



AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8559	
Aircraft Registration	ZS-OSD	Date of Accident	05 October 2008		Time of Accident	1338Z
Type of Aircraft	Brittan-Norman Islander		Type of Operation	Private		
Pilot-in-command Licence Type	Commercial	Age	21	Licence Valid	Yes	
Pilot-in-command Flying Experience	Total Flying Hours	275.7		Hours on Type	9.6	
Last point of departure	Kruger Mpumalanga International Airport (FAKN)					
Next point of intended landing	New Tempe aerodrome (FATP)					
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
Tree plantation near Barberton, Mpumalanga Province.GPS position S25°40.739 E30° 44.907						
Meteorological Information	Adverse weather conditions prevailed in the area					
Number of people on board	1+8	No. of people injured	0	No. of people killed	9	
Synopsis						
<p>The pilot, accompanied by eight passengers, departed from Kruger Mpumalanga International Airport (FAKN) on a visual flight rules (VFR) flight to New Tempe aerodrome (FATP).</p> <p>Approximately 20 minutes after departure from FAKN, a witness observed the aircraft flying at a height of approximately 1000ft (AGL) in a wings-level attitude over his farm in the direction of the mountains. Thick mist covered approximately one third (1/3) of the top of the mountains at the time. He then lost sight of the aircraft, and approximately two minutes later he heard an explosion. He immediately notified the Kruger Mpumalanga Airport authorities who initiated a search and rescue operation after the appropriate authorities had been informed.</p> <p>The search and rescue operation that entailed air and ground search operations, were hampered by adverse weather conditions in the areas. The main wreckage was located the following day during the air search operation, approximately 50 m below the mountain top in the Barberton area. The aircraft had ploughed through a pine tree plantation and had been destroyed by the post- impact fire that had erupted. All the occupants had been fatally injured in the accident.</p>						
Probable Cause						
<p>The pilot, flying a VFR certified aircraft, encountered adverse weather (IMC) conditions en route during a VFR flight, which resulted in controlled flight into terrain (CFIT) near the top of the mountain.</p>						
IARC Date				Release Date		



AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : Glen Lena CC
Manufacturer : Brittan-Norman LTD
Model : Islander BN-2A-26
Nationality : South African
Registration Marks : ZS-OSD
Place : Barberton. Approximately 2nm south of Kaapsehoop mountain
Date : 2008/10/05
Time : 1338Z

All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Purpose of the Investigation:

*In terms of Regulation 12.03.1 of the Civil Aviation Regulations (1997) this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and **not to establish legal liability.***

Disclaimer:

This report is given without prejudice to the rights of the CAA, which are reserved.

1. FACTUAL INFORMATION

1.1 History of Flight

1.1.1 The purpose of the flight was to spend a week in Mozambique during the school holidays following the 3rd term. The regular pilot of the aircraft was unable to undertake the journey due to an injured leg, so a replacement pilot was trained over a three-day period to fly two families to Mozambique.

The pilot, together with four adults accompanied by four children, departed New Tempe aerodrome (FATP) on the 27th of September 2008. The first leg of the journey would see the aircraft fly from New Tempe aerodrome (FATP) to Kruger Mpumalanga International Airport (FAKN). After a brief stop at Kruger Mpumalanga International Airport (FAKN) for customs formalities, the aircraft then proceeded to Inhambane (FQIN) in Mozambique.

On the 5th of October 2008, the aircraft was refuelled with 200 litres of fuel at Inhambane (FQIN) in Mozambique for the return leg of the journey. The return leg of the journey would see the aircraft fly from Inhambane (FQIN) in Mozambique to Kruger Mpumalanga International Airport (FAKN) for customs formalities and refuelling. 326 litres of fuel was uplifted at Kruger Mpumalanga International Airport (FAKN).

The pilot filed a visual flight rules (VFR) flight plan with the ATC at Kruger Mpumalanga International Airport (FAKN) for the flight to New Tempe aerodrome (FATP) on the day of the accident.

The aircraft departed Kruger Mpumalanga International Airport (FAKN) at 1317Z for the final leg of the flight to New Tempe aerodrome (FATP).

Approximately 20 minutes after take-off from FAKN, a witness observed the aircraft flying at an altitude of approximately 1000 ft AGL with the wings level in a southerly direction, overhead the farm, in the direction of the mountains. The witness noted that the aircraft was flying much lower than aircraft would normally fly when they flew over the farm. Thick mist covered approximately one third (1/3) of the top of the mountain at the time. The witness then lost sight of the aircraft and approximately two minutes later he heard an explosion. The witness immediately notified the Kruger Mpumalanga Airport authorities that an aircraft may have been involved in an accident. A search and rescue operation was initiated after the appropriate authorities had been informed.

The search and rescue operation that consisted of air and ground searches were hampered by adverse weather conditions in the area from where the witness had heard the explosion emanating. The wreckage was located the following day during the air search operation, approximately 170ft below the mountain top, where the aircraft had impacted with terrain. The aircraft had ploughed through a pine tree plantation, and was destroyed in the impact sequence and by the post-impact fire that had erupted. All the occupants on board the aircraft were fatally injured in the accident.

1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	1	-	8	-
Serious	-	-	-	-
Minor	-	-	-	-
None	-	-	-	-

1.3 Damage to Aircraft

1.3.1 The wings had separated from the fuselage on impact with the trees in the pine tree plantation. A post-impact fire had erupted. The main wreckage, with the exception of the tail section, was destroyed by the ensuing fire. The engines were also damaged by the post-impact fire, but remained intact.



Photo 1: Showing the main wreckage.

1.4 Other Damage

1.4.1 Damage was limited to several trees in the pine plantation that were damaged by the impact and by the fire that had erupted at the accident site.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	21
Licence Number	xxxxxxxxxx	Licence Type	Commercial		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Instructor Grade 3. Instrument Rating. Night Rating				
Medical Expiry Date	31/07/2009				
Restrictions	None				
Previous Accidents	None				

1.5.1 The pilot had been converted onto the aircraft type (Britten-Norman Islander) during the period 24 September 2008 until 26 September 2008. The pilot had flown a total of 2.6 dual flying hours during the period.

1.5.2 The pilot successfully passed the Technical Examination onto the Britten-Norman Islander on 26 September 2008 at an approved Aviation Training Organisation (ATO) at New Tempe Aerodrome.

1.5.3 According to the Aviation Training Organisation, the accident pilot was requested by the owner of the aircraft to be converted onto the type aircraft in order to fly the aircraft with the owner's family to Inhambane in Mozambique during the school holiday, as the pilot that used to fly the aircraft on a regular basis was not available at the time.

1.5.4 The accident pilot's total flying hours on the aircraft type were calculated as follows:

1.5.4.1 Total hours during conversion onto the type aircraft = 2.6 hours

Conversion training took place from the 24th September 2008 until 26th September 2008.

1.5.4.2 New Tempe (FATP) to Kruger Mpumalanga Airport (FAKN) = 3.0 hours.

1.5.4.3 Kruger Mpumalanga Airport (FAKN) to Inhambane (FQIN) = 2.0 hours

The trip from New Tempe to Inhambane was undertaken on the 27th of September 2008

1.5.4.4 Inhambane (FQIN) to Kruger Mpumalanga Airport (FAKN) = 2.0 hours

The return trip from Inhambane (FQIN) to Kruger Mpumalanga Airport (FAKN) took place on the 5th of October 2008, the day of the accident.

Flying Experience:

Total Hours	275.7
Total Past 60 Days	75.4
Total on Type Past 90 Days	9.6
Total on Type	9.6

1.6 Aircraft Information



Picture showing the Islander-type aircraft

1.6.1 The islander type aircraft is a twin reciprocating engine, propeller driven aircraft. Fuel was supplied to the two engines via individual carburettors attached to each individual engine. The aircraft seats 10 occupants in 5 rows of seats.

1.6.2 The equipment list of the aircraft indicates that the aircraft was equipped with the following radio and navigation equipment.

- King KX170 Navigation/Communication receiver
- Bendix ADFT12 Automatic Direction Finder (ADF) Receiver
- King KN62 Distance Measuring Equipment (DME) Receiver

- King KMA20 Audio Control Panel
- King KT76A Air Traffic Control (ATC) Transponder.

Airframe:

Type	BN 2A-26 Islander	
Serial Number	461	
Manufacturer	Britten-Norman LTD	
Date of Manufacture	1974	
Total Airframe Hours (At time of Accident)	Unknown	
Last MPI (Date & Hours)	04/07/2008	11656.75
Hours since Last MPI	Unknown	
C of A (Issue Date)	18 June 2001	
C of R (Issue Date) (Present owner)	09 October 2007	
Operating Categories	Standard	

1.6.2 The total airframe hours and the hours since the last MPI at the time of the accident could not be determined, as the aircraft and cockpit instruments were destroyed during the post-impact fire.

1.6.3 The level of destruction of the aircraft was of such a nature that the investigation team were unable to locate the Hobbs meter and the flight folio.

Engine: #1

Type	Lycoming O 540-E4C5
Serial Number	RL18365-40A
Hours since New (Last MPI)	4726.45
Hours since Overhaul (Last MPI)	1804.45

Engine: #2

Type	Lycoming O 540-E4C5
Serial Number	RL17807-40A
Hours since New (Last MPI)	2589.45
Hours since Overhaul (Last MPI)	1804.45

Propeller: #1

Type	Hartzell HC-C2YK-2CUF
Serial Number	AU5164
Hours since New (Last MPI)	1111.25
Hours since Overhaul (Last MPI)	388.65

Propeller: #2

Type	Hartzell HC-C2YK-2CUF
Serial Number	AU5480
Hours since New (Last MPI)	1242.75
Hours since Overhaul (Last MPI)	597.25

Aircraft Performance

1.6.1 Mass and Balance.

1.6.1.1 According to the aircraft mass and balance documentation in the aircraft file, the last time the aircraft was weighed was on the 24th of May 2006, when the aircraft's basic empty mass was found to be 4278.8lbs. The maximum take-off weight for the aircraft, according to the aircraft flight manual, is 6232.3lbs.

ITEM	WEIGHT (LBS)
Basic Empty Weight	4278.8
Pilot	165.3
Front Passenger	174.1
3 x Adult Passengers	522.0
4 x Child Passengers	176.3
Fuel 130 US Gallons	754.0
Baggage	155.0
TOTAL WEIGHT	6225.5

1.6.2 Aircraft Performance

The weights of the pilot and passengers were estimated. The pilot and four adult passengers were estimated at 174 pounds per person and the 4 children were estimated to be 44 pounds per person.

The fuel on board the aircraft was calculated to be the maximum capacity of fuel that may be filled into the aircraft according to the aircraft flight manual.

The estimated luggage weight is a very conservative estimate, considering the large amount of luggage and curios reported to have been loaded on board the aircraft.

According to the Aircraft Performance Graph for the aircraft, the take-off weight for the aircraft at Kruger Mpumalanga Airport was calculated as follows:

The maximum take-off weight at sea level is 6232.3 lbs. According to the performance chart, at an elevation of 2829 ft AMSL with the temperature at 19°C, the maximum take-off weight for the aircraft was 5840 lbs.

1.7 Meteorological Information

1.7.1 An official weather report was obtained from the South African Weather Service ref. JS16/7/1/05102008. No official weather observations were available at the time and place of the accident. The most likely weather conditions at the place of the accident are tabulated below.

Wind direction	100°	Wind speed	10 kts	Visibility	+10km
Temperature	19°C	Cloud cover	6-7/8	Cloud base	1500ft
Dew point	13°C				

1.7.2 The above weather report states that weather conditions in the vicinity of the accident, were caused by a ridging high pressure system that was feeding moist air in over the eastern part of the country, causing low cloud to occur all along the eastern escarpment with light rain or drizzle in places.

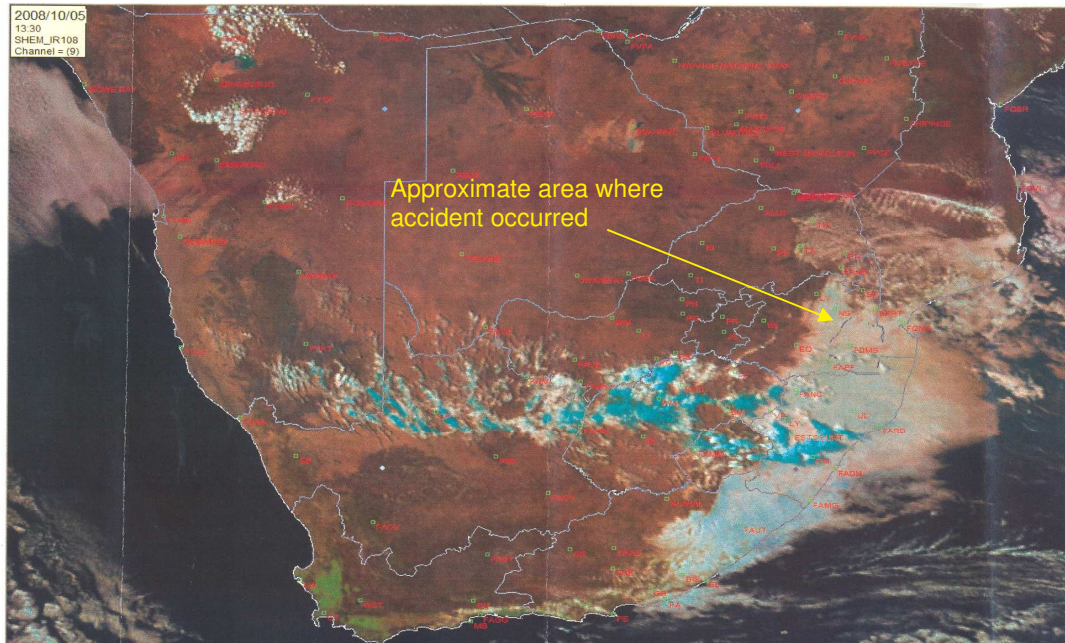


Figure 1: Shows the weather in the area at the time of the accident

1.8 Aids to Navigation

1.8.1 The aircraft was fitted with the standard navigation equipment approved for the aircraft type and none of the components was reported unserviceable prior to or during the accident.

1.8.2 The aircraft was not equipped with weather radar, nor was it equipped with a ground proximity warning system (GPWS).

1.9 Communications

1.9.1 The pilot communicated his intentions to the air traffic controller on the tower radio frequency 119.2 MHz.

1.9.2 The pilot was given take-off clearance by Kruger Mpumalanga International Airport (FAKN) ATC at 1317Z on the day of the accident.

1.10 Aerodrome Information

Aerodrome Location	Kruger Mpumalanga Intl. (FAKN)	
Aerodrome Co-ordinates	S25° 23.297 E31° 05.574	
Aerodrome Elevation	2829ft	
Runway Designations	05/23	
Runway Dimensions	2600m	
Runway Used	05	
Runway Surface	Asphalt	
Approach Facilities	Precision Approach Path Indicator (PAPI)	

1.10.1 The accident did not occur at or near an aerodrome

1.11 Flight Recorders

1.11.1 The aircraft was not fitted with a Flight Data Recorder (FDR) or Cockpit Voice Recorder (CVR), and neither required by the regulations to be fitted to this type of aircraft.

1.12 Wreckage and Impact Information

1.12.1 The accident occurred at a location outside the aerodrome at G.P.S coordinates S25°40.739 E30° 44.907.

1.12.2 During an on-site investigation, the following was observed:

The initial impact point was at 4,898ft (AMSL) on the north side of the mountain range on a 30 degree slope. The wreckage debris was distributed about 500 feet up the side of the mountain along a magnetic heading of 320 degrees. Pieces of wing tip were found about 262.5ft from the wreckage.

The vegetation located adjacent to the impact area displayed branches that were freshly broken. The trees that were impacted by the aircraft displayed signs that they were impacted in straight and level flight. A number of branches of the trees showed signs that they were cut by the propellers of the aircraft turning at high power.



Photo 2: Showing trees impacted in straight and level flight.

All of the airplane's flight control surfaces were identified throughout the debris field. All fracture features were bent and distorted. The horizontal and vertical stabilizers remained attached to each other but were separated from the rest of the airplane. The rudder and elevator remained attached to the vertical stabilizer and horizontal stabilizer, respectively.

The engines had separated from the fuselage and were relatively close to the main fuselage. A section of the right wing with the right spoiler attached, remained intact, and to the right of the impact area. Sections of the left aileron, left flap, left spoiler, and right aileron were located in the debris field. Both engines remained intact but sustained significant impact and fire damage.

The time of impact was determined by the clock on board the aircraft which was the only instrument found amongst the wreckage that was still legible. The time corresponded to the approximate time that the farmer had reported the accident.

The terrain surrounding the accident site was of such a nature as to render the recovery of the engines impossible.

1.13 Medical and Pathological Information

1.13.1 The medical and pathological reports were not available at the time when this report was compiled.

1.14 Fire

1.14.1 There was no evidence of an in-flight fire.

1.14.2 The post-impact fire was limited to the aircraft's fuselage. The surrounding vegetation suffered little fire damage due to it being dampened by the inclement weather that was present in the area at the time of the accident.

1.15 Survival Aspects

- 1.15.1 Search and rescue efforts began when the aircraft failed to contact Johannesburg ATC, and at the same time a report was received from a farmer in the Barberton area of a possible aircraft accident.
- 1.15.2 Inclement weather prevented an aerial search, so an extensive ground search was launched, which carried on throughout the night. Search and rescue teams were joined the next day by two helicopters from the National Defence Force, in order to conduct an aerial search once the weather began to clear. The wreckage was located on the afternoon of the 6th of October 2008. None of the occupants on board the aircraft had survived the accident.
- 1.15.3 The accident was not survivable due to the magnitude of the deceleration forces and the severity of the post-impact fire.

1.16 Tests and Research

- 1.16.1 None was considered necessary

1.17 Organisational and Management Information

- 1.17.1 This was a private flight.
- 1.17.2 The last MPI was performed by an authorised maintenance facility.

1.18 Additional Information

Replacement Pilot

- 1.18.1 Two weeks before the departure of the flight to Inhambane in Mozambique, the regular pilot that the owner used to fly the aircraft, injured his leg and was unable to undertake the flight to Inhambane. A replacement pilot was needed at short notice, and conversion training began to familiarise the new pilot to the Islander-type aircraft.

Flight Planning

- 1.18.2 Before departure from Inhambane in Mozambique, on the return leg of the flight, the pilot was very concerned about the weather, and was not keen to fly at all as the weather in the Nelspruit area was not good. The staff at the lodge noticed that the pilot was spending an unusually long time on the internet and questioned the pilot about it. The pilot expressed his concerns about the weather to the staff at the lodge. The pilot then attempted to convince the owner of the aircraft to delay their departure, but only managed to convince the owner of the aircraft to delay departure for another hour.

Staff at the lodge observed that the pilot was intimidated into flying, against his own judgement, by the owner of the aircraft. Staff at the lodge observed the intimidating manner of the owner of the aircraft throughout his stay at the lodge.

Four of the occupants of the aircraft were school children, who had to return to school on Monday the 6th of October, when schools reopened, which placed additional pressure on the pilot to conduct the flight.

Before departure from the lodge, the owner of the lodge expressed concern to the owner of the aircraft as to the large amount of luggage and curios that were gathered at the reception desk to be loaded into the aircraft. The owner of the lodge made a passing remark to the owner of the aircraft that he would need to attach a trailer to the aircraft to carry all the luggage and curios.

The aircraft would have had to be flying below the cloud base of 1500 ft for the witness to have seen it. The witness noted that the aircraft was flying lower than aircraft normally would fly, in order to clear the mountain range in their direct flight path.

Controlled Flight Into Terrain.

1.18.6 CFIT occurs when an airworthy aircraft, under the control of a pilot, is flown into terrain (water or obstacles) with inadequate awareness on the part of the pilot of the impending disaster.

A number of general aviation weather accidents have been associated with external or social pressures, such as the pilot's reluctance to appear "cowardly" or to disappoint passengers eager to make or continue a trip. There is almost always pressure to launch, and pressure to continue. Even the small investment in making the trip to the airport can create pressure to avoid "wasted" time.

One of the most effective safety tools at a pilot's disposal is waiting out bad weather. Bad weather (especially involving weather fronts) normally does not last long, and waiting just a day can often make the difference between a flight with high weather risk and a flight that you can make safely.

Many times, weather is not forecast to be severe enough to cancel the trip, so pilots often choose to take off and evaluate the weather as they go. While it is not necessarily a bad idea to take off and take a look, staying safe requires staying alert to weather changes. General aviation pilots and their aircraft operate in (rather than above) most weather. At typical general aviation aircraft speeds, making a 200-mile trip can leave a two to three hour weather information gap between the preflight briefing and the actual flight. In-flight updates are vital!

Because a single-piloted, small general aviation aircraft is vulnerable to the same CFIT risks as a crewed aircraft but with only one pilot to perform all of the flight and decision-making duties, that pilot must be better prepared to avoid a CFIT type accident.

In some cases, a general aviation pilot may be more at risk of making certain CFIT type accidents because the pilot does not have the company management or government oversight that a corporate or commercial operator may be exposed to.

Without such oversight, such as detailed standard operating procedures and higher mandatory safety requirements, it is the responsibility of the single pilot to ensure that he or she is well trained, qualified for the intended flight, meets all regulatory requirements for the flight, and has the self-discipline to follow industry recommended safety procedures that can minimize CFIT type accidents.
Reference: FAA Advisory Circular AC No: 61-134.

1.19 Useful or Effective Investigation Techniques

1.19.1 None

2. ANALYSIS

2.1.1 The pilot of the aircraft had done his conversion training onto the aircraft type four days prior to their departure on the trip from New Tempe aerodrome to Inhambane in Mozambique.

2.1.2 On the morning of the return flight from Inhambane, the pilot had concerns about the prevailing weather conditions and had expressed his concern to the owner of the aircraft. The pilot also expressed these weather concerns to the staff at the lodge.

2.1.3 The pilot only managed to convince the owner to delay the flight by one hour.

2.1.4 A large, unknown amount of luggage and curios were loaded into the aircraft and 200 litres of fuel was also uplifted at Inhambane.

2.1.5 The aircraft then proceeded on its journey to Kruger Mpumalanga International Airport (FAKN) where it stopped to uplift more fuel for its journey to New Tempe aerodrome (FATP).

2.1.6 The pilot filed a visual flight rules (VFR) flight plan with the ATC for the flight to New Tempe Aerodrome

2.1.7 The aircraft departed the Kruger Mpumalanga International Airport (FAKN) at 1317Z.

2.1.8 At approximately 1336Z a witness noticed the aircraft flying overhead a farm.

2.1.9 The aircraft would have had to be flying below the cloud base of 1500 ft for the witness to see it. The witness noted that the aircraft was flying lower than aircraft normally would fly, in order to clear the mountain range in their direct flight path.

2.1.10 Approximately two minutes later the witness heard an explosion. The witness notified the Kruger Mpumalanga International Airport (FAKN) where after a search and rescue operation was activated after the appropriate authorities were notified.

2.1.11 The aircraft's wreckage was located the following day.

2.1.12 All the occupants of the aircraft had sustained fatal injuries during the accident sequence.

2.1.13 An on-site investigation revealed that the aircraft had impacted with terrain at high speed.

3. CONCLUSION

3.1 Findings

3.1.1 The pilot was correctly licensed and rated on the aircraft type in accordance with existing regulations. The pilot was also the holder of an Instrument Flying (IF) rating.

3.1.2 The maintenance records indicate that the aircraft was equipped and maintained in accordance with existing regulations and approved procedures.

3.1.3 Pressure was put on the pilot by the owner of the aircraft to complete the flight, regardless of the pilot's concerns regarding the weather conditions en route.

3.1.4 The official weather report states that weather conditions in the vicinity of the accident were caused by a ridging high pressure system that was feeding moist air in over the eastern part of the country, causing low cloud to occur all along the eastern escarpment with light rain or drizzle in places.

3.1.5 There was no evidence of any defect or malfunction in the aircraft that could have contributed to the accident.

3.1.6 The pilot attempted to continue visual flight in instrument meteorological conditions.

3.1.7 All control surfaces were accounted for, and all damage to the aircraft was attributable to the severe impact forces.

3.1.8 The aircraft was destroyed by impact forces and a post-impact fire.

3.1.9 Propeller blade damage, together with the number of branches exhibiting signs of being cut by an object turning at high speed, were consistent with the engines producing power at impact.

3.1.10 The accident was not survivable due to the magnitude of the deceleration forces and the severity of the post-impact fire.

3.2 Probable Cause/s

3.2.1 The pilot encountered adverse weather (IMC) conditions en route during a VFR flight, which resulted in controlled flight into terrain near the top of the mountain.

4. SAFETY RECOMMENDATIONS

4.1 None

5. APPENDICES

5.1 None

Report reviewed and amended by the Advisory Safety Panel on 16 February 2010
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