operation of Unm
   considered a non-aeronautical activity for
   Improvement Program (AIP) Grant Assuranc

Operators flying sUAS in categories #1 and #3 abov
types of operations will likely be conducted under Pa
answer general questions and address comments via e
UA for flight requirements and airspace authorizations

Additionally, airspace access should not be construed as acce
approval granted by the airport sponsor and governing authorit
badging to access secure areas on an airfield may be applicab
terminate within the airport's property line, as depicted on a cu
the approved Airport Layout Plan (ALP).

[1] sUAS is an unmanned aircraft weighing less than 55 pounds on takeoff, including eve
[2] The FAA considers on airport operations as UAS operations occurring within the airp
[3] Public Operations-Manned and Unmanned defined under Title 49 USC (49 U.S.C.) §
[4] See 49 USC 44809, Exception for limited recreational operations of unmanned aircr

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U.S. Department of Transportation
Federal Aviation Administration

Office of Airport Safety and Standards

800 Independence Avenue, SW
Washington, DC 20591

October 3, 2023

Dear Airport Sponsor:

This letter provides information for the use of unmanned aircraft systems (UAS) in dispersing wildlife at an airport, and related permitting requirements under the Airborne Hunting Act (AHA), in conjunction with an airport's Part 139 Wildlife Hazard Management Plan or wildlife program. Prior to operating UAS for the purpose of dispersing wildlife, UAS operators shall:

- Coordinate with the airport operator or sponsor.
- Have an approved airspace authorization and other necessary approvals as needed.
- Contact respective regional U.S. Fish and Wildlife permitting offices.

Due to the nature of the technology, the FAA has specific requirements and guidance addressing operating requirements, registration, pilot and certifications, as well as waivers and airspace authorizations for UAS. More information about airport sponsor coordination of UAS and their types of operations at an airport is available in the letter dated October 19, 2022, to airports regarding policies and general best practices for UAS activities on airports.[1]

Although infrequently tested for wildlife applications, the varied characteristics of UAS and their capabilities have the potential to be used as a wildlife mitigation tool. Prior to the use of UAS for this type of application, the Office of Airports is informing airport sponsors and stakeholders that the AHA[1] generally prohibits harassment of wildlife from any aircraft. For the purposes of the AHA and its regulations, an aircraft includes "any contrivance used for flight in the air."

If an airport sponsor plans to use an unmanned aircraft systems to disperse wildlife at an airport, it is important to understand that regulations of the AHA describe the—

> "prohibition against shooting or harassing of wildlife from any aircraft, provide the requirements for the contents and filing of annual reports by the States regarding permits issued for such shooting or harassing, and provide regulations necessary for effective enforcement of the Fish and Wildlife Act of 1956 as amended."

Below are exclusions to the regulation explaining that:

A. A person may fall under an exception to the AHA's general prohibition of harassing wildlife from aircraft. In order to fall within an exception, regulation 50 CFR 19.12 states that the person must—

[1] Letter to Airport Sponsors about Policies and Best Practices for UAS Activities on Airports: https://www.faa.gov/airports/new_entrants/on_airport_operations/airport_sponsor_letter_sUAS.

Resource Links

General Information

- FAA Office of Airports
- New and Emerging Entrants on Airport
- FAA UAS Integration Office
- FAA Commercial Space Transportation

Advanced Air Mobility (AAM)

- Urban Air Mobility and AAM
- Advanced Air Mobility
- Engineering Brief No. 105, Vertiport Design
- Advanced Air Mobility Implementation Plan – "Innovate28"

Commercial Space

- New Applicant Pre-application Initial Contact Information

ATR Research

- AAM Research
- UAS Integration at Airports

Unmanned Aircraft Systems (UAS)

- On Airport UAS Operations
- Letter to Airport Sponsors about Policies and General Best Practices for UAS Activities On Airports
- UAS Detection, Mitigation, and Response on Airports
- Best Practices for the Submission of On-Airport UAS Detection and Mitigation System(s) into OE/AAA
- Public Safety and Government UAS Sighting Resources
- Law Enforcement Assistance Program

Questions ?

Mike Branum

Michael.Branum@faa.gov

https://www.faa.gov/airports/new_entrants

Jim Patterson
Manager, FAA Airport Safety R&D Section

Jim.Patterson@faa.gov

https://www.airporttech.tc.faa.gov/