Unmanned Aircraft System (UAS) Flight Operations and User's Manual

TxDOT Flight Services

RECORD OF AMENDMENTS

Number	Date	Date Entered	Entered By
001	09 Apr 2018	09 Apr 2018	J. Martin
002	18 Oct 2018	18 Oct 2018	J.Martin
003	30 Sep 2019	30 Sep 2019	J.Martin
004	23 Jun 2020	23 Jun 2020	J Martin

LIST OF EFFECTIVE PAGES

Page No.	Amendment No. Effective Date
1-61	Initial document release (09 Apr 2018)

i. TxDOT UAS Program

This *Unmanned Aircraft System (UAS) Flight Operations and User's Manual* describes the TxDOT UAS Program including:

- Organization, administration, and operation of the program.
- Ground operations.
- Air Operations.

This manual applies to all UAS operations and aircraft configurations including rotary-wing, fixed-wing, and hybrid aircraft.

For clarity and the logical flow of the manual, a distinction is made between what constitutes a ground operation versus an air operation:

- A ground operation occurs when the aircraft is not connected to or otherwise provided with a fuel source. In this condition the aircraft is incapable of generating propulsion.
- A flight operation occurs when the aircraft is provided a fuel source and is capable of generating propulsion.

Certain aspects of ground and air operations are interdependent and subsequently processes and procedures may overlap.

ii. UAS at TxDOT

UAS is a tool used to collect qualitative (i.e., visual) and quantitative (i.e., metric) data. The role of UAS is similar to other tools used to collect these same types of data: the Global Positioning System (GPS), Light Detection and Ranging (LiDAR), RADAR, Sonar, optical surveying equipment, and close-range and vertical photogrammetry. In fact, UAS incorporates many of these data collection tools within its system.

However, unlike other tools, UAS is regulated by statute at the state and federal level. Local ordinances may also affect the use of UAS.

In addition to the regulatory aspects of operating a UAS, there are unique risks involved in operating an unmanned aircraft in the same airspace with manned aircraft. The risk becomes more complex with the aircraft operating near public roadways.

Because of the regulatory environment and the unique risks involved, a more thoughtful and measured approach is required when considering the use of UAS versus other data collection methods and technologies.

This manual has been developed to guide users in the safe operation of UAS in compliance with all local, state, and federal regulations. Adherence to the policies, rules, and regulations contained within this manual is mandatory.

iii. Regulatory Environment

The federal government has exclusive sovereignty of U.S. airspace. Congress has vested the Federal Aviation Administration (FAA) with authority to regulate the areas of airspace use, management and efficiency, air traffic control, safety, navigational facilities, and aircraft noise at its source (49 United States Code (U.S.C.) §§ 40103, 44502, and 44701-44735). Congress has directed the FAA to "develop plans and policy for the use of the navigable airspace and assign by regulation or order the use of the airspace necessary to ensure the safety of aircraft and the efficient use of airspace" (49 U.S.C. § 40103(b)(1)). Congress has further directed the FAA to "prescribe air traffic regulations on the flight of aircraft (including regulations on safe altitudes)" for navigating, protecting, and identifying aircraft; protecting individuals and property on the ground; using the navigable airspace efficiently; and preventing collision between aircraft, between aircraft and land or water vehicles, and between aircraft and airborne objects (49 U.S.C. § 40103(b)(2)).

Consistent with its statutory authority, the FAA has developed policy to integrate small UAS (under 55 pounds) into the National Airspace (NAS). Current policy is provided in 14 Code of Federal Regulations (CFR) Part 107 and/or FAA Order 8900.1, Volume 16, *Unmanned Aircraft System (UAS)*, dated 29 August, 2016. All UAS operations are required to be in compliance with an FAA Certificate of Authorization (COA), Section 333 permissions, or 14 CFR Part 107.

iv. FAA Remote Pilot Certificate

A person acting as a Remote Pilot in Command (RPIC) of a UAS in the National Airspace System (NAS) under part 107 must obtain a remote pilot certificate with a UAS rating issued by the FAA prior to UAS operation. This provision under part 107 applies to UAS aircraft operated for commercial or governmental uses.

In accordance with FAA Advisory Circular 107-2, *Small Unmanned Aircraft Systems (sUAS)*, Section 5.2.2., *Person Manipulating the Flight Controls*, TxDOT allows a person who does not hold a remote pilot certificate or a remote pilot that has not met the recurrent testing/training requirements of part 107 to operate a UAS provided there is direct supervision from a RPIC and that the RPIC has the ability to immediate take control of the UAS in accordance with section 5.2.2.

v. Indemnification

TxDOT does not indemnify UAS operations or any individual persons engaged in any aspect of those operations. It is the responsibility of the provider of a UAS service to carry appropriate insurance to indemnify the provider in the event of a loss.

vi. Emergency Operations

This manual does not cover UAS operations for emergency or critical incident response. All UAS operations for emergency or critical incident response must be conducted in compliance with the controlling agency's rules and regulations.

vii. Important Information Links

Integration of UAS into the NAS is an evolving process. Users of this technology must stay informed on new policies and procedures from federal, state, and local authorities. The following Internet links are provided as one of many resources available to help users stay informed.

FAA *Unmanned Aircraft Systems* webpage
https://www.faa.gov/uas/

Texas Legislature Online website:
http://www.legis.state.tx.us/

Table of Contents

Section i — TxDOT UAS Program....ii
Section ii — UAS at TxDOT....ii
Section iii — Regulatory Environment....iii
Section iv — FAA Remote Pilot Certificate....iii
Section v — Indemnification....iii
Section vi — Emergency Operations....iii
Section vii — Important Information Links....iv

1. TxDOT UAS Program....1-1
Section 1.1. — Organization and Administration....1-2
Section 1.2. — Safety Management System (SMS)....1-2
Section 1.3. — Program Operation....1-3

2. Ground Operations....2-1
Section 2.1. — Flight Crew Requirements....2-2
Section 2.1.1. — Remote Pilot in Command....2-2
Section 2.1.2. — Visual Observer (VO)....2-3
Section 2.1.3. — Secondary Remote Pilot in Command (SRPIC)....2-4
Section 2.1.4. — Additional Visual Observer (AVO)....2-4
Section 2.1.5. — Recurrent Training....2-4
Section 2.2. — Project Risk Assessment (PRA) 2-4
Section 2.3. — Flight Planning 2-6
Section 2.3.1. — Flight Planning General Rules....2-6
Section 2.3.2. — Flight Plan....2-9
Section 2.3.3. — Traffic Control Plan....2-10
Section 2.4. — Health and Safety Plan....2-10
Section 2.5. — In-Flight Emergency Plan....2-12
Section 2.5.1. — Total Loss of Aircraft Power....2-13
Section 2.5.2. — Partial Loss of Aircraft Power....2-15
Section 2.5.3. — Airspace Encroachment....2-16
Section 2.5.4. — Loss of Aircraft Control....2-17
Section 2.5.5. — Erratic Aircraft Behavior....2-17
Section 2.5.6. — Aircraft Fly-Away....2-18
Section 2.5.7. — Bird Strikes....2-19
Section 2.5.8. — Fixed Object Strikes....2-19
Section 2.5.9. — Interference with Flight Crew....2-20
Section 2.5.10. — Nearby Emergency Operations....2-20
Section 2.6. — Downed Aircraft Recovery Plan (DARP)....2-21

Section 2.6.1. — DARP General Rules....2-21
Section 2.6.2. — The DARP Procedures....2-22
Section 2.7. — Accident Reporting....2-23
Section 2.7.1. — TxDOT Reporting Requirements....2-23
Section 2.7.2. — FAA Notification Requirements....2-24
Section 2.7.3. — NTSB Notification Requirements....2-25
Section 2.8. — Maintenance....2-25
Section 2.9. — Aircraft Registration Number....2-25
Section 2.10. — Logs and Records....2-26
Section 2.10.1. — Pilot Log....2-26
Section 2.10.2. — Aircraft Maintenance Log....2-26
Section 2.10.3. — Record Retention....2-26

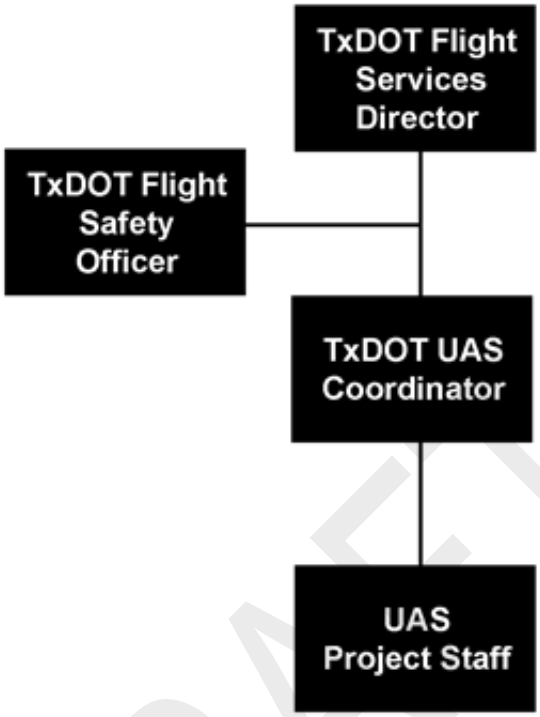
3. Air Operations....3-1
Section 3.1. — Flight Crew Organization....3-2
Section 3.2. — Flight Crew Duty Day....3-2
Section 3.3. — Flight Crew Health....3-2
Section 3.4. — On-Location Risk Assessment....3-3
Section 3.5. — Flight Procedures....3-4
Section 3.6. — Privacy Issues....3-5

4. Appendix....4-1
Appendix A — Example Flight Plan....4-2
Appendix B — Pre-approval Form....4-5
Appendix C — In-Flight Emergency Checklist....4-7
Appendix D — Downed Aircraft Emergency Plan (DARP) Checklist....4-17
Appendix E — Accident Report Form....4-18

1. TxDOT UAS Program

1.1. Organization and Administration

The TxDOT UAS Program organization chart is shown below.



The TxDOT UAS Coordinator is granted authority by the TxDOT Flight Services Director to review and approve UAS operations conducted by or on behalf of TxDOT.

TxDOT staff may observe flight operations but are not allowed to interact or communicate with the flight crew during flight operations without first obtaining permission from the RPIC prior to commencement of the flight operations. If permission to communicate with the flight crew is granted, TxDOT staff will limit communication to the Visual Observer who will then communicate with the RPIC as needed. TxDOT staff is prohibited from interacting or communicating with the flight crew during critical phases of the flight (e.g., take-off and landing).

If the UAS Coordinator or designee is observing a flight and notices a deviation from the rules and requirements contained within this manual, that person may request that all flight operations cease until the deviation can be resolved.

1.2. Safety Management System (SMS)

The Safety Management System (SMS) is used to:

- Identify safety risks and hazards and implement mitigating processes and procedures.

- Establish an organizational management structure with key safety personnel to plan, implement, and maintain emergency response procedures.
- Develop change management procedures, continuous improvement processes and safety performance metrics and monitoring procedures.
- Provide safety training, communication, and education to create an organization-wide safety culture.

The objective of the SMS is to promote safe, efficient, and effective UAS operations. This is accomplished through identification and mitigation of risks and hazards to as low a level as possible

The following safety management principles are used to develop the SMS:

- Safety is recognized by management and staff as an integral, vital, and necessary part of the organization.
- Safety is critical and is the top priority of the organization.
- The supervisor in charge is responsible for safety.
- Each individual involved in an operation must recognize safety as being their primary responsibility, including the safety of their fellow workers and the public.
- During flight operations, the RPIC is the supervisor in charge and is responsible for safety including:
  - Final authority to refuse to perform or to discontinue a mission based on safety or security concerns.
  - Finalizing planned take-off and landing locations based on field conditions at the time of the flight.
  - Changes or deviations from the planned flight based on field conditions at the time of the flight.

Requirements for the RPIC are listed in Section 2.1.1., *Remote Pilot in Command (RPIC)*.

The SMS is composed of the following documents:

- The Flight Plan.
- The Health and Safety Plan.
- The In-flight Emergency Response Plan.
- The Downed Aircraft Recovery Plan (DARP).

1.3. Program Operation

The TxDOT UAS Program is designed to be flexible while ensuring that all UAS activities are conducted in the safest manner possible in compliance with all statutory requirements. To this end, all UAS flights are required to have:

- A flight plan providing information about the proposed flight.
- A Project Risk Assessment (PRA) completed prior to the flight.
- Appropriate liability insurance.

Depending on the project, pre-approval from the TxDOT UAS Coordinator may be required prior to any flight operations.

For all projects, a flight plan must be submitted to the following e-mail address TxDOT-UASFlightPlan@txdot.gov prior to the flight. Only flight plans (and pre-approval forms if required) are to be submitted to this e-mail address.

In the subject line of the e-mail type "Flight Plan" and the three letter designation of the TxDOT District or Division for which the flight is being conducted. For example, a flight for the Houston District would have an e-mail subject line of "Flight Plan HOU." The flight plan serves as a record of all UAS flights done at the agency. An example flight plan is provided in Appendix A.

Projects that do not have the risk factors listed in Section 2.2., *Project Risk Assessment* can commence flight operations once the flight plan has been submitted. However, the flight plan must state that the risk factors in Section 2.2 do not apply to the flight.

For projects having any of the risk factors listed in Section 2.2., pre-approval of the flight by the UAS Coordinator is required before any flight operations can commence. A pre-approval request form must be submitted along with the flight plan to the e-mail address TxDOT-UASFlightPlan@txdot.gov. The pre-approval form is provided in Appendix B.

In the interest of safety, for any UAS flight, TxDOT reserves the right to impose additional flight and/or operational restrictions in addition to those listed in this document. The UAS Coordinator will provide the additional flight and/or operational restrictions to the flight planner by e-mail. The additional restrictions must be incorporated into the flight plan and the flight plan must be resubmitted for approval prior to any flight operations.

Any correspondence other than flight plans and pre-approval forms should be directed to the UAS Coordinator at the e-mail address TxDOT-UASCoord@txdot.gov.

For projects with risk factors, the UAS Coordinator will review the Flight Approval Request Form along with the flight planning data. The UAS Coordinator may consult with subject matter experts to determine if a flight operation should be approved. If the flight operation is approved, the UAS Coordinator will inform the flight planner by e-mail with an attached copy of the signed approved request form.

If the flight operation is not approved, the UAS Coordinator will inform the flight planner of the specific deficiency. Depending on the deficiency, the flight planner may have an opportunity to revise the flight plan and submit a revised request for reconsideration. However, UAS users should be aware that certain flight operations may never be approved based on risk.

Failure to perform the risk assessment, prepare the flight plan, or comply with the decision of the UAS Coordinator may result in discipline up to and including termination of employment.

2. Ground Operations

2.1. Flight Crew Requirements

A minimum UAS flight crew will consist of a Remote Pilot in Command (RPIC) and a Visual Observer (VO). Additional flight crew staff may be required depending on project characteristics.

2.1.1. Remote Pilot in Command (RPIC)

The minimal requirements for the Remote Pilot in Command (RPIC) are:

- A Federal Aviation Administration (FAA) Remote Pilot Certificate (14 CFR Part 107).
- Qualifying hours must be obtained independently for each type of flight mode: manual or autonomous.
  - The RPIC is only allowed to fly in the mode in which qualifying hours have been achieved.
  - Qualifying hours under one flight mode cannot be used to achieve qualification for operation under the other mode.
- A minimal of five qualifying hours of flight time for operation of a rotary-wing aircraft. A minimal of 20 take-off and landings for operation of a fixed-wing or hybrid aircraft. In addition, for fixed wing and hybrid aircraft the aircraft must reach a minimal altitude of 50 feet above ground level (AGL) and must reach its cruising airspeed for each of the 20 take-off and landing cycles.
  - Qualifying hours should be flown in Class G airspace.
  - Qualifying hours are required before any flight operations can be conducted in Class B, C, and D airspace or Class E airspace that starts at ground level.
  - Qualifying hours can be obtained during actual flight missions used to collect data.
- Familiarity with the specific UAS being operated.
  - Requires understanding and following of the manufacturer's instructions and manuals for flight operation and maintenance.
  - Requires understanding of the flight dynamics of the UAS type (e.g., rotary-wing, fixed-wing, or hybrid) being operated.
- Currency of operation of the UAS being used
  - Requires a minimal of three take-offs and landings of the UAS type (e.g., rotary-wing, fixed-wing, or hybrid) being used within one month of a project flight.
- Responsibility for and final authority for the flight mission and operation of the aircraft.
  - Responsibility for cancelling the flight mission if conditions (weather, mechanical, airspace, terrain, project, etc.) warrant.
  - Responsible for ancillary equipment including charged batteries, radios, and sensors.
  - Responsible for fuel consumption checks during the flight mission. The RPIC will check fuel consumption rate and remaining fuel available at regular intervals.
- Responsibility for safe conduct of field operations.

  - Adherence to the Health & Safety Plan.
  - Adherence to the In-Flight Emergency Plan.
  - Adherence to the Downed Aircraft Recovery Plan (DARP).
  - Ensuring access to a first aid kit and fire extinguisher.
  - Ensuring the use of Personal Protective Equipment (PPE) by the flight crew.
- Responsibility for pre-flight inspection of the project area.
  - Pre-flight site survey and local orientation of the project site.
  - Review of proposed take-off and landing sites.
  - Review of proposed secondary landing site.
  - Selection of an emergency ditch site.
  - Review of any obstacles or hazards missed during flight planning.
- Responsibility for pre-flight briefing and post-flight debriefing.
- Responsibility for pre-flight and post-flight inspection of UAS and ancillary equipment.
  - In accordance with the manufacturer's recommendation.
  - Verification that the aircraft is airworthy.
- Responsibility for flight documentation
  - Completion of pilot's logbook entries.
  - Completion of aircraft hours logbook for maintenance tracking.

2.1.2. Visual Observer (VO)

The minimal requirements for the Visual Observer (VO) are:

- A minimal of five qualifying hours of observation time with the UAS type (e.g., rotary-wing, fixed-wing, or hybrid) being operated.
  - Qualifying hours must be in Class G airspace.
  - Required before any observations can be conducted in Class B, C, and D airspace or Class E airspace that starts at ground level.
  - Qualifying hours can be obtained during an actual flight mission to collect data.
- Familiarity with the flight mission being conducted.
- Understanding of the risks involved in UAS field operations.
  - Weather factors impacting completion of the flight.
  - Hazards including natural hazards (e.g., animals, pests, sun exposure, heat exposure, etc.) and manmade hazards (traffic, aircraft intrusion, driver distraction, hostile landowners).
  - Intrusion of UAS airspace by manned aircraft.

- Intrusion of UAS airspace by other UAS aircraft.

2.1.3. Secondary Remote Pilot in Command (SRPIC)

For any project using a Secondary Pilot in Command (SRPIC) the minimal requirements are identical to those for the RPIC. The SRPIC must be prepared to assume responsibility for the flight when given control of the aircraft.

2.1.4. Additional Visual Observer (AVO)

For any project using an Additional Visual Observer (AVO) the minimal requirements are identical to those for the VO.

2.1.5. Recurrent Training

The RPIC must complete UAS refresher training every 24 months following receipt of the FAA Remote Pilot Certification. Recurrent training must include the following:

- Local, state, and federal regulations affecting the operation of the UAS.
- UAS emergency procedures.
- Maintenance and pre-flight inspection.
- UAS related topics.

Recurrent training is self-reported. The RPIC must maintain a training folder documenting all of the training received. The training folder must be made available to the UAS Coordinator on request.

2.2. Project Risk Assessment (PRA)

The Project Risk Assessment (PRA) is used to determine if pre-approval from the UAS Coordinator is required before a flight operation can take place. The PRA takes into account all aspects of a proposed project including:

- The FAA airspace classification.
- The proximity of airports and heliports.
- The complexity and hazards within the UAS operational airspace.
- Project specific characteristics:
  - Roadway traffic volume.
  - Roadway traffic speed.
  - Driver line-of-sight and the potential for driver distraction from UAS operations.
- Alternative technologies that potentially could collect the data more safely, efficiently, or cost-effectively.

The result of the PRA determines if the project requires pre-approval. This is a binary assessment used only to determine if pre-approval is required. No determination is made as to the relative degree of risk of any particular project.

Projects requiring pre-approval are:

- Any project located within class B, C, or D airspace or Class E airspace that starts at ground level.
- Any project requiring an exception from any of the general rules listed in Section 2.3.1., *Flight Planning General Rules*.
- Any project requiring an FAA waiver or authorization.
- Any project conducted within a railroad corridor.
- Any project requiring permission from a land owner as required by Texas Government Code Chapter 423.

Within Class G airspace:

- Any project located within two nautical miles of an airport or heliport with paved runway or helipad.
- Any project within 100 feet of the right-of-way of an interstate highway or any highway with three or more travel lanes in either direction.
- Any project with complex UAS operational airspace. In this context "complex" airspace relates to the number of potential obstructions and hazards present in the envelope of airspace that the aircraft will occupy during the flight. Examples of complex airspace are:
  - Urban areas with tall buildings, street lamps, signs, and utility lines.
  - Highway flyovers.
  - Narrow roadway corridors with utility lines, overhanging trees, and limited lines of sight.
  - Areas near electrical substations with numerous utility lines.
  - Areas near industrial complexes with towers, utility lines, or similar features.

  If there is any doubt of the airspace being complex, the assumption is that the airspace is complex and the flight must be approved by the UAS Coordinator.
- Any project that requires traffic control beyond warning signs. This includes any project that requires the placement of traffic cones on the roadway surface, speed reduction, or lane closure.

For projects that require pre-approval from the UAS Coordinator, the following information must be sent as an attachment to an e-mail sent to: TxDOT-UASFlightPlan@txdot.gov.

- The Flight Approval Request Form (Appendix B).
- The Flight Plan.
- The Traffic Control Plan (if required for the project. See Section 2.3.3., *Traffic Control*).

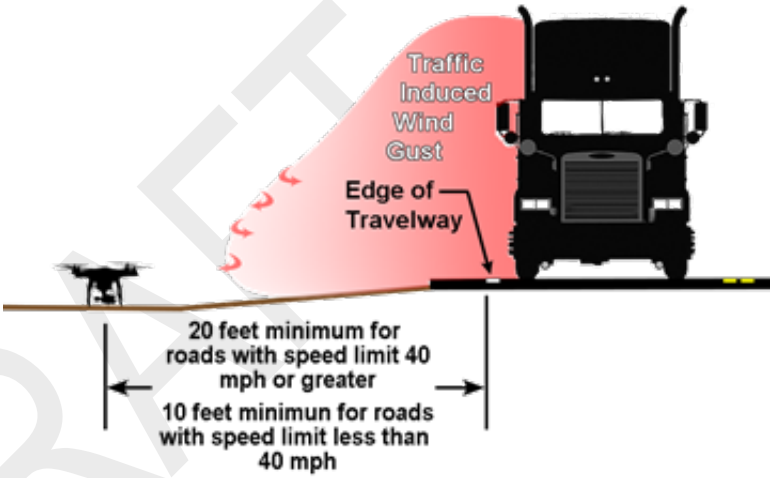
The submitted information will be reviewed within 48 hours. Upon approval or rejection, a return e-mail will be sent to the responsible party listed on the Project Request Form. In the event of a rejection, the UAS Coordinator will provide information regarding the specific reason(s) for rejection. Keep in mind that at this stage additional flight and/or operations restrictions may be imposed in the interest of safe flight operations.

2.3. Flight Planning

2.3.1. Flight Planning General Rules

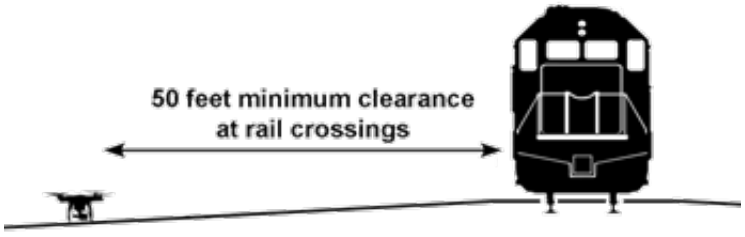
General rules for operating a UAS must be followed as a part of the flight planning process. Any deviation from a stated rule requires approval from the UAS Coordinator.

Rule 1: No aircraft will takeoff or land closer than 20 feet from the outer edge of the travel lane on roadways with a posted speed limit of 40 miles per hour or greater. For all other roadways, no aircraft shall take off or land closer than 10 feet from the outer edge of a travel lane.



The purpose of this rule is twofold: First, it is intended to reduce driver distraction due to UAS operations near the roadway. Second, it moves the aircraft out of the traffic-induced wind gusts extending from the travel lanes. Because take-off and landings are critical flight stages, operating in the unstable air caused by traffic is prohibited.

No aircraft will takeoff or land within 50 feet from the edge of the railway. When working within a railroad corridor, the flight crew will consult with a TxDOT rail inspector for the location of take-off and landing locations.

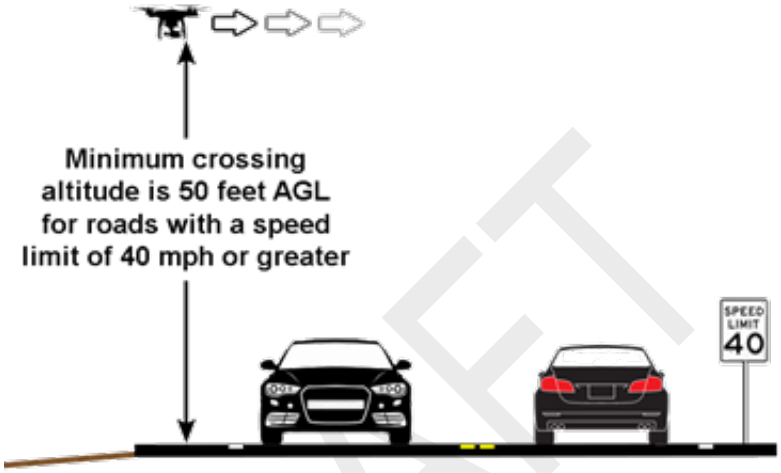


Rule 1 increases flight crew safety by locating their operations further from the roadway or railway. In general, it is recommended to take off and land a UAS as far from the roadway or railway as practical.

For some projects Rule 1 will require take-off and landing locations that are outside of the TxDOT right-of-way. In those cases, the flight planner must obtain right-of-entry from a nearby or adjacent private land owner to establish take-off and landing sites.

Rule 2: When an aircraft crosses a roadway:

- For roadways with a speed limit greater than 40 mph, the aircraft will cross the roadway at an altitude no less than 50 feet AGL.



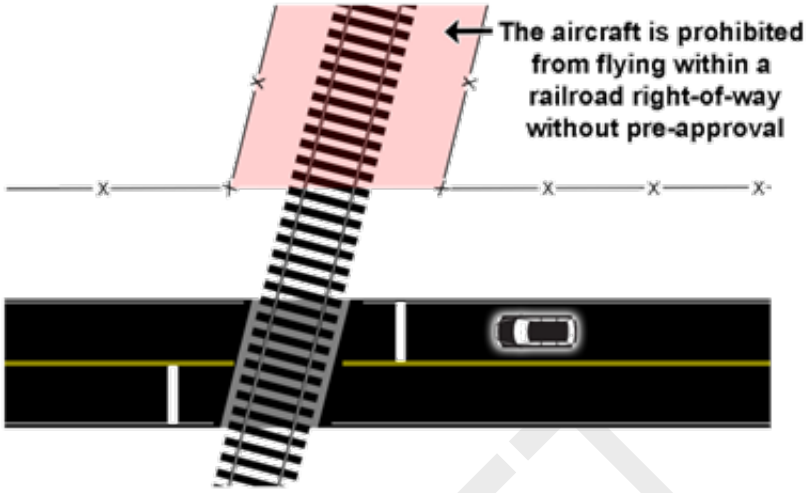
- The aircraft will cross the road at the highest altitude above ground level as practical.
- The aircraft will linger over the roadway no longer than necessary.
- The RPIC will attempt the crossing when no vehicle is closer than ¼ mile of the crossing.
- The RPIC will attempt to avoid a vehicle(s) passing directly beneath the aircraft during the crossing.

Rule 3: Take-off and landings between lanes of a divided highway is prohibited.

In general, the flight planner and flight crew should avoid locating the take-off and landing areas with traffic on both sides. This location can limit the options for an emergency landing if needed.

Rule 4: The aircraft will not operate within six feet of any fixed object. Fixed objects include buildings, utility poles, utility lines, signs, and trees among others. An aircraft can experience unexpected wind gusts near structures resulting in an impact and/or crash.

Rule 5: When working along a road right-of-way the aircraft is prohibited from entering into an adjacent railroad right-of-way. Any UAS project within a railway corridor requires approval by the UAS Coordinator.



Rule 6: No aircraft will operate under the deck of an overpass bridge with traffic on a lower roadway without an approved traffic plan. This restriction also applies to operation near roadway intersection fly-overs.

Rule 7: The aircraft will not operate directly above a roadway when vehicles are present.

- Data collection will always be from a "stand-off" position to the side of the roadway when vehicles are present. This rule is intended to prevent an aircraft from landing/impacting on the roadway in the event of a critical system failure.
- If flight directly above a roadway is required:
  - Approval by the UAS Coordinator is required.
  - Flight above the roadway will only take place when no vehicle(s) are directly below the aircraft.
  - A minimal of two VOs are required for traffic monitoring.
  - Lane closure may be necessary depending on the site characteristics.

- Alternative data collection technologies should be considered.

2.3.2. Flight Plan

All UAS projects require a flight plan. At a minimum, the flight plan is required to include:

- A project description including the following information:
  - A general description of the purpose of the flight mission.
  - A map showing the general project location in relation to nearby towns or cultural features.
  - The proposed flight date(s) and time(s) including backup date(s) and time(s).
  - The airspace classification in which the UAS will operate.
  - The location and distance to the nearest airport or airfield with either unimproved (e.g. grass) or improved (i.e., pavement) surfaces. If the closest airport has unimproved surfaces, show its location and the location of the closest airport with improved surfaces.
  - The planned operating altitude of the aircraft.
  - Any proposed FAA Notice to Airmen (NOTAM) to be issued for the project.
  - Any FAA waivers or authorizations for the flight.
- A project map with the following information:
  - A background base map showing general cultural features including structures, roadways, and railroads. The base map can be an aerial photographic image (orthophoto) or a raster map such as a USGS 7.5-minute quadrangle map.
  - The project area over which data will be collected.
  - The limits of the UAS operating area including maneuvering and turn areas.
  - The proposed take-off, landing, and secondary landing locations.

Depending on the nature of a project, additional factors may need to be considered when preparing the flight plan.

- Fuel requirements and flight time/distance limitations. It is recommended that the aircraft have a 20% fuel reserve at the end of each flight. In this instance, "end" means the aircraft on the ground with the propulsion system powered down.
- The possibility of inadvertent meteorological conditions.
- State and local flying rules and ordinances.
- Privacy (imagery spillage) issues.

Flight planners should be aware that as the complexity of a project increases, the complexity of the flight plan should increase accordingly. Additional information above and beyond the minimal requirements may be necessary to fully describe the flight. This is particularly true for projects requiring approval from the UAS

Coordinator. To avoid delays of complex projects it may be necessary to produce a more comprehensive flight plan for submittal. An example flight plan for a low complexity project is included as Appendix A.

2.3.3. Traffic Control

For purposes of Traffic Control, UAS operations will fall under the same procedures and requirements as land surveying operations. The UAS operator shall control traffic in and near the operation adequately to comply with provisions of TxDOT's *Traffic Standards TCP (S) – Traffic Control for Surveying Operations* which can be found on the State's Internet site. The UAS operator shall provide all necessary signs, flags, and safety equipment.

If traffic must be diverted or travel lanes closed, the UAS operator shall prepare a Traffic Control Plan based upon the guidelines in the latest edition of TxDOT's *Traffic Standards TCP (S) – Traffic Control for Surveying Operations*. This Traffic Control Plan must be approved by the State prior to commencement of field work. The UAS operator shall notify the TxDOT Public Information Office of the District where the work is to be performed at least five working days prior to commencement of the work. The UAS operator's field crew personnel on the job site shall be in possession of a copy of the approved plan at all times and shall make the plan available to the State's personnel for inspection upon request.

Depending on the particular roadway, location, time of day, daily traffic volume, or other variables and conditions the State may impose different or additional traffic control requirements at the discretion of the State's local office.

It is recommended to use both the "Survey Crew Ahead" and "Drones Operating In Area" warning signs for a UAS project. The "Survey Crew Ahead" sign should be placed in a position where motorists will see this sign first, followed by "Drones Operating in Area" spaced according to the table below. The rationale is that most people are familiar with surveying but less so with UAS operations. By viewing the surveying sign first, motorists will be more prepared for the sight of a UAS aircraft. The combination of signs may help reduce the possibility of driver distraction.

Posted Speed (mph)	Minimum Sign Spacing "X" Distance (feet)
30	120
35	160
40	240
45	320
50	400
55	500
60	600
65	700
70	800
75	900

2.4. Health and Safety Plan

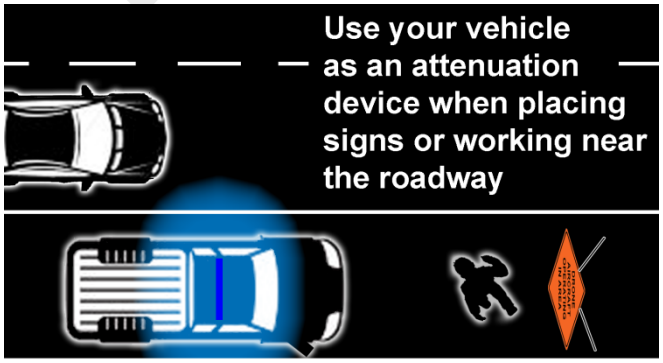
The Health and Safety Plan is used to:

- Identify potential physical and health hazards that could harm flight crew members working in field conditions with particular attention to working near roadways and in rail corridors.
- Describe procedures to prevent accidents.
- Describe steps to be taken when accidents do occur.

For most field operations, this information is sufficiently covered in the TxDOT *Handbook of Safe Practices*. Anyone working within the TxDOT right-of-way is required to follow the rules, processes, and procedures contained in the handbook.

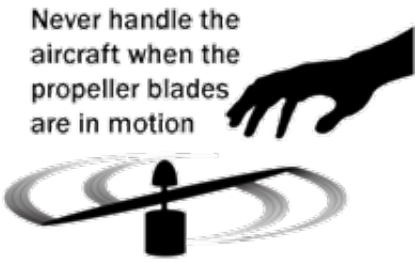
In addition to the handbook, the following safety procedures apply specifically to UAS operations:

- Prior to deploying to the field, the flight crew is required to know the location of the closest emergency room or critical care facility and how to drive to the facility from the project site. It is recommended that a map showing the location and directions to the facility be provided to each member of the field crew.
- The flight crew is required to know how to describe the project location to a 9-1-1 operator.
- For work in remote areas, cellular phone or radio coverage should be checked prior to deployment.
  - When working in remote areas, the use of regularly scheduled check-in times is recommended.
  - When working in remote areas, a backup plan identifying the closest area of cellular coverage or the location of the closest telephone landline is recommended.
- Caution must be exercised when placing traffic control and warning signs on the side of the highway. A vehicle equipped with a warning light bar is required for this task. It is recommended that the vehicle be used as an attenuation device to limit the hazard to the worker placing the sign. Cut the front wheels of the vehicle to point off of the roadway. Position the vehicle far enough back from the work area that a rear collision will send the vehicle off of the roadway and not into the work area.

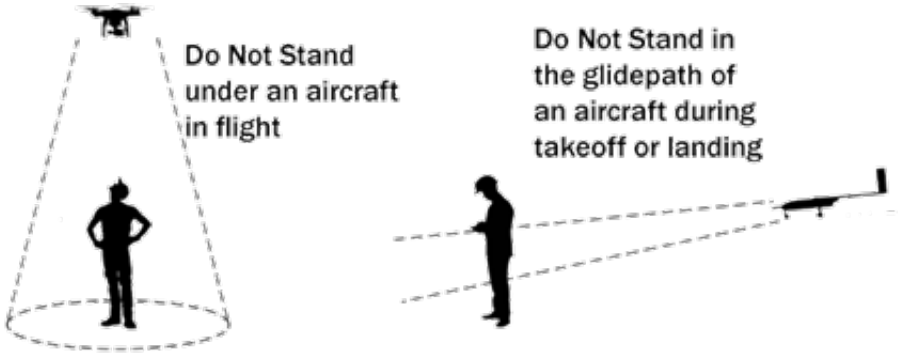


- The use of four-wheel drive vehicles and the availability of survival gear should be considered for projects conducted in remote areas.

- When working with UAS equipment:
  - Be alert to the spinning propellers on the aircraft. Often propellers are spinning at a rate that makes them invisible. The aircraft should never be handled when the propellers are in motion. This includes never attempting to catch or retrieve the aircraft when it is airborne.



  - Be alert to the hazard of debris ejected by propeller wash or from the impact of the propeller with the terrain or other fixed objects. This hazard is particularly common during take-off and landing. It is recommended that the flight crew always wear protective eyewear when at the project site.
  - Be alert to the potential hazards of using battery fuel sources. Many types of batteries contain hazardous materials including irritants and corrosives. Batteries may explode or catch fire under certain conditions. Care should be taken when handling batteries, including the use of protective goggles and gloves. Batteries should be carefully inspected for cracks or leaking prior to installation on the aircraft. A fire extinguisher should be located nearby whenever connecting or disconnecting batteries to the aircraft.
  - Be alert to the potential hazards of using liquid fuel sources. Liquid fuels can be an irritant and may be a carcinogen. The vapor from liquid fuels is often highly flammable. Care should be taken when handling liquid fuels, including the use of protective goggles and gloves. Anecdotal evidence suggests that electrical grounding of a UAS aircraft is not an effective means to mitigate static electricity and sparks that can potentially cause combustion of liquid fuel vapors. Therefore, a fire extinguisher should be located nearby whenever fueling an aircraft with liquid fuel. It is required that liquid fuel be transported and stored in OSHA Standard 29 CFR § 1926.152(a)(1) approved containers.
  - The flight crew and observers must stay clear of the aircraft operating area. Standing or working underneath an aircraft is prohibited due to the risk of impact and injury if the aircraft were to lose power. Similarly, standing within the glide path of an aircraft carries the risk of injury. For fixed-



wing aircraft it is recommended that the landing area, including the limits of the glide path within 10 feet AGL, be marked on the ground with paint, surveyors' stakes, or similar materials.

2.5. In-Flight Emergency Plan

The In-Flight Emergency Plan describes the steps that must be followed in the event of an in-flight emergency. Activation of the plan requires alerting the designated Flight Services staff as quickly as possible once the emergency situation has been resolved. The Flight Services staff to contact are:

Flight Services Staff	Phone Number
Duty Officer	512-936-8900
UAS Coordinator	512-413-2903
Aircraft Operations Coordinator	682-234-1189

Activation of the In-Flight Emergency Plan requires completion of an Accident Report. The reporting requirements and report form are described in Section 2.7., *Accident Reporting*. The Accident Report is e-mailed to the UAS Coordinator at TxDOT-UASCoord@txdot.gov.

An In-Flight Emergency Plan check list is provided as Appendix C.

The following emergency situations are covered by the plan:

- Total loss of aircraft power.
- Partial loss of aircraft power.
- Airspace Encroachment.
- Loss of control of the aircraft including sustained and transient loss of control.
- Erratic aircraft behavior, including sustained and transient erratic behavior.
- Aircraft fly-away.
- Bird strikes.
- Fixed object strikes.
- Outside interference with flight crew.
- Nearby or collocated emergency response activities.

2.5.1. Total Loss of Aircraft Power

Anecdotal evidence suggests that one of the most common causes of a UAS crash is battery failure and the subsequent loss of power for propulsion and control of the aircraft. Unfortunately, for rotary-wing, fixed-wing, and hybrid aircraft alike, a total loss of power offers few options for the RPIC.

A rotary-wing aircraft will usually make a rapid descent when power is lost. The rate of descent depends on a number of factors, including the wind resistance of the vehicle and feathering of the propellers. For a rotary-wing aircraft starting at a flight altitude of 400 feet AGL, impact with the ground is expected within five seconds of a full power loss.

The rate of descent for a fixed-wing and hybrid aircraft depends on the flight maneuver being done at the time of the power loss. For level flight, aircraft with fixed wings will glide. However, if the aircraft is in a turn or other maneuver at the time of the power loss the descent may be rapid.

In either case, during a full power loss there is little the RPIC can do other than observe the event and plan for a response once the aircraft impacts the ground or other object.

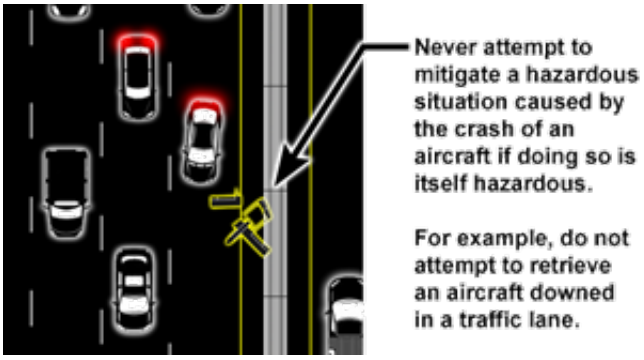
Unless otherwise directed by the aircraft operations manual, the following sequence of events shall occur during a total loss of power in-flight:

- The RPIC announces the emergency to the flight crew.
- The RPIC attempts to restore power.
- The RPIC and VO attempt to warn nearby persons of the imminent crash by shouting a warning.
- The RPIC and VO attempt to stay in visual contact with fixed-wing or hybrid aircraft gliding towards an impact.

Because the RPIC has few options during a full power loss situation, attention should shift to mitigation of the possibility of a chain reaction resulting from the crash of the aircraft. The following sequence of events shall occur once the aircraft has come to a rest:

- If so equipped, the RPIC will immediately send a remote shutdown command to the aircraft.
- The RPIC will shut down all control and communication systems.
- The RPIC shall quickly determine if the crash of the aircraft will cause a subsequent hazardous situation(s) based on the crash location or other factors.

- If the crash has caused or has the potential to cause a chain reaction of hazardous events, the RPIC must call 9-1-1 and request emergency assistance. The flight crew must never attempt to prevent a chain reaction (e.g., by attempting to retrieve an aircraft in a hazardous location) or mitigate a hazardous situation if doing so places their safety in jeopardy.



- If the aircraft is not in a hazardous location, the flight crew will secure the crash site and power down the aircraft if not already done so remotely. The flight crew will check for fire caused by the crash or for fluid leaks resulting from damage to the fuel cells. If a fire has started, the flight crew will attempt to extinguish the fire. If a fluid leak is found the flight crew will attempt to contain the spread of the fluid by placing absorbing material on the liquid or mounding soil to prevent flow of the liquid.
- Once any emergency response has concluded or after the crash site has been secured the Downed Aircraft Recovery Plan (DARP) will begin as described in Section 2.6., *Downed Aircraft Recovery Plan (DARP).*

2.5.2. Partial Loss of Aircraft Power

A partial loss of power may allow the RPIC to maintain some control over the aircraft. The primary goal of the RPIC when handling a partial loss of power emergency and subsequent landing is to:

- First: Avoid injury to persons.
- Second: Avoid causing a chain reaction of additional emergency events.
- Third: Avoid damage to property.

To accomplish this goal the RPIC may need to sacrifice the aircraft by ditching or by performing a controlled collision with a fixed object.

The following sequence of events shall occur during a partial loss of power in-flight emergency:

- The RPIC announces the emergency to the flight crew.
- The RPIC with aid of the VO identifies an emergency landing or ditching area.
  - Emergency and ditch landings are prohibited on the roadway or its shoulder.
  - A ditch area is to be used if the probability of a safe landing is unlikely. A safe landing is any landing that does not pose a threat of injury or property damage.

  - The ditch area can be any location or feature that will limit the effect of the crash. For example, a controlled collision of the aircraft with a concrete bridge column is preferable over an impact with a person or vehicle.

- The RPIC and VO attempt to warn nearby persons of the imminent crash by shouting a warning.
- The RPIC will immediately land or ditch the aircraft.
- If so equipped, the RPIC will immediately send a remote shutdown command to the aircraft.
- The RPIC will shut down all control and communication systems.
- The RPIC shall quickly determine if the crash of the aircraft will cause a subsequent hazardous situation(s) based on the crash location or other factors.
- If the crash either already has or has the potential to cause a chain reaction of hazardous events, the RPIC must call 9-1-1 and request emergency assistance. The flight crew must never attempt to prevent a chain reaction or mitigate a hazardous situation caused by the crash of an aircraft if doing so places their safety in jeopardy.
- If the aircraft is not in a hazardous location, the flight crew will secure the crash site and power down the aircraft if not already done so remotely. The flight crew will check for fire caused by the crash or for fluid leaks resulting from damage to the fuel cells. If a fire has started, the flight crew will attempt to extinguish the fire. If a fluid leak is found, the flight crew will attempt to contain the spread of the fluid by placing absorbing material on the liquid or mounding soil to prevent flow of the liquid.
- Once any emergency response has concluded or after the crash site has been secured with effective mitigation of any fire or fluid leak hazards, the DARP will begin as described in Section 2.6., *Downed Aircraft Recovery Plan (DARP).*

2.5.3. Airspace Encroachment

An airspace encroachment occurs when any aircraft, either manned or unmanned, enters the operational area of the project. However, the flight crew must remain alert to any aircraft operating in the vicinity that *might* cause an encroachment. The flight crew must anticipate an encroachment and prepare accordingly.

The following sequence of events shall occur during an airspace encroachment or in anticipation of an encroachment:

- The RPIC announces the emergency to the flight crew.
- If a collision is imminent, the RPIC shall take immediate evasive action.
- If a collision is a near-term possibility, the RPIC will land the aircraft and will not resume flight operations until the encroachment hazard has passed.

- If a collision is not imminent or a near-term possibility, the RPIC will place the aircraft in a loitering position.
- The position and heading of the encroaching or anticipated encroaching aircraft is monitored until the hazard has passed.
- The VO will continue to monitor the entire project site in addition to monitoring the encroaching or anticipated encroaching aircraft.
- Flight operations will not resume until the encroachment hazard has passed.

2.5.4. Loss of Aircraft Control – Sustained and Transient

Many UAS aircraft have a "return to home" function that will automatically return the aircraft to the launch site if communication between the controller and aircraft is lost. The return to home position must be set for the current project location at the beginning of the flight operation. If the position is not correctly set, the aircraft may attempt to return to a previous project location stored in memory. Loss of aircraft control includes the loss of the navigational GPS signal.

The following sequence of events shall occur during a loss of aircraft control in-flight emergency:

- The RPIC announces the emergency to the flight crew.
- The RPIC attempts to issue a "return to home" command (if so equipped) and continues to issue the command until the aircraft responds.
- The RPIC attempts to restore control through manipulation of the flight controls.
    - If the RPIC regains control, the aircraft shall be landed immediately. After landing, the cause of the loss of control must be investigated and mitigated before flight resumes. It is possible that mitigation may require the use of a different technology to gather the required data.
    - If control cannot be restored, the aircraft is considered to be in a fly-away condition the pilot will follow the procedures in Section 2.5.6., *Aircraft Fly-Away*.

2.5.5. Erratic Aircraft Behavior – Sustained and Transient

The following sequence of events shall occur during an erratic aircraft behavior in-flight emergency:

- The RPIC announces the emergency to the flight crew.
- The RPIC attempts to issue a "return to home" command (if so equipped) and continues to issue the command until the aircraft responds.

- The RPIC attempts to land the aircraft either at the designated landing location, an emergency landing location, or at a ditch location. Depending on the nature of the erratic behavior, the RPIC must consider the threat of injury or property damage due to the aircraft.

- If the RPIC decides for an emergency or ditch landing, the RPIC will follow the procedures in Section 2.5.2., *Partial Loss of Aircraft Power*.

- After landing, the cause of the erratic behavior must be investigated and mitigated before flight resumes. It is possible that mitigation may involve using a different technology to gather the required data. This may be necessary in areas with high electro-magnetic interference (EMI).

- If the erratic behavior creates a situation in which the aircraft is incapable of landing, the aircraft is considered to be in a fly-away condition. The pilot will follow the procedures in Section 2.5.6., *Aircraft Fly-Away*.

2.5.6. Aircraft Fly-Away

A fly-away condition occurs when the aircraft does not respond to commands from the RPIC and flies out of the project area. A fly-away has the potential to be disastrous and requires immediate action on the part of the air crew.

The following sequence of events shall occur during an aircraft fly-away in-flight emergency:

- The RPIC announces the emergency to the flight crew.
- The RPIC attempts to issue a "return to home" command (if so equipped) and continues to issue the command in case the aircraft responds.
- The RPIC notes the time of the loss of control, the remaining flight range based on available fuel, and the heading and altitude of the aircraft.
- The RPIC and VO will attempt to keep the aircraft in sight by moving to vantage points or following the aircraft on foot.
    - The use of a chase vehicle to follow a fly-away aircraft is prohibited.
- The RPIC shall quickly determine if the fly-away will cause a subsequent hazardous situation(s) based on the project location, nearby airspace, nearby infrastructure (e.g., refineries, electric substations, etc.), or other pertinent factors.
    - If there is any possibility that the fly-away aircraft will enter controlled airspace, the RPIC is required to contact the local air traffic control center (ATC) immediately.

  - If there is a reasonable expectation that the fly-away aircraft will cause injury to a person, the RPIC is required to contact 9-1-1.

- If emergency response is required no other activities shall take place until the emergency response concludes. Once the emergency response has ended, the Downed Aircraft Recovery Plan (DARP) as described in Section 2.6., *Downed Aircraft Recovery Plan (DARP)* will begin.

2.5.7. Bird Strikes

Certain bird species can be aggressive towards UAS aircraft. Typically, these are larger birds of prey including hawks and eagles. However, it is possible that smaller birds may inadvertently collide with an aircraft.

The amount of damage done to the aircraft by a bird strike will vary. The damage may be imperceptible or may result in an aircraft crashing in the case of damage to a control surface or propeller.

The RPIC and VO must remain vigilant to birds flying near the aircraft and particularly to birds displaying aggressive behavior.

The following sequence of events shall occur during a bird strike in-flight emergency:

- The RPIC announces the emergency to the flight crew.
- The RPIC attempts to land the aircraft as quickly as possible.
- Depending on the nature of the damage to the aircraft a crash landing may occur. If the bird strike incapacitates the aircraft resulting in a crash, the RPIC will follow the procedures in Section 2.5.1.,. *Total Loss of Aircraft Power*. If some control of the aircraft remains after the bird strike the RPIC will refer to the in-flight emergency check sheet for *Partial Loss of Aircraft Power*.
- Following a bird strike the UAS must be inspected for airworthiness before flight operations continue.

2.5.8. Fixed Object Strikes

Section 2.3.1., *Flight Planning General Rules*, Rule 4 states that a UAS aircraft will not fly within six feet of any fixed object including trees, power poles, utility lines, or buildings. If the RPIC follows this rule, collision with a fixed object should not occur. However, unexpected wind currents or other conditions may cause an aircraft to strike a fixed object.

The following sequence of events shall occur during a fixed object strike in-flight emergency:

- The RPIC announces the emergency to the flight crew.

- The RPIC attempts to land the aircraft as quickly as possible.
- Depending on the nature of the damage to the aircraft a crash landing may occur. If the fixed object strike incapacitates the aircraft resulting in a crash, the RPIC will refer to the in-flight emergency check sheet for 2.5.1., *Total Loss of Aircraft Power*. If some control of the aircraft remains after the fixed object strike the RPIC will refer to the in-flight emergency check sheet for *Partial Loss of Aircraft Power*.
- Following a fixed object strike, the UAS will be inspected for airworthiness before flight operations continue.

2.5.9. Interference with Flight Crew

The flight crew should be aware that some individuals may have concerns that a UAS aircraft is being used for surveillance or for a nefarious activity. The RPIC and VO should be alert to individuals approaching the flight crew. The VO has the primary responsibility of monitoring the project site and is responsible for alerting the RPIC if an unknown individual approaches.

The following sequence of events shall occur during an outside interference in-flight emergency:

- The RPIC announces the emergency to the flight crew.
- The RPIC places the aircraft in a loitering position.
- The RPIC quickly assesses the volatility of the situation.
  - The RPIC notes the number of individuals involved, their posture, tone and volume of voice, and the possession of weaponry.
  - The RPIC remains in contact with the VO to aid in assessing the situation.

If there is a reasonable expectation that the situation will escalate to the point of violence or injury to the flight crew:

- The RPIC will immediately land the aircraft.
- The RPIC will contact 9-1-1.
  - Depending on the situation, the RPIC and VO may need to immediately abandon the project location.

2.5.10. Nearby Emergency Operations.

If an emergency event occurs near the UAS project site (e.g., a vehicular collision or hazardous material spill) flight operations will cease until the emergency response has ended.

The following sequence of events shall occur during a nearby incident in-flight emergency:

- The RPIC announces the emergency to the flight crew.
- The RPIC attempts to land the aircraft as quickly as possible.
- Flight operations will not resume until the emergency response has concluded.

2.6. Downed Aircraft Recovery Plan (DARP)

The Downed Aircraft Recovery Plan (DARP) describes the process and procedures to follow after an aircraft has crash landed.

Per Section 2.5., *In-Flight Emergency Plan*, a crash landing may or may not require an emergency response. An emergency response is required when the location or condition of the downed aircraft either already has or has the potential to cause a chain reaction of additional incidents.

As part of the emergency response, the responders may recover the aircraft or may instruct the flight crew to recover the aircraft. However, in no event should the flight crew attempt to recover the aircraft during an emergency response without being directed to do so by the emergency responders. Recovery of an aircraft during an emergency response is not part of the DARP.

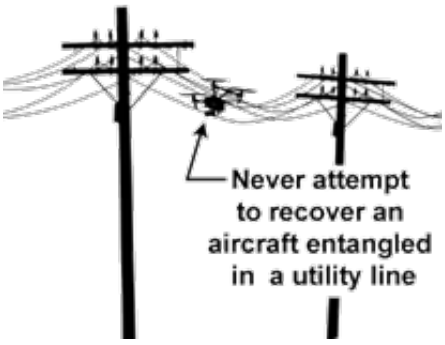
The DARP is implemented through a checklist describing a series of steps to be performed in sequential order. The DARP checklist is included as Appendix D.

Activation of the DARP requires reporting to the UAS Coordinator. The reporting requirements and report form are described in Section 2.7., *Accident Reporting*.

2.6.1. DARP General Rules

Rules that apply to the recovery of a downed aircraft are:

Rule 1: No attempt will be made to recover a downed aircraft located in a hazardous area.



Hazardous areas include:

- A downed aircraft entangled in a utility line. Never attempt to recover a downed aircraft entangled in any type of utility line. The local utility provider must be contacted for recovery of the aircraft.
- An aircraft in any location that could reasonably be expected to endanger the person or persons attempting to recover the aircraft. This includes an aircraft entangled in a tree or in a structure like a tower. The local TxDOT Maintenance Office or a qualified contractor must be contacted for recovery of the aircraft. If the position of the aircraft is not precarious and there is a reasonable expectation that the

aircraft can be recovered without causing injury, property damage, or further damage to the aircraft, the aircraft may be recovered by the flight crew.

- A downed aircraft in a precarious location on or near a roadway or railway. Never attempt to recover a downed aircraft on a roadway with heavy traffic. For any downed aircraft on a roadway, the location of the aircraft and its impact (or potential impact) on traffic may require a 9-1-1 response. The RPIC is responsible for contacting 9-1-1. In some situations, the RPIC may need to contact the local TxDOT Maintenance Office to assist in traffic control and recovery of the aircraft. An example would be a downed aircraft that is not impacting traffic but is located in an inaccessible area such as a median.
- A downed aircraft in an area of precarious terrain including cliffs or steep grades, sinkholes, or unstable soil.
- A downed aircraft in water. Water presents unique hazards that may not be detected by viewing the surface. Never attempt to recover a downed aircraft in swift water. If the aircraft is within five feet of the bank and there is a reasonable expectation that it can be recovered without incident, the aircraft may be recovered. If the aircraft is located more than five feet from the bank, the use of a recovery boat is required. Recovery of a submerged aircraft may require the assistance of a diver.

Rule 2: Do not attempt to recover a downed aircraft on privately owned property without the prior consent of the landowner or other responsible entity. The only exception to this rule is if there is an imminent threat that the downed aircraft, due to its condition, may cause further damage to property. An example would be a range fire caused by a battery short. If there is a reasonable expectation of an imminent threat from the downed aircraft that may cause additional damage to property, the flight crew may enter the private property to mitigate the risk. However, this does not necessarily mean that the aircraft can be removed from the property. If the condition causing the threat can be mitigated without removal of the aircraft, the aircraft must remain in place until the landowner or other responsible party can be contacted for approval to enter the property.

Rule 3: Government-owned fenced areas require approval from the responsible governmental agency before a downed aircraft can be recovered.

2.6.2. The DARP Procedures

No recovery activities can begin until all emergency response has concluded. The only exception is if the emergency responders direct the flight crew to remove the aircraft from the crash location.

The steps to recovering a downed aircraft are outlined in the checklist attached as Appendix D. The recovery of a downed aircraft must be documented, particularly if there is the possibility of litigation resulting from the incident. The RPIC is responsible for:

- Following the DARP checklist.
  - Confirm that all emergency response has concluded. Emergency response includes the act of entering private property to address an immediate hazard such as a fire caused by the crash aircraft or the leaking of hazardous materials from the aircraft.
  - Verify that all aircraft, control, and communications systems are powered off.
  - Secure the project site by stowing any equipment or supplies not needed for the recovery effort.
  - Determine if the crash site in on public or private property. If the aircraft is on private property attempt to identify the landowner from on-site information such mailboxes or nearby houses. If the landowner cannot be identified on-site other resources to check include the county appraisal district property maps, neighbors, or possibly local law enforcement. The TxDOT Right-of-Way Division may be able to assist in determining the land owner.
  - Determine if assistance is required to recover the downed aircraft. DO NOT attempt to recover an aircraft in a hazardous location.
  - Document the recovery by taking notes, making sketches, and taking photographs.
  - Completing the Accident Report per Section 2.7., *Accident Reporting*.

2.7. Accident Reporting

Do not discuss a UAS accident with any member of the public or the media. Only the TxDOT Chief Communications Officer is authorized to respond to inquiries regarding a UAS incident.

2.7.1. TxDOT Reporting Requirements

An Accident Report, completed by the RPIC, is required whenever:

- The In-Flight Emergency Plan or Downed Aircraft Recovery Plan (DARP) is activated.
- The UAS aircraft unexpectedly (i.e., unplanned) comes within 20 feet of any other vehicle whether in motion or stationary. “Other” vehicles include other UAS aircraft, cars or trucks, watercraft, or railroad vehicles of any kind. This type of incident categorized as a “near-miss.”
- The UAS aircraft unexpectedly (i.e., unplanned) comes within 10 feet of a fixed object. A fixed object includes buildings, utility poles, utility lines, trees, bridges, dams, or similar fixed structures. This type of incident is categorized as a “near-miss.”
- The UAS aircraft causes damage to property.
- The UAS aircraft causes injury of any kind.
- The UAS aircraft causes a fire or creates a hazardous condition of any kind.

At a minimum, the accident report is required to include:

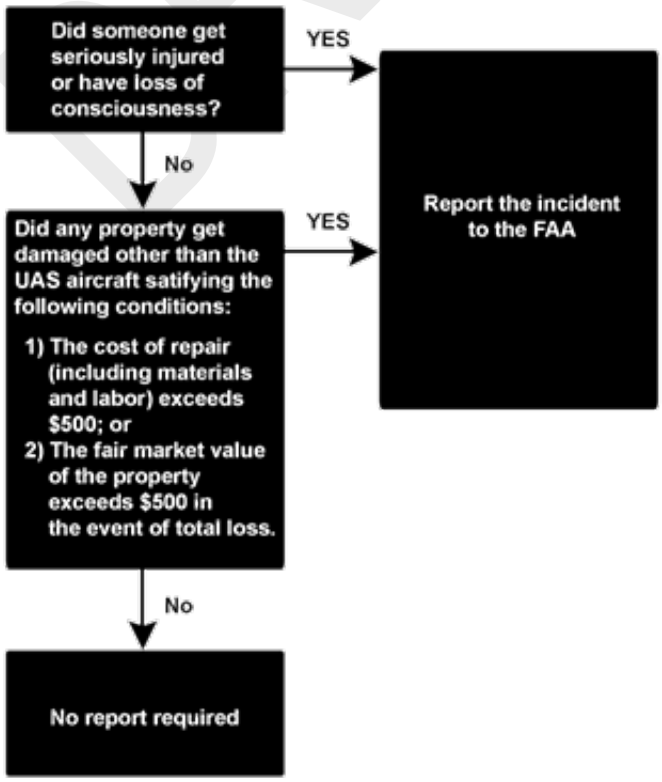
- The date, time, location, and description of the project and the specific operation being conducted when the incident occurred.
- A description of the UAS equipment being used.
- A listing of the flight crew involved in the operation at the time of the incident.
- A listing of any other persons present at the time of the incident.
- A detailed description of the incident based on the observation of the RPIC and/or crew member witnessing the incident.
- A detailed description of any actions taken by the flight crew.
- A detailed description of any interaction between the flight crew and any other person(s) resulting directly or indirectly due to the incident.

It is recommended to include photos and sketches in the accident report to help better characterize the incident. The Accident Report must be e-mailed to the TxDOT UAS Coordinator at TxDOT-UASCoord@txdot.gov within one day of the accident.

The UAS Accident Report Form is included as Appendix E.

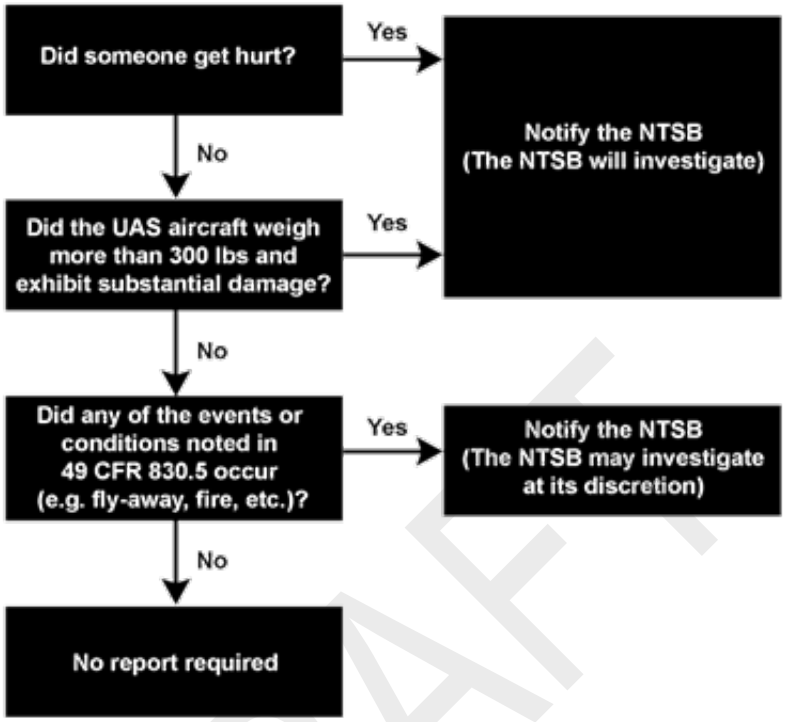
2.7.2. FAA Notification Requirements

In addition to the TxDOT reporting requirements, the FAA may require notification of a UAS incident. The FAA notification decision tree is shown below.



2.7.3. National Transportation Safety Board (NTSB) Notification Requirements

In addition to the TxDOT reporting requirements, the NTSB may require notification of a UAS incident. The NTSB notification decision tree is shown below.



2.8. Maintenance

All UAS aircraft and control systems are required to be maintained and in operational condition prior to flight. Maintenance is, at a minimum, required to follow recommendations from the UAS manufacturer.

All UAS that have received mechanical, firmware, or software maintenance are required to perform a functional test. The system must be deemed airworthy before being used on any TxDOT project.

It is a requirement that any maintenance, whether scheduled or unscheduled, be documented in a UAS maintenance log. The maintenance log must be presented for inspection when requested by the UAS Coordinator.

2.9. Aircraft Registration Number

All UAS aircraft must be registered with the FAA. The assigned aircraft registration number must be placed on the aircraft in a manner acceptable to the FAA.

2.10. Logs and Records

2.10.1. Pilot Log

The RPIC and SRPIC are required to maintain a pilot log with entries documenting each project flown. The log is required to include the following information:

- The flight date(s) of the project.
- The aircraft model and FAA registration number.
- The total number of minutes of flight.
- A general description of the flight mission (e.g., inspection, aerial photo acquisition, etc.)

The pilot log can be a hardcopy notebook or in electronic format. The logbook shall be made available for inspection by the UAS Coordinator. The UAS Coordinator may request copies of all or any portion of the logbook.

2.10.2. Aircraft Maintenance Log

A maintenance log must be kept for each UAS aircraft. The log will document all scheduled and unscheduled maintenance to the aircraft. The log will include the date of the maintenance and the specific maintenance or repair being done. The maintenance log shall be made available to the UAS Coordinator. The UAS Coordinator may request copies of all or any portion of the maintenance log.

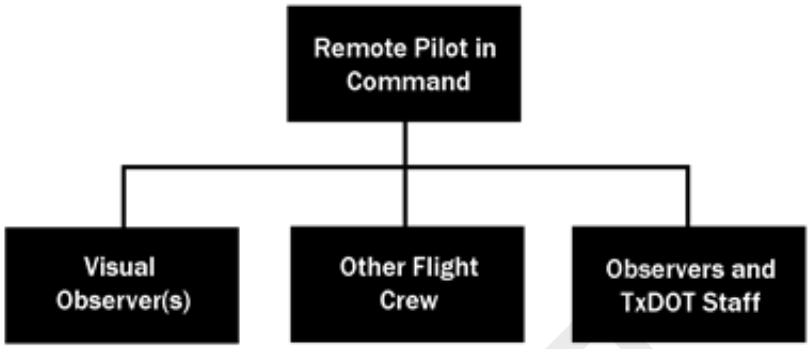
2.10.3. Record Retention

Record retention for all UAS activities will follow the TxDOT record retention policies and guidelines.

3. Air Operations

3.1. Flight Crew Organization

The RPIC has authority over the flight crew. At a UAS project site, the UAS Coordinator has ultimate authority when present. Otherwise, the RPIC is the authority at the project site and has authority over the flight crew, observers, and any other TxDOT staff present.



3.2. Flight Crew Duty Day

The flight crew is limited to six hours of flight time during any continuous 24-hour period unless preapproved by the UAS Coordinator.

- For all operations, the flight crew is limited to a 12-hour duty day.
- The flight crew is required to have a minimum of 48 hours of continuous time off every 14 days.

3.3. Flight Crew Health

All flight crew members shall use the IMSAFE mnemonic to assess fitness prior to a UAS operation. This technique is used to confirm operational status of crew members. The crew member shall report the results of the fitness assessment to the RPIC prior to the flight operation. Any crew member who reports unease or a feeling of sickness must notify the RPIC immediately. The RPIC is responsible for deciding if the flight mission can continue based on the IMSAFE assessment. The components of the IMSAFE are:

- I for Illness. Is the crew member suffering from an illness which may affect their ability to perform their assigned duties? If it is determined that a crew member is suffering from a medical condition that may impair judgment or reaction time, the crew member will not be allowed to participate in the flight operation.
- M for Medication. Is the crew member currently taking a medication that may impair judgment or reaction time? If it is determined that a crew member is on a medication (prescription, over-the-counter, or illicit) that may impair judgement or reaction time, the crew member will not be allowed to participate in the flight operation. Because UAS operations are considered “safety critical,” working under the influence of illicit drugs may result in punishment up to and including termination of employment.

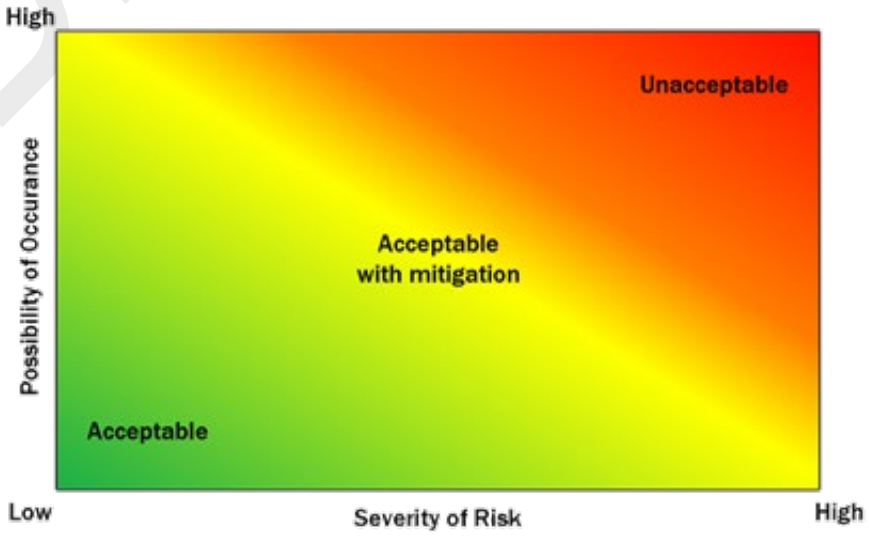
- S for Stress. Is the crew member distracted by stress factors? Stress can adversely affect an individual's performance and impair judgment. If stress is determined to affect the performance of a crew member, the crew member will not be allowed to participate in the flight mission.
- A for Alcohol. Is the crew member under the influence of alcohol? No crew member shall be allowed to participate in the flight mission under the influence of alcohol. Because UAS operations are considered "safety critical," working under the influence of alcohol may result in punishment up to and including termination of employment.
- F for Fatigue. Is the crew member suffering from fatigue? Fatigue can adversely affect an individual's performance and impair judgment. If fatigue is determined to affect the performance of a crew member, the crew member will not be allowed to participate in the flight mission.
- E for Emotion. Is the crew member under emotional distress? Emotional distress can adversely affect an individual's performance and impair judgment. If emotional distress is determined to affect the performance of a crew member, the crew member will not be allowed to participate in the flight mission.

3.4. On-Location Risk Assessment

During flight planning, it is impossible to anticipate all of the field conditions that the flight crew will encounter once at the project site. To address any issues missed during flight planning, the RPIC is required to perform an on-site risk assessment prior to flight.

Using the flight planning information as a starting point, the RPIC will walk the project site noting any potential hazards missed during planning. For those hazards, the RPIC will perform an ad hoc analysis of the potential risks involved in proceeding with the flight mission.

Using the chart as a guide, the RPIC will determine the relative risk involved and will make a decision as to whether the flight should proceed or if more planning is necessary. The RPIC may decide that the mission can continue provided the hazards are mitigated. Mitigation can include changes to the flight plan. However, any changes to the flight plan must be documented by the RPIC and made available to the UAS Coordinator on demand.



3.5. Flight Procedures

Flight procedures will somewhat depend on the aircraft being used. However certain procedures are required for every flight including:

- The RPIC will announce to the flight crew and any observers present that the flight operation has begun.
- A pre-flight safety briefing. The safety briefing is the responsibility of the RPIC unless a dedicated project safety officer is present. The briefing is given to the flight crew and any observers of the flight mission. The briefing will cover the safety aspects of the current project location:
  - Traffic hazards including site specific hazards.
  - Environmental hazards including sun and wind exposure, heat, cold, insects, reptiles, etc.
  - Security including any requirement to secure equipment or vehicles during the flight operation and any security threat from hostile individuals.
- The placement of traffic control signs required for the operation.
- A pre-flight site inspection as detailed in Section 3.4., *On-Location Risk Assessment*. The pre-flight site inspection is the responsibility of the RPIC. The inspection shall pay particular attention to hazards that may not have been noticed during flight planning, such as overhead utility wires, guy wires, trees, and new construction. The RPIC should mentally note emergency landing and ditch areas during the inspection.
- A pre-flight project briefing. The pre-flight project briefing is the responsibility of the RPIC. The briefing will be given to the flight crew and any observers of the flight mission. The briefing will cover the goals of the flight mission with a description of the sequence of events. In this briefing, the RPIC should inform the flight crew of any planned deviations to the flight plan based on the results of the on-location risk assessment. The RPIC will describe to the flight crew the location of the emergency landing and ditch areas as located during the inspection.
- Set up of the control and communication equipment and positioning of the aircraft in the take-off area. The RPIC and VO should check operation of any radio or cellular phones being used for communication purposes. The RPIC will confirm the "return home" coordinate setting.
- Performance of the pre-flight checklist. The pre-flight check list is the responsibility of the RPIC with assistance from the VO. At a minimum, the manufacturer's checklist should be used.

Prior to aircraft take off, the following will occur:

- The RPIC and VO will take their positions and will report their status as "Ready" once in position. The VO will begin scanning the project area for hazards or concerns and will inform to RPIC if any potential problems are detected. The VO will scan the surrounding airspace for other aircraft and will frequently scan the airspace for the remainder of the flight operation. It is important that the VO does not become fixated on the aircraft. The VO is responsible for remaining alert to the conditions over the entire operational area.
- The RPIC will announce the take-off to the flight crew and observers and the flight mission will commence.

At take-off:

- The RPIC and VO will remain in constant contact for the duration of the flight mission.
- At the conclusion of the flight mission, the RPIC will announce the impending landing of the aircraft to the flight crew and observers.
- The aircraft, control, and communications equipment will be powered down, removed from the landing area, and stowed.
- Traffic control signs are picked up.
- Once the project site is secured, the RPIC is responsible for a post-flight briefing. The post-flight briefing will review the events of the flight and will include critique of the operation to include any lessons learned.
- The RPIC will announce to the flight crew and any observers that the flight operation has concluded.

3.6. Privacy Issues

Collection of data using UAS is a relatively new phenomenon. As such, much of the case law surrounding the use of the technology has not been developed. Case law will ultimately inform UAS users of the privacy boundaries to be respected when collecting data using a UAS aircraft.

Any persons collecting data using UAS must be familiar with Chapter 423 of the Texas Government Code titled "Use of Unmanned Aircraft," which concerns the legality of using a UAS to capture images of people or private property.

In light of the current legal environment, TxDOT will operate UAS under the following privacy requirements:

- Data will only be collected for use that is consistent and relevant to mission of the agency.
- Flight crews will make every attempt to limit coincidental collection of data outside of the project area.
- Coincidental data collected outside of the project area will be deleted if that data could reasonably be considered to be an invasion of an individual's privacy.
- UAS data collection will be performed in a manner consistent with federal and state laws and with any local ordinances.

For any project in which privacy issues are a concern, pre-approval from the TxDOT UAS Coordinator is required. The privacy issue shall be submitted to the UAS Coordinator using the *UAS Flight Pre-Approval Form* provided in Appendix B along with the flight plan. The form will be e-mailed to TxDOT-UASFlightPlan@txdot.gov.

4. Appendix

Appendix A Example Flight Plan

UAS Flight Plan

Project Information

Project Name	Pre-Approval Required?
US 290 Retaining pond drainage study	☐ Yes ☒ No

Refer to Section 2.2 Project Risk Assessment. Projects not requiring pre-approval are flown in Class G airspace and have none of the risk factors listed in the Section.

If pre-approval is required, complete and submit the Pre-Approval Request form in addition to the Flight Plan.

Location	County	Project Number
Latitude: N 30.44.58.2105 Longitude: W 98.23.46.2633	BURNET	2017023
Use latitude/longitude in decimal seconds to four digits of precision in format DD.MM.SS.SSSS		The project number is assigned by the TxDOT UAS Coordinator. All correspondence should refer to this project number.

Purpose of Flight

The data gathered will be used to assess the drainage around a detention pond located on the north side of Highway 21.

Maximum flight altitude to be used	Is an FAA waiver required?	Airspace Class
100 Feet AGL (Above ground level (AGL))	☐ Yes ☒ No	☐ B ☐ D ☒ Other If other, specify: G ☐ C ☐ E (at ground level)

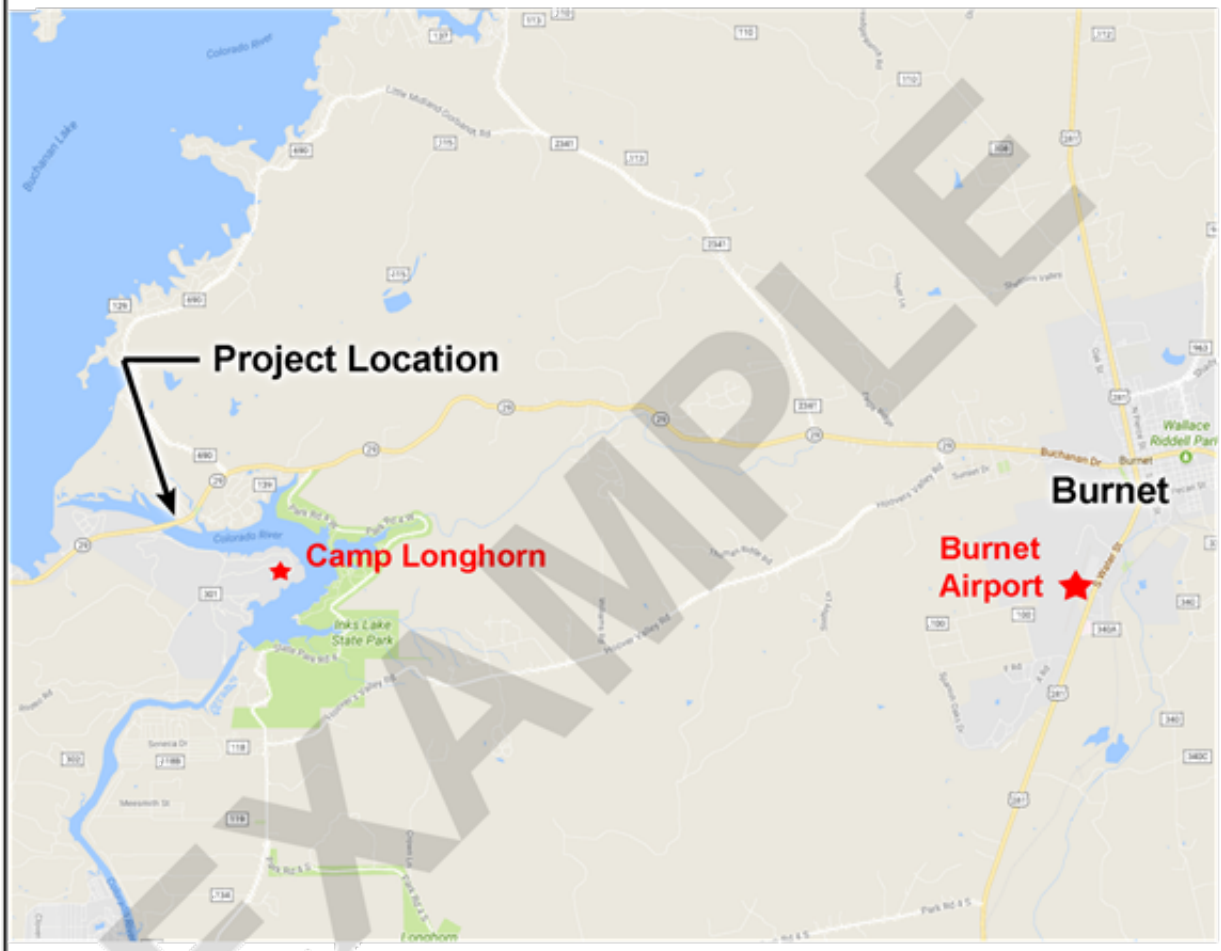
Will a NOTAM be used?	Proposed flight date	Backup flight date
☐ Yes ☒ No	Sep 29, 2018	Sep 30, 2018

	Submitting Organization Information	Performing Organization Information (☐ Same as submitting organization)
Name:	Texas Department of Transportation	Contractor Name
Address line 1:	125 East 11th Street	Contractor Address
Address line 2:		
City:	Austin	Contractor City
State:	TX	Contractor State
Zip Code:	78701	Contractor Zip Code
Phone number:	512.555.5555	Contractor Phone Number
Fax number:	512.555.5555	Contractor Fax Number
Contact name:	TxDOT employee	Contractor Contact Name
Contact e-mail:	TxDOT employee@txdot.gov	Contractor Contact e-mail

UAS Flight Plan

General Location Map

Instructions: Provide a map showing the general location of the project. Show nearby towns, roadways, airports, and other cultural features to aid in locating the project.



The nearest improved airport is Burnet Municipal at 9.4 miles.
The nearest unimproved airport is Camp Longhorn at 1.8 miles. Camp Longhorn is a remote control aircraft airport.

Page 3 of 3

UAS Flight Plan

Project Map

Instructions: Provide a map showing the project site. Show the area over which the data will be collected, the limits of the UAS operating area including maneuver and turning areas, and proposed take-off and landing sites.

Appendix B Pre-Approval Form

UAS Flight Pre-Approval Form

Project Name

Project Number

The project number is assigned by the TxDOT UAS Coordinator. All correspondence should refer to this project number.

Location

Latitude N Longitude W

Use latitude/longitude in decimal seconds to four digits of precision in format DD:MM:SS.SSSS

County

Proposed flight date

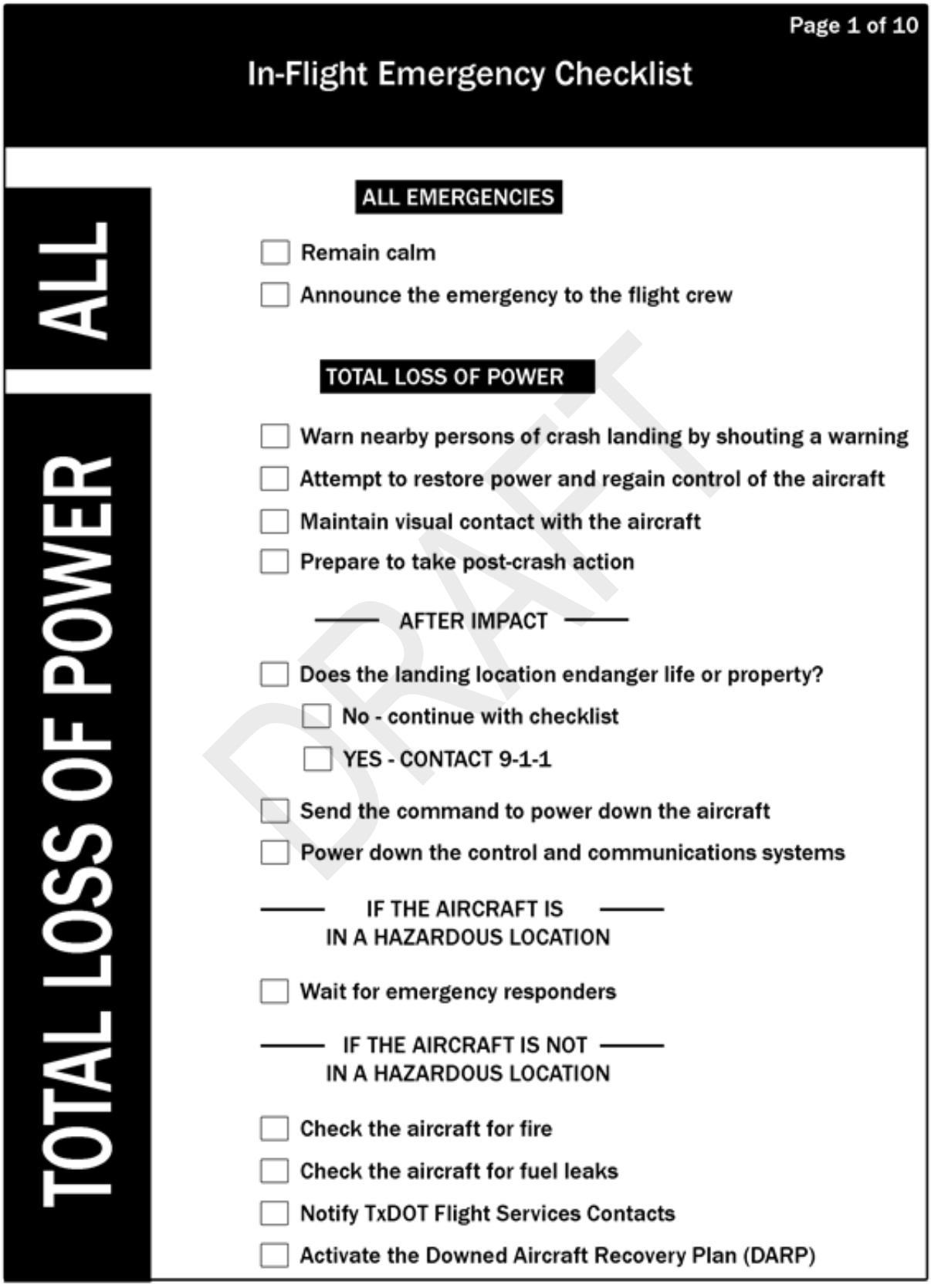
Reason Pre-Approval is required: (Fully explain the reason pre-approval is required. Reasons may include airspace approval required for Class B, C, D, or Class E airspace that starts at ground level; Class G airspace with risk factors listed in Section 2.2 Project Risk Assessment; request to deviate from general rules listed in Section 2.3.1, Flight Planning General Rules; the use of an FAA waiver; operation within a railroad coorider; privacy issues; etc. Use additional sheets as needed.)

☐ Approved ☐ Rejected Date

If rejected, reason for rejection:

TxDOT UAS Coordinator signature:

Appendix C In-Flight Emergency Checklist



Page 1 of 10

In-Flight Emergency Checklist

ALL

TOTAL LOSS OF POWER

ALL EMERGENCIES

- [ ] Remain calm
- [ ] Announce the emergency to the flight crew

TOTAL LOSS OF POWER

- [ ] Warn nearby persons of crash landing by shouting a warning
- [ ] Attempt to restore power and regain control of the aircraft
- [ ] Maintain visual contact with the aircraft
- [ ] Prepare to take post-crash action

AFTER IMPACT

- [ ] Does the landing location endanger life or property?
  - [ ] No - continue with checklist
  - [ ] YES - CONTACT 9-1-1
- [ ] Send the command to power down the aircraft
- [ ] Power down the control and communications systems

IF THE AIRCRAFT IS IN A HAZARDOUS LOCATION

- [ ] Wait for emergency responders

IF THE AIRCRAFT IS NOT IN A HAZARDOUS LOCATION

- [ ] Check the aircraft for fire
- [ ] Check the aircraft for fuel leaks
- [ ] Notify TxDOT Flight Services Contacts
- [ ] Activate the Downed Aircraft Recovery Plan (DARP)

In-Flight Emergency Checklist

PARTIAL LOSS OF POWER | ALL

ALL EMERGENCIES

- [ ] Remain calm
- [ ] Announce the emergency to the flight crew

PARTIAL LOSS OF POWER

- [ ] Identify emergency landing or ditch areas
- [ ] Warn nearby persons of crash landing by shouting a warning
- [ ] Immediately land or ditch the aircraft
- [ ] Does the landing location endanger life or property?
  - [ ] No - continue with checklist
  - [ ] YES - CONTACT 9-1-1
- [ ] Send the command to power down the aircraft
- [ ] Power down the control and communications systems

IF THE AIRCRAFT HAS CRASHED IN A HAZARDOUS LOCATION

- [ ] Wait for emergency responders

IF THE AIRCRAFT IS NOT IN A HAZARDOUS LOCATION

- [ ] Check the aircraft for fire
- [ ] Check the aircraft for fuel leaks
- [ ] Notify TxDOT Flight Services Contacts
- [ ] Activate the Downed Aircraft Recovery Plan (DARP)

In-Flight Emergency Checklist

ALL

AIRSPACE ENCROACHMENT

ALL EMERGENCIES

- [ ] Remain calm
- [ ] Announce the emergency to the flight crew

AIRSPACE ENCROACHMENT

- [ ] Is a collision imminent?
  - [ ] No - continue with checklist
  - [ ] YES - TAKE EVASIVE ACTION
- [ ] Is a collision possible?
  - [ ] No - continue with checklist
  - [ ] YES - Land your aircraft. Do not resume flight until the encroachment has ended
- [ ] Suspend flight operations
- [ ] Place your aircraft in a loitering position that will allow a quick landing if needed
- [ ] Monitor the position and heading of the encroaching aircraft
- [ ] Continue to monitor the entire project site
- [ ] Do not resume flight operations until the encroachment has ended

In-Flight Emergency Checklist

ALL

LOSS OF CONTROL

ALL EMERGENCIES

- [ ] Remain calm
- [ ] Announce the emergency to the flight crew

LOSS OF CONTROL

- [ ] Send the aircraft the "RETURN TO HOME" command
- [ ] Attempt to regain control through manipulation of the flight controller
- [ ] If control is regained LAND IMMEDIATELY

IF THE AIRCRAFT REMAINS WITHIN THE PROJECT SITE

- [ ] Warn persons on or near the project site of the emergency situation
- [ ] Continue to issue the "RETURN TO HOME" command
- [ ] Continue to attempt to regain control and land the aircraft
- [ ] Wait until the fuel is depleted and the aircraft auto lands or crashes
- [ ] Notify TxDOT Flight Services Contacts
- [ ] Activate the Downed Aircraft Recovery Plan (DARP)

IF THE AIRCRAFT DEPARTS THE PROJECT AREA

- [ ] FOLLOW THE PROCEDURES FOR A FLY-AWAY EMERGENCY

In-Flight Emergency Checklist

ALL

ERRATIC BEHAVIOR

ALL EMERGENCIES

- ☐ Remain calm
- ☐ Announce the emergency to the flight crew

ERRATIC AIRCRAFT BEHAVIOR

- ☐ Send the aircraft the "RETURN TO HOME" command
- ☐ Attempt to land the aircraft

IF EMERGENCY LANDING IS NECESSARY

- ☐ FOLLOW THE PROCEDURES FOR THE PARTIAL LOSS OF CONTROL EMERGENCY

In-Flight Emergency Checklist

ALL

FLY-AWAY

ALL EMERGENCIES

- [ ] Remain calm
- [ ] Announce the emergency to the flight crew

FLY-AWAY

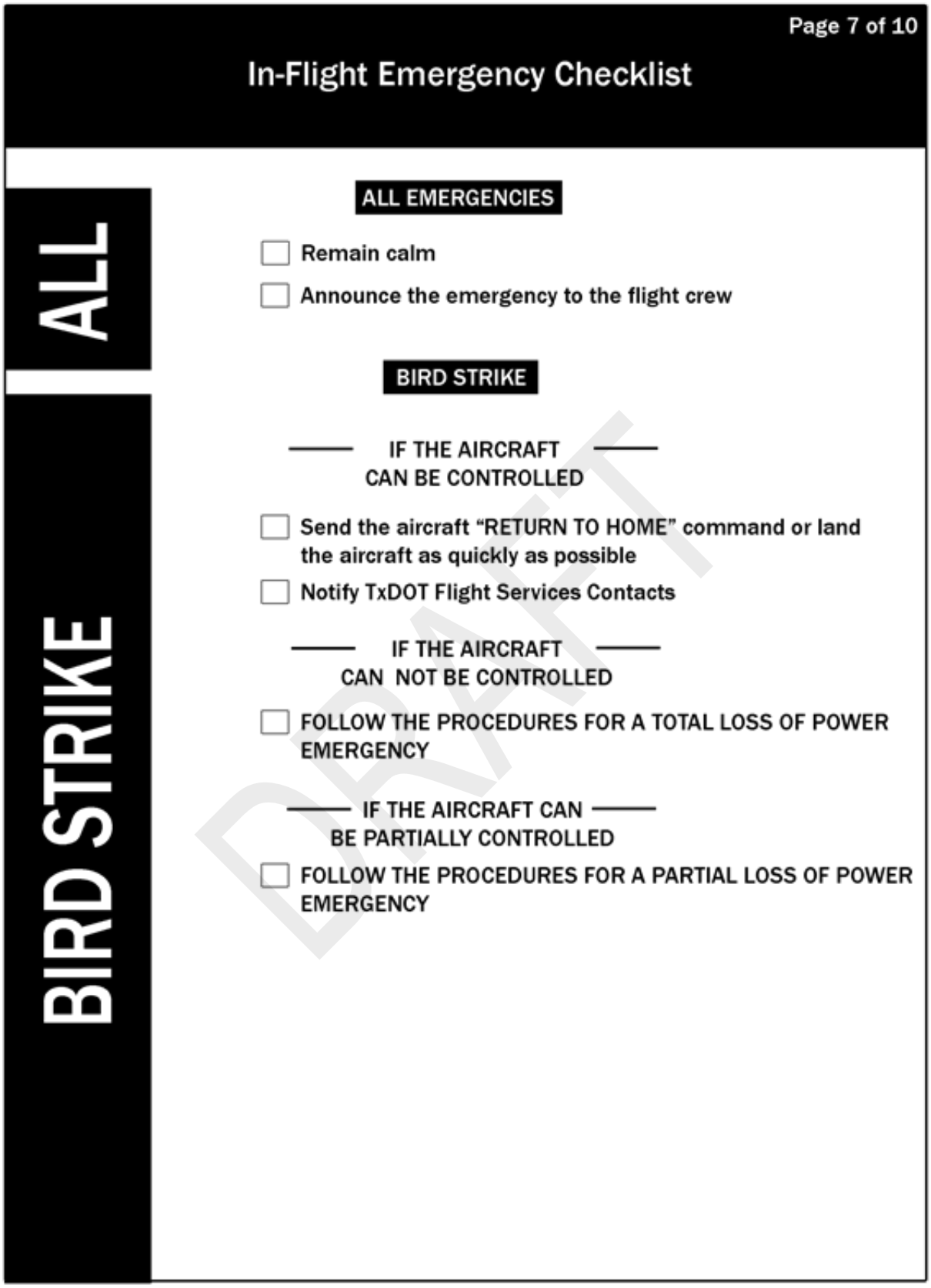
- [ ] Send the aircraft the "RETURN TO HOME" command
- [ ] Attempt to regain control through manipulation of the flight controller
- [ ] If control is regained LAND IMMEDIATELY

IF THE AIRCRAFT REMAINS WITHIN THE PROJECT SITE

- [ ] Continue to issue the "RETURN TO HOME" command
- [ ] Wait until the fuel is depleted and the aircraft auto lands or crashes.
- [ ] FOLLOW THE PROCEEDURES FOR A TOTAL LOSS OF POWER EMERGENCY

IF THE AIRCRAFT DEPARTS THE PROJECT AREA

- [ ] Maintain visual contact with the aircraft if possible
- [ ] Note the time, fuel load, heading, and remaining flight time
- [ ] Will the aircraft enter controlled airspace?
  - [ ] NO - continue with checklist
  - [ ] YES - IMMEDIATELY CONTACT ATC
- [ ] Will the aircraft potentially cause injury or property damage?
  - [ ] NO - continue to maintain visual contact
  - [ ] YES - IMMEDIATELY CONTACT 9-1-1
- [ ] FOLLOW THE PROCEDURES FOR TOTAL LOSS OF POWER EMERGENCY



Page 7 of 10

In-Flight Emergency Checklist

ALL

BIRD STRIKE

ALL EMERGENCIES

- ☐ Remain calm
- ☐ Announce the emergency to the flight crew

BIRD STRIKE

IF THE AIRCRAFT CAN BE CONTROLLED

- ☐ Send the aircraft "RETURN TO HOME" command or land the aircraft as quickly as possible
- ☐ Notify TxDOT Flight Services Contacts

IF THE AIRCRAFT CAN NOT BE CONTROLLED

- ☐ FOLLOW THE PROCEDURES FOR A TOTAL LOSS OF POWER EMERGENCY

IF THE AIRCRAFT CAN BE PARTIALLY CONTROLLED

- ☐ FOLLOW THE PROCEDURES FOR A PARTIAL LOSS OF POWER EMERGENCY

In-Flight Emergency Checklist

ALL

FIXED OBJECT STRIKE

ALL EMERGENCIES

- [ ] Remain calm
- [ ] Announce the emergency to the flight crew

FIXED OBJECT STRIKE

IF THE AIRCRAFT CAN BE CONTROLLED

- [ ] Send the aircraft "RETURN TO HOME" command or land the aircraft as quickly as possible
- [ ] Notify TxDOT Flight Services Contacts

IF THE AIRCRAFT CAN NOT BE CONTROLLED

- [ ] FOLLOW THE PROCEDURES FOR A TOTAL LOSS OF POWER EMERGENCY

IF THE AIRCRAFT CAN BE PARTIALLY CONTROLLED

- [ ] FOLLOW THE PROCEDURES FOR A PARTIAL LOSS OF POWER EMERGENCY

In-Flight Emergency Checklist

ALL

INTERFERENCE

ALL EMERGENCIES

- [ ] Remain calm
- [ ] Announce the emergency to the flight crew

INTERFERENCE WITH FLIGHT CREW

- [ ] Place the aircraft in a loitering position
- [ ] Assess the risk
  - [ ] Note the number of individuals involved
  - [ ] Evaluate the aggressiveness of the individual(s) through posture and tone and volume of voice
  - [ ] Check for weapons

IF THE SITUATION IS NOT VOLATILE

- [ ] Calmly ask the individual(s) to leave the operational area until the flight operation has concluded
  - [ ] Offer to meet once the flight operation has ended

IF THE SITUATION IS VOLATILE

- [ ] If there is time, land and secure the aircraft
- [ ] If there no time, land the aircraft and depart the area
- [ ] Call 9-1-1
- [ ] Notify the TxDOT Flight Services Contacts

In-Flight Emergency Checklist

ALL

NEARBY EMERGENCY

ALL EMERGENCIES

- [ ] Remain calm
- [ ] Announce the emergency to the flight crew

NEARBY EMERGENCY OPERATIONS

- [ ] Place the aircraft in a loitering position
- [ ] Assess the impact of the nearby emergency operation on the flight mission
- [ ] Assess the impact of the flight mission on the nearby emergency operation
- [ ] If there are any negative impacts, terminate the flight mission
- [ ] If there are no negative impacts, continue the flight mission
- [ ] Monitor the situation
- [ ] Notify the TxDOT Flight Services Contacts

Appendix D Downed Aircraft Recovery Plan (DARP) Checklist

DARP Checklist

- ☐ Verify that all emergency response has concluded
- ☐ Verify that the downed aircraft will not cause collateral damage through a fire or fluid leak

---

- ☐ Send power down command to aircraft
- ☐ Power down control and communications equipment
- ☐ Secure the project site. Stow all equipment and supplies not required for the aircraft recovery effort
- ☐ Is the aircraft is on public or private property?
  - ☐ Private - Contact the land owner before continuing with recovery
  - ☐ Public - Continue with recovery
- ☐ Can the aircraft be accessed safely?
  - ☐ No - Contact Maintenance Division or qualified contractor for assistance
  - ☐ Yes - Continue with recovery
- ☐ Access the aircraft
  - ☐ Power down the aircraft
  - ☐ Remove the fuel source
    - ☐ Remove batteries
    - ☐ Close liquid fuel valve
- ☐ Document the crash
  - ☐ Take photographs, make notes and sketches as needed
- ☐ Remove the aircraft
  - ☐ Clean all debris from the site

Appendix E Accident Report

Page 1 of 1

UAS Accident Report

Project Name	Did this flight require pre-approval? ☐ Yes - Project Number: _____ ☐ No All pre-approved flights are given a project number by TxDOT. Refer to the signed Pre-Approval Request Form from the UAS Coordinator

Instructions: Refer to manual Section 2.7.1. *Accident Report* for the minimal requirements for accident reporting. It is recommended to fully describe the accident including the day, time, meteorological conditions and flight maneuver being conducted at the time of the incident. Describe any injury or damage caused by the accident. Include the name of the RPIC, VO, and any other observers present. Describe any contact with law enforcement or the public. Include photographs if possible. Use additional pages as needed.

Accident Report:

RPIC Initials: _____