

SERIOUS INCIDENT

Aircraft Type and Registration:	DHC-6 Series 310 Twin Otter, G-BVVK	
No & Type of Engines:	2 Pratt & Whitney Canada PT6A-27 turboprop engines	
Year of Manufacture:	1980 (Serial no: 666)	
Date & Time (UTC):	7 March 2017 at 1745 hrs	
Location:	Tiree Airport, Isle of Tiree	
Type of Flight:	Commercial Air Transport (Passenger)	
Persons on Board:	Crew - 2	Passengers - 7
Injuries:	Crew - None	Passengers - None
Nature of Damage:	No damage	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	55 years	
Commander's Flying Experience:	10,680 hours (of which 634 were on type) Last 90 days - 152 hours Last 28 days - 60 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

The aircraft was conducting a scheduled flight from Glasgow to Tiree. After landing in marginal weather, the aircraft veered off the left side of the runway, crossed a short section of grass and came to rest on the cross runway.

History of the flight

The aircraft departed Glasgow at 1635 hrs on a scheduled passenger flight to Tiree, with two crew and seven passengers on board. The weather forecast indicated strong southerly winds at Tiree, with a cloudbase at about 500 ft and visibility between 2,000 and 4,000 m. The crew briefed for and executed a VOR/DME approach to Runway 23. While Runway 17 would have been more into the prevailing wind, it has no direct instrument approach and the cloudbase was below the minimum for a circling approach. The co-pilot was the PF for the approach, in accordance with the operator's Standard Operating Procedures(SOPS), with the commander taking control for the landing when visual with the runway.

On first contact with the Tiree AFISO, the crew were advised that the surface wind was from 160° at 24 kt, gusting to 35 kt. When the crew called established inbound, approximately five minutes prior to touchdown, the Tiree AFISO advised them the wind was 160°/27 kt. During the approach, the crew asked for two more wind checks. Two minutes before touchdown, the wind was given as 170°/25 kt and a wind check just before landing gave a wind of 170°/23 kt. These wind checks did not include any gust information.

The approach was uneventful and the commander took control when the runway became visual at an altitude of approximately 450 ft amsl (the Minimum Descent Altitude (MDA) was 410 ft). The crew described the landing as normal and the captain felt that the required control inputs were consistent with the crosswind. After touchdown, the left wing suddenly lifted as the aircraft decelerated and the aircraft veered to the left. Despite the application of full right rudder and left aileron, the aircraft continued to veer left for two or three seconds, before resuming a more normal attitude. The aircraft was then brought to a stop using normal braking, the crew believing that there had been a sudden strong gust of wind.

The airport crash alarms were sounded and the RFFS responded immediately but were quickly stood down. The crew recognised that they had departed the left side of the runway but considered they had remained on the asphalt area at the side of runway. They taxied the aircraft to the apron, with the RFFS in attendance, and shut down normally.

After shutdown, the captain accompanied airfield operations personnel while they checked the incident site. It became apparent that the aircraft had departed the paved area and crossed the grass (Figure 1). Consequently, the aircraft was taken out of service and remained at Tiree until an engineering inspection confirmed that there was no damage.

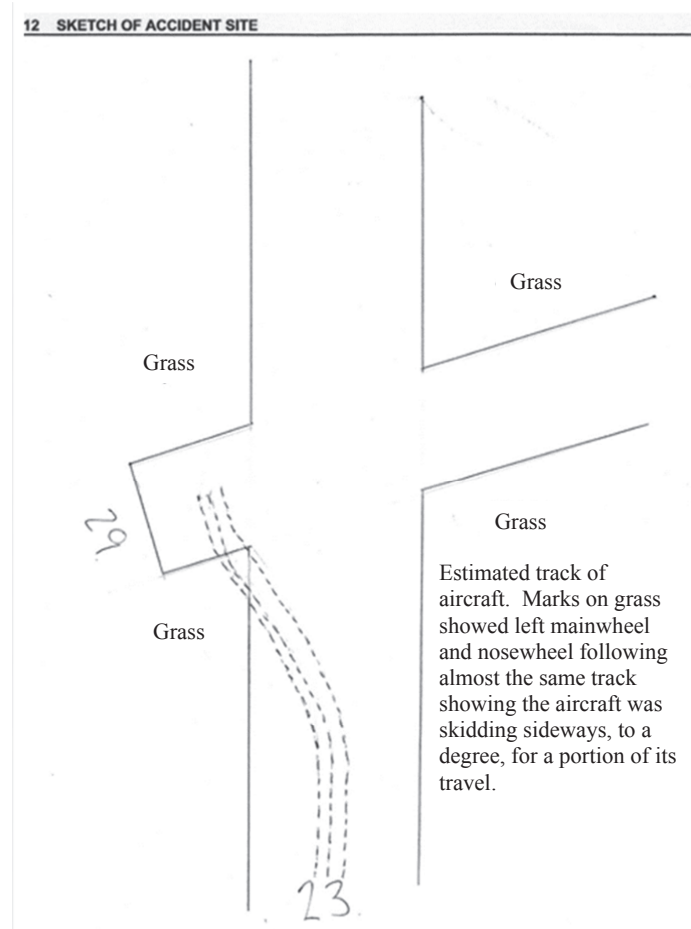


Figure 1
Commander's sketch of incident site

Aircraft performance

The manufacturer's Pilot Operating Handbook and Aircraft Flight Manual state that:

'Adequate controllability during landing has been demonstrated using full flap extension (37.5° flap) in crosswind components up to 25 KIAS measured at a tower height of 33 feet. This demonstration was made with both engines operating, on a dry runway. This is the maximum crosswind experienced during crosswind trials and is not considered limiting. Operators are encouraged to establish their own crosswind landing policies.'

The operator's policy is to consider 25 kt, including gusts, as a limit.

Meteorology

The meteorological records around the time of the incident were obtained from Tiree Airport. During the period leading up to the landing, there were regular gusts up to approximately 30 kt (Table 1), though this was not communicated to the crew after their first contact with the Tiree AFISO. The wind figures passed by radio to the aircraft were taken from the Runway 23 touchdown zone indicator, the output of which was not recorded. These may have differed from the recorded values, shown in Table 1, which were recorded by the Tiree Met Office sensor located near the threshold of Runway 11.

With regard to the reporting of wind speed by ATC, Civil Aviation Publication (CAP) 746, 'Requirements for Meteorology' states:

'4.10 The maximum wind (gust) within the last 10 minutes (or since the marked discontinuity) shall be reported only if it exceeds the mean speed by 10 knots or more.'

Date/time	Mean wind direction (°)	Mean wind speed (kt)	Max gust direction (°)	Max gust speed (kt)
07/03/2017 17:35	169.30	25.37	172.50	28.76
07/03/2017 17:36	170.00	25.69	169.60	29.44
07/03/2017 17:37	165.00	27.19	164.70	30.68
07/03/2017 17:38	164.30	27.70	161.20	30.88
07/03/2017 17:39	167.10	28.49	167.30	32.35
07/03/2017 17:40	165.20	28.14	160.30	31.03

Date/time	Mean wind direction (°)	Mean wind speed (kt)	Max gust direction (°)	Max gust speed (kt)
07/03/2017 17:41	167.20	24.71	164.80	29.79
07/03/2017 17:42	169.80	25.05	168.10	31.19
07/03/2017 17:43	167.10	21.04	168.60	25.42
07/03/2017 17:44	166.70	23.62	168.00	29.34
07/03/2017 17:45	167.20	24.67	167.40	30.62
07/03/2017 17:46	168.60	24.43	168.00	28.82
07/03/2017 17:47	167.10	21.85	166.00	27.22
07/03/2017 17:48	171.90	24.02	175.90	28.69

Table 1

Recorded wind information (approximate time of landing in red)

Analysis

Given the low cloudbase at Tiree Airport, there was no viable approach to a more into-wind runway than a VOR/DME approach to Runway 23. The flight crew were aware of a strong southerly wind from the forecast and from information passed to them by the Tiree AFISO, in accordance with CAP 746, including the possibility of gusts to 35 kt. During the approach, they requested two additional wind checks. These indicated that the wind was within their 25 kt crosswind limit, so the commander decided to land.

The crew considered that the aircraft response during the approach and landing was as they would expect for a crosswind of around 25 kt and they described the landing as normal. However, meteorological records showed that the surface wind at Tiree Airport was gusting to approximately 32 kt.

During the rollout, as the aircraft decelerated, it appeared to weathercock as the flight controls lost their authority.

Conclusion

Given the information they received, the crew believed the wind was within their limitations for landing. However, it is highly likely that the aircraft was affected by a strong gust of wind from the left during the landing roll. The event was sudden and briefly overcame

the controls, which were reduced in effectiveness due to the low airspeed. As a result, the aircraft veered sharply left and departed the paved surface. There were no injuries and no damage to the aircraft or the airfield infrastructure.

Tiree Airport has a policy of increasing the RFFS readiness state in marginal weather conditions. With the low cloudbase, strong crosswind and poor visibility they had done so for this incident flight.