

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

July 22, 2016

GPS Factual Report

Specialist's Report
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1. EVENT AND SUMMARY

Location: Gilmer, Texas
Date: January 13, 2016
Aircraft: Cessna 172N
Registration: N737EZ
Operator: Private
NTSB Number: CEN16FA083

On January 13, 2016, about 0105 central standard time (CST), a Cessna 172N, N737EZ, was located in a wooded area about 0.5 nautical miles south/southwest of runway 36 at Fox Stephens Field - Gilmer Municipal Airport (JXI), Gilmer, Texas. The airplane was found by a Texas Department of Public Safety Officer during a search with the Gilmer Police Department for an airplane that was reported by a family member to be overdue. The non-instrument rated private pilot was fatally injured and a passenger sustained serious injuries. The airplane received substantial damage to the wings, fuselage, and empennage. The airplane was registered to and operated by the pilot under 14 *Code of Federal Regulations* Part 91 as a personal flight that was not operating on a flight plan nor receiving any air traffic control services. Night instrument meteorological conditions prevailed for the flight that departed from Sulphur Springs Municipal Airport, Sulphur Springs, Texas on January 12, 2016 about 1915 and was returning to JXI.

2. DETAILS OF INVESTIGATION

The National Transportation Safety Board Vehicle Recorder Laboratory received the following devices:

GPS Manufacturer/Model: iFly 740
Serial Number: VH15050402

2.1. Adventure Pilot iFLy 740 Device Description

The Adventure Pilot iFly is an externally-powered, multi-function display and GPS receiver with a high resolution, LCD touch screen display. The unit includes a built-in navigational database and is optionally capable of receiving inflight ADS-B information including NEXRAD weather radar, airport weather reports (METARs), weather forecasts, and traffic advisories. The navigational and information features include terrain warnings, airspace alerts, and display of enroute VFR and IFR navigational information and IFR approach charts.

The unit is capable of recording track history to a removable SD card that is compatible with the Microsoft file allocation table (FAT) file system. Track history data are written as National Marine Electronics Association (NMEA) 0183 compatible sentences containing local time (as selected by the user), latitude, longitude, and altitude.

2.2 Adventure Pilot iFLy 740 Data Recovery

The device was in good condition and the data were extracted from the SD card normally. The NMEA 0183 track history sentences were converted to comma delimited value (CSV) and Keyhole Markup Language (KML) formats using.



Figure 1. Photo of iFly, as received.

2.3 Adventure Pilot iFLy 740 Data Description

Two log files existed and corresponded to the date of the accident flight on January 12, 2016. The most recent log spanned from 19:16:21 to 19:53:53 CST which captured the accident event. The second log spanned from 16:42:46 to 17:26:59 CST. The data appeared to be sampled at a variable rate in both logs.

2.3.1 Adventure Pilot iFLy 740 Event Log Data Description

The GPS records a system log of notable events processed by the GPS such as; terrain alerts, flight phases, user inputs, and GPS signal conditions. Table 1 lists the events pertinent to this investigation and its associated time during the accident flight.

Table 1. Pertinent Event Log Data.

Time (CST)	Event
19:53:38	Aircraft Status Phase:Landing_Low FOX STEPHENS FIELD - GILMER MUNI (JXI)
19:53:42	>>>>>> AvMap Mouse Down <<<<<<
19:53:42	MapControl Clicked: AvMapCtrlMouseUp,
19:53:42	PopupMenu.Show(): Settings Menu
19:53:42	FORM SHOWN!: iFly.Forms.PopupMenuForm
19:53:42	PopupMenu.OnClosed(): Settings Menu ==> <NONE>
19:53:49	GPS SignalBars Changing: 2 => 1, 99.99
19:53:49	SignalProblem-BEGINS

The event at 19:53:38 CST, is a flight phase event that indicates the system presumes the aircraft is on final approach to the destination airport. The five events at 19:53:42 CST, are user interface (UI) events regarding manipulating the device's touchscreen. The manufacturer has stated that g-forces can create false "touches" to the screen inducing these events. The two events at 19:53:49 CST, are GPS signal strength events which show the decay of the GPS signal.

2.4 GPS Parameters Provided

Table 2 describes data parameters provided by the GPS device. Date, Time, Latitude, Longitude, and GPS Altitude are recorded by the device. Groundspeed and Track are derived from the recorded parameters.

Table 2. GPS Data Parameters.

Parameter Name	Parameter Description
Date	Date for recorded data point (MM/DD/YYYY)
Time	Time (UTC) for recorded data point (HH:MM:SS)
Latitude	Recorded Latitude (degrees)
Longitude	Recorded Longitude (degrees)
GPS Alt	Recorded GPS Altitude (feet)
Groundspeed	Derived groundspeed (knots)

3. OVERLAY AND TABULAR DATA

The following overlay was created using Google Earth. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

Figure 2 is a Google Earth overlay that shows the flight track and the first and last recorded data point from respective flight, the prior flight is represented in purple, and the accident flight is represented in blue.

Figure 3 is an overlay that shows the flight track from the accident flight's recorded contents. Multiple data points are shown to highlight the direction of travel, beginning with the first recorded data point at 19:16:21 CST, and ending at 19:53:53 CST.

Figures 4 and 5 are a top and side view overlay that highlights the last recorded data points. A yellow marker was placed that shows the final rest of the wreckage, as supplied by onscene investigators.

At 19:52:55 CST, the flight track shows the aircraft traveling due south, parallel to the runway with a groundspeed of 79 kts. The track crosses the wreckage point at 19:53:42 CST, concurrently when the UI events were logged.

Tabular data used to generate figures 2 through 5 are included as Attachment 1. Data marked not valid is indicated by an asterisk(*). This attachment is provided in electronic comma-delimited (*.CSV) format.

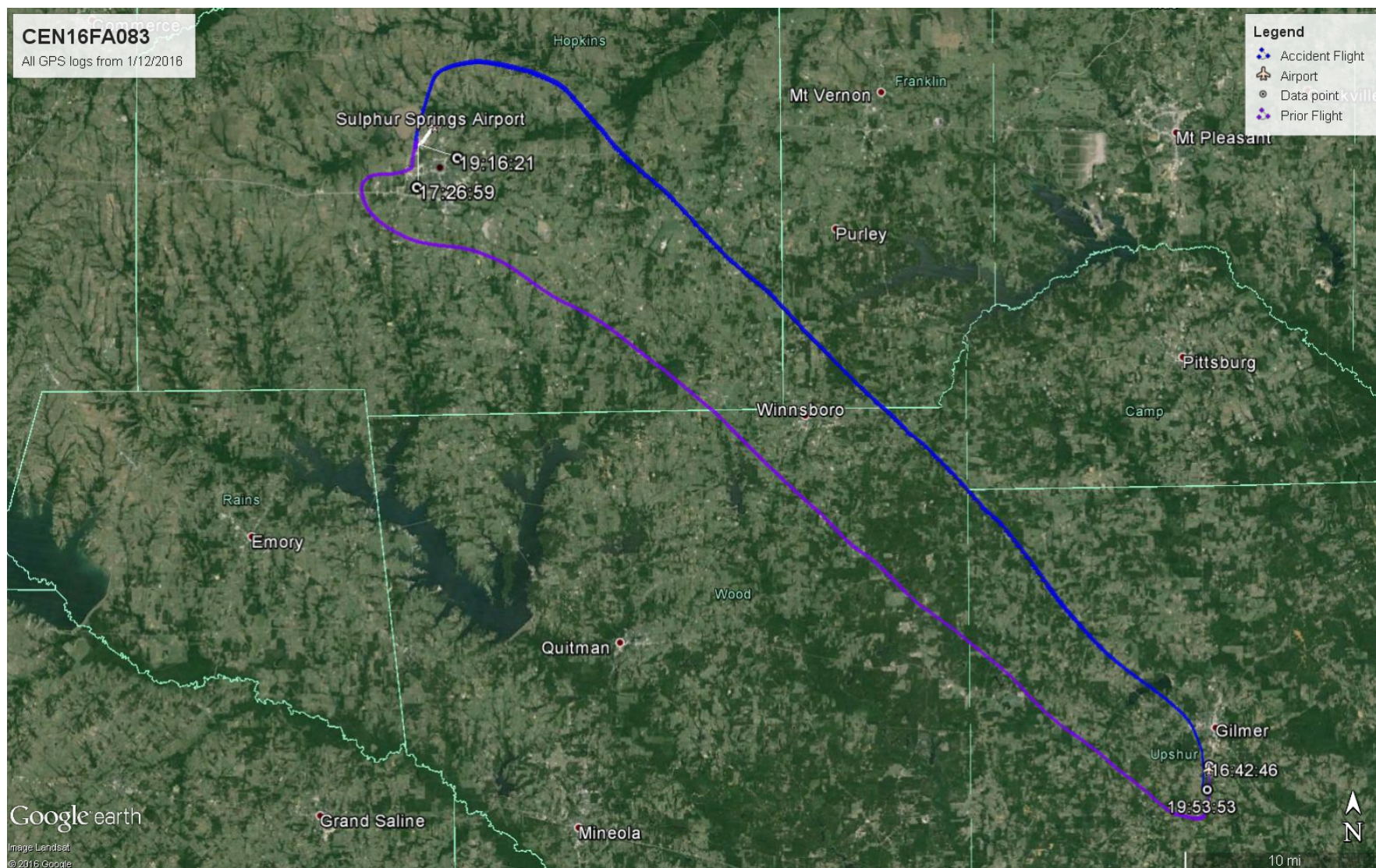


Figure 2. Overlay of both recorded flights on the accident date.

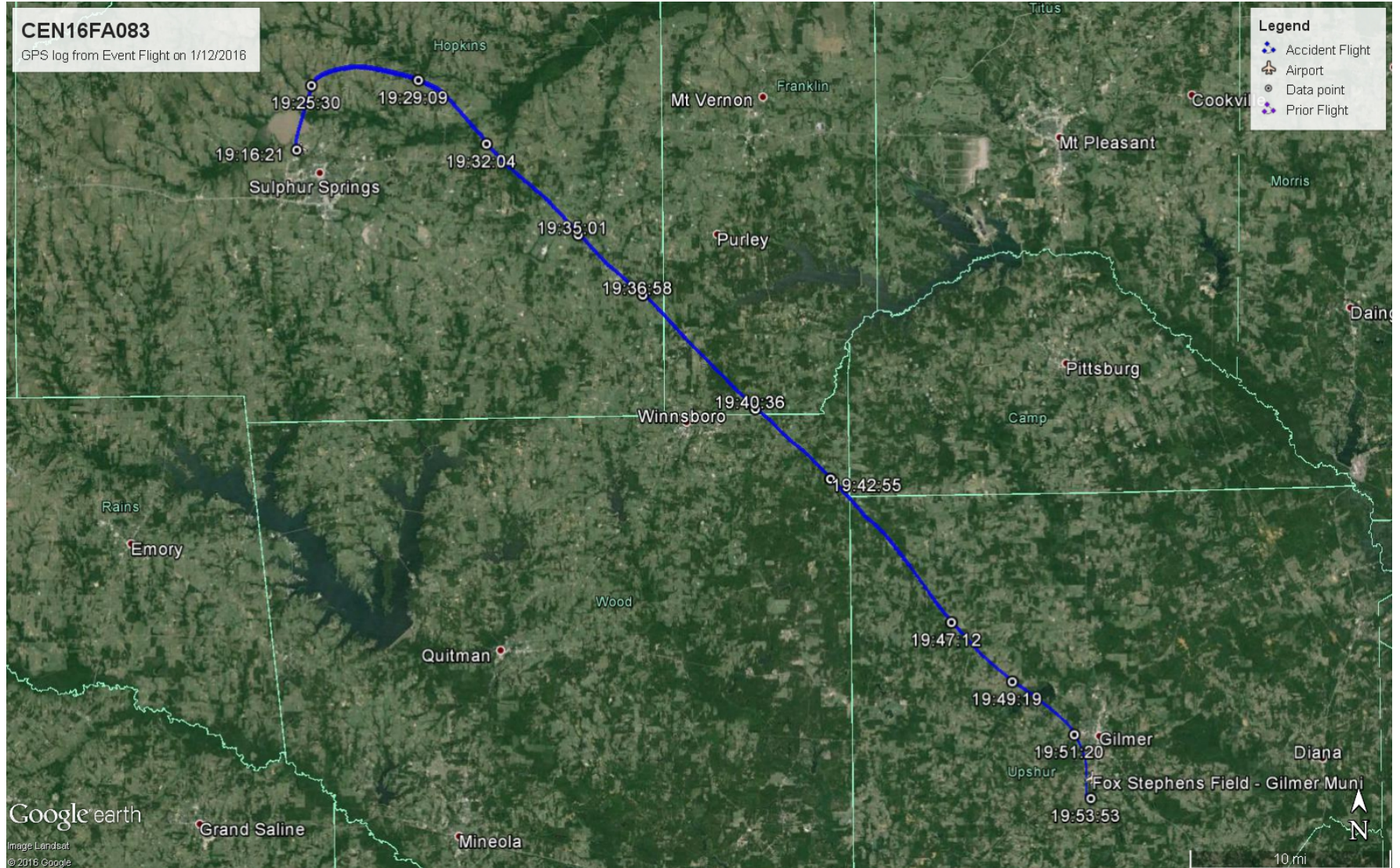


Figure 3. Overlay of all recorded data from accident flight.

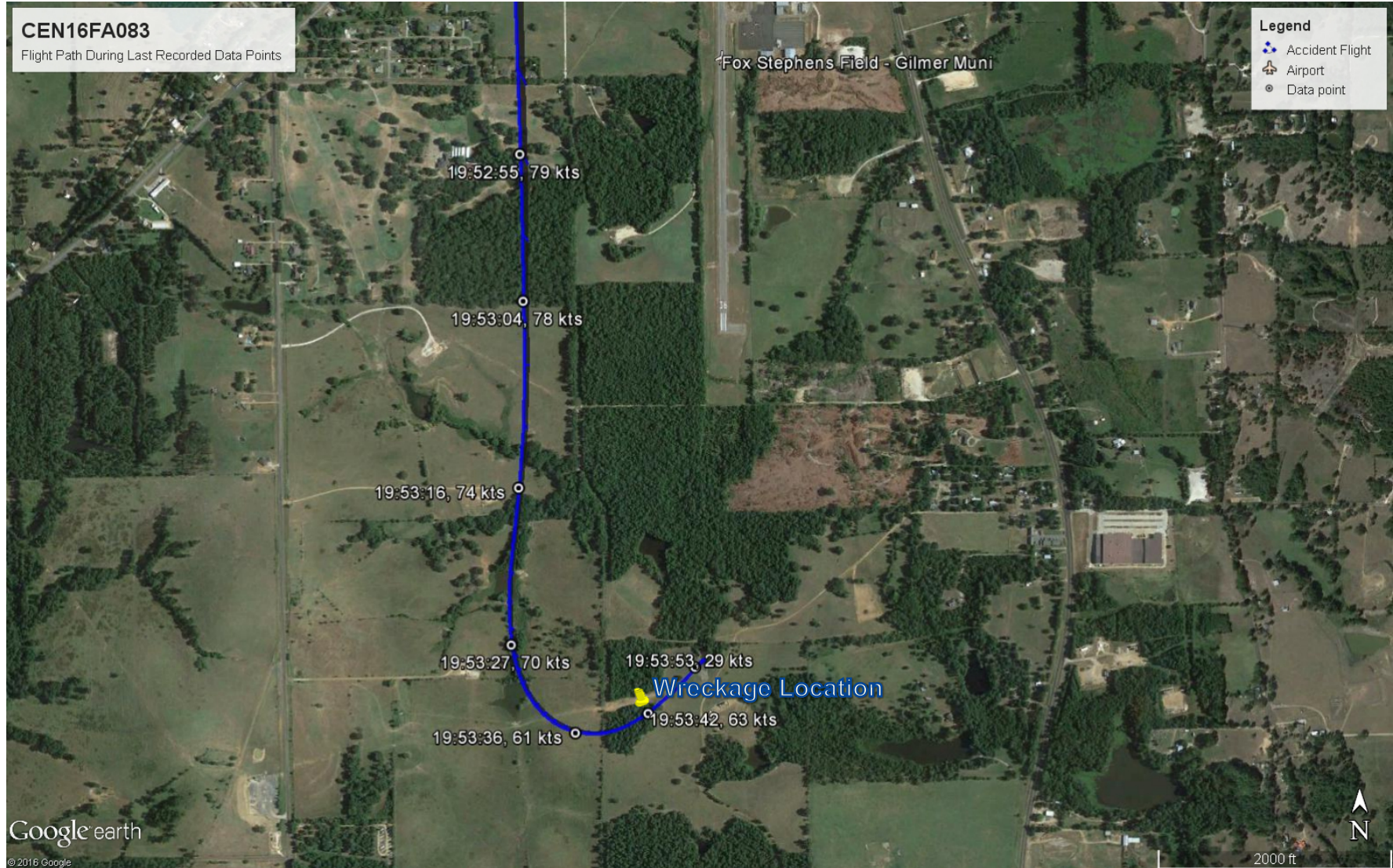


Figure 4. Top view of last recorded data points.

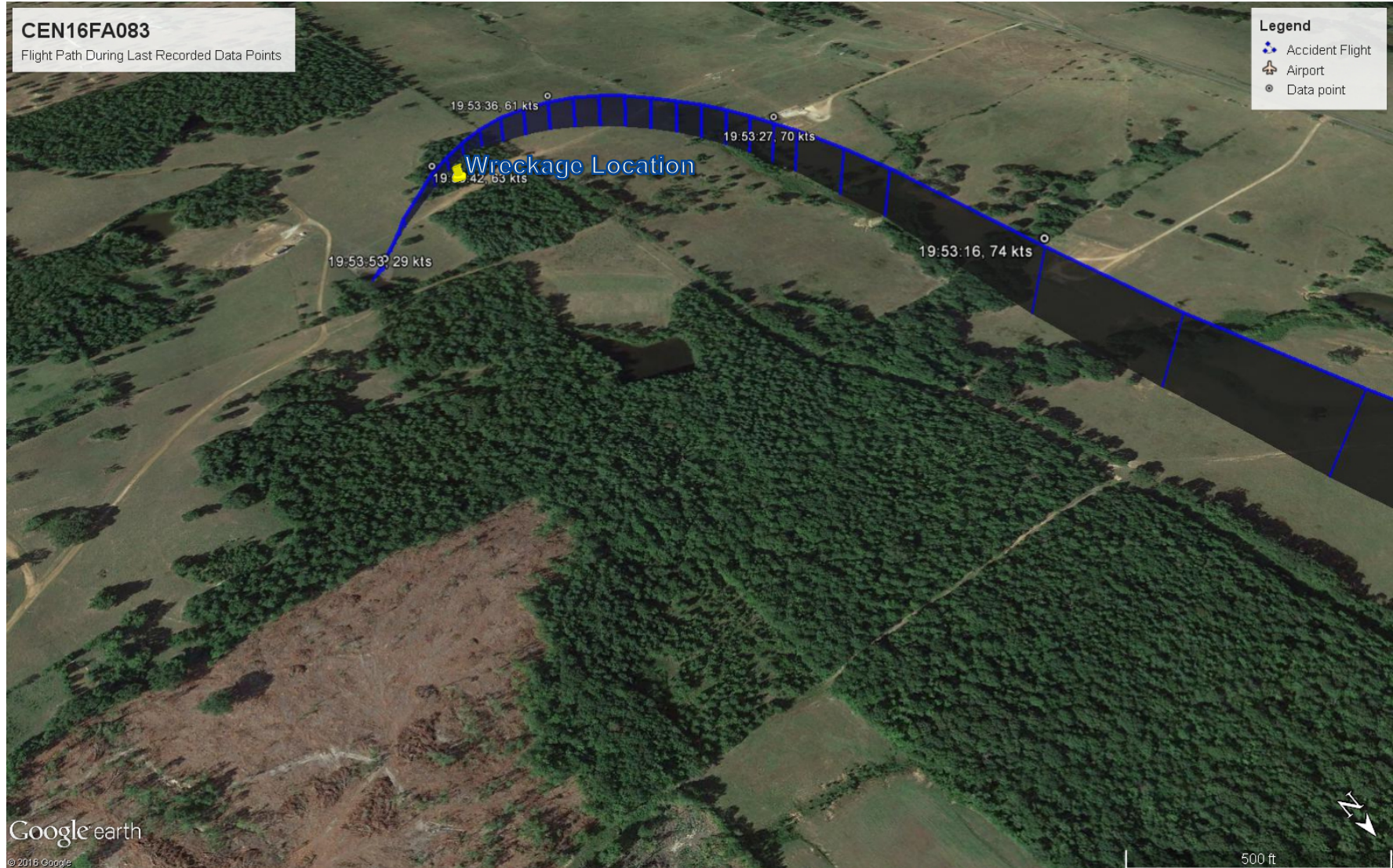


Figure 5. Side view of last recorded data points.