

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

UAS Aerial Imagery Report

11/14/2018

A. ACCIDENT ERA18FA251

Location: Woburn, Massachusetts
Date: September 15, 2018

B. PERSONNEL

UAS RPIC¹: Michael Bauer
National Transportation Safety Board
Washington, D.C.

C. ACCIDENT SUMMARY

On September 15, 2018, about 1103 eastern daylight time, a Columbia Aircraft Mfg. LC41-550FG, N2536T, collided with trees and terrain during an instrument approach at Woburn, Massachusetts. The private pilot and one passenger were fatally injured. The airplane was destroyed. The airplane was registered to the pilot and was operated under the provisions of Title 14 Code of Federal Regulations Part 91 as a personal flight. Day, instrument meteorological conditions prevailed, and an instrument flight rules flight plan was filed for the flight. The flight originated at Republic Airport (FRG), Farmingdale, New York at 0954 and was destined for Laurence G Hanscom Field (BED) Bedford, Massachusetts.

D. DETAILS OF IMAGERY

1.0 Equipment and Procedures

Equipment

Mapping and viewpoint flights of the accident site were conducted on September 15th and 16th, 2018, using the NTSB DJI Phantom 4 Professional (P4P) small unmanned aircraft system (sUAS, commonly known as a drone). Additional and similar flights were conducted by the Massachusetts Department of Transportation but are not discussed in this report.

The drone was equipped with a dual GPS/GLONASS receiver which provided georeferenced information on all still photos. The drone was equipped with an FC6310 camera using the Sony Exmor 1" CMOS sensor, with a focal length of 8.8 mm and the

¹ RPIC – Remote Pilot In Command

number of effective pixels of 20 megapixels. Still photos were captured in a JPG format. One video was taken in MP4 format, with 4K resolution at 30 frames per second.

Ground control points were documented with a Trimble GEO7X differential GPS receiver.

Procedures

The accident site was located in a heavily wooded area approximately 4.2 nm from the departure end of runway 29 at Laurence G Hanscom Field airport (KBED). The accident site was bordering the KBED class D airspace. Automated airspace approval was received through the FAA LAANC system. Flights were conducted under the provisions of 14 CFR Part 107.

Weather conditions were clear with light winds during flight operations. The purpose of the UAS imagery was to document the wreckage site and collect still images around the impact area.

The sUAS was flown in an overlapping double grid over the region of interest over the wreckage site at two altitudes of 125 ft above ground level (AGL) and 200 ft AGL from the launch point providing an approximate ground sample distance of 0.44 in/pixel and 0.68 in/pixel, respectively.

Additional sets of still images were taken for additional viewpoints. Total flight time was approximately 60 minutes.

Processing

Geo-referenced still imagery was processed using Pix4D photogrammetry software to produce a 3D point cloud and an orthomosaic map of the wreckage site. Relative accuracy (within the map) was calculated at 1.14 inches, twice the average ground sample distance.

DGPS data was used to correct for any UAS elevation data errors and provide positional data for ground control points and checkpoints. DGPS data was corrected using the continuously operating reference station (CORS) at Milton, MA (MAMI). Horizontal and vertical positional accuracy (when compared to features outside the 3D point cloud) was calculated at 27.6 inches horizontally and 51.2 inches vertically.

2.0 Imagery products

Approximately 430 high resolution photos and one video were gathered. Select photos and excerpts from the 3D modelling products are included in this report in section 4.0. A list of images and select output products attached to this report and contained in the docket are listed in section 3.0.

Figure 1 contains a still image taken from above the wreckage site looking towards Minchin Drive. An area of discolored vegetation is visible on the tree canopy around the accident site.

Figure 2 contains a still image of a side view of the accident site. Several pieces of the accident aircraft are visible including a section of the tail which includes a portion of the left elevator and vertical tail. Additionally, the rudder and the main landing gear is also visible. A section of a large tree that was downed due to the accident can also be seen.

Figure 3 contains an overhead image of the accident site with a tree that was downed in the accident after impact with the accident aircraft.

Figure 4 contains a still image of an overhead view of the accident site. Several pieces of the accident aircraft are visible including the rudder and aircraft engine.

Figure 5 contains a screenshot of the orthomosaic map in Google Earth .kmz format.

3.0 Attachments

Attachment 1 – Original Photograph used in Figure 1

Attachment 2 – Original Photograph used in Figure 2

Attachment 3 – Original Photograph used in Figure 3

Attachment 4 – Original Photograph used in Figure 4

Attachment 5 – Orthomosaic map in Google Earth .kmz format (ref. Figure 5)

4.0 Oversized Imagery

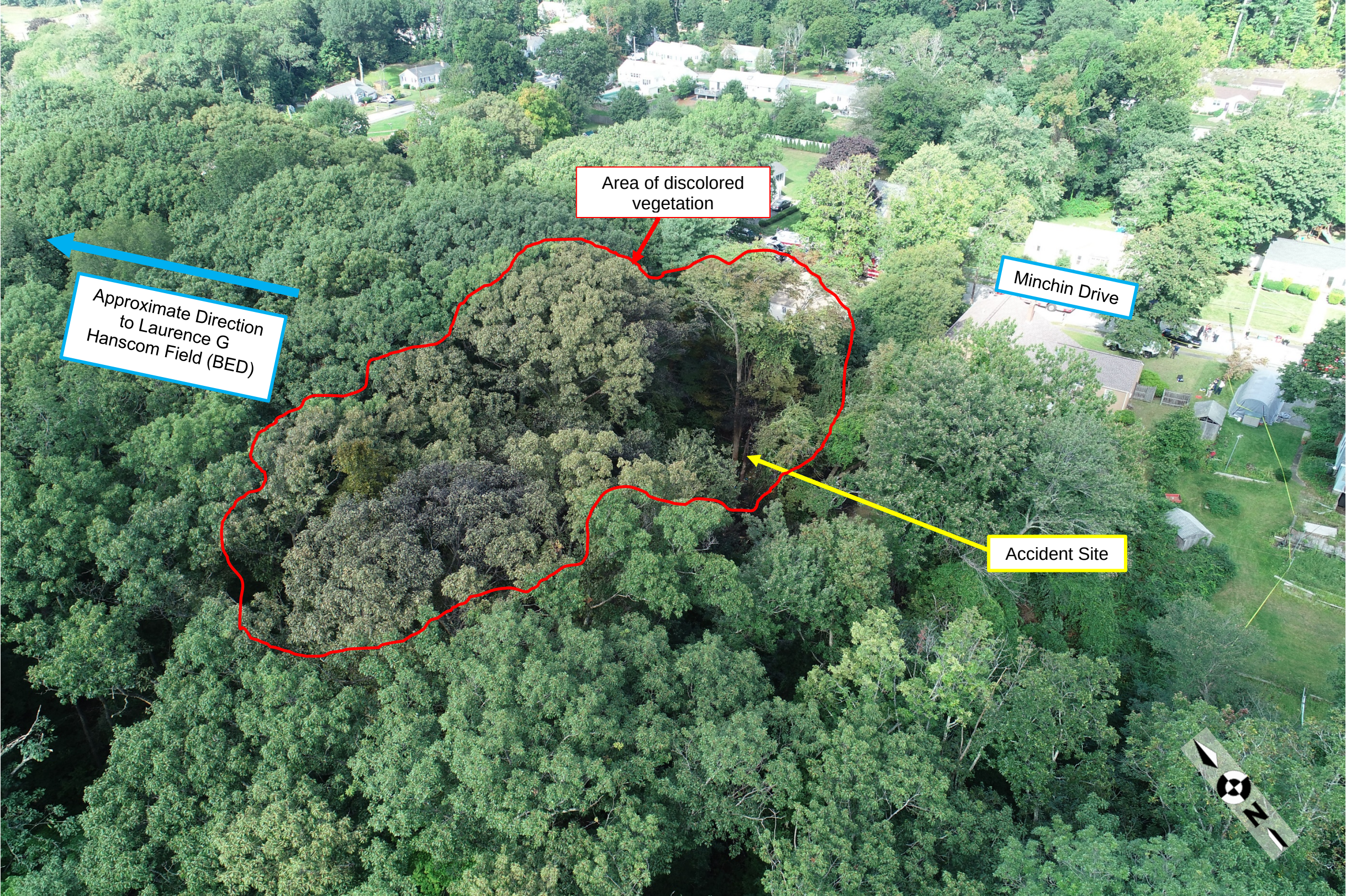


Figure 1 – Photo – Aerial view of accident site on the day of the accident, an area of discolored vegetation is noted (directional arrow approximated)

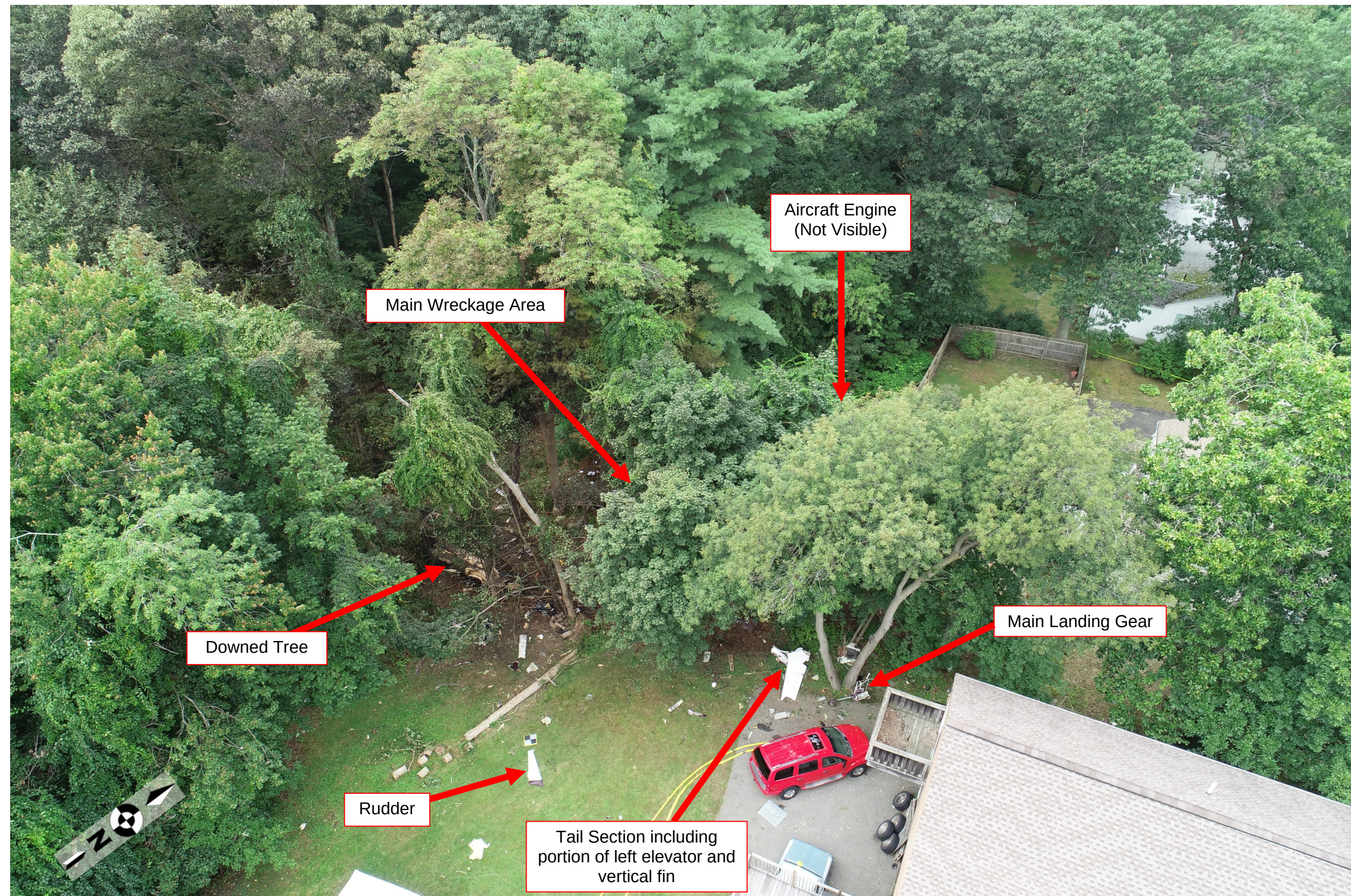


Figure 2 – Photo - Aerial side view of accident site on the day of the accident (directional arrow approximated)

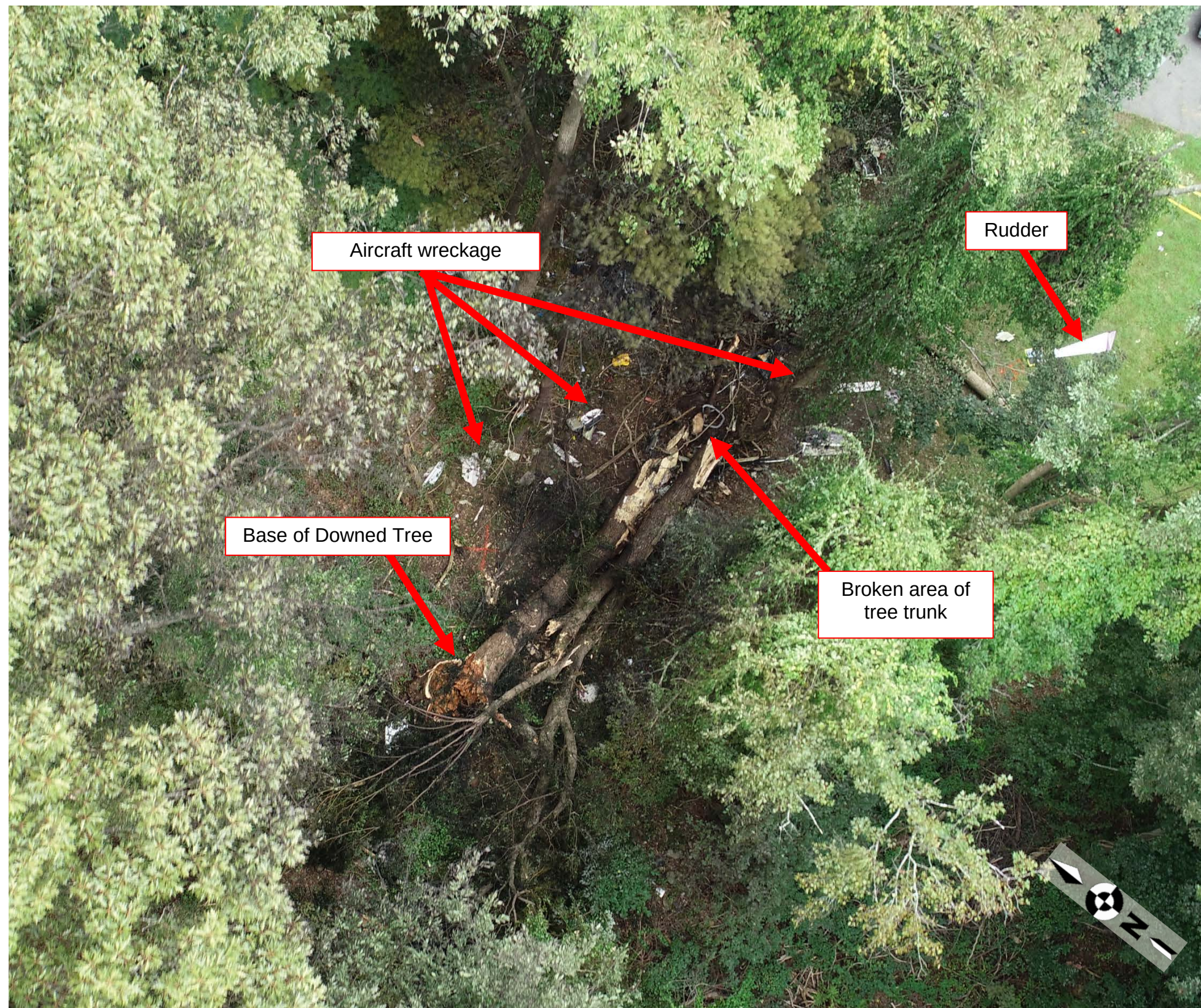


Figure 3 - Photo (cropped) - Aerial view of showing additional wreckage and downed tree (directional arrow approximated)



Figure 4 – Photo (cropped) - Aerial view of showing additional wreckage and aircraft engine (directional arrow approximated)



Figure 5 – Orthomosaic image overlaid on Google Earth of accident site.