CIVIL AVIATION AUTHORITY
OF NEW ZEALAND
Te Mana Rererangi Tūmatanui o Aotearoa

2025-00556

Dingle Burn, 29 March 2025.

Loss of control during low level turn.

Investigation Final Report

CLASSIFICATION | Public

Date 26 November 2025

Contents

File details

Kapua ID:	2025-00556
Occurrence date:	29 March 2025, 13:04 NZDT
Aircraft:	Piper PA-20-135 Pacer, S/n 20-962, ZK-PEE
Investigator in charge:	Roger Shepherd
Peer reviewed by:	Steve Baddock, Steve Walker
Prepared for:	CAA

Executive summary

1. On Saturday 29 March 2025, Piper Pacer ZK-PEE (the aircraft) impacted terrain in the Dingle Burn valley shortly after its pilot had discontinued his approach into a nearby airstrip. The pilot and his passenger sustained serious injuries but survived the impact however the passenger later died at the scene from his injuries. The pilot was airlifted to Dunedin hospital where he remained in an induced coma for 10 days. He has since made a good physical recovery however he has no memory recall of events between approximately 07:30 on 29 March 2025 and waking up in hospital 10 days later.

2. The investigation found that:

   - The pilot and the aircraft were appropriately certificated and the aircraft was in an airworthy condition prior to the impact with terrain.
   - The pilot commenced a turn in a valley with insufficient space to complete the turn.
   - The aircraft stalled[1] during the turn at a low height above the ground with insufficient height to recover from the stall.
   - The stall was likely influenced by the limited space available for the turn and the close proximity of the valley's mountainous terrain.

Piper PA-20-135 Pacer, ZK-PEE. S/n 20-962 (photo courtesy of Dave Paull, nzcivair blog)

NOTE: All times in this report are in New Zealand Daylight Time (UTC+13)

[1] An aircraft stall is a sudden reduction in lift that occurs when the wings exceed the critical angle of attack, causing the airflow to separate from the wing's top surface. This results in a loss of lift, and the aircraft will begin to descend. A stall is an aerodynamic condition and is not the same as a car stalling. See Appendix 1 for an explanation of 'angle of attack'.

Primary participant

3. At the time of this accident, the pilot held a New Zealand Civil Aviation Rule (CAR) Part 61 Private Pilot's Licence – Aeroplane (PPL(A)) issued in July 2009 and was type rated on the PA20 aircraft. The pilots CAR Part 67 Class 2 pilot medical certificate had expired but he held a current DL9[2] medical certificate.

4. The pilots next BFR[3] was due in July 2025 and at the time of the accident he had a total flight experience of over 800 hours in a variety of aircraft, including over 600 hours in ZK-PEE. He was 60 years old at the time of this accident.

Narrative of events

5. The pilot was a participant of AOPANZs[4] Autum 'Fly In' held at Omarama aerodrome (NZOA) from 28 to 30 March 2025. The purpose of the fly-in was for members of AOPANZ to meet at NZOA for a social gathering and to also experience flying in remote and mountainous areas and operating from remote airstrips which may not normally be accessed by an individual pilot.

6. All the pilots who had registered for this fly-in were aware in advance that the weekend would provide an opportunity to voluntarily operate at remote airstrips in mountainous terrain.

7. After dinner on Friday 28 March, lists and location maps of the various airstrips that were available for pilots to operate at were made available for the assembled pilots to choose from. Experienced local pilots familiar with flying in the area who would lead groups of other pilots to these airstrips were available for the visiting pilots to discuss airstrip specifics and from that, individual pilots were to decide what airstrips suited their personal and aircrafts capabilities.

8. Fog at NZOA delayed the start of Saturdays flying so an impromptu seminar was arranged by one of the group leaders covering specific mountain flying topics including lack of horizon, speed control, wind observations, sloping airstrips and good overshoot procedures. The assembled pilots were again reminded by the AOPANZ executive that they were the pilots in command of their own aircraft and must be ready to make their own decisions.

9. After 11:30 the pilot along with his sole passenger departed NZOA along with ten other aircraft all headed for the Riverside, Ben Dhu 'home' and Ben Dhu 'fert' airstrips in the Quail Burn. After this group arrived at Riverside the group leaders briefed the pilots on what to expect at the next two airstrips.

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[2] A 'DL9' is an New Zealand Transport Agency commercial driver's medical standard which is accepted by the CAA enabling pilots to exercise the privileges of a CAR Part 61 Pilots Licence without holding a current CAR Part 67 medical certificate.

[3] A BFR is a two-yearly review of a pilot's proficiency in normal and emergency operations and manoeuvres.

[4] Aircraft Owner Pilots Association New Zealand

10. Due to the physical restraints of accommodating the aircraft on the small airstrips, the group of 11 then divided into two groups of five and six.

11. At approximately 12:42, the pilot and his passenger departed the Ben Dhu 'fert' airstrip as the 4th aircraft in a group of five with the Cattleyards airstrip (the airstrip) in the Dingle Burn valley as the next planned destination airstrip for the group. After entering the Dingle Burn valley near its head the aircraft tracked south down the valley and passed abeam the airstrip at 13:02 where other aircraft in the group had already landed.

12. Shortly after 13:03, ZK-PEE was observed by the pilots and their passengers on the ground at the airstrip to perform a 'go-around'[5] from the airstrip and observed it continue flying up the valley in an approximately north-easterly direction. None of the witnesses at the airstrip were concerned with the engine sound of the aircraft or its performance as it passed overhead.

13. Other than the go-around the witnesses did not keep ZK-PEE in their view but when the aircraft did not return back over the airstrip, the observers at the airstrip became concerned about where the aircraft was.

14. Shortly after this, the signal from ZK-PEEs ELT[6] was received at RCCNZ[7] at 13:06.

15. At 13:10 a pilot at the airstrip got airborne in his aircraft and quickly located ZK-PEE and observed that it had impacted with moderately sloping terrain approximately 1.2km north of the airstrip on the true left of the valley.

16. The pilot of the airborne aircraft relayed information via VHF[8] radio to those back at the airstrip about ZK-PEEs location and was also able to contact the rescue services by mobile phone from the air, there being no cellphone reception at the airstrip.

17. At 13:30, two pilots and a passenger arrived at the accident site, having walked from the airstrip. They noted the pilot and his passenger were conscious and they could carry out limited conversations with the pilot and passenger while attempting to make them as comfortable as they could.

18. At 13:22 a Queenstown based EMS helicopter and crew were tasked with attending the accident and departed Queenstown at 13:32, arriving at the accident site at 14:00. Paramedics began administering first aid to the pilot and the passenger who were both still conscious however their access to the occupants was impeded by the significantly disrupted cockpit and cabin.

19. At 14:30 the paramedics pronounced the passenger as deceased.

20. At 16:54 after the pilot's condition was stabilised by the paramedics and after FENZ personnel had used cutting equipment to assist with extricating him from the cockpit of the aircraft, the pilot was taken by EMS helicopter to Dunedin hospital.

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[5] Also known as Baulked Landing, performed when the pilot in command is not satisfied with their approach prior to landing.

[6] Emergency Locator Transmitter.

[7] Rescue Coordination Center, New Zealand operated by Maritime New Zealand.

[8] Very High Frequency

Conduct of the investigation

21. On 31 March 2025 two CAA investigators inspected the aircraft at the accident site in the Dingle Burn valley. One investigator continued their inspection of the aircraft the next day at Wanaka aerodrome where the aircraft had been transported to by road and stored in an aircraft maintenance hangar.

22. Because Police were conducting a parallel investigation on behalf of the coroner and had taken statements from several of the Fly In attendees and from the first responders who attended the accident site, those statements were provided to the CAA investigators and have been used in this investigation. A CAA investigator briefly interviewed some of the witnesses who were at the accident site to clarify some aspects of their written statements.

23. The pilots' logbooks and the aircrafts maintenance logbooks were also reviewed as part of this investigation. Immediately after the accident the pilot was in an induced coma for 10 days and it was not until mid-June 2025 until he was mentally and physically capable of being interviewed by the CAA investigator.

24. Meteorological information was requested from Met Service and Wanaka Airport Company. A request was also made to Airways New Zealand for any ADS-B tracking data for the aircraft however none was available due to the high terrain in the accident location.

25. The pilots iPad had recorded tracking data for ZK-PEE during the accident flight and this was retrieved with the assistance of the pilot and the Police Digital Forensics Unit.

26. The tracking data recorded by the aviation chart application running on the pilots iPad recorded among other parameters, geometric (GPS) altitude in metres, ground speed in metres per second and track in degrees true. The GPS altitude derived from the iPad was not produced from a certified source such as the ADS-B data that can be provided by Airways NZ.

27. However, because the iPad data started from the Ben Dhu fert airstrip where the pilot had landed at and a spot height for this particular airstrip was available from a LINZ[9] topographical chart, this created a reliable datum and the accuracy of the GPS altitude could be established. Comparisons between the iPad data, Google Earth satellite imagery and the relevant LINZ chart showed the iPad altitude data accuracy margins were in the order of +/-5 feet.

28. A certified source for the wind velocity at the airstrip and accident site was not available and witness estimations could not be verified but all of the witness estimations were consistent and considered the wind was light. Because the accident sequence flight path was largely south-west to north-east, that is up the valley and witnesses described the wind was blowing up the valley, the ground speeds recorded are likely to be equal to or greater than the aircrafts true airspeed by 2 – 5 knots (kts). There is likely to be less deviation for the aircraft's true airspeed during its path to the east, that is across the wind.

29. Notwithstanding the above, the height data combined with the speed and track data meant that reliable approximations of the aircrafts flight path could be made which supported the witness observations as well as the conclusions arising from the inspection of the damaged

[9] Land Information New Zealand.

aircraft. Because of the very short time intervals relating to significant aspects of the aircrafts manoeuvring in the last 50 seconds of its flight path, variations of +/- 1 second have a disproportionately large effect on the calculated vertical and horizontal speeds, hence approximations are unavoidable.

Analysis

Aircraft information.

30. ZK-PEE was 4 seat light general aviation aeroplane manufactured in the USA in 1953 by Piper Aircraft Corporation and originally fitted with a normally aspirated 4 cylinder 135 horse power (hp) Lycoming piston engine. Prior to the pilot's ownership, the aircraft had been fitted with a normally aspirated 4 cylinder 150hp Lycoming piston engine but is maximum certified take-off weight (MCTOW) remained at the original 1950 pounds.

31. The pilot had been the registered operator of the aircraft since December 2012 and in that time it had been fitted with oversize 'Tundra' tyres to facilitate operations from rough unprepared airstrips. These tyres were fitted in accordance with an approved Supplemental Type Certificate (STC).

32. Under another STC, the top surfaces of the aircraft's wings were fitted with vortex generators[10] enabling an approximately 4kt to 5kt reduction in the aircrafts stall speed.

33. At the time of the accident, the aircraft had accumulated 2900 hours TTIS and the engine 1812 hours since its last overhaul. There were no defects recorded in the Technical Log and the aircraft logbooks revealed the aircraft had been appropriately maintained. The aircrafts next annual inspection was due on 22 March 2025 and therefore overdue at the time of the accident. The CARs permitted this inspection to be deferred however the new deferred date had not been recorded on the Technical Log. Despite this finding, the overdue maintenance inspection was not a contributory factor in this accident.

34. Piper Service Bulletin 1379A was applicable to this aircraft and related to identifying the grade of steel used in the aircrafts rudder and if required, replacing it with one constructed from a higher grade of steel. While the aircrafts rudder was made from the lower grade of steel it had not failed prior to or during the impact therefore this was not a contributory factor in this accident.

35. The aircrafts All Up Weight (AUW) and Centre of Gravity[11] (CG) were calculated to be approximately 1632 pounds and 14.98 inches aft of the datum. These values were within the manufacturer's permissible limits.

[10] See Appendix 1.

[11] CG is a point around which the aircraft would balance if suspended at that point.

Meteorological information

36. Above is a section of a Wanaka aerodrome security camera image taken at 13:00 on 29 March 2025. The red arrow points in the direction of the Dingle Burn valley which is located beyond the hills on the skyline.

37. Aeronautical meteorological data provided to the CAA showed that adverse weather was not a contributory factor in this accident as also evidenced by the above image. Carburettor icing was also ruled out due to the low relative humidity.

38. The wind velocity was assessed by witnesses[12] at the airstrip to be 2 to 5 kts blowing up the valley, i.e. from south-west to north-east. The density[13] altitude at the airstrip was approximately 3300ft amsl[14].

39. As can be seen from the graph at Appendix 1, the aircraft was climbing and slowly accelerating therefore the 3300 ft density altitude was not a contributory factor in this accident.

Wreckage and impact information

40. The aircraft struck a mildly sloping gravel fan on the true left (east) side of the Dingle Burn valley 1.2km north-east of the airstrip at an elevation of 2755 ft amsl. At the initial impact the aircraft was on an easterly heading in an approximately 45^0 nose down and slight right wing low attitude. There was no wreckage trail and the entire structure of the aircraft could be accounted for at the accident site. The only separated component was the RH wheel and tyre assembly.

41. The nature of the damage to both wings and their position relative to the fuselage indicated the aircraft had not entered a spin. The damage was consistent with the aircraft impacting the ground with a low forward speed but a high rate of descent. The cockpit and cabin structure

[12] CAA interview of first responder and statements made to Police.

[13] Density altitude is the air density given as a height above mean sea level.

[14] Above mean sea level.

was significantly compressed in length and height and the disruption to its structural elements initially hindered paramedics access to the pilot and passenger.

42. The 4-point safety harnesses fitted to the two front seats and their attachments to the airframe had not failed during the impact. First responders at the accident site found both the pilot and passenger seated in the front left and right seats respectively and both were still wearing their safety harnesses.

43. During the initial impact the right-hand (RH) undercarriage assembly began separating from the fuselage at its attachment point and swung back and up the RH side of the fuselage. That assembly then separated completely from its fuselage attachments and passed outward across the top of the right wing as far as the RH wingtip. The large low pressure RH tyre then rebounded from the ground coming to rest one metre forward of the left wing.

44. The initial impact caused the aircraft to yaw approximately 20^0 to the right as it rebounded into the air. The aircraft came to rest approximately 3m from the initial impact point, still on an approximately easterly heading and in a slight nose and right wing low attitude.

45. An inspection of the flap actuation mechanism under the cockpit floor indicated the flaps were in the retracted position at impact. The inspections of the aircraft revealed that up to the time of impact with terrain, the aircraft was in all respects, mechanically airworthy.

46. The position of the carburettor heat valve could not be determined with certainty due to the significant disruption to the cockpit and engine compartment but the position of the throttle valve arm on the carburettor corresponded to the 'wide-open' (full power) position.

47. Each fuel tank was approximately 60% full and clean fuel was present at the inlet to the carburettor. The engine contained approximately the correct quantity of oil.

48. During the post-accident inspection of the aircraft, the engine crankshaft could be rotated by hand[15] and four compressions were present. The damage to the propeller and its attachment bolts indicated the engine was producing high power at the time of impact.

49. At the accident site, both the ignition switch and fuel tank selector were found in their respective OFF[16] positions.

50. The six Fly In attendees and one FENZ volunteer who were at the accident site and who provided written statements to the Police did not state they turned the fuel and/or ignition off when they reached the aircraft. When these same people were later reinterviewed by the CAA investigator, five said they had not moved any of these controls but one said he 'may have instinctively but could not recall'.

51. It is possible that despite his injuries the pilot may have carried out these two discrete actions himself which would be consistent with how pilots are trained to respond to such emergencies. However, the ignition key was found broken off[17] from the ignition switch which retained the broken remains of the key in the switch barrel and the other half was found on

[15] A lever attached to the propeller flange was required to accomplish this.

[16] See Appendix 1 for images.

[17] See Appendix 1 for image.

the cockpit floor. It is unlikely the pilot would have been able to turn the ignition off with the broken key.

52. It cannot be ruled out that movement of the pilot or passenger's limbs due to impact forces moved the ignition switch to the off position while simultaneously breaking it. However, due to the location of the fuel tank selector in the cockpit and its plane of rotation, it is unlikely it was moved in this way.

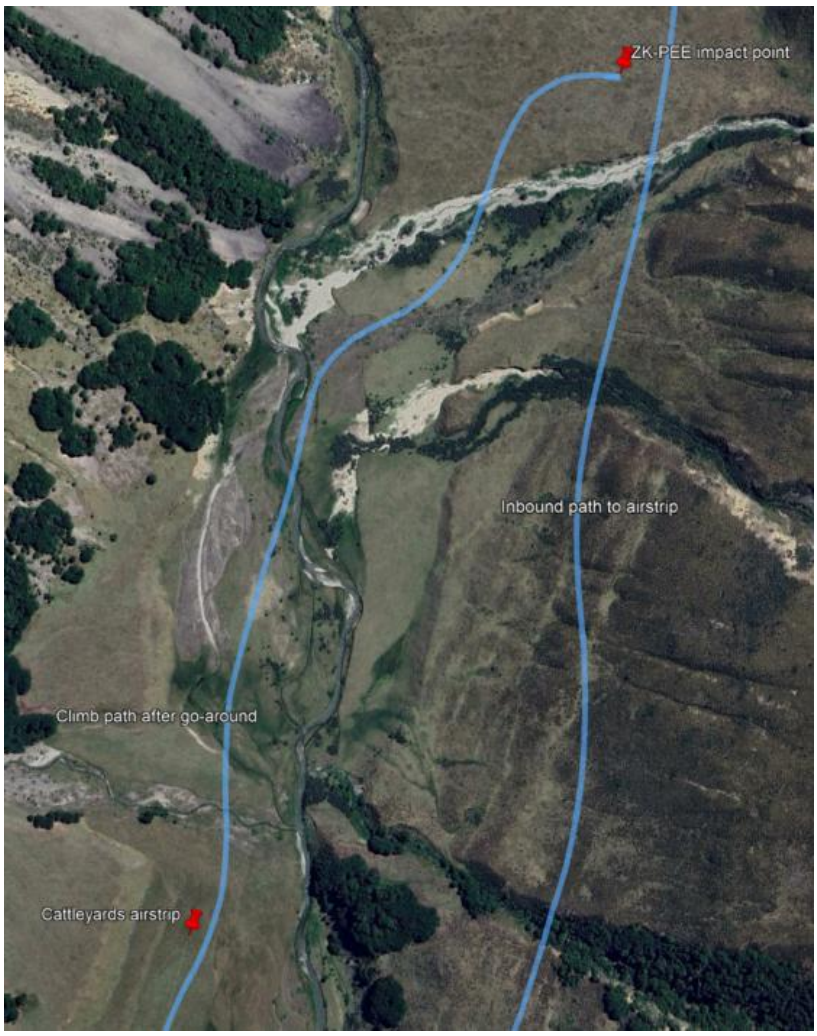
53. When interviewed later, the pilot said that whenever he went flying in the aircraft he would mentally run through the actions of what he would do in the event of a forced landing[18]. He said that two items he often mentally recited were to turn the ignition and fuel off.

54. Therefore, it is likely that impact forces acting upon the limbs of the pilot or passenger moved the ignition to OFF during the initial impact/rebound and the pilot intentionally moved the fuel tank selector to OFF after the aircraft came to rest.

55. Irrespective of the above, the damage to the propeller and its attachment bolts indicated the engine was producing high power/high rpm at the time of the initial impact.

[18] An unplanned landing forced upon a pilot due to either an aircraft system or propulsion malfunction.

The accident sequence



Above is a Google Earth image showing the airstrip and impact point in the Dingle Burn valley. True north is at the top of the image with the aircrafts track overlaid. The track line on the right is the inbound path of the aircraft from north to south (top to bottom).

56. After the pilot commenced the go-around[19], the aircraft climbed at an average rate of climb of 306 fpm[20] as it largely tracked the extended centreline of the airstrip for 1.0 km on a north-easterly heading. A witness at the airstrip stated the aircraft 'was climbing well in a gentle right hand turn'.

57. At this distance the aircrafts ground speed reached a maximum of 62 kts when the pilot commenced a brief right turn followed by a left turn to take up his original post go-around path. The aircraft was now closer to the eastern or true left side of the valley and headed for the gravel fan.

[19] See Appendix 1 for a graph of speed and height against time.
[20] Feet per minute

58. Fifty-one seconds after the go-around and now over the gravel fan, the pilot commenced another right turn through approximately 70^0 at an angle of bank of approximately 35^0. Half way through this turn the aircrafts groundspeed decayed to 51 kts while it was approximately 69 ft above the ground. One second later the aircraft reached its maximum height since the go-around of approximately 78 ft above the ground but the ground speed had reduced to 45 kts.

59. Adjusting the wings level, zero flap (idle thrust) stall speed[21] for a 35^0 angle of bank, the aircrafts estimated AUW[22] and the previously mentioned vortex generators derives a new stall speed of approximately 41 kts.

60. Approximately half way through the right turn, the aircraft has stalled aerodynamically and departed from controlled flight.

61. Five seconds after reaching its maximum height and one minute after the start of the go-around the aircraft impacted the gravel fan with an average rate of descent of 936 fpm and a groundspeed of 41 kts.

Human factors and the environment

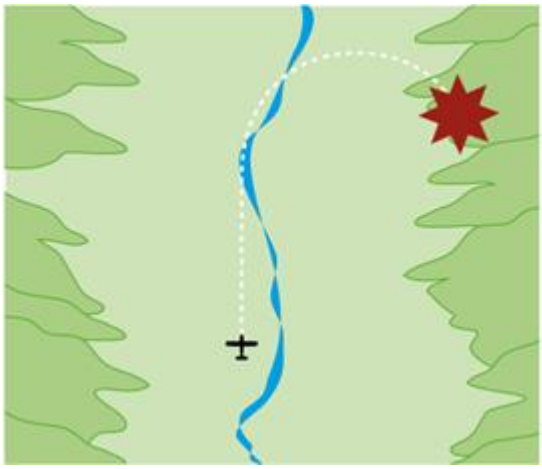
62. When flying in a valley, the aircraft should be positioned as high as possible to one side of the valley to provide the greatest amount of room to complete an 180^0 turn if required. The turn is then performed toward the opposite side of the valley with the angle of bank being adjusted during the turn to be no steeper than what is required to complete the reversal of direction.

63. Leaving the maximum room to turn also means less bank angle is needed, therefore less wing loading, a lower stall speed and less pressure on the pilot.

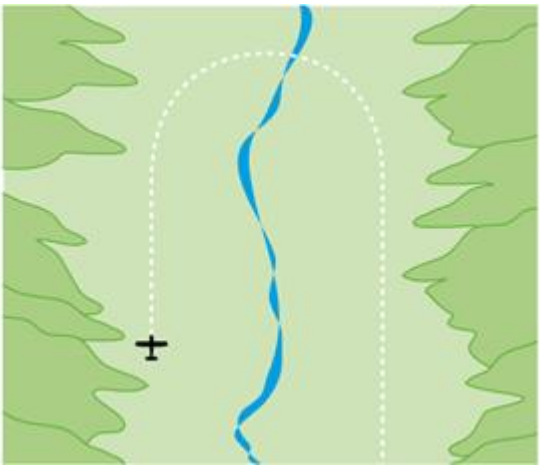
64. The iPad data enable the rate and radius of the turn to be calculated. If the pilot had commenced a 35^0 angle of bank level turn to the right at 60 kts from the same location as in the accident, 278 metres of horizontal space would have been required to complete the 180^0 change in direction. However, this distance was not available and the aircraft would still have impacted the side of the valley.

[21] The stall speeds are based on the airspeed indicator markings as found in the aircraft and as described in the Piper Aircraft Corporation Airplane Flight Manual as found in the aircraft since this was the only reliable source.

[22] All Up Weight of the aircraft at a specified time.



Positioning in the middle of the valley means a steeper turn is necessary and there may be insufficient room to turn back safely.



Positioning to one side of the valley leaves maximum room to turn. Always use the maximum room available in case a 360-degree holding turn is required.

65. When surrounded by mountainous terrain there will not be a representative view of the horizon. The pilot will have to imagine where the true horizon lies and select the appropriate nose attitude accordingly. The lower the aircraft is relative to the terrain, the harder it will be to establish the correct horizon. The effect may be worse in a climb due to the limited forward view.

66. As the aircraft approaches higher terrain, the horizon can appear to be moving up the windscreen and this effect is more pronounced the closer the aircraft is to the terrain. In response, a pilot may subconsciously apply back pressure on the elevator control to keep the horizon in the normal place. If unchecked, this will result in a loss of airspeed and an aerodynamic stall.

67. As the pilot began the right turn toward the eastern side of the valley, his view ahead would have rapidly become one of a close and steep mountainside with the skyline over 30^{o} above the true horizon.

68. The pilot was issued a PPL(A) in 2009 and in 2010 he received 6.0 hrs of dual instruction detailed in his logbook as ‘Mountain Flying Skills’. This was carried out over four flights in the Tasman district where the pilot lived at that time.

69. Prior to the accident flight, the pilot had not operated any aircraft at the Cattleyards airstrip but had participated in four AOPANZ Fly Ins at NZOA between 2012 and 2022 at which he had performed flights at other airstrips in the Dingle Burn valley. From 2021 he had resided in Wanaka and had made numerous flights in that area. He was therefore familiar with the mountainous terrain.

70. Because the pilot had no recall of the events leading up to the accident he could give no reason why he performed a go-around but surmised he was not happy with some aspect of his approach such as his height and/or airspeed. He also had no recall and explanation for why he commenced the turn at the location he did.

Conclusion

71. The pilot and aircraft were appropriately certificated and the aircraft was in an airworthy condition prior to the impact with terrain.

72. The occurrence was initiated when a right turn was commenced from a position in the valley where limited horizontal space was available to complete the manoeuvre. This positioning likely arose from the inherent visual and spatial challenges of operating in mountainous terrain.

73. The subsequent loss of control is consistent with an unintentional misjudgement of the aircrafts attitude, influenced by reduced visual cues and the difficulty of accurately perceiving the horizon in the confined valley environment.

74. The aircraft entered an aerodynamic stall at a height above the ground that was insufficient to permit recovery.

75. Had the aircraft remained on the western side of the valley while continuing to climb, additional horizontal space would likely have become available, allowing the change in direction to be completed safely.

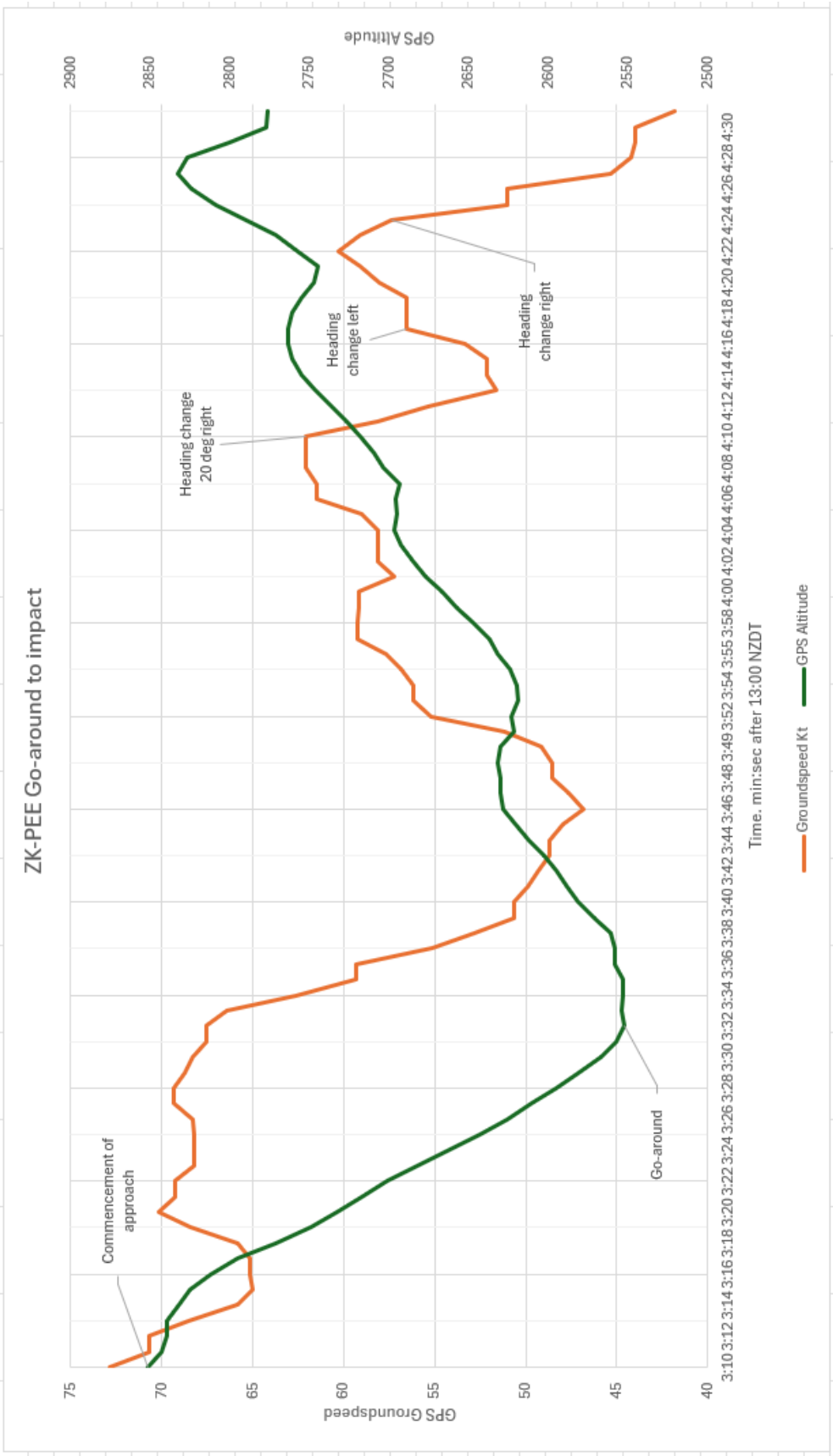
Safety message

76. The CAA has produced the following educational tool for pilots to help them modify their behaviour, as follows:

    - A Good Aviation Practice booklet (GAP) *Mountain Flying*. This booklet includes sections on Valley flying and turning. The booklet also contains the following pertinent advice;

    The aircraft must never be placed in a situation where there is insufficient room to turn back safely.

Appendix 1. Reference images and data.



Graph of GPS altitude and groundspeed against time starting at 13:00 NZDT sourced from the pilots iPad.

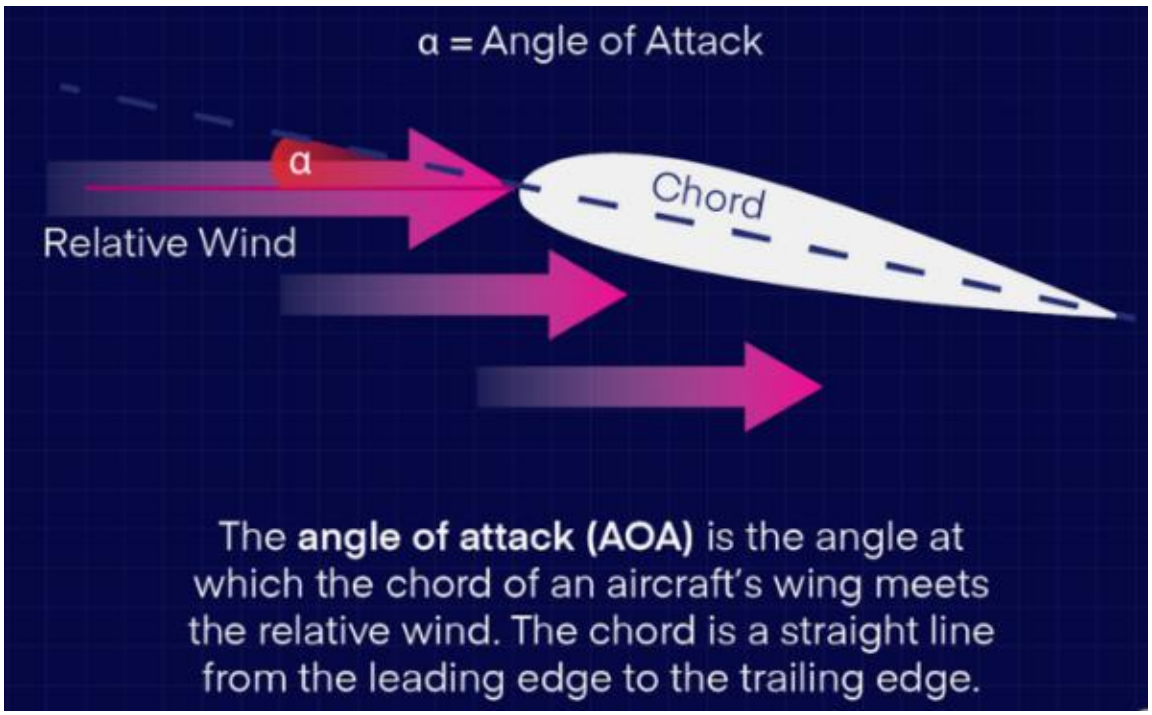
Piper PA-20-135 Pacer, ZK-PEE. S/n 20-962, Dingle Burn valley. The left hand rear cabin door, part of a seat base and a shoulder harness were removed from the aircraft by first responders to aid their access and placed in the locations as seen above. The RH main wheel is in its final resting place and position as found by the people who walked from the airstrip.(CAA photo)

ZK-PEE Fuel tank selector control. (CAA photo)

The fuel tank selector is located on the lower left portion of the cockpit sidewall, adjacent to where the pilots lower left leg would have been. Impact forces have dislodged the cover panel, rotating it approximately 20° anticlockwise. The selector handle is in the OFF position.

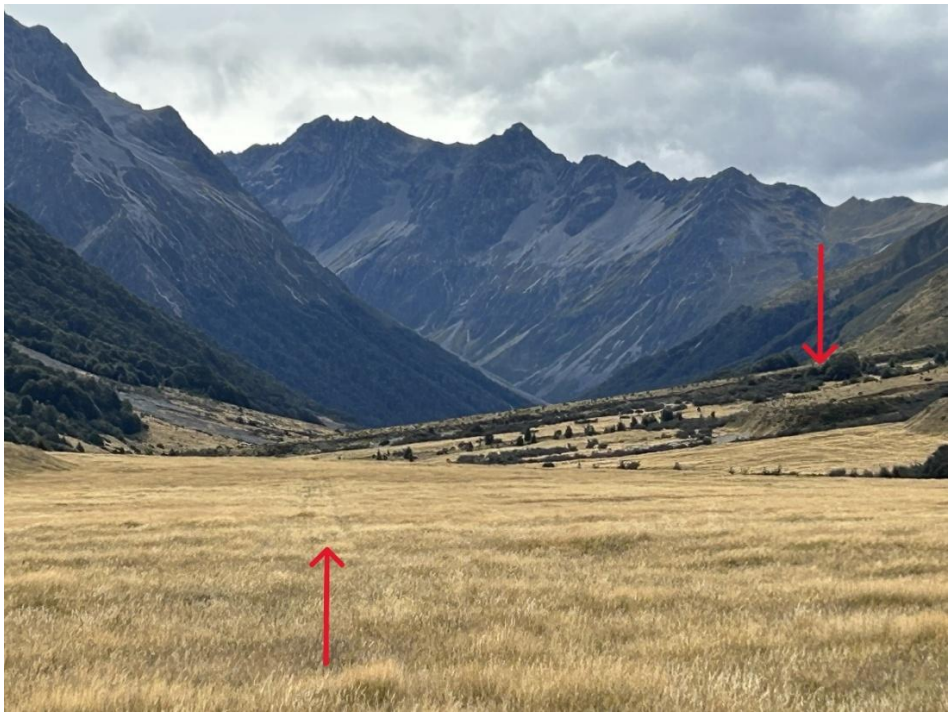
ZK-PEE Ignition switch. (CAA photo)

The switch is in the OFF position. The key has broken at impact and the remains of it can be seen in the key barrel.



Angle of attack description. (pilotinstitute.com)

Vortex generators on the top surface of ZK-PEEs right wing. These ‘fins’ are approximately 3.8 cm long and 1.3 cm high. They are attached in pairs on the top surface of both wings. Their purpose is to keep the air flowing across the top of the wing attached to the surface at high angles of attack where ordinarily the airflow would become detached resulting in a loss of lift. However, there is still an angle of attack limit at which the vortex generators will cease to function. (CAA photo)



Above, the Dingleburn valley looking along the Cattleyards airstrip in the foreground. The lower left arrow indicates the landing direction (up-slope) with aircraft wheel tracks still visible. The upper right arrow indicates the location of the accident site, 1.2km away on a gravel fan. Note the gravel fan also rises steadily from the valley floor. (CAA photo)

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