Australian Government
Australian Transport Safety Bureau

Collision with terrain involving Cessna 172, VH-CBB

31 km west of Mittagong, New South Wales, on 22 March 2020

ATSB Transport Safety Report
Aviation Occurrence Investigation (Short)
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Addendum

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Safety summary

What happened

On 22 March 2020, a Cessna 172 aircraft, registered VH-CBB, took off from a private airfield in Canyonleigh, New South Wales, on a local private flight with the pilot and one passenger on board. Shortly after take-off, due to turbulent weather, the pilot decided to terminate the flight and return to land at the airfield. During the approach, while the aircraft was lower than the pilot had intended, it encountered turbulence. This resulted in the aircraft pitching up steeply. After the pilot corrected the aircraft's pitch attitude, the landing gear contacted the tree canopy of a steep forested escarpment on the approach path and below the level of the runway threshold. Uncertain if the aircraft could climb above the canopy, the pilot elected to reduce power immediately and land in the trees. The pilot and passenger sustained serious injuries as a result, and the aircraft was substantially damaged.

What the ATSB found

The ATSB determined that the aircraft was on a relatively shallow approach and was at a low height above the terrain when it encountered turbulence. After recovering from the turbulence, the pilot assessed that the aircraft could not reach the runway over the steep terrain, and decided to land in trees.

Safety message

This accident highlights the importance of adopting an approach profile that mitigates the effects of gusty/turbulent conditions and being prepared to go around if the approach becomes unstable. The Flight Safety Foundation Approach-and-landing Accident Reduction briefing note 6.1 emphasises the need to be 'go-around-prepared' or 'go-around-minded' because it is not a manoeuvre that pilots execute regularly.

The investigation

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope investigation was conducted in order to produce a short investigation report, and allow for greater industry awareness of findings that affect safety and potential learning opportunities.

The occurrence

On the afternoon of 22 March 2020, the pilot of a Cessna 172A aircraft, registered VH-CBB, planned to conduct a local private flight from a private airfield at Canyonleigh, New South Wales, with one passenger on board. The pilot noted that the wind speed and direction were as forecast, which were 20 kt and west-south-westerly, and therefore selected runway 27[1] for take-off.

Shortly after take-off, the aircraft experienced some turbulence. The pilot and passenger assessed it was 'not going to be a relaxing time to go for a fly', and decided to terminate the flight. The pilot confirmed via the windsock that the wind direction had not changed since take-off, and elected to continue onto a downwind leg of the circuit for runway 27.

When the aircraft was 1 NM from the threshold, and approximately 400 ft above aerodrome level, the pilot completed the turn onto final approach. The pilot reported having selected one stage of flap for the approach and landing. The aircraft was on approach over steep forested terrain when the pilot noticed that the approach profile was shallower than intended and that the aircraft was 'a bit low'. In response, the pilot increased the power.

The pilot reported that the turbulence then became 'very severe' and the aircraft pitched up steeply. The pilot initially decided to conduct a go-around manoeuvre, but after correcting the pitch attitude, realised that the aircraft was far lower than expected, and no longer aligned with the runway. The aircraft's wheels reportedly brushed the tree canopy on the escarpment downhill from the runway threshold. Uncertain whether the aircraft would be able to climb over the canopy to the runway, the pilot elected to reduce power and land in the trees. The aircraft came to rest approximately 50 metres short of the threshold and to the left of the runway.

Both the pilot and passenger sustained serious injuries, but they were able to exit the aircraft and contact emergency services. The aircraft was substantially damaged.

Context

Recorded data and airfield geography

OzRunways[2] information for the flight was obtained, with the final approach shown in Figure 1. A review of the flight data identified that during the second half of the approach, the aircraft's altitude remained relatively level (highlighted segment), but the terrain beneath falls away into a deep gully then climbs towards the airfield.

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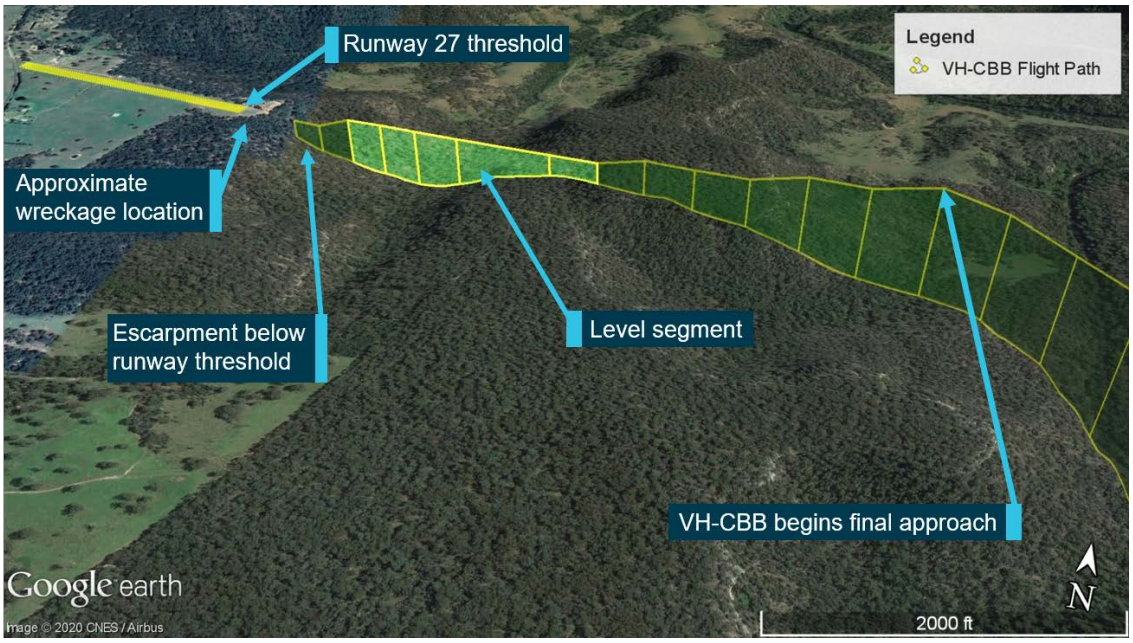
1 Runways are numbered in relation to their magnetic direction rounded off to the nearest 10°. This is the runway designation. Runway 27 at Canyonleigh has a runway direction of 269° magnetic

2 OzRunways is an electronic flight bag application that provides navigation, weather, area briefings and other flight planning information.

Figure 1: VH-CBB approach to Canyonleigh airfield, runway 27



The recorded data rounded the aircraft's altitude down to 100 ft increments, giving a low approximation of VH-CBB's actual approach. Due to sudden changes in attitude and altitude, the last few data points were considered unreliable and were therefore not included in the image.
Source: Google Earth, annotated by the ATSB

Pilot's experience at Canyonleigh

The pilot had landed at Canyonleigh airfield about 50 times prior to the occurrence, all in VH-CBB. During previous landings on runway 27, the pilot reported sometimes making high/steep approaches and extending full flaps to 'increase the safety margin' while flying over the steep, heavily forested terrain. On the day of the occurrence, the pilot believed a high approach would not be necessary.

The pilot assessed that the severe turbulence encountered prior to landing was caused by rotors—a specific type of turbulence produced by mountain waves.[3] This kind of turbulence had reportedly been encountered by both the accident pilot and, to a lesser degree, the airfield owner, during previous landings on runway 27.

Meteorological information

The Bureau of Meteorology provided the following assessment of the likely weather conditions at Canyonleigh on the day of the accident:

> While winds gusting to 26 knots were observed at [the nearby weather station], it is possible that the winds higher in the atmosphere were a little stronger, possibly reaching 30 knots at times. With 20 to 30 knots of wind over elevated terrain, light to moderate mechanical turbulence is likely.

With regard to the possible formation of rotors beyond the threshold of runway 27, the Bureau of Meteorology stated:

> While the atmospheric conditions did not strongly favour mountain wave and rotor turbulence and no evidence of waves could be seen on satellite imagery, the presence of a temperature inversion above the ridge top with moderate winds blowing perpendicular to the ridge means that small scale waves and rotors cannot be ruled out. The terrain downstream from the threshold, sloping sharply downwards towards the valley, could cause an acceleration of the winds close to the ground, thus increasing the possibility of downward air motion as well as rotor formation. There are, however, no observations to confirm that this occurred.

[3] Mountain waves are a weather phenomenon involving winds flowing over mountain ranges.

Safety analysis

While on approach to runway 27, the pilot noticed the glideslope was shallower than intended and that the aircraft was low, so increased power. The aircraft then encountered turbulence, resulting in it pitching upward. The exact nature of the turbulence could not be determined, but rotors or downward air motion over the escarpment may have been present at the time.

Once the aircraft's attitude was corrected, the pilot assessed that the aircraft was too low and close to the terrain to climb out of the valley to the runway, and decided to land immediately in the trees below.

Findings

ATSB investigation report findings focus on safety factors (that is, events and conditions that increase risk). Safety factors include 'contributing factors' and 'other factors that increased risk' (that is, factors that did not meet the definition of a contributing factor for this occurrence but were still considered important to include in the report for the purpose of increasing awareness and enhancing safety). In addition, 'other findings' may be included to provide important information about topics other than safety factors.

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

From the evidence available, the following findings are made with respect to the collision with terrain involving Cessna 172, VH-CBB, on 22 March 2020.

Contributing factors

- During a shallow approach, the aircraft encountered significant turbulence that affected the aircraft's pitch attitude and flight profile. As a result, the pilot assessed the aircraft was too low to reach the runway, and elected to land in trees.

Sources and submissions

Sources of information

The sources of information during the investigation included the:

- pilot
- passenger
- airfield owner
- New South Wales Police Force
- Bureau of Meteorology
- OzRunways.

Submissions

Under section 26 of the *Transport Safety Investigation Act 2003*, the ATSB may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. That section allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the following directly involved parties:

- the pilot
- the airfield owner
- the Bureau of Meteorology.

No submissions were received.

General details

Occurrence details

Date and time:	22 March 2020 – 1323 EDT	
Occurrence category:	Accident	
Primary occurrence type:	Collision with Terrain	
Location:	31 km west of Mittagong, New South Wales	
	Latitude: 34° 27.42' S	Longitude: 150° 9.22' E

Aircraft details

Manufacturer and model:	Cessna Aircraft Company 172A	
Registration:	VH-CBB	
Operator:	N/A	
Serial number:	47716	
Type of operation:	Private - Pleasure/Travel	
Departure:	Canyonleigh Airfield, New South Wales	
Destination:	Canyonleigh Airfield, New South Wales	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – 1 serious	Passengers – 1 serious
Aircraft damage:	Substantial	