

**AIRCRAFT ACCIDENT REPORT
CAA OCCURRENCE NUMBER 13/365
MICRO AVIATION BANTAM B22S
ZK-MLF
Loss of Control,
Due to Spatial Disorientation
CARTERS BEACH, WESTPORT
30 JANUARY 2013**



Source: Eyewitness

FOREWORD

New Zealand's legislative mandate to investigate an accident or incident are prescribed in the Transport Accident Investigation Commission Act 1990 (the TAIC Act) and Civil Aviation Act 1990 (the CAA Act).

Following notification of an accident or incident CAA may investigate subject to Section 72B(2)(d) of the CAA Act which prescribes the following:

72B Functions of Authority

(2) The Authority has the following functions:

- (d) To investigate and review civil aviation accidents and incidents in its capacity as the responsible safety and security authority, subject to the limitations set out in section [14\(3\)](#) of the [Transport Accident Investigation Commission Act 1990](#)

The purpose of a CAA safety investigation is to determine the circumstances and identify contributory factors of an accident or incident with the purpose of minimising or reducing the risk to an acceptable level of a similar occurrence arising in the future. The investigation does not seek to ascribe responsibility to any person but to establish the contributory factors of the accident or incident based on the balance of probability.

A CAA safety investigation seeks to provide the Director of CAA with the information required to assess which, if any, risk-based regulatory intervention tools may be required to attain CAA safety objectives.

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Glossary of abbreviations

ARC	Aviation Related Concern
ATSB	Australian Transport Safety Bureau
BFR	Biennial Flight Review
CAA	Civil Aviation Authority
CAR	Civil Aviation Rule(s)
CCTV	Closed-Circuit Television
CMV	Certificate and Membership Validation
E	east
ECT	Evening Civil Twilight ¹
FAA	Federal Aviation Administration
ft	feet
hp	horsepower
hr(s)	hour(s)
IMC	Instrument Meteorological Conditions
km	kilometre(s)
MBZ	Mandatory Broadcast Zone
MCT	Morning Civil Twilight ²
m	metre(s)
NTSB	National Transportation Safety Board
NZDT	New Zealand Daylight Time
NZWS	Westport Aerodrome
RAANZ	Recreational Aviation Association New Zealand
RCCNZ	Rescue Coordination Centre of New Zealand
S	south
SAC	Sports Aviation Corporation Ltd
s/n	serial number
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
WGS 84	World Geodetic System 1984

¹ Evening Civil Twilight is the period between sunset and when the centre of the setting sun's disc is 6 degrees below the horizon, also known as dusk.

² Morning Civil Twilight is the period between when the centre of the rising sun's disc is 6 degrees below the horizon and sunrise, also known as dawn.

Data summary

Aircraft type, serial number and registration:	Micro Aviation (NZ) Ltd Bantam B22s, s/n 97-014, ZK-MLF
Number and type of engines:	1 Bombardier-Rotax GmbH 582 (65 hp)
Year of manufacture:	1997
Date and time:	30 January 2013, approximately 2120 hrs ³
Location:	Carters Beach, Westport Latitude ⁴ : S41° 44' 55.6" Longitude: E171° 30' 47.8"
Type of flight:	Private
Persons on board:	Crew: 1 Passenger: 1
Injuries:	Crew: 1 Fatal Passenger: 1 Fatal
Nature of damage:	Aircraft destroyed
Pilot's licence:	Advanced Local Microlight Pilot Certificate (RAANZ)
Pilot's age:	58 years
Pilot's total flying experience:	Approximately 765 hours total flight time (logged)
Information sources:	Civil Aviation Authority Field Investigation
Investigator in Charge:	Mr M R Harris

³ All times are NZDT (UTC + 13 hrs).

⁴ World Geodetic System (WGS 84) co-ordinates.

Synopsis

At approximately 2021 hrs NZDT on 30 January 2013 the pilot and passenger of a Bantam B22s Microlight, registered ZK-MLF were videoed at Westport Aerodrome. The pair were preparing for a flight in the microlight, with the intention of looking for deer.

At approximately 2110 hrs a witness saw the microlight flying towards the local vicinity of Cape Foulwind. This was the last time the aircraft was seen. At approximately 2120 hrs a loud bang was heard by witnesses in the area of Carters Beach, Westport.

The local weather conditions at the time were reported to consist of low visibility with reducing cloud ceiling and fog developing in the vicinity.

The microlight pilot and passenger were reported missing the next morning and a search was initiated. At 0930 hrs on 31 January 2013 the Civil Aviation Authority (CAA) was notified by the Rescue Coordination Centre of New Zealand (RCCNZ). The Transport Accident Investigation Commission was notified and elected not to investigate. The CAA initiated an investigation the same day.

The microlight was located, partially buried on Carters Beach. The first persons on the scene found the occupants deceased and the microlight destroyed.

The CAA safety investigation did not identify any mechanical defects which may have contributed to the accident. The safety investigation considered it probable that the microlight flew into deteriorating weather, after sunset and that the pilot probably experienced the effects of spatial disorientation resulting in a loss of control of the microlight.

1. Factual information

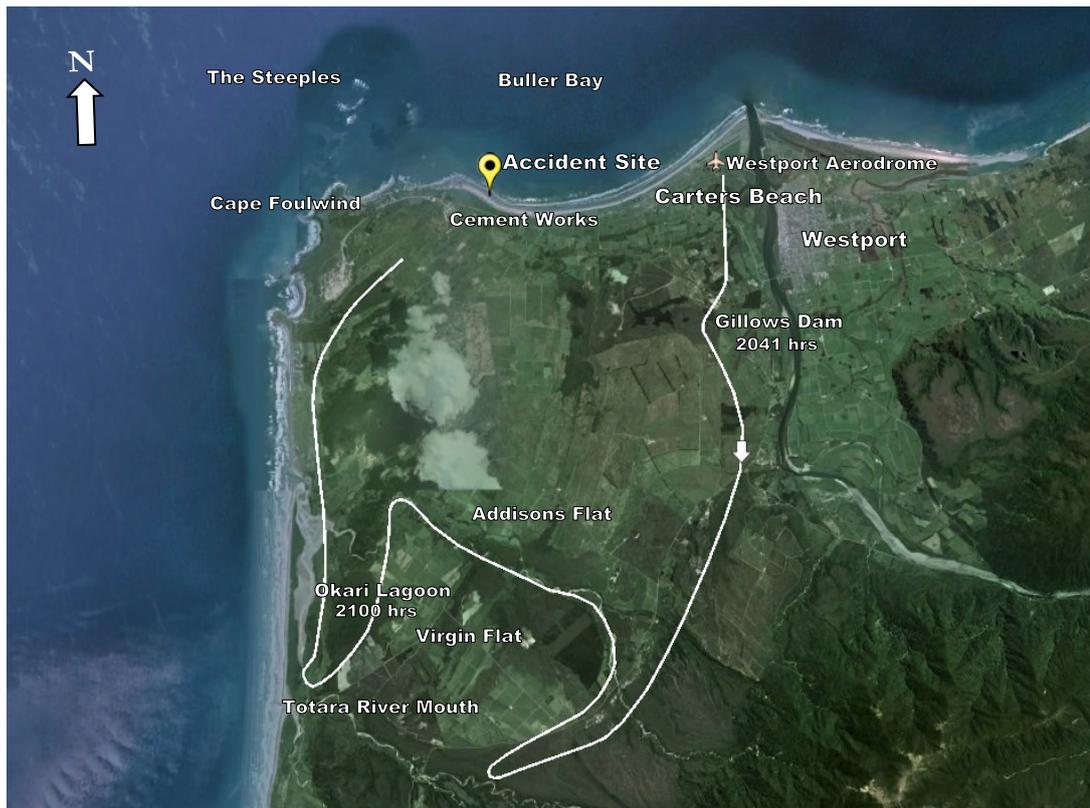
1.1 History of flight

- 1.1.1 On 30 January 2013, at approximately 2000 hrs the pilot and passenger were observed leaving a private residence to travel to Westport Aerodrome in the pilot's vehicle. The pair were getting ready for a flight in the pilot's microlight, ZK-MLF, to look for deer.
- 1.1.2 CCTV footage taken of the Westport Aerodrome fuel bowser shows the pilot pumping aviation fuel. The time stamp on the footage is 2021 hrs.
- 1.1.3 At 2041 hrs ZK-MLF was photographed flying over the Gillows Dam district (see Figure 1) and later observed over the Virgin Flat and Addison Flat regions, before heading for the Totara River Mouth. The microlight's approximate flight path is depicted in Figure 2.



Source: Eyewitness

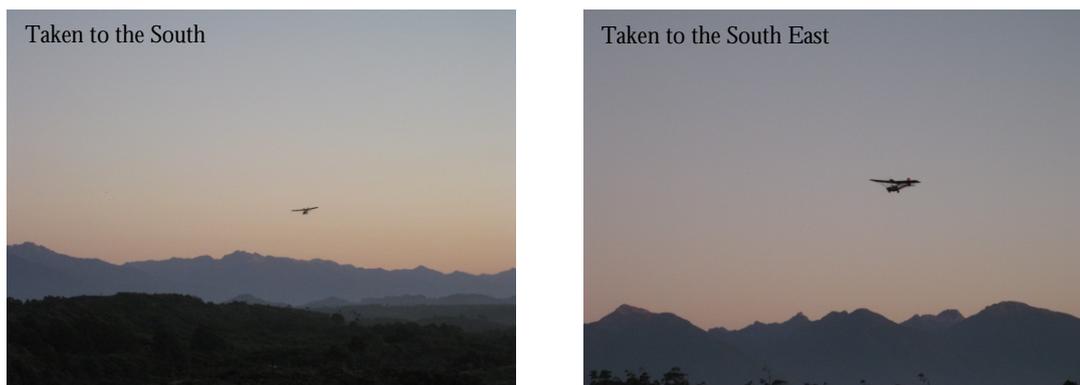
Figure 1:
ZK-MLF photographed in the area of Gillows Dam



Source: Google Earth™

Figure 2:
ZK-MLF's approximate flight path

1.1.4 At approximately 2100 hrs ZK-MLF was photographed over the Okari Lagoon by a hunter in the area. Figure 3 shows two of the photographs taken.



Source: Eyewitness

Figure 3:

ZK-MLF photographed over Okari Lagoon area

- 1.1.5 The last positive sighting of ZK-MLF was made by the hunter at approximately 2110 hrs as it headed towards the local vicinity of Cape Foulwind.
- 1.1.6 Around this time another witness observed a microlight approximately 3 km south west of where the wreckage was discovered. The witness reported that it ‘flew through the fog in the general direction of the Cement Works’.
- 1.1.7 At approximately 2110 hrs another witness located on Larsen Street near the Cement Works heard what he believed to be the pilot’s microlight but could not see it because of the weather conditions. ‘I hadn’t seen the microlite (sic) because it was too foggy for me to see at this time.’
- 1.1.8 At around 2120 hrs, a fisherman who had been fishing from Carters Beach recalled hearing, what he described as a motor revving four times in quick succession, followed immediately by a loud bang. However, he dismissed this as the noise of a truck at the Cement Works nearby.
- 1.1.9 The wreckage of ZK-MLF was located the following morning on Carters Beach. The passenger was located within the wreck and the pilot was located approximately 1.5 km along the beach to the east.
- 1.1.10 Based on witness accounts it appears likely that the accident occurred after sunset,⁵ at approximately 2120 hrs, on Carters Beach. Latitude S41° 44' 55.6" Longitude E171° 30' 47.8".

1.2 Injuries to persons

Table 1: Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>
Fatal	1	1

⁵ The sunset on the West Coast on 30 January 2013 was determined to be approximately 2057 hrs.

1.3 Damage to aircraft

1.3.1 The microlight was destroyed.

1.4 Personnel information

1.4.1 The pilot aged 58, held an Advanced Local Microlight Pilot Certificate with a passenger rating issued by the Recreational Aircraft Association of New Zealand (RAANZ). The pilot was a current member of RAANZ and his membership was valid until 15 December 2013.

1.4.2 Civil Aviation Rule (CAR) 103.5 *Pilot Requirements* stipulates that a pilot of a microlight aircraft shall hold an appropriate current microlight pilot certificate. In accordance with the requirements stated on the RAANZ Microlight Pilot Certificate, in order for the certificate to remain valid, the holder must hold a current Medical Certificate and current Certificate and Membership Validation (CMV).

1.4.3 At the time of the accident the pilot's last CMV had expired. The pilot's associated Medical Certificate and Declaration could not be found during the safety investigation. Due to the expired CMV and absence of a Medical Certificate and Declaration, at the time of the accident the pilot did not hold a valid RAANZ Microlight Pilot Certificate.

1.4.4 In accordance with the RAANZ Pilot Qualification requirements an Advanced Local Pilot Certificate is valid for the maximum of two years. In order to renew a pilot certificate microlight pilots are required to undergo a flight review every two years, commonly known as a Biennial Flight Review (BFR). The safety investigation determined that the pilot's last BFR was carried out 02 February 2010. It was determined that at the time of the accident the pilot's BFR was approximately a year overdue.

1.4.5 The safety investigation could not locate the pilot's logbook, however, based on records that could be identified, at the time of the pilot's last CMV and BFR, the pilot had a total of 765 hours flight time logged on microlight aircraft.

1.4.6 Pilots operating on a RAANZ Advanced Local Microlight Pilot Certificate must fly by Visual Flight Rules (VFR) and are not permitted to fly at night,⁶ or in instrument meteorological conditions (IMC).

1.4.7 The pilot did not hold a Private Pilot Licence (Aeroplane) with the required flight training or the appropriate ratings and as such was not allowed to operate at night or in IMC.

1.4.8 CAR 91.311 *Minimum heights for Visual Flight Rules (VFR) flights* states a pilot must not fly at a height of less than 500ft above the surface. Several witnesses indicated that the pilot had been flying the microlight at low level (below 500ft) on the accident flight. They also stated that the pilot would often fly below 500ft.

⁶ Night is defined as the time between the end of Evening Civil Twilight (ECT) and the beginning of Morning Civil Twilight (MCT). The end of ECT for the region on 30 January 2013 was at 2122 hrs.

- 1.4.9 The pilot had come to the attention of the CAA in January 2007 when an Aviation Related Concern (ARC) was received by the CAA (07/ARCG/104). The ARC alleged that the pilot had flown at low level (approximately 200ft) in the vicinity of Westport Aerodrome. It was also alleged that the pilot did not conform with the correct Westport Aerodrome circuit procedure in operation at the time and was operating the microlight NORDO,⁷ within a Mandatory Broadcast Zone (MBZ).
- 1.4.10 CAR 91.135 *Mandatory Broadcast Zones*, requires a pilot to broadcast the aircraft callsign, position and altitude on the radio frequency assigned to the MBZ. Broadcasts must be made at specific times such as before entering a runway for take-off and at least at the intervals prescribed for the MBZ, which for the Westport MBZ is every 5 minutes.
- 1.4.11 In 2007 as a result of the ARC, a CAA Inspector visited the pilot to discuss the concerns and briefed the pilot on the requirements of operating in a MBZ and the acceptable circuit procedure for Westport Aerodrome. Following this discussion it appears the pilot sought instruction on radio and circuit procedures applicable to Westport Aerodrome. The CAA elected to ‘continue to monitor activity when travel plans allow’, although no documentation could be found relating to any follow up.

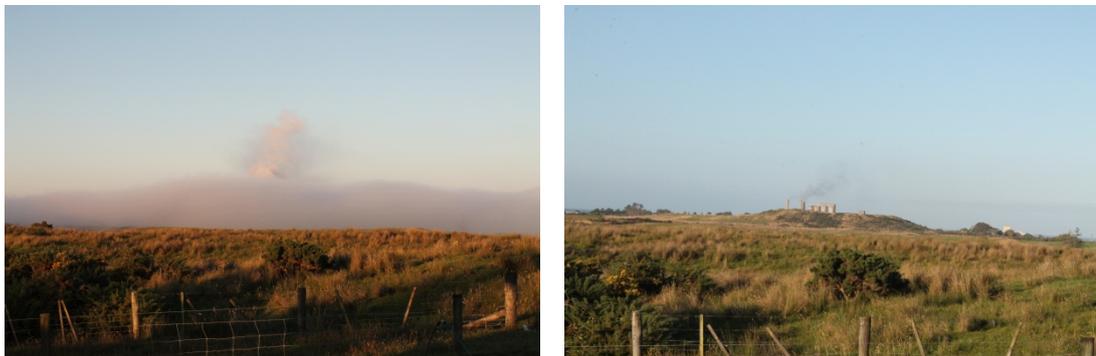
1.5 Aircraft information

- 1.5.1 Bantam B22s, serial number 97-014, ZK-MLF was a Class 2 microlight designed and manufactured by Micro Aviation (NZ) Limited. It was of a high-wing monoplane construction with conventional controls. The microlight was capable of carrying two occupants in a side-by-side seating configuration. It was powered by a 65-horsepower Bombardier-Rotax GmbH 582 engine, driving a 3 blade fixed-pitch composite propeller.
- 1.5.2 The microlight was first registered in New Zealand as ZK-MLF in 1997. At the time of the accident the microlight had a current Flight Permit. The last Microlight Aircraft Annual Condition Inspection had been carried out by a Sport Aviation Corporation (SAC) Ltd Inspection Authority Holder, in compliance with the SAC Microlight Aircraft Annual Condition Inspection Application. This was completed on 20 August 2012 and showed that at that time the aircraft had accrued 460.5 hours. The engine was inspected at this time and had also accrued 460.5 hours. No discrepancies or defects were noted.
- 1.5.3 Aircraft operated in IMC or by night VFR must have an Airworthiness Certificate and be suitably equipped under the CARs. Microlight aircraft are not issued an airworthiness certificate, instead operate under the authority of a permit to fly and are therefore limited to operation by day only. Furthermore CARs limit microlight aircraft to operation in conditions equal or above VFR meteorological minima.

⁷ NORDO is the term used for aircraft in which no radio equipment is installed.

1.6 Meteorological information

- 1.6.1 Westport Aerodrome and Carters Beach are situated within the Tasman area forecast (ARFOR) region. ARFORs are issued to provide information for domestic VFR Flights below 10,000 ft.
- 1.6.2 The ARFOR for the Tasman region issued at 1127 hrs 30 January 2013 forecast predominantly north westerly winds at five knots with visibility reducing from 30 km to 1500 m in mist and further reducing to 500 m in fog.⁸ The cloud was forecast to be areas of broken stratus cloud with a ceiling of 100 ft in the vicinity of the aerodrome. Mist and fog was anticipated to develop in the late evening about the West Coast and in sheltered valleys. The safety investigation could find no evidence that the pilot obtained the ARFOR issued on 30 January.
- 1.6.3 Several witnesses interviewed during the safety investigation stated that the region of Cape Foulwind and Carters Beach was affected by thick fog around the time of the accident. Owing to the unusual nature of the weather conditions, an eyewitness situated approximately 3 km south west of the accident site, took a photograph of the fog that had formed over the area of the Cement Works and Carters Beach. This photograph was taken at approximately 2045 hrs. As part of the safety investigation the eyewitness was asked to take a second photograph from the same location, looking in the same direction on a clear day to provide a comparison. Both photographs can be seen in Figure 4.



Source: Eyewitness

Figure 4:

photographs of weather conditions over the Cement Works

(Note - Left photo taken on the evening of the accident and right on a clear day.)

- 1.6.4 One witness, who was fishing from a vessel, in the vicinity of the Steeples in Buller Bay, stated that at approximately 2100 hrs he found himself ‘in thick fog’. The fog was reported to be so thick that it caused the eyewitness to become disorientated and he ended up ‘heading for rocks’.
- 1.6.5 Another witness who had been motorcycling along Carters Beach arrived at the beach end of Larsen Street at approximately 2110 hrs. The motorcyclist stated that at

⁸ Mist is defined as 1000 – 5000 meters visibility and fog is defined as visibility less than 1000m.

this time 'the fog was now about lamp post height'. The motorcyclist also commented that from the beach end of Larsen Street he could not see the hazard lights of a friend's vehicle which was parked at the other end of the street from the beach. Larsen Street is approximately 200 metres long. The motorcyclist described the conditions on the night of the accident as "bleak and gloomy".

1.6.6 The automatic meteorological aerodrome reports (METARs) issued for Westport Aerodrome around the time of the accident, report mist developing into fog with the visibility reducing to 300 m and the cloud ceiling reducing to 200 ft. The temperature was 17 degrees Celsius and the dew point was also 17 degrees Celsius.

1.6.7 The New Zealand Meteorological Service (MetService) were requested to report on the meteorological conditions on the evening of the accident. Extracts of their observations are as follows:

'VFR conditions ceased again at NZWS at about 0700 UTC (2000 hours), and conditions were deteriorating further from that time.

After sunset at about 2100 hours and consequent increasing cooling of the ground by radiation to the sky, fog formed and cloud ceiling lowered to 200 feet. At 2130 hours, visibility at the airport was reported to be 300 metres.'

1.6.8 CAR 91.301 VFR meteorological minima stipulates the meteorological minima at aerodromes in uncontrolled airspace is 600 ft cloud ceiling and 1500 m visibility. The VFR minima in uncontrolled airspace is to remain clear of cloud, in sight of the surface and 5000 m visibility. As stated by the MetService at 2000 hrs VFR meteorological conditions were below minima at the aerodrome.

1.7 Communications

1.7.1 On the day of the accident the pilot had been operating the microlight within the Westport MBZ. The safety investigation determined that the microlight had provisions for a radio but no radio was found at the accident site. The safety investigation could not confirm that a radio had been carried on the accident flight nor any evidence to suggest that the pilot had made any radio broadcasts, if a radio was carried.

1.8 Wreckage and impact information

1.8.1 The wreckage was found partially buried on Carters Beach below the high tide mark. Between the time of the accident (approximately one and a half hours after low tide) and the time when the microlight was found (approximately 0930 hrs the next morning), the wreckage had been subjected to one tidal cycle. High tide was at approximately 0204 hrs on the morning of 31 January 2013 and the tidal range (height) was approximately 3.1 m.

1.8.2 The safety investigation determined that the wreckage had moved to a position approximately 140 m from the point of initial impact due to the action of the tidal

stream.⁹ The point of initial impact was established to be where the nose landing gear structure was found. As a result of the movement, the wreckage was significantly disrupted and the structure had become entangled. It is also believed, that the pilot was separated from the microlight and carried further along the beach during this phase of tidal stream movement.

- 1.8.3 Significant damage to the left hand front side of the microlight had occurred. The cockpit structure had a degree of angular displacement to the right and the tail boom had failed in a right hand downward direction. The nose landing gear had completely separated from the fuselage.
- 1.8.4 The engine was displaced forward with a nose down rotation, severely deforming its mounts and compressing the forward end of the keel beam tube. One propeller blade had fractured at the hub, the other two had sustained longitudinal separation of the composite material.
- 1.8.5 Although flight control cable runs were disrupted by the impact and movement of the wreckage post impact, pre-accident control integrity was established as far as possible.

1.9 Medical and pathological information

- 1.9.1 The post mortem examination revealed no medical condition(s) which would be likely to have contributed to the accident.
- 1.9.2 The results of toxicological testing showed no alcohol or drugs present in the pilot's or passenger's blood.
- 1.9.3 The pilot and passenger both suffered fatal injuries as a result of the accident impact.

1.10 Test and research

- 1.10.1 The engine was disassembled and inspected by an authorised maintenance provider under CAA supervision. The engine strip found the pistons had seized in the bores post-accident due to corrosion consistent with being in sea water. Although seized, sand was found in one of the sealed chambers. Therefore no evidence of catastrophic engine failure or in-flight seizure was identified. The safety investigation identified no evidence to suggest that the aircraft engine should not have been functioning as intended at the time of the accident.
- 1.10.2 There is a wealth of information published with regard to the physical and mental phenomena experienced by pilots known as spatial disorientation.
- 1.10.3 A pilot maintains spatial orientation relative to the earth through senses transmitted by the nervous system to the brain by both the vestibular system (balance) and postural system (position and visual reference).

⁹ Tidal stream is the periodic movement of water in a horizontal direction that is due ultimately to the same astronomical causes as the tide (whereas the tide is a movement in the vertical direction).

- 1.10.4 The Australian Transport Safety Bureau (ATSB) report *An Overview of Spatial Disorientation as a Factor in Aviation Accidents and Incidents* provides a definition of Spatial Disorientation as:

‘..a term used to describe a variety of incidents occurring in flight where the pilot fails to sense correctly the position, motion or attitude of his aircraft or of himself within the fixed coordinate system provided by the surface of the Earth and the gravitational vertical. In addition, errors in perception by the pilot of his position, motion or attitude with respect to his aircraft, or of his own aircraft relative to other aircraft, may also be embraced within a broader definition of spatial disorientation in flight.’

- 1.10.5 The continuation of a VFR flight into Instrument Meteorological Conditions (IMC) is widely regarded as a significant factor in many aviation accidents.
- 1.10.6 A report produced by the ATSB *Avoidable Accidents No. 4, Accidents involving pilots in Instrument Meteorological Conditions* states that ‘Pressing on into IMC conditions with no instrument rating carries a significant risk of severe spatial disorientation due to powerful and misleading orientation sensations in the absence of visual cues’.
- 1.10.7 A study carried out by the National Transportation Safety Board (NTSB) has shown that between 1975 and 1986, 72 percent of accidents with a fatal outcome were associated with VFR flight into IMC when compared to an overall general aviation fatality rate of 17 percent. Another study carried out by researchers at the University of Illinois showed that on average it took only 178 seconds for non-instrument rated pilots to lose control of their aircraft once all visual references were lost.

1.11 Organisational and management information

- 1.11.1 Microlight activities in New Zealand are administered by an Aviation Recreation Organisation. The Director of Civil Aviation delegates authority for the issue of Pilot Certificates and authorisation of microlight inspections to a nominated senior person in a Part 149 Certificated Aviation Recreation Organisation.
- 1.11.2 The Recreational Aviation Association of New Zealand (RAANZ) and the Sport Aviation Corporation (SAC) Ltd are both Part 149 Aviation Recreation Organisations certificated by the CAA.
- 1.11.3 CAR 149.63 *Internal Quality Assurance* requires that each Aviation Recreation Organisation has procedures in place to ensure that any safety problems are identified and appropriate actions are agreed on to correct the deficiencies.
- 1.11.4 During the safety investigation representatives from both the RAANZ and SAC organisations were asked if any previous safety concerns had been raised about the pilot and/or microlight. Both representatives informed that no previous safety concerns had been recorded.
- 1.11.5 The CARs requires microlight pilots to report accidents and only a limited scope of incidents (airspace and bird strikes). The CARs do not require Aviation Recreation

Organisations to report safety concerns or incidents to the CAA, unless associated with CAR Part 115 *Adventure Aviation - Certification and Operations*.

2. Analysis

- 2.1 Evidence indicates that the accident occurred as a result of the microlight departing from controlled flight.
- 2.2 The damage sustained indicated that the microlight struck the beach at a steep nose-down attitude with a left hand or anticlockwise rotation on impact. Prior to impact and following the departure from controlled flight the exact accident sequence could not be conclusively determined. As far as the safety investigation could determine, there was no evidence of any mechanical issue which may have contributed to the accident.
- 2.3 The departure from controlled flight probably occurred because the pilot experienced the effects of spatial disorientation, due to the local environmental conditions encountered, and the time of day.
- 2.4 The accident occurred after sunset and approximately two minutes before the end of ECT for the region. At the time of the accident, Carters Beach was reported by several witnesses to be affected by thick fog and visibility was estimated to be less than 200 m. The MetService report stated that after sunset due to the consequence of increased cooling of the ground, fog formed and the cloud ceiling lowered to 200 ft.
- 2.5 The METAR issued for Westport Aerodrome around the time of the accident, reported that the dew point and temperature were both 17 degrees Celsius. The MetService consultant explained the relationship between dew point and temperature as:

‘...the concept of relative humidity. The dew point, given in degrees, is the temperature at which the air can hold no more moisture. When the temperature of the air is reduced to the dew point, the air is completely saturated and moisture begins to condense out of the air in the form of fog...’
- 2.6 Once a pilot has lost visual reference the powerful and misleading orientation sensations associated with spatial disorientation can very quickly lead to loss of control. Although the dangers of VFR pilots flying in IMC and the effects of spatial disorientation are well known, research has shown that they are still major contributing factors in aviation accidents, regardless of the pilot’s experience level. Therefore CAA safety actions (CAA 14A1021 and 14A1023) have been raised recommending that the Aviation Recreation Organisations remind their members of these dangers.
- 2.7 The reason the pilot continued into deteriorating meteorological conditions could not be conclusively determined. However, the pilots’ decision to continue the flight into adverse weather conditions, even though indications were that an alternative course

of action may have been safer, is characteristic of plan continuation bias or 'Get-there-itis'.¹⁰

2.8 Many factors may compel a pilots' decision to continue with a chosen course of action, these may be such as time pressures or simply the intention to return to the point of departure to secure the aircraft and get home.

2.9 Research conducted by the ATSB shows that although the dangers of flying VFR into IMC are well known, pilots still fly into deteriorating weather. An ATSB research investigation report *General Aviation Pilot Behaviours in the Face of Adverse Weather* concluded that:

'The chances of a VFR into IMC encounter increased as the flight progressed until they reached a maximum during the final 20 [percent] of the flight distance. This result highlights the danger of pilots 'pressing on' to reach their destination.'

2.10 Considering the approximate flight track as illustrated in Figure 2, the pilot was well into the return leg of the journey and therefore nearing the maximum chance of a VFR into IMC encounter, as explored by the ATSB.

2.11 As stated by the MetService, at the time that the pilot and passenger took-off in the microlight (sometime between 2021 hrs and 2041 hrs), conditions were below VFR meteorological minima.

2.12 At the time of the accident the pilot was nearly a year overdue for his Biennial Flight Review and his last Certificate and Membership Validation had expired.

2.13 The pilot was neither night nor instrument rated and the microlight was not equipped for night flight or flight into IMC. Considering the environmental conditions and the approach of night, the pilot found himself in a situation that he, nor the microlight was equipped for.

2.14 When planning a flight it is the responsibility of the pilot to ensure that the meteorological conditions are suitable for the flight and that the weather information attained is appropriate. It is also the responsibility of the pilot to ensure that they are appropriately rated, licenced and prepared to conduct the flight. The safety investigation could find no evidence of any pre-flight planning for this flight.

2.15 The accident highlights the importance of the individual ensuring a comprehensive assessment is made of the suitability to conduct a flight, and that Civil Aviation Rules are regarded as the minimum required for safety.

2.16 Although both Aviation Recreation Organisations engaged during the safety investigation have procedures to communicate safety concerns to the CAA, the safety investigation found these may not be functioning efficiently. It was also identified that safety concerns known to the CAA were not communicated to the relevant Aviation Recreation Organisations. As a result CAA safety action (CAA

¹⁰ A determination to reach your destination despite changing circumstances is commonly referred to as 'Get-there-itis'.

14A1022) has been raised recommending that further work is undertaken to review the regulatory oversight of microlight operations, including the exchange of safety information between the CAA and the Aviation Recreation Organisations.

3. Conclusions

- 3.1 The pilot most likely lost control of the microlight in circumstances consistent with VFR flight into IMC leading to spatial disorientation.
- 3.2 It is likely that the pilot entered an area of thick fog in limited light conditions, most probably compelled by plan continuation bias.
- 3.3 Research has shown that once all visual references are lost, it takes very little time for non-instrument rated pilots to lose control of their aircraft.
- 3.4 VFR conditions in the vicinity of Westport Aerodrome ceased at approximately 2000 hrs and conditions deteriorated further from that time, with thick fog developing in the region.
- 3.5 The pilot elected to commence the flight in condition below VFR minima in contravention of CAR 91.301.
- 3.6 The pilot was not night or instrument rated nor was the microlight equipped for flying at night or in IMC.
- 3.7 The pilot did not have a current Microlight Pilot Certificate, his BFR was approximately a year overdue and his last CMV had expired.
- 3.8 The safety investigation did not identify any mechanical defects which may have contributed to the accident.
- 3.9 It is considered that if Civil Aviation Rules had been complied with, the accident would not have occurred.
- 3.10 The accident was not survivable.
- 3.11 The safety investigation highlighted that the communication and exchange of safety information between the Aviation Recreation Organisations and the CAA has not been functioning effectively.

4. Safety actions

- 4.1 Safety action (CAA 14A1021) has in the course of the safety investigation been addressed by the Recreational Aircraft Association of New Zealand, who have highlighted the dangers of the VFR pilot flying in IMC and spatial disorientation in their monthly publication 'Recreational Pilot e-zine', Issue 82, dated May 2014. The organisation is to also include the topics in the next ATO/Instructor workshop to reinforce the message with their pilots.

- 4.2 Safety action (CAA 14A1023) has been raised recommending that the Sport Aviation Corporation Ltd remind their members of the dangers of the VFR pilot flying in IMC and the effects of spatial disorientation in their next safety publication.
- 4.3 Safety action (CAA 14A1022) has been raised for the General Manager of the General Aviation Group to endorse an issue assessment of the regulatory oversight of microlight operations.

5. References

- 5.1 ATSB (2007). *An Overview of Spatial Disorientation as a Factor in Aviation Accidents and Incidents*. Aviation Research and Analysis Report B2007/0063. Canberra, Australia: ATSB.
- 5.2 FAA (1983). Pilot's spatial disorientation (AC 60-4A). Washington, DC: Federal Aviation Administration.
- 5.3 ATSB (2013). *Avoidable Accidents No. 4, Accidents involving pilots in Instrument Meteorological Conditions*. Research Report No. AR-2011-050. Canberra, Australia: ATSB.
- 5.4 NTSB (1989). *Safety report: General aviation accidents involving visual flight rules flight into instrument meteorological conditions* (NTSB-SR-89-01). Washington, DC: National Transportation Safety Board.
- 5.5 Bryan, L., Stonecipher, J. & Aron, K. (1954). 180-degree turn experiment (Vol. 54(11), pp. 1-52): University of Illinois Bulletin.
- 5.6 ATSB (2005). *General Aviation Pilot Behaviours in the Face of Adverse Weather*. Aviation Research Investigation Report B2005/0127. Canberra, Australia: ATSB.

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