

ACCIDENT

Aircraft Type and Registration:	Piper PA-28R-201 Cherokee Arrow III, G-CEOF	
No & Type of Engines:	1 Lycoming IO-360-C1C6 piston engine	
Year of Manufacture:	1988 (Serial no: 2837008)	
Date & Time (UTC):	25 May 2017 at 1050 hrs	
Location:	Two miles north-east of Skipness, Kintyre peninsula	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - 1 (Fatal)	Passengers - 1 (Fatal)
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	62	
Commander's Flying Experience:	Approximately 219 hours (of which 38 were on type) Last 90 days - 8 hours Last 28 days - 5 hours	
Information Source:	AAIB Field Investigation	

Synopsis

During a flight from Oban to Carlisle, the aircraft flew into an area of low cloud, fog and mist that extended from the Irish Sea, around the Isle of Arran and into Loch Fyne. As the aircraft travelled down Loch Fyne it descended into the sea, approximately two miles north-east of Skipness on the Kintyre peninsula. The pilot and passenger were fatally injured in the accident.

History of the flight

The pilot chartered the aircraft from Carlisle Lake District Airport on 20 May 2017 to fly to Oban Airport where he planned to meet friends and walk up Ben Nevis. The intention was to return to Carlisle on 24 May 2017. After a brief flight check with a local instructor, the pilot and a friend departed Carlisle at 1600 hrs for the flight to Oban. Oban Airport closed at 1715 hrs and although the flying club at Carlisle had attempted to arrange for an out-of-hours arrival before his departure, the paperwork had not been correctly submitted. Consequently, en route to Oban the pilot was informed by Scottish Information that Oban Airport would be closed at his predicted arrival time and he was advised to divert to Cumbernauld Airport. The pilot landed at Cumbernauld at 1638 hrs.

The following morning the pilot had a discussion with instructors at Cumbernauld on the routing to Oban. G-CEOF departed Cumbernauld at 1151 hrs and arrived at Oban at

1246 hrs on 21 May 2017¹. The weather on 24 May 2017 was not suitable for the planned return flight to Carlisle, so the flight was delayed until 25 May 2017.

The pilot and passenger arrived at Oban Airport at approximately 0900 hrs on 25 May 2017. There was fog and low cloud in the area at that time and the conditions were not suitable to depart Oban and fly to Carlisle. The pilot was seen by several witnesses checking the weather using an application on a mobile device; however, it was not possible to confirm which application he used. At some point, the pilot contacted the flying school at Carlisle and was told that the weather at the airfield was poor but was expected to improve. The pilot discussed the weather with the Flight Information Service Officer (FISO) at Oban and mentioned that there was low cloud at Campbeltown and Islay, and that he would delay his departure. At approximately 0950 hrs, the pilot contacted the flying school at Carlisle and was informed that the weather had improved at the airfield. He told them that he would depart Oban shortly and asked the school to book a taxi to meet the aircraft to take him and his passenger to Carlisle train station. Several witnesses stated that the pilot told them that he intended to head to Campbeltown; one witness said that the pilot told him that he would route closer to Prestwick. The departure at 1025 hrs was uneventful and the aircraft changed frequency to Scottish Information shortly after leaving the ATZ.

At 1040 hrs, the pilot of G-CEOF relayed a message to Scottish Information, via a second aircraft, that he was over Lochgilphead at 1,000 ft and that he was routing to Carlisle via the Turnberry VOR. Scottish Information, in turn, relayed a message informing the pilot of G-CEOF that he would receive a Basic Service and to squawk 7401. He was also advised that better two-way communication could be expected as the aircraft routed south towards the Turnberry VOR. The flight details were passed to Prestwick ATC as Scottish Information anticipated transferring the aircraft to Prestwick once it was in the vicinity of Bute.

Approximately 20 minutes after the relay call to G-CEOF, Scottish Information had still not heard from the pilot of G-CEOF and therefore the FISO attempted to communicate with him. As there was no response from the pilot, and the FISO could see no evidence of the aircraft on his Flight Information Display, he checked with ATC at Prestwick, Glasgow, Campbeltown, Oban and Carlisle to determine if any of these units were in contact with the aircraft. As none of these units had made contact with the pilot, at 1115 hrs the FISO at Scottish Information reported his concern for the safety of the aircraft to the Airways Watch Manager and the Distress and Diversion (D&D) Cell at Swanwick. Floating wreckage and the bodies of both occupants were later recovered from the sea.

Aircraft information

The Piper 28R-201 is a four-seat, low wing monoplane of all metal construction, with retractable landing gear and conventional controls.

G-CEOF was powered by a fuel injected piston engine fitted with a three-blade, constant-speed propeller and when cruising at 120 kt used approximately 40 litres of fuel

Footnote

¹ The arrival date was incorrectly logged by Oban ATC as 22 May 2017.

per hour. Fuel was stored in two wing tanks with a total useable capacity of 38 gal US (146 litre) in each. A three-position rotary fuel selector valve situated on the left cockpit wall, allowed the pilot to select the LEFT or RIGHT fuel tanks, or both tanks OFF. A fuel contents gauge for each tank was situated on the lower part of the instrument panel. In addition to the mechanical fuel pump on the engine, the aircraft was also fitted with an electric fuel booster pump that could be selected ON / OFF by the pilot. A fuel flow gauge was fitted and co-located with a manifold pressure gauge, adjacent to the engine rpm gauge.

G-CEOF was approved to operate in IMC conditions and was fitted with a Mode C capable transponder that transmitted the aircraft's altitude to an accuracy of ± 50 ft. It had two altimeters and the attitude indicator was driven by suction provided by a mechanical pump fitted to the aircraft's engine.

The front seat occupants were secured by a lap and diagonal seatbelt. There were no lifejackets or a life raft on the aircraft during the accident flight.

Maintenance

G-CEOF was operated on a Certificate of Airworthiness and maintained to the Light Aircraft Maintenance Programme (CAP 766). The annual maintenance was completed on 1 September 2016 at 11,377 Flight Hours and the last maintenance activity, a six month / 50-hour check was completed on 7 March 2017 at 11,396 Flight Hours. The Airworthiness Review Certificate was issued on 1 July 2016 at 11,376 Flight Hours and was valid until 3 July 2017.

No significant faults had been recorded in the aircraft documentation. An instructor who flew G-CEOF regularly, and who undertook the check flight with the pilot on the day he departed for Oban, reported that all the equipment on the aircraft operated satisfactorily and when the pilot demonstrated a recovery from a stall, the stall warner operated correctly.

Search and Rescue organisation

Distress and Diversion Cell

The Distress and Diversion (D&D) Cell is a Royal Air Force Unit based at the London Area Control Centre in Swanwick. The unit undertakes a number of tasks including assistance to aircraft in an emergency and carrying out tracing action for missing / lost aircraft.

Aeronautical Rescue and Coordination Centre

The Aeronautical Rescue and Coordination Centre (ARCC) is based at the National Maritime Operations Centre (NMOC). The ARCC² is responsible for coordinating all Maritime and Coastguard Agency Search and Rescue (SAR) helicopters and for providing an aeronautical SAR service in conjunction with the D&D Cell.

Footnote

² Responsibilities are detailed in MCA; ARCC Transition Programme; Concept of Operations for the Aeronautical Rescue Coordination Centre function by Her Majesty's Coastguard. Version 6.8 dated October 2015.

Missing / overdue aircraft

The D&D Cell are the lead organisation for overdue action and for instigating tracing action which includes checking alternative airfields, contacting other Air Traffic Control Centres and reviewing radar replays.

Missing aircraft are assigned one of three emergency phases that are defined in the ICAO IAMSAR³ taxonomy:

Uncertainty Phase: A situation wherein doubt exists as to the safety of an aircraft or its occupants.

Alert Phase: A situation wherein an aircraft or its occupants are having some difficulty and may need assistance, but are not in immediate danger.

Distress Phase: A situation wherein there is reasonable certainty that an aircraft or its occupants are in danger and require immediate assistance.

Concerns regarding the safety of an aircraft can be received from a number of sources including the general public and one of the 62 different Air Navigation Service Providers (ANSP) within the UK. Establishing the situation of General Aviation (GA) aircraft can be difficult as they do not generally file a flight plan and while they might request and obtain a Basic Service from an ANSP, the fundamental aspect of such a service is that it is non-surveillance. GA pilots who are not receiving a service are at liberty to change their route, or timings without informing anyone. Therefore, the D&D Cell will take into consideration the maximum endurance of GA aircraft before escalating the emergency phase. It is also not unusual for the D&D Cell to undertake tracing action for a GA aircraft to discover that the aircraft is parked in a hangar, or has flown to a different airfield.

Search and Rescue operation

On being informed by Scottish Information at 1115 hrs of their concerns for G-CEOF, the D&D Cell assistant on duty was tasked by his controller with contacting the operator of the aircraft, who reported that the aircraft was not due to arrive at Carlisle until 1200 hrs. When the aircraft did not arrive at the expected time, the D&D Cell initiated tracing action which included contacting the same ATC units as Scottish Information. However, there was no internal record of the actions taken. After the initial tracing action had been carried out, the D&D Cell requested a radar replay from NATS which identified a target, believed to be G-CEOF, which faded from the radar at 1050 hrs when it was approximately two miles north-east of Skipness.

At 1320 hrs, the D&D Cell alerted the ARCC of the incident, who verified the information by conducting their own inquiries which included contacting the same ATC units as the D&D Cell and Scottish Information. At 1356 hrs, the D&D Cell informed the ARCC of the outcome of the radar replay and the last known position of the missing aircraft. At 1401 hrs the ARCC

Footnote

³ International Aeronautical and Maritime Search and Rescue.

tasked a Coastguard helicopter that was operating in the Edinburgh area with conducting a search for the aircraft in the area where it was last seen on radar.

When the helicopter reached the search area at 1440 hrs, the crew received reports from a nearby vessel that wreckage had been sighted. The helicopter crew identified the wreckage near the last reported radar position of the aircraft at 1441 hrs and then two minutes later sighted a casualty in the water. The casualty, who was recovered by winch, had sustained fatal injuries. A second casualty, who was found close by and had also sustained fatal injuries, was recovered by an RNLI lifeboat. Neither the pilot or passenger were wearing a lifejacket.

Aircraft wreckage

Floating wreckage

The crew of the Coastguard helicopter reported that they had identified one of the aircraft wings floating in the water. The crew of the RNLI lifeboat recovered both pilot's seats, a bag containing the aircraft technical log and some personal items including the passenger's camera. The captain of a charter boat operating in the area reported that they had sighted the fuselage and cabin of the aircraft, which was missing both wings and the tail section. For safety reasons, the Coastguard instructed the captain not to put a line on the fuselage.

Underwater search

An underwater search of the area where the floating wreckage and casualties were sighted was carried out by the MoD Salvage & Marine Operations Project Team on 6 June 2017 using a towed side-scan sonar and an underwater, light weight, remotely operated vehicle.

The depth of water varied between 35 m and 55 m and the seabed consisted of undulating fine sand and mud which made the detection of small items difficult. Nevertheless, the left wing was found in 48 m of water, approximately 800 m from the shore of the Kintyre peninsula.

Location of wreckage and casualties

The locations of the casualties and wreckage extended over an area 800 m long and are plotted in Figure 1. It is possible that in the 12 days between the accident occurring and the underwater search beginning, some items of wreckage might have moved as a result of the extensive bottom trawling that is carried out in this area.

At the time of the accident, the wind was calm and the predicted tidal flow was 0.2 kt to the south; therefore, the floating section of wing could not have been the same section of wing found on the seabed. Given the tidal flow, it is likely that the floating wreckage may have settled in an area south of the accident site where submerged cables between Skipness Point and Arran are routed along the seabed; an underwater search could not be conducted in this area. The wreckage might also have remained afloat for some considerable time and moved further down the Firth of Clyde.

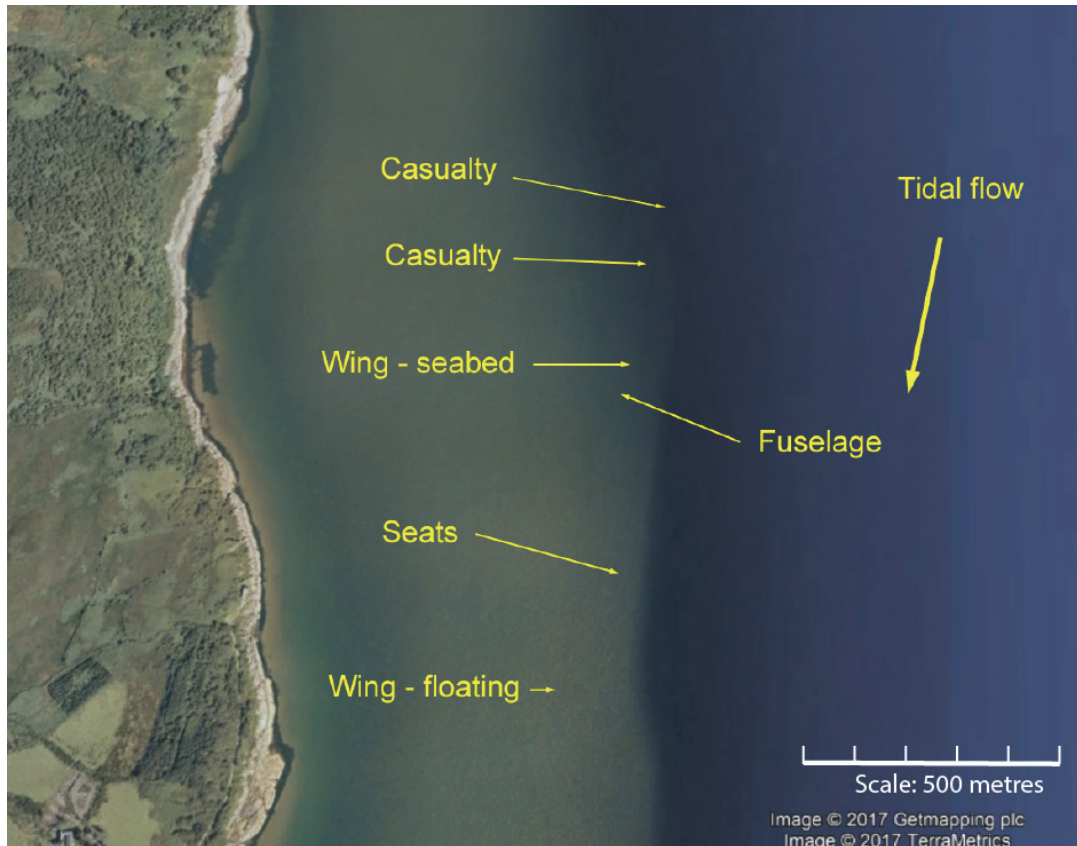


Figure 1

Reported position of casualties and wreckage

Meteorology

Met Office forecast

The Met Office forecast (below 10,000 ft), which was valid from 0800 hrs until 1700 hrs on 25 May 2017, reported extensive areas of poor visibility extending from the Irish Sea into Loch Fyne. The wind at 1,000 ft in the area of Skipness was forecast to be from the south at approximately 12 kt. The synopsis map is at Figure 2 and the accident occurred in Zone A. The Met Office text relating to Zone A reported:

'Zone A:

Widespread 3000 M in mist and occasional 200 M in fog, along with widespread hill fog. Isolated moderate turbulence was forecast near the fog until 1100 UTC. Cloud structure (all heights AMSL) was expected to be widespread stratus with bases 200-600 FT with tops 1500 FT, bases on the surface were allowed for in fog. Above this stratus, isolated areas of broken stratocumulus were expected in the far N.'

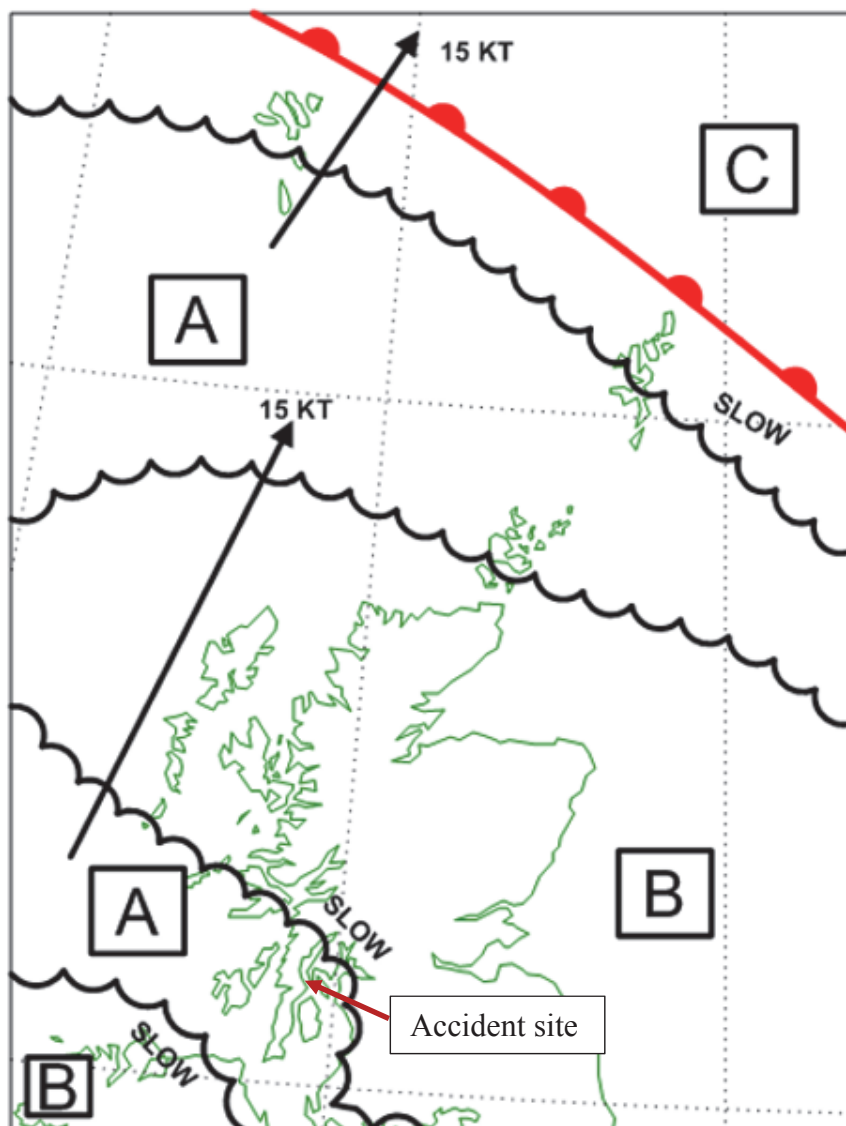
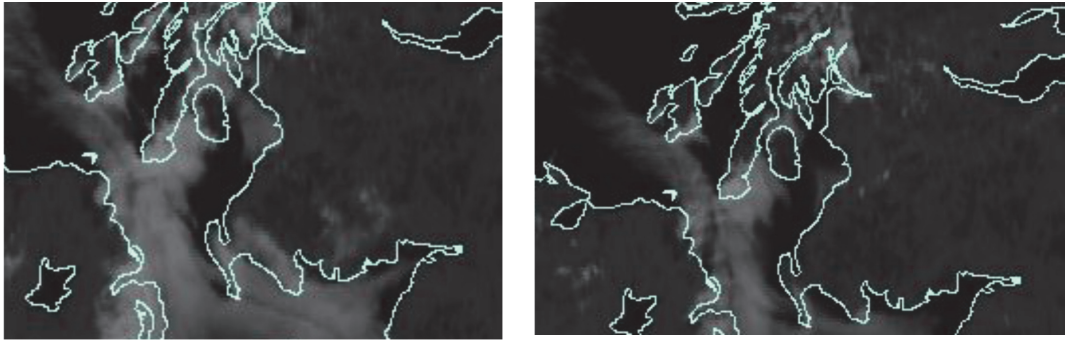


Figure 2

Met Office forecast, below 10,000ft, valid from 0800 hrs until 1700 hrs on 25 May 2017

High resolution visible satellite images

The Met Office high resolution visible satellite images taken at 1000 hrs and 1100 hrs on 25 May 2017 show areas of stratus or fog extending into Loch Fyne, with clear areas to the lee of high ground (Figure 3).



1000 hrs on 25 May 2017

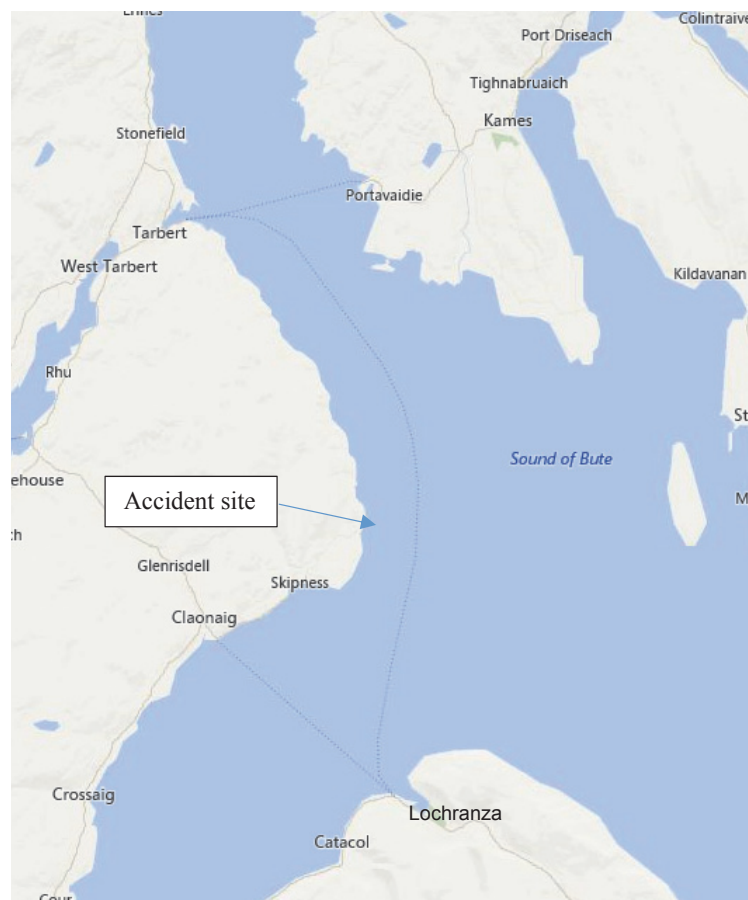
1100 hrs on 25 May 2017

Figure 3

High resolution satellite image for 1000 hrs and 1100 hrs on 25 May 2017

Other observations

Two ferries operating in the vicinity of the accident site suspended services due to poor visibility. The MV Isle of Cumbrae operated a service across Loch Fyne between Tarbert and Portavaidie. The MV Catriona operated between Lochranza on the north of the Isle of Arran and Claonaig on the Kyle peninsula (Figure 4).

**Figure 4**

Routes of ferry services

In the ship's log for MV Isle of Cumbrae it was reported that at 0920⁴ hrs the visibility was less than 1 nautical mile, the service had been suspended and the ship remained in Portavadie until the weather improved at 1145 hrs. The ship's log reported the weather and sea state at 0730 hrs as '*SE AIRS, CALM SEAS, MOD-POOR VIS*' and at 0900 hrs as '*VAR AIRS, CALM SEAS, POOR VIS*'.

The entry for the ship's log for the MV Catriona at 1040 hrs was '*FOG FILLED IN AGAIN, 40 MTRS VIS, INFORMED ... SERVICE SUSPENDED*'. The weather and sea state at 0700 hrs was recorded as '*WIND NONE, MIST PATCHES, SEA CALM*' and at 1200 hrs as '*VERY THICK FOG, VISIBILTY DOWN TO 40 MTRS, NO WIND, SEA CALM*'.

The Tarbert harbour CCTV, which was located around 6.5 miles north of the accident site, showed drifting fog / mist in the entrance to the harbour. The AAIB estimated that the visibility at 1120 hrs was around 600 m.

Recorded information

From a camera recovered from the accident site, photographs and video clips were downloaded by the AAIB which showed the flight from Cumbernauld to Oban on 21 May 2017. Several of the images showed two mobile devices that were running a flight planning and mapping application.

Photographs

An image of the instruments taken when the aircraft was west of Glasgow showed the aircraft flying at an altitude of 1,250 ft and speed of 130 kt. Another image showed a printout of the Pilots Log (PLOG) for the flight, which had been generated by the flight planning application. The PLOG recorded that the pilot planned to fly to Oban at a cruise speed of 120 kt.

Mobile devices

The mobile devices were not recovered. However, the company that developed the application provided the date and time that these devices last communicated with the company's servers and provided the AAIB with copies of the flight plans that had been saved to their servers.

This information showed that the pilot had planned a return flight from Oban to Carlisle which was last modified on 25 May 2017 at 0649 hrs. His device last contacted the company's servers at 1022 hrs, which was around the time that G-CEOF departed from Oban. The planned route was from Oban, to the island of Luing, which lies approximately 18 miles to the south-west of Oban, south down the Sound of Jura towards Gigha Island before overflying Campbeltown and then onwards towards Carlisle.

Footnote

⁴ The times recorded in the ships logs and on the CCTV footage were all in Local and have been adjusted to UTC.

Three flight plans that had been saved to the company's servers on the evening of 20 May 2017 were recovered and showed planned routes from Cumbernauld to Oban. One of these routes showed a direct track from a point just south of Stirling to Oban, whereas the other two routes showed similar paths but included within their titles the words '*low level*'. The '*low level*' flight plans used Lochgilphead as an en route waypoint and roughly followed the Crinan Canal which is an area of low lying land.

Radar data

Radar data was obtained from two radar heads located at Tiree and Lowther Hill which showed the actual route of the aircraft during the flight to Oban on 21 May 2017 and the return flight to Carlisle on 25 May 2017 (Figure 6).

On 21 May 2017, the aircraft followed one of the planned '*low level*' routes, passing overhead Lochgilphead and routing to Oban via the Crinan Canal at an altitude which varied between 1,000 and 2,000 ft amsl.

On 25 May 2017, G-CEOF initially followed the planned route from Oban to the island of Luing, but then deviated inland flying along the Crinan Canal towards Lochgilphead, before heading south down Loch Fyne towards the Isle of Arran. The radar data showed that G-CEOF was abeam Lochgilphead at 1042:41 hrs at a height of 1,050 ft and then flew for a further 15 nm down Loch Fyne with the last radar return occurring 7 minutes 43 seconds later when it was at a height of 150 ft. During the first 10.1 nm from Lochgilphead, the aircraft descended approximately 300 ft until it was at a height of 750 ft abeam Tarbert. During the next 4.9 nm, there was an increase in the rate of descent which was estimated to be approximately 500 ft/min towards the end of the flight.

From the radar data, the AAIB was able to derive the aircraft's approximate groundspeed using a moving average calculation, which has been plotted, along with the altitude, at Figure 5 against the distance from the last radar return. There is a gap in the radar data as the aircraft passed Lochgilphead and before it was picked up by the second radar head.

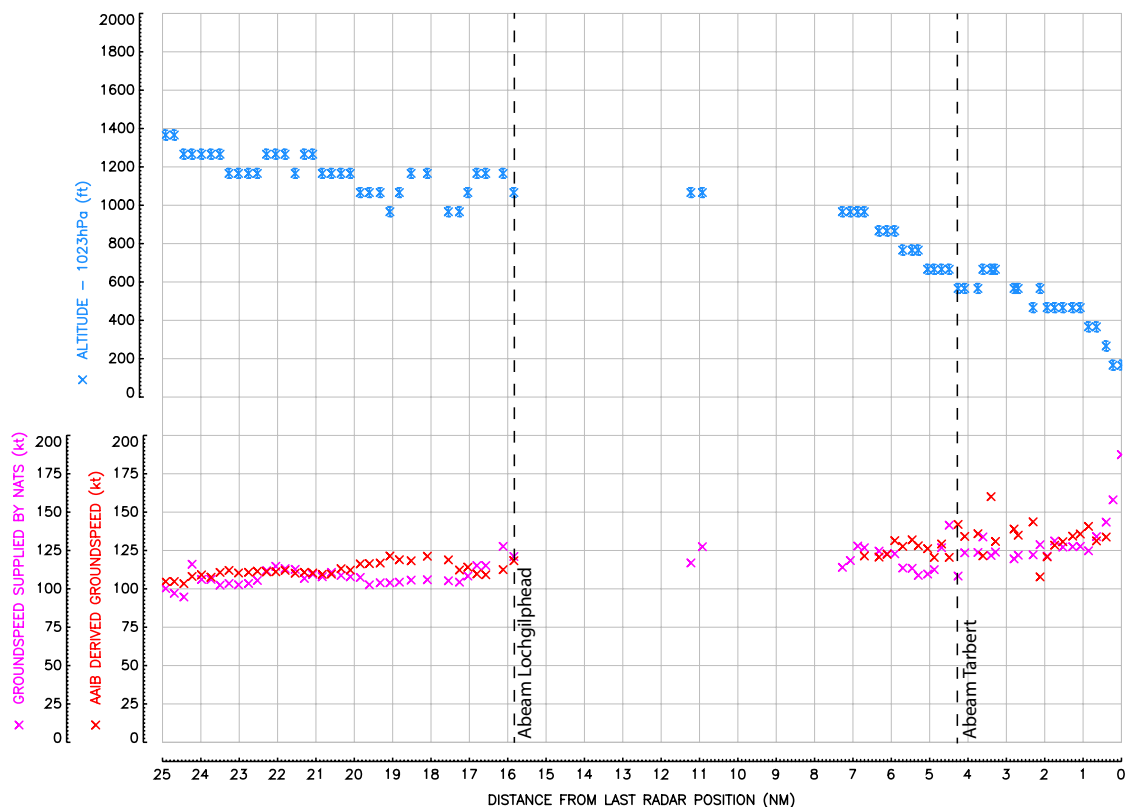


Figure 5

Aircraft altitude and derived airspeed plotted against the distance from the last radar return

Combined data overlay

Plotted at Figure 6 are the radar tracks for the flights from Cumbernauld Airport to Oban on 21 May 2017, the accident flight, and the planned route to Carlisle stored on the company’s servers. The tracks are overlaid with the Met Office satellite imagery taken at 1100 hrs on 25 May 2017.

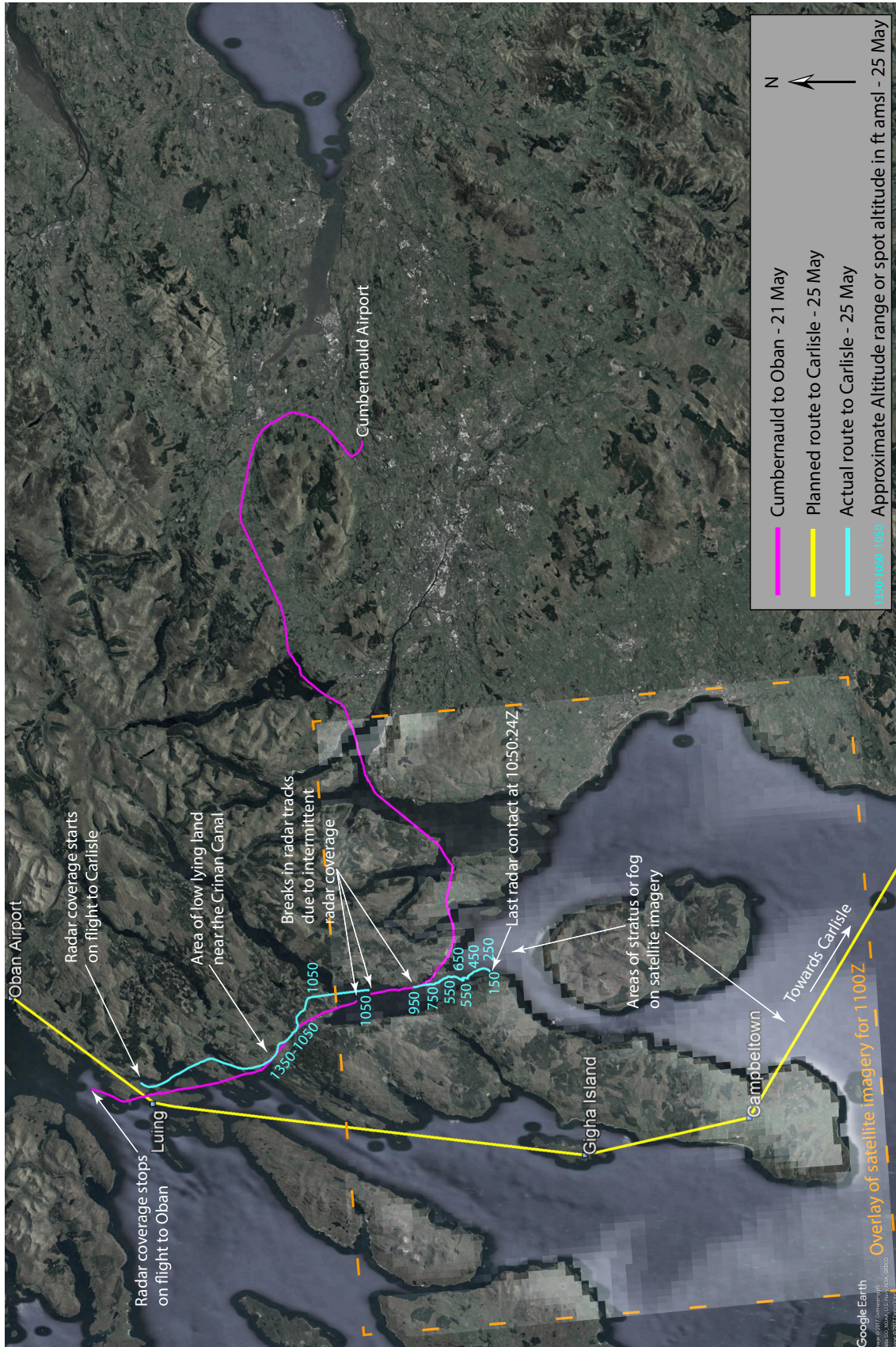


Figure 6

Radar track data and Met Office satellite imagery for 1100 hrs

Aircraft examination

Wreckage

The witness descriptions of the floating sections of the aircraft, the AAIB examination of the aircraft seats, and the condition of the left wing found on the seabed (Figure 7) all indicate that the aircraft broke up when it struck the water.



Figure 7

Left wing on seabed

Instruments

A video film recovered from the passenger's camera contained footage of the aircraft instruments when it was on base leg at Oban on 21 May 2017. From this footage it was determined that, with the exception of the Garmin GPS 150, all the avionics equipment was switched on and functioning. The needle on the suction gauge was at 5 in Hg and all the flight instruments appeared to operate normally. The engine parameters were in the normal range and the fuel selector was at the RIGHT position. The left fuel gauge indicated 30 US gal and the right gauge was at F (Full).

Fuel

The fuel records at Oban Airport show that at 1100 hr on 24 May 2017, 28.14 litre (7.4 gal US) of AVGAS was uploaded into the 'S' (right) fuel tank on G-CEOF. The fueller reported that the pilot only asked for the right⁵ fuel tank to be replenished in order to balance the plane. A video taken by the passenger after the aircraft landed at Oban showed the left fuel gauge reading 28 gal US and the right gauge approximately 30 gal US. There would therefore

Footnote

⁵ A photograph of the aircraft gauges show that on the ground it is the left fuel tank that had the lowest quantity.

have been approximately 250 litres (66 gal US) of fuel on the aircraft when it departed Oban, giving an endurance of approximately 6 hours.

The batch of fuel had been delivered on 11 April 2017 (15,000 litres) and the daily sampling checks carried out between 17 and 26 May 2017 found the fuel to be clear of water. There were no reports of any aircraft experiencing problems after uploading this batch of fuel.

Visual Flight Rules (VFR)

For a flight to operate under VFR, it must remain in VMC which is defined in terms of minimum visibility and distance from cloud. G-CEOF was operating below 3,000 ft amsl in Class G (uncontrolled) airspace. Regulation (EU) No 923/2012, SERA.5001, states that in such circumstances the minimum permitted visibility for flight under VFR is 5 km and the aircraft must also remain clear of cloud and within sight of the surface. However, SERA.5001 allowed the CAA to reduce the flight visibility requirement to 1,500 m for aircraft operating at speeds of 140 kt or less. The cruise speed of G-CEOF would have been less than 140 kt and therefore the pilot was permitted to fly VFR with the visibility as low as 1,500 m.

Medical

During the renewal of his Class 2 medical, a minor issue was noted on the pilot's electrocardiogram (ECG) trace and he was required to undertake a further and more extensive ECG examination. While this examination noted the existence of a conduction defect, it was considered sufficiently minor for his medical to be reissued without restriction or the need for further treatment. The post-mortem report for the pilot also noted an issue with an enlarged heart and that may have been symptomatic with a cardiac arrhythmia. Medical opinion was that such a symptom would not have been sufficient to constitute a factor in the pilot's capacity to operate the aircraft. There were no other relevant medical issues identified in the post mortem report.

Pilot's qualification and experience

The pilot's log book was lost in the accident and the following information was established from records held by two flying schools, a copy of his licence and two pages of his log book that were made by the operator when he hired the aircraft.

The pilot completed his PPL(A) Skill Test on 10 May 2014 and the only endorsement on his licence was SEP (Land). He converted to the PA-28 Arrow on 10 April 2016 and flew the aircraft regularly with an aircraft group based at Blackbushe Airport.

His training records show that during February and March 2016 he undertook three instrument flying training flights that included climbs and descents, rate 1 turns, partial panels, recovery from unusual attitudes and ILS approaches. His log book entries show that he then commenced IMC training on 20 December 2016 and over the following two months undertook three flying lessons that lasted for a total of 3 hours and 50 minutes of which 1 hour 30 minutes was logged as instrument flying. A flight undertaken on 5 January 2017 logged 50 minutes of Dual / P2 night flying.

One hour of simulated instrument flight on an FNPT1⁶ simulator at Wycombe Airport was logged in the pilot's log book for 8 and 13 March 2017. The instructor who conducted the simulator session stated that the pilot had said that he wanted to practise instrument flying and that as he had not started an IMC course the hours did not count towards his IMC rating.

In April 2017, the pilot started the process of converting onto the Cessna 182 and flew two flights on 6 and 12 April 2017 totalling 1 hour 40 minutes.

The summary for the last entry in the pilot's log book, that included flights up to and including 20 May 2017, recorded that he had flown a total of: 5.8 hours night flying; 12.5 hours instrument flying and 2 hours simulated instrument flying.

The pilot did not complete the IMC course syllabus and at the time of the accident did not hold an IMC / Restricted Instrument Rating (IR/R).

Human factors

Difficulty in judging height over water

Pilots flying under VFR rely on visual references, such as the horizon, to establish the attitude of the aircraft. If the horizon is obscured or difficult to define, then the attitude of the aircraft can be maintained by visual reference to the surface below. However, when flying in low visibility conditions over a calm expanse of water there might be insufficient visual cues to allow the pilot to establish the attitude and height of the aircraft without reference to the aircraft's flight instruments.

Decision making by a pilot

In the AAIB report into an accident involving a Piper PA-30 that flew into high ground during poor weather⁷, the AAIB discussed the factors which affect a pilot's decision making. The report also quoted Sydney Dekker who in his book *The Field Guide to Understanding 'Human Error'* states:

'Conditions often deteriorate gradually and ambiguously, not precipitously and unequivocally. In such a gradual deterioration, there are almost always strong initial cues that suggest that the situation is under control and can be continued without increased risk. Later cues that suggest the plan should be abandoned ... even while people see them and acknowledge them, often do not succeed in pulling people into a different direction.'

Footnote

⁶ Flight Navigation Procedures Trainer (FNPT), as defined in EASA CS-FSTD (A) for fixed-wing aircraft, but in essence a lower level training device than a Full flight simulator or Flight training device.

⁷ AAIB Report EW/C2017/01/01, Piper PA-30, registration G-ATMT.

CAA advice to GA pilots

The CAA publishes the Skyway Code⁸ which provides advice to GA pilots on the planning and the safe conduct of their flights.

The Code contains the following advice to pilots:

VFR minima

For operations in class G airspace the legal VFR minima allow flight in potentially very poor conditions. Clear of cloud and visibility of 1500 m is all that is required if below 3000 ft AMSL and flying at less than 140 kts.

In reality, the limiting factor is usually cloud rather than in-flight visibility – in conditions approaching 1500 m visibility, the cloud ceiling would likely mean flying dangerously low. The legal minima are not a good reference point for decision making because safe VFR flight normally ceases to be possible long before the visibility is that poor. They are limits not targets.

Full flight plan

Details of how to file a full VFR flight plan using the AFPEX system are contained in the 'International Flying' chapter (see p.154). A full flight plan may be filed for any flight, but it is a requirement for flying internationally. It is also recommended to file one if:

- > Flying over water, more than 10 NM from the UK coastline;*
- > When flying to the Scottish Highlands and Islands aerodromes; and*
- > Over other sparsely populated areas where search and rescue might be difficult.'*

Analysis

Aircraft

G-CEOF was equipped to fly in IMC conditions and a video clip and photographs taken during the flight to Oban by the passenger showed the flight and navigation instruments working normally. The operator reported that there were no known faults on the aircraft and the pilot and passenger made no mention of problems with the aircraft after arriving at Oban.

From the refuelling records at Oban, and cockpit photographs that showed the aircraft fuel gauges after it landed, it was estimated that on the return flight to Carlisle the aircraft had sufficient fuel on board to remain airborne for approximately 6 hours.

Footnote

⁸ http://publicapps.caa.co.uk/docs/33/CAA6395_Skyway_Code_AW_150817_SCREEN.pdf

Wreckage

The wreckage of the aircraft was found close to the last radar contact. While the aircraft was not recovered, the floating wreckage and the condition of the left wing found on the seabed indicate that the aircraft did not undertake a controlled ditching, but broke up when it struck the sea. The post-mortem examination revealed that the pilot and passenger both sustained fatal injuries during the impact, which was not survivable.

Prevailing weather conditions

The Met Office forecast fog, mist and low cloud in the area south of the Crinan Canal with visibility in some places as low as 200 m. The cloud base was forecast at 200 to 600 ft with the tops at 1,500 ft. High resolution satellite images, Tarbert harbour CCTV and the entries in the logs of two ferries all confirmed the presence of low stratus cloud or fog, south of Lochgilphead at the time of the accident.

The pilot delayed his departure until 1025 hrs when the weather at Oban and Carlisle had improved. From his conversation with the FISO at Oban, when he told him that there was low cloud at Campbeltown and Islay, it is evident that the pilot had checked the weather en route; however, the source of where he obtained this weather forecast could not be established.

While the flight started in VMC, after the aircraft passed Tarbert, it is likely that the visibility had reduced below 1,500 m such that the aircraft was being flown in IMC.

The pilot

The pilot had a current Class 2 medical and the post-mortem and review of his medical records did not identify any condition that would affect his ability to operate the aircraft. The instructor who conducted the check flight at Carlisle raised no concerns at the pilot's ability to fly the aircraft. The pilot had logged 12.5 hours of instrument flying and had undertaken two hours of instrument training in a simulator two months before the accident; however, he was not qualified and had not completed the required training to fly unsupervised in IMC.

The accident flight

The pilot had mentioned to a number of witnesses that he intended to return to Carlisle via Campbeltown, which was consistent with the planned flight recovered from the planning and mapping application. Another witness mentioned that the pilot had told him on the morning of the flight that he would route closer to Prestwick. The radar track of the accident flight shows that the pilot did not fly the planned route, but instead flew along low-lying land to the east of the Crinan Canal. The pilot was familiar with this area as he had flown through it several days earlier on his flight from Cumbernauld to Oban. This route would also have shortened the flying time by approximately 10 minutes and would have kept the aircraft clear of high ground around Campbeltown. However, the route would have taken him towards an area of poor visibility.

The pilot reported, via a relay call to Scottish Information, that he was overhead Lochgilphead at a height of 1,000 ft; the radar trace showed the aircraft at 1,050 ft to the east of

Lochgilhead. The pilot made no mention of any problems with the aircraft. Over the next 10.1 nm the aircraft descended 300 ft until it was abeam Tarbert at a height of 750 ft. Over the next 4.9 nm the aircraft's rate of descent increased and was approximately 500 ft / min before it disappeared from radar.

The NATS and AAIB derived ground speeds remained relatively constant as the aircraft approached and passed Lochgilhead, with no evidence of the aircraft having slowed down. From the forecast winds provided by the Met Office, the aircraft flew down Loch Fyne at an airspeed of approximately 130 kt, which is consistent with the cruise speed of the aircraft and the speed that it was flown on the flight from Cumbernauld to Oban.

As the pilot flew south down Loch Fyne the reducing visibility would have made it more difficult to identify the horizon. Therefore, he would have been dependent on other visual cues such as the surface of the water or the shoreline on either side of the Loch. However, the surface of the water would have been relatively calm and it would have been difficult for the pilot to detect changes in height without reference to the aircraft instruments. His PPL training would have taught him that the preferred course of action following inadvertent IMC was to perform a 180° turn. His other option was to climb above the cloud. It is possible that the high ground on both sides of Loch Fyne may have deterred him from performing a 180° turn. While he did not hold an IMC qualification he had experienced instrument flying which might have been sufficient for him to climb above 1,500 ft where the visibility would have been considerably better.

With a gradual reduction in visibility, the pilot might not have been aware how poor the conditions had become and there was no evidence that he reduced his airspeed to give himself more time to react to any external visual cues. He was probably using the application on his mobile device to remain on track and clear of high ground, which may have reduced the time available to scan his flight instruments and look for external visual cues. The descent as the aircraft passed Tarbert might have been flown in order to remain in sight of the water and to increase the pilot's forward visibility as he descended clear of the cloud base. However, he was flying into a fog bank which started at sea level.

This was the passenger's third flight in a light aircraft so it is unlikely, in these conditions, that he would have been able to assist the pilot. Flying in such conditions would have markedly increased the pilot's workload, and stress, while reducing his capacity to make decisions. He might, therefore, not have considered the other options and may have instead focused on identifying external visual cues to the detriment of using his altimeter to maintain a safe height above the water.

Time pressure

The pilot had already been delayed by 24 hours and before departing Oban had arranged for a taxi to meet him at Carlisle to take him and his passenger to the railway station. The change from the flight plan on his mobile application would have shortened the flight time by around 10 minutes. However, the investigation was unable to establish if the pilot felt that he was under any time pressure to return to Carlisle.

Conclusion

Poor visibility had been forecast south of Lochgilphead and as the aircraft flew down Loch Fyne, the visibility would have reduced to below that permitted for VFR flight. The pilot was not qualified to fly in IMC and it is concluded that the accident probably occurred as a result of the aircraft being flown, in poor visibility, into the sea.

AAIB comment

The AAIB investigates a number of accidents that are similar to this one each year, which occur throughout the UK. Common themes in these accidents are: marginal weather conditions, the pilot does not recognise that the weather has deteriorated below safe limits, or continues to press on. In many cases, actions such as performing a 180° turn, rerouting, diverting or climbing to a minimum safe altitude are not always taken.

Missing / overdue action was initiated by the FISO within 20 minutes of the aircraft accident, and information was passed to the D&D Cell who started tracing action. However, SAR assets were not tasked until two hours 45 minutes later, after the last position of G-CEOF had been identified on radar by the D&D Cell. The RNLI life boat and the Coastguard helicopter arrived on the scene 40 minutes after they had been tasked. While the occupants of G-CEOF were fatally injured in the impact, had they survived a ditching, or a forced landing in a mountainous or remote area, then the outcome might have been dependent on the speed of response. It is for this reason that both the CAA and the D&D Cell recommend that GA pilots who fly in the Scottish Highlands and Islands, or other remote areas, should file a flight plan.

Safety actions

While this accident was not survivable, the Department for Transport and the Royal Air Force D&D Cell have initiated a number of safety actions to reduce duplication of effort and ensure that the required actions are carried out in a timely manner.

The D&D Cell

The D&D Cell undertook a broad review of their procedures for dealing with missing / overdue GA aircraft in order to reduce the timeframe during the uncertainty phase. They have introduced a standard checklist for their staff which has been shared with NATS and the ARCC. The D&D Cell have also reduced the time for requesting a radar replay for GA events and the request to NATS will now be actioned no later than 30 minutes after an aircraft's Estimated Time of Arrival, or the start of tracing action. The new procedures will also help to reduce duplication of effort across the ANSPs, the D&D and the ARCC. The introduction of improved log keeping and data gathering will also help to better inform future decision making.

Review of the D&D Cell and ARCC processes

The Department of Transport has initiated a review of the processes and procedures carried out by the D&D Cell and ARCC. The intention is to map the roles and responsibilities of both organisations, identify any duplication and consider if processes can be streamlined.