Small Unmanned Aircraft
Project Aviation Safety Plan

Mission: Aerial Photography	Project Name: Rapid response mapping of coastal landscape change with UAS	Unit: Cape Cod N.S.
Anticipated Project Date: Feb 29, 2016 – Mar 4, 2016	Start Time: 0630	Ending Time: 1700

Project Plan Prepared by: Christopher Sherwood/Jeff Sloan/Mark Bauer	Title: Research Oceanographer UAS Operators/Analysts	Date: Dec 29, 2015
Note: Signature by the preparer verifies that all personnel have the required training for the mission. Attach Map, clearly showing areas to be flown; aerial hazards must be indicated.		
Project Plan Reviewed by:	Title: NPS Safety Aviation Manager	Date:
Project Plan Reviewed by:	Title: NPS Chief of Law Enforcement	Date:
Project Plan Reviewed by:	Title: NPS, IMR Reg. Aviation Manag.	Date:
Project Plan Reviewed by:	Title:	Date:
Project Plan Reviewed by:	Title:	Date:
This Flight is Approved by: Jeff Sloan	Title: Chief, National UAS Project Office	Date: Dec 29, 2015

Project Description:

1) UAS flights - A series of UAS flights will be flown along overlapping flight lines over the survey area. Flights will be launched and landed from an open, unoccupied location (e.g., a beach, parking lot, or lawn) with good sight lines and no overhead obstructions (e.g., trees, power lines, towers). Flight levels will be limited to <400 feet above ground levels and kept within line-of-sight, and flights will be visually monitored by certified operators. Target regions to be mapped are sandy beach environments with sparse vegetation, bluffs and dunes, vegetated uplands, and wetlands, including vegetated marsh and unvegetated tidal flats. Portions of flights will be over water. The aircraft will be a FAA-approved rotary-wing (helicopter) or fixed-wing aircraft with camera, GPS, radio-control, and autopilot capabilities.

2) Ground-control markers

Ground-control markers will be deployed by project personnel and surveyed in with differential GPS. Each of the approximately 10-15 markers will be made of durable fabric and placed on the ground temporarily during overflights. They will be deployed by foot by (a) team(s) of two, who will also survey their location. Marker locations on Nauset Spit and marsh locations may be placed by trained and properly equipped personnel operating a 14' outboard.

3) Ground-truth surveys

Walking surveys with continuously recorded differential GPS data, photos, and field notes describing vegetation cover (including canopy height) and ground texture will be made during the overflights. These surveys will be conducted by the same team(s) that deploy and recover the ground-control markers.

4) Construction of orthophotomosaic, digital surface map, and digital elevation map.

Software will be used to mosaic the images, rectify the mosaic with the ground-control points, and construct a digital elevation map using structure-from-motion algorithms. These activities will take place at the USGS offices.

Organization:

a. USGS Leads: Mark Bauer (USGS) and Todd Burton (USGS) and Jeff Sloan (USGS) - have go/no-go authority
b. USGS Coordinator: Christopher Sherwood (USGS)

c. Nearest Airport Manager:
ARTCC: Boston Logan International (KBOS) Freq. 124.725 118.250. Facility Manager: Ed Freni Ph. (617)-567-5400
Chatham Municipal Airport (KCQX), attended 1300Z-dusk. Facility Manager: Timothy Howard. Ph. (508)-945-9000
Barnstable Municipal Airport (KHYA). Facility Manager: Bud Breault. Ph. 508-775-2020
Provincetown Municipal Airport (KPVC). Facility Manager: Arthur Lisenby. Ph. 508-487-0241

d. NOTAM: 48 hours prior to start, contact Boston Center ARTCC (603)879-6655
e. Plan approval authority: Mark Bauer or Todd Burton - USGS National UAS Project Office
f. UAS Flights will be coordinated with NPS Cape Cod National Seashore dispatcher.

Safety Provisions:

a. All UAS flight activity will be within the defined FAA-DOI MOA boundary.
b. USGS or NPS visual observers will be utilized at all times.
c. UAS pilots will maintain a safe operating distance from manned and unmanned aircraft.

d. UAS operators are responsible for determining the airworthiness of their aircraft in accordance with the appropriate standard.
e. UAS operators must be credentialed to operate their aircraft by the FAA and/or their agency.
f. UAS operators who are not current in the aircraft must be supervised by a qualified and current operator. (OPM-11)
g. One Pilot in Command (PIC) will be designated for each flight and will be responsible for the safety of the UAS and persons and property along the UAS flight path.
h. All operators that use GPS as a sole source for navigation must check all NOTAMS and RAIM (receiver autonomous integrity monitoring). Flight under degraded RAIM is not authorized. http://www.raimprediction.net/
i. First aid kit and fire extinguisher will be on site.
j. Hearing and eye protection will be available and used as necessary.

Operational Provisions
k. USGS will maintain operational control of UAS assets at all times.

Attachments: ☒ Map (2 maps attached)	☒ Other: UAS air-worthiness certification	
Project Manager: Christopher Sherwood	Phone: 508-457-2269	Cell: 774-269-9399
Project Aviation Manager: Mark Bauer or other qualified operator	Phone: 303-236-1247	Cell: 303-949-9359
PIC: Mark Bauer or Todd Burton	Cell: 303-949-9359	Cell: 970-618-3854
Mission Operator: Mark Bauer and Todd Burton	Cell: 303-949-9359	Cell 970-618-3854
Observers: Mark Bauer, Todd Burton, Joe Adams, Geoff Debendetto and other qualified operators.		

Nature or Mission: Aerial Photography	UAS system to be used: Falcon Fixed and Falcon Hover	Accounting Code:
Projected Cost: TBD	USGS National UAS Project Office	GX16RL00F0J0100

Kits: SN 036 Falcon Fixed Wing SN 005 Falcon Hover	Make & Model: Falcon Fixed Wing and Falcon Hover	UAS Description: See appendix for Falcon Specifications	
Pilot Name(s): Mark Bauer, Todd Burton and other qualified operators		Pilot(s) Carded: ☒Yes ☐No	A/C Carded: ☒Yes ☐No
Flight Following Procedure: Flight following will be conducted using the Mission Planner software on the ground control unit of the Falcon system. Loss of Link setting will be return to the home waypoint.			
FM Receive: 2.4 GHz	FM Transmit: 900MHz	Tones: NA	
AM Air to Air: NA	AM Unicom: 122.95	ATC Freq: 128.8	

Start Location	Latitude	Longitude	Elevation	Description of Launch/Recovery Areas
Coast Guard Beach, Cape Cod Nat'l Seashore	N 41.8382°	W 69.945188°	MSL 3'	Beach or logical safe open area

Type of Flight	Personal Protective Equipment Requirements
☒ Falcon Fixed Wing	Eye protection will be used during run-up and launch. Personnel should dress appropriately for cold weather conditions. Temperatures could range from15-50°F.
☒ Falcon Hover	
☐ Pulse Vapor	
☐ Other:	

Military Training Route (MTR) Information

MTR	Route Legs-Altitude	Activity	Time	Time Zone
☐		☐Hot ☐Cold	Start Stop	☐UTC ☐Local
☐		☐Hot ☐Cold	Start Stop	☐UTC ☐Local
☐		☐Hot ☐Cold	Start Stop	☐UTC ☐Local

Other Airspace Deconfliction Procedures:
Flights will be coordinated with NPS Cape Cod National Seashore dispatcher located in Boston, 617-242-5659. The Eastham and Orleans Police and Fire Departments will be notified of flight times and locations.

Justification Statement for UAS flights:
The proposed project is directly related to Cape Cod National Seashore (CACO) enabling legislation to "preserve the natural and historic values of a portion of Cape Cod". According to the CACO General Management plan, the purposes of Cape Cod National Seashore are to:

- Preserve the nationally significant and special cultural and natural features, distinctive patterns of human activity, and ambiance that characterizes the Outer Cape, along with the associated scenic, cultural, and recreational values.
- Provide opportunities for current and future generations to experience, enjoy, and understand these features and values.

Coastal storms affect the park, reshaping natural features, changing habitats, and altering infrastructure and access to park features. The primary objective of the proposed UAS mapping is to explore methods for rapidly mapping coastal topography and habitat before and after storm events. The UAS system is expected to provide precise, accurate, and inexpensive geo-referenced images of topography and habitat in a non-intrusive manner. Once the initial maps have been made, subsequent mapping efforts will be conducted after significant storms to quantify changes, including erosion, deposition and changes in vegetation and habitat. Analysis of the initial maps and subsequent changes will be conducted by the USGS to improve quantitative models of response of natural coastal features to storms. This project will also provide an opportunity to formalize the permitting process for UAS research use in CACO and evaluate the role of UAS in the National Park system.

Special Instructions: Personnel should be prepared for field conditions and should take precautions for any possible inclement weather. Temperatures could range from 15-50 degrees F and rain/snow is possible. Caution should be taken to stay hydrated and under shelter from the various weather conditions.

Emergency medical attention and evacuation plan: Personnel certified in Advanced First Aid will be present during field operations. Any medical emergencies will be coordinated through emergency services (dial 911) and the Cape Cod dispatch (located in Boston) 617-242-5659. In the event of a medical incident, the medical incident commander for the USGS will be Sandy Brosnahan.

Risk Assessment Matrix				
	Severity			
Likelihood	IV Negligible	III Marginal	II Critical	I Catastrophic
Frequent A	2	3	4	4
Probable B	2	3	4	HIGH
Occasional C	1	2	SERIOUS	4
Remote D	1	MEDIUM	2	3
Improbable E	LOW	2	2	2

Reference the Aviation Risk Mgmt. Workbook, JHAs, etc., to assist completion of Risk Assessment

Assess the risks involved with the proposed operation. Use additional sheets if necessary.			
Describe the Hazard:	Pre-Mitigation hazards rate out as:		
	Likelihood A-E	Severity I-IV	Risk Level
1. Mid-air collision with another aircraft	E	I	1
2. Collision with personnel or the general public	C	II	2
3. Collision with vehicles or boats	B	II	2
4. Operating A/C outside of approved area	B	III	1
5. Operating aircraft outside of manual limitations	B	III	2
6. Collision with birds	D	IV	1

7. Fire	D	III	2
8. Heat/Cold Injury	C	II	2
9. Loss of Link with aircraft. (LOL)	C	II	3
10. Injury to fingers/hands due to spinning blades on aircraft	C	II	3
11. Bungee stake pulling out of ground and causing injury.	C	III	2
12. Reduced visibility when driving on dirt roads.	A	III	3
13. Watercraft incidents	C	II	3
14. Unplanned AV landing on water	D	II	2
Pre-Mitigation Overall Rating			**2**

Mitigation	Post Mitigation hazards rate out as:		
Mitigation:	Likelihood A-E	Severity I-IV	Risk Level
1. The project will be conducted during season when local aircraft traffic is low, and will be kept below 450'. Monitor local air traffic on universal communication (UNICOM) frequency 122.9 during all UAS flight operations. UAS PIC will practice "See and Avoid"	E	I	1
2. Flight patterns will be planned to avoid people on the ground when approaching for landings. Non-participating personnel will remain clear of the ground control station so as not to be a distraction to the operators. Landing areas will be established that minimize risk of impact to people. Project is planned for mid-week, off-season period when visitor traffic is low. NPS personnel in area will be alerted to flights.	D	II	2
3. Vehicles will be parked outside of operating areas. Flight lines will avoid parking areas.	D	IV	1
4. A/C will be programmed to stay within the operating areas in the event of LOL. Boundaries will be placed into flight software and will be monitored at all times while the aircraft is in the air.	D	IV	1
5. Operations outside of manual limitations will be approved by the AMD training division chief with concurrence of the OIC and RSO.	C	IV	1
6. If a bird is encountered and attempting to come in contact with the airplane then the pilot shall land as soon as practical in order to prevent injury to the animal. Project is planned to avoid nesting season.	E	IV	1
7. A fire extinguisher will be on site and available at all times. Eastham and Orleans police and fire departments will be alerted in advance to flight activities.	E	I	1
8. Personnel have been briefed on the possible weather conditions and advised to bring proper clothing and equipment. Anyone showing signs of exposure will be transported to a warm environment.	D	II	2
9. Prior to launching any aircraft the LOL settings will be verified. LOL setting will be set to have the aircraft return to its point of launch and loiter until LOL is reestablished on Com 1 or Com 2. If LOL happens for more than 5 minutes resulting in a mishap (Interagency Aviation Mishap Response 888-464-7427) will be notified with the last known location and heading of the UAV.	C	IV	1
10. Checklist procedures will be followed to ensure that personnel ensure that their hands stay clear of rotating blades.	D	II	2
11. All trained personnel are aware of the procedures for avoiding possible problems with a bungee launch. All observing personnel will be stay well clear of the launch area.	D	II	3
12. Wide spacing between vehicles will be maintained while driving to the launch site. Drivers will use caution on dirt roads, be alert for blind curves and sand drifting across roads. Personnel will be provided with appropriate tool to remove battery from A/C. Tool will be included with the kit.	C	IV	1
13. Watercraft safety procedures will follow guidance provided by US Coast Guard regulations and the Dept. of Interior Motorboat Operator	C	III	2

Certification Course. Personnel will wear insulted flotation suits and be in radio contact with land. In the event of a mishap, local fire and police and the US Coast Guard will be notified (call 911).			
14. In event of an unplanned AV landing on water, trained, suitably equipped personnel will attempt to retrieve the AV via watercraft. Ditch points will be discussed before each flight plan operations take place.	D	II	2
Post-Mitigation Overall Rating Success Probability/Benefits Statement: Success of the project will be measured by meeting the project objectives of photographing all of the target research area and the quality of the photographs allows for georectifying the photos. A high probability of success is expected. Overall risk will be reduced to an acceptable level by the use of various controls. The remoteness of the site and the design of the flight patterns will minimize the chance that visitors will be disturbed by the aircraft or that any visitors or personnel will be struck by the aircraft. In the event of any mishap the Park Superintendent will be notified.			**2 Med**

Appropriate Management Level for Risk Decisions		
Risk Level	Project	Incident
HIGH	OAS Associate Director	Incident Commander or Ops Chief
SERIOUS	OAS Division Chief	Incident Commander or Ops Chief
MEDIUM	Project Aviation Manager	Air Operations
LOW	UAS Pilot In Command	Air Operations

Mission Planning/Preflight Briefing Checklist: Review with all participants as part of preflight briefing

General Safety			
1. Chain of command, individual roles and responsibilities are identified to all participants?	☐ Yes	☐ No	☐ NA
2. Review the emergency evacuation plan.	☐ Yes	☐ No	☐ NA
3. Locate the nearest 1st Aid Kits	☐ Yes	☐ No	☐ NA
4. Locate nearest fire extinguishers.	☐ Yes	☐ No	☐ NA
5. Discuss communications plan and review cell coverage, and radio tests for field site.	☐ Yes	☐ No	☐ NA
6. Have ground hazards and safety been identified to all participants?	☐ Yes	☐ No	☐ NA
7. Do all personnel have the required PPE?	☐ Yes	☐ No	☐ NA
8. Participants briefed on landing announcements and do not recover UAS instructions (only trained personnel should recover the UAS).	☐ Yes	☐ No	☐ NA
9. Participants briefed on sterile cockpit expectations.	☐ Yes	☐ No	☐ NA
UAS Operators and Personnel			
10. Are all agency personnel qualified for the mission?	☐ Yes	☐ No	☐ NA
11. Is the pilot carded and experienced for the mission to be conducted?	☐ Yes	☐ No	☐ NA
12. Are pilot flight and duty times compromised?	☐ Yes	☐ No	☐ NA
13. Is the aircraft properly carded?	☐ Yes	☐ No	☐ NA
14. Is the aircraft capable of performing the mission with a margin of safety?	☐ Yes	☐ No	☐ NA
15. Are there enough (qualified) agency personnel to accomplish the mission safely?	☐ Yes	☐ No	☐ NA
UAS Flight Operations	☐ Yes	☐ No	☐ NA
16. Are all aerial hazards identified and known to all participants?	☐ Yes	☐ No	☐ NA
17. Can terrain, altitude, temperature or weather that could have an adverse effect be mitigated?	☐ Yes	☐ No	☐ NA
18. Have mitigating measures been taken to avoid conflicts with military or civilian aircraft?	☐ Yes	☐ No	☐ NA
19. Have adequate landing areas been identified and or improved to minimum standards?	☐ Yes	☐ No	☐ NA
20. Has ditch point locations been discussed in event of a power loss?	☐ Yes	☐ No	☐ NA
21. Have the proper approvals been given by FAA?	☐ Yes	☐ No	☐ NA
22. If flying in restricted airspace, has notification been made with controlling authority prior to launching UAS?	☐ Yes	☐ No	☐ NA
23. Have the retrieval instructions been discussed in the event of a loss of aircraft? Have the retrieval instructions been discussed in the event of a loss of aircraft?	☐ Yes	☐ No	☐ NA
24. Will adequate briefings be conducted prior to flight with all participants?	☐ Yes	☐ No	☐ NA
25. Is there an alternative method that would accomplish the mission more safely?	☐ Yes	☐ No	☐ NA
Other Special Cases			
26. Has a bird behavior observer been designated and has been briefed for flight operations?	☐ Yes	☐ No	☐ NA
27. Other -	☐ Yes	☐ No	☐ NA
28. Other -	☐ Yes	☐ No	☐ NA
Identify Corrections (if any):			

PIC Signature:		**Date:**	**Operator/Observe Signature:**		**Date:**

Project Aviation Safety Briefing

Briefing Leader: _____

Briefing Date: _____ Time: _____ Location: _____

Discussion Items:

__ a. Hazard Analysis – ground and aerial (as outlined in plan)

__ b. Safety Air Ops (Ground)

__ c. Safety Air Ops (Flight)

__ d. Military Training Routes

__ e. Flight Following

__ f. Frequencies

__ g. Lost Link Procedures

__ h. Emergency Evacuation Plan

__ i. Authorities

__ j. Weather Considerations

__ k. Watercraft Safety

__ l. Review applicable JHAs/Risk Assessments

__ m. Other

Briefing Attendees Signature and Concurrence:	

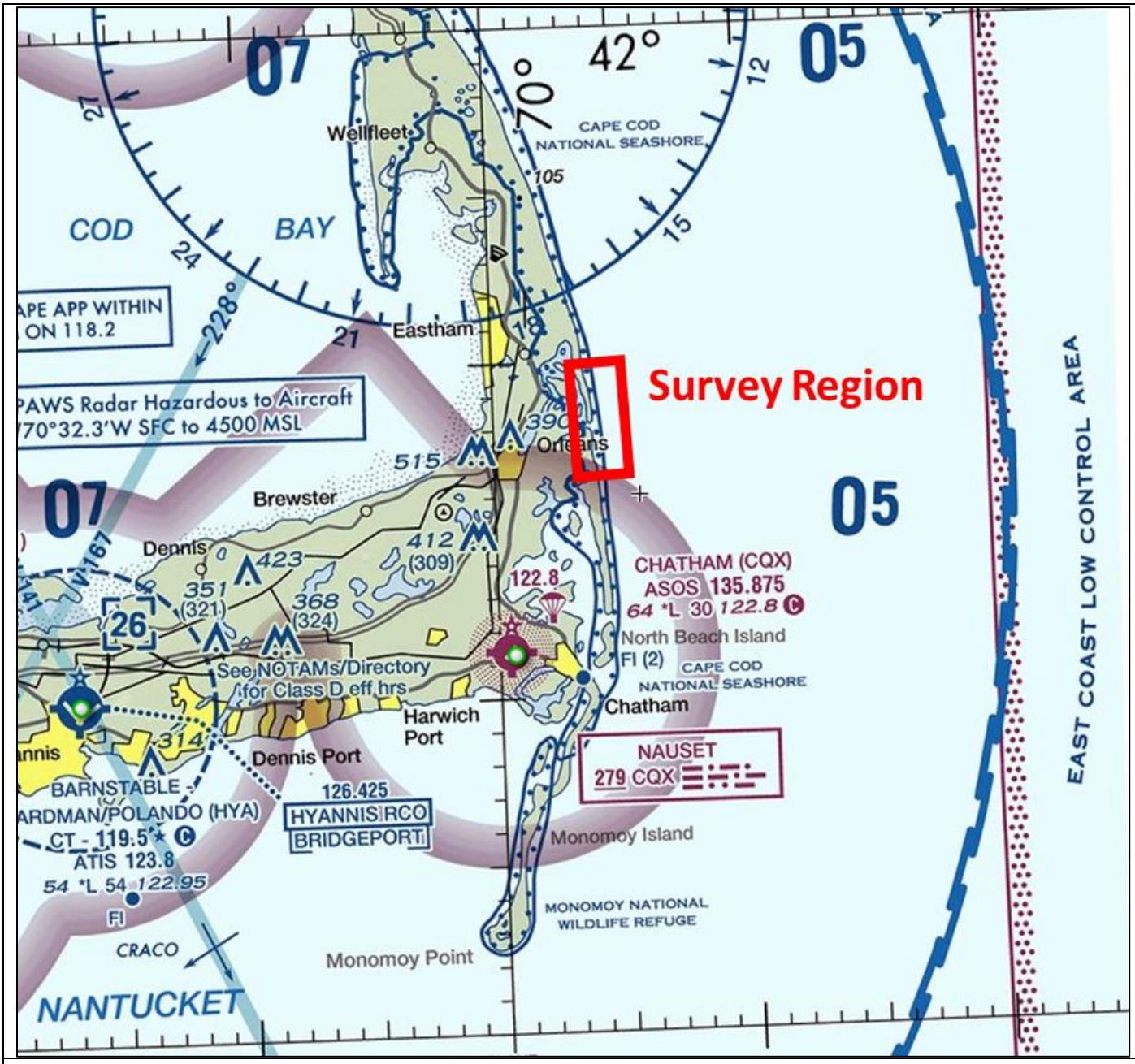

Figure 1. Proposed Project Survey Area – SkyVector Aero Chart of Cape Cod with Survey Region (red)

Figure 2. Example flight plan. Final plan will be optimized for 70% battery life and 50% image overlap.

Table 1. Survey Area (decimal degress, NAD83

Point	Lat	Long
NE	41.8428	-69.9471
SE	41.8207	-69.9379
SW	41.8203	-69.9475
NW	41.8435	-69.9532

Appendix 1. UAS Specifications- Falcon (Fixed Wing)

Capabilities

Falcon is a tactical, fixed wing, unmanned aerial vehicle (UAV). The Falcon is designed around a modular payload and airframe design concept allowing for multi-mission capabilities, easy setup, and simple logistics for long term support. Falcon is single person portable system which may be operated by a single individual and is transported in a custom soft bag with backpack straps, shoulder sling, and hand holds for easy transport. Falcon and Falcon Hover utilize interoperable components including shared payloads, shared batteries, and a shared ground control station.

Falcon is bungee launched using a single bungee cord attached to any object/structure that can withstand the pull force of 15lbs (8kg). Example launch attach points include trailer hitches, roots, branches, tree trunks, brush, fence posts, a stake in the ground, and even a person holding the end of the bungee. The bungee launch provides most of the energy for launch thereby reducing the physical strength requirements to launch the aircraft. The bungee launch also directs the aircraft along a desired launch path and gains altitude rapidly allowing for operations in tightly constrained locations including forested areas, narrow paths, roadways, parks, parking lots, etc.

Falcon uses a parachute recovery as the primary landing method however a secondary landing method is a conventional belly landing. The parachute recovery allows for recovery in constrained environments as well as areas with rugged ground cover. During a parachute recovery the aircraft lands motor first.

Specifications

Communications:	Secure Digital Datalink (Up to 256 bit AES encryption)
Autopilot:	Pixhawk Autopilot by 3D Robotics
Sensor Suite:	Ublox GPS, Barometric Pressure Sensor, Dynamic Pressure Sensor, Redundant 3
Sensor Suite:	Axis Accelerometers, Redundant 3 Axis Rate Gyros
Control Modes:	GPS Waypoint Navigation and Multiple Semi-Autonomous Flight Modes
Launch Method:	Bungee Hand Launch / Bungee Rail Launch
Recovery Method:	Parachute or Belly Landing
Endurance:	60+ min (operations/mission dependent)
Assembly:	Less than 2 min
Ready to Launch:	Less than 10 minutes
Take Off Weight:	Up to 12 lb (Payload Dependent)
Payload Weight:	Up to 2.5lbs
Flight Endur. Range:	30-60 miles
Communicat. Range:	6+ miles (terrain / antenna dependent)
Dash Speed:	45 knots
Cruise Speed:	27 knots
Operating Altitude:	Up to 2000 ft AGL
Service Ceiling:	Tested to 12,000 ft, estimated maximum altitude of 15,000 ft MSL
Assemb. Dimensions:	96" width (span) x 17" height x 54" length
Packed Dimensions:	14" width x 7" height x 54" length

Falcon Hover (Vertical Take-off and Landing VTOL)

Capabilities

Falcon Hover (or Hover) is a tactical, quadcopter, unmanned aerial vehicle (UAV) with a top mounted fuselage capable of front mounted and bottom mounted payload options. Falcon Hover is designed around a modular payload and airframe design concept allowing for multi-mission capabilities, easy setup, and simple logistics for long term support. Hover is a single person portable system which may be operated by a single individual and is stored in a custom soft bag with hand holds for easy transport. Falcon and Falcon Hover utilize interoperable components including shared payloads, shared batteries, and a shared ground control station.

Falcon Hover is a Vertical Take Off and Landing (VTOL) aircraft. The VTOL launch and recovery of the aircraft allow for operations in tightly constrained locations including forested area, narrow paths, roadways, parks, parking lots, etc. Takeoffs and landings can be conducted in areas smaller than 8ft x 8ft.

Specifications

Communications:	Secure Digital Datalink (Up to 256 bit AES encryption)
Autopilot:	Pixhawk Autopilot by 3D Robotics
Sensor Suite:	Ublox GPS, Barometric Pressure Sensor, Dynamic Pressure Sensor, Redundant 3 Sensor
Suite:	Axis Accelerometers, Redundant 3 Axis Rate Gyros
Control Modes:	GPS Waypoint Navigation and Multiple Semi-Autonomous Flight Modes
Launch Method:	Vertical Takeoff
Recovery Method:	Vertical Landing
Endurance:	20-25+ min @ 5,800' MSL (operations/mission dependent)
Assembly:	Less than 2 minutes
Ready to Launch:	Less than 5 min
Take Off Weight:	Up to 7.5 lb (Payload Dependent)
Payload Weight:	Up to 2.5 lbs
Flight Endur. Range:	2+ Miles
Communicat Range:	6+ Miles (terrain / antenna dependent)
Speed:	0 to 15 knots
Operating Altitude:	Up to 1000 ft AGL
Service Ceiling:	Tested to 10,000 ft, estimated maximum altitude of 15,000 ft MSL
Assemb. Dimensions:	48" maximum tip to tip / 6" tall (without modular legs)
Packed Dimensions:	9" wide x 7" height x 24" length

Appendix 2. DOI-Office of Aviation Services Statement of Falcon UAS Air-worthiness.

United States Department of the Interior
Office of Aviation Services
300 E. Mallard Dr., Ste 200
Boise, Idaho 83706-3991

In reply refer to:

December 10, 2015

Memorandum

To: Earl Lawrence, Federal Aviation Administration

From: Mark Bathrick, Department of the Interior Acting ERIN HORSBURGH

Subject: Airworthiness Statement for Department of the Interior (DOI) Falcon and Falcon Hover Systems

The Department of the Interior intends to operate its fleet of Falcon and Falcon Hover aircraft for a variety of missions throughout the United States. These aircraft have been passed the NASA-Ames Airworthiness review process. DOI considers these aircraft to be airworthy based on the standards required by the NASA-Ames Airworthiness Review Board. DOI UAS operators have the final responsibility to determine airworthiness based upon the minimum equipment requirements and procedures outlined in the Falcon and Falcon Hover Operator's Manual. Department of the Interior fleet aircraft (including small UAS) are inspected on an annual basis. This inspection determines that the UAS has the minimum required equipment per the manufacture's operating handbook and function as intended by the manufacturer. Upon a satisfactory inspection the UAS inspector will issue a DOI Aircraft Data Card (OAS-36U) indicating the date and expiration of the inspection. Copies of these aircraft data cards are included in each COA application.

Warnings/Limitations

- DOI operators will only operate the small UAS provided it meets the minimum equipment requirement and function according to the procedures outlined in the manufacturer's operating handbook
- DOI operators have the final responsibility to determine the airworthiness of the small UAS.
- DOI operators will comply with all provisions of the COA or MOA when conducting operations within the national airspace system.
- Warnings and Limitations will be provided in each COA application submitted by DOI as part of the document package.