



Report 96-007

Hughes 369D

ZK-HLE

3 km east of Windwhistle

12 February 1996

Abstract

On Monday 12 February 1996 at about 2240 hours, Hughes 369D helicopter ZK-HLE, on a night rescue flight, collided with trees and the ground, and caught fire. The two crew were killed. Reduced visibility in poor weather was probably a factor in the collision. The details of the flight leading to the collision were not established.

Transport Accident Investigation Commission

Aircraft Accident Report 96-007

Aircraft type, serial number and registration:	Hughes 369D, 870179D, ZK-HLE
Number and type of engines:	One Allison 250 - C20B
Year of manufacture:	1977
Date and time:	12 February 1996, about 2240 hours*
Location:	3 km east of Windwhistle, Canterbury Latitude: 43° 31.0' S Longitude: 171° 44.8' E
Type of flight:	Aerial Work; Search and Rescue
Persons on board:	Crew: 2
Injuries:	Crew: 2 fatal
Nature of damage:	Destroyed
Pilot in Command's Licence:	Commercial Pilot Licence (Helicopter and Aeroplane)
Pilot in Command's age:	48
Pilot in Command's total flying experience:	16 446 hours 15 744 hours on helicopters 10 100 hours on type
Investigator in Charge:	J J Goddard

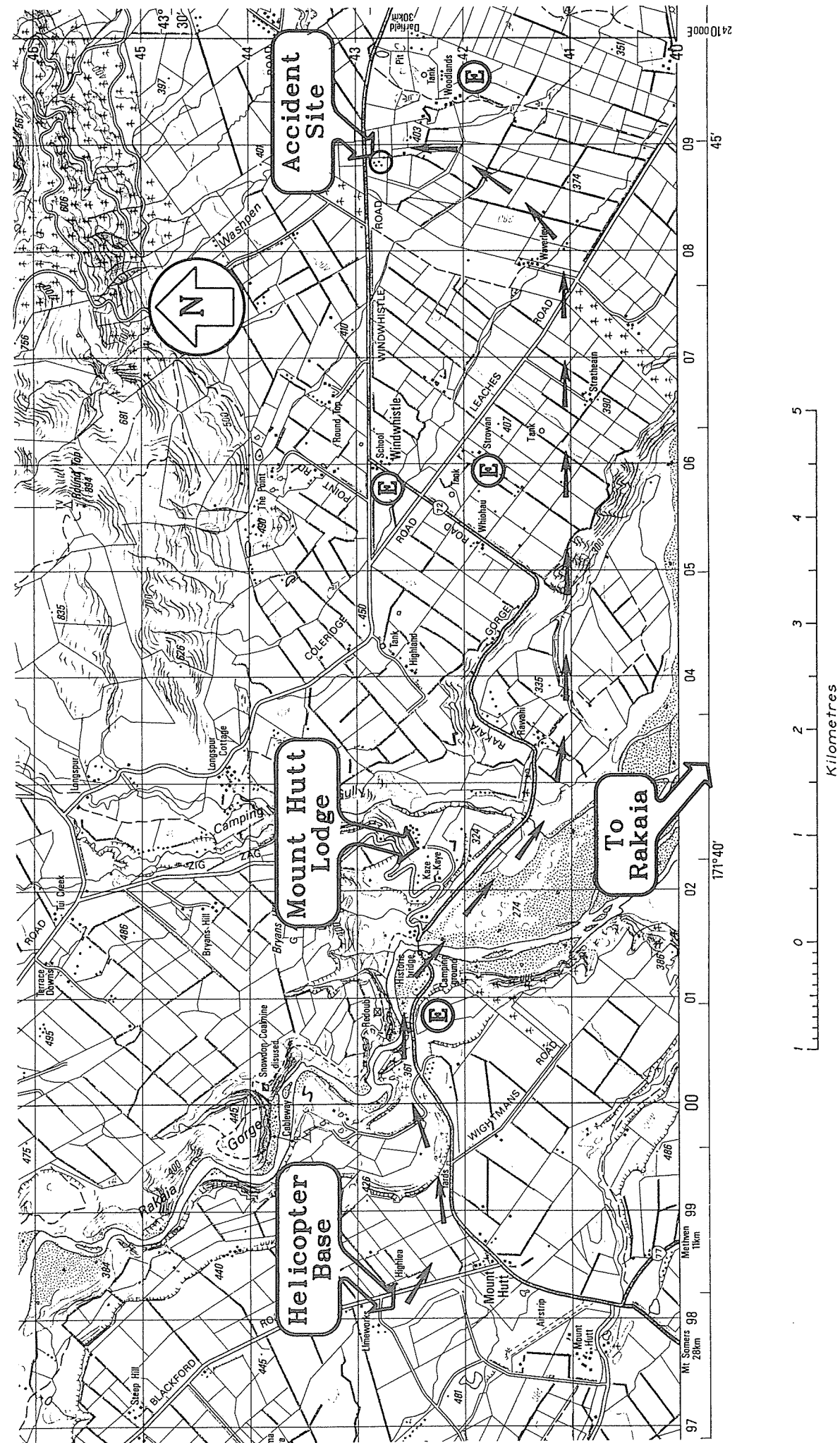
* All times in this report are in NZDT (UTC +13 hours)

1. Factual Information

- 1.1 The pilot of ZK-HLE was the Managing Director and Chief Pilot of a helicopter operation based at his home on Mount Hutt Station, where he had operated since 1983. Many helicopter aerial work tasks had been performed during that time, including ambulance and SAR flights, using the Hughes 369D helicopter ZK-HLE, and the operation had become well regarded for its capability and effectiveness in difficult circumstances.
- 1.2 On the morning of 12 February 1996 the pilot had been engaged for an hour on a fire-fighting task with the helicopter, using a monsoon bucket. After this was completed, he had driven to Christchurch in the afternoon, with his wife. After a meal, and a visit to the cinema, they drove home to Mount Hutt. At 2120 hours, on the journey home, the pilot received a telephone call from the Police requesting his services for a SAR job. This consisted of rescuing a group of four overseas tourists who had become marooned on an island in the Rakaia River near Rakaia township, 40 km south east of Mount Hutt Station, as a result of a rapid rise in the river level following heavy rain in the mountains.
- 1.3 At that time they were about half-way on the journey home, about 20 km north of Rakaia. The weather they were driving through was not good, with patches of fog, and low cloud and drizzle. The pilot however accepted the task, advising that he would be airborne in about 45 minutes. He then telephoned his crewman, asking him to get the helicopter ready for their departure.
- 1.4 They arrived home at about 2215 hours, and the pilot went straight to the helicopter. With his crewman he lifted off in ZK-HLE at about 2230 hours, and departed to the east, towards the Rakaia Gorge. No radio communications were received at the pilot's base then or later.
- 1.5 At 2235 hours the pilot called the Police unit which was keeping watch on the stranded tourists at Rakaia, by RTF on the Police channel. He advised that they had just passed Mount Hutt Lodge, and asked what the weather was like. Upon receiving the reply that it was pretty clear, he stated that they were having a problem with some low fog round Mount Hutt (Lodge), and anticipated that they would be on the way shortly. No further RTF communications were received from the helicopter. Mount Hutt Lodge is on the lower river terrace on the north-east side of the Rakaia Gorge, about 4 km east of the pilot's base.
- 1.6 After an extended wait for ZK-HLE, which had not arrived at Rakaia, the Police became concerned about it. After checking with the pilot's base, and finding that no communications with the crew had been received, at 2340 hours they arranged for a RNZAF Iroquois from Wigram to be called out to perform the original rescue of the tourists.
- 1.7 A Police Search operation for ZK-HLE was commenced at 0052 hours, with SAR headquarters at Rakaia and Methven opened.
- 1.8 The Iroquois helicopter arrived at Rakaia at 0058 hours, and the crew were briefed for both tasks. They recovered the stranded tourists to the Rakaia SAR base at 0121 hours, and then departed to search for ZK-HLE. They had clear starry night conditions with bright moonlight as they flew upriver, until about half-way to the Rakaia Gorge, from where a layer of low cloud or fog extended inland.
- 1.9 After a low level search of the Rakaia riverbed area, and a high level ELT search, both with no results, the searching Iroquois was landed at Ashburton at 0325 hours. Low cloud or fog generally prevailed in the Methven - Rakaia Gorge - Windwhistle area at that time.

- 1.10 A ground search was implemented at first light, 0540 hours, on 13 February, and the air search by the Iroquois was resumed at 0745 hours. Low cloud or fog continued to limit their results. At about 0845, a Windwhistle farmer who had seen something shiny suspended in trees on his farm while driving past on State Highway 72, investigated further and reported the wreckage of the helicopter.
- 1.11 The Iroquois was able to proceed promptly to the site in the clearing fog, and the crew confirmed the accident to ZK-HLE, with no survivors.
- 1.12 The accident site was on the eastern side of a thicket of mature pine trees situated 3 km east of Windwhistle, and about 150 m south of State Highway 72, at an elevation of 1250 feet amsl. A series of fires had occurred which had consumed much of the principal wreckage of the helicopter, and had damaged some trees before dying down.
- 1.13 The helicopter had cut a swath through branches of trees on the eastern face of the thicket, evidently while travelling to the north. The swath commenced at between 50 and 65 feet agl, and was initially nearly level, then angled progressively down to the principal wreckage over a distance of 45 m.
- 1.14 The principal wreckage had comprised the cabin structure, engine, main gearbox, mast, main rotor head and two blades. The fire had consumed most light alloy components, so that the status of control systems could not be determined. No significant evidence was available from instruments or switch positions. The main rotor head damage was consistent with heavy blade strikes occurring while appreciable power was being delivered to the rotor, however. Two latched four-point harness buckles suggested that the occupants had been restrained in the front seats.
- 1.15 The extremities of all major components were accounted for at the site, indicating that the helicopter had been complete before the accident. Two main rotor blade outer sections, and other miscellaneous items were suspended in trees along the wreckage trail. Separated items along the 40 m trail leading to the principal wreckage included the horizontal stabiliser, tail rotor with its gearbox and vertical stabiliser, tail boom sections, both skids and associated fuselage structure, cabin doors, engine cowlings and the fifth main rotor blade. All items showed evidence of tree strikes which were consistent with their separation.
- 1.16 It was not possible to determine the roll attitude of the helicopter from strike marks on branches at the initial collision with the trees. The wreckage trail, however, was well aligned with the edge of the trees and the adjacent fence line, which was oriented 335° magnetic.
- 1.17 This fence line, and an adjacent pine hedge, extended to the south in a straight line for 250 m from the thicket of pine trees. The pine hedge had been trimmed at the sides, but not on the top, and its height varied between about 25 and 45 feet, being tallest at the end adjacent to the pine trees. The height of the thicket of pine trees was 60 to 80 feet. The ground sloped down locally at about 4° to the north, towards State Highway 72. This road ran straight, east to west, in this area for 5 km before turning to descend to the Rakaia Gorge Bridge. The road was aligned accurately towards the pilot's base at Mount Hutt Station, 11 km to the west across the Gorge.
- 1.18 Maintenance records indicated that ZK-HLE had been maintained in accordance with the Operator's Maintenance Manual. No deferred defects were recorded. The pilot had a reputation for ensuring that the helicopter was scrupulously maintained to a high standard. It had a valid Maintenance Release and Certificate of Airworthiness.

- 1.19 The fuel quantity on ZK-HLE was not determined, but it had probably been filled to capacity before departure. The weight and balance of the helicopter would have been within approved limits with any quantity of fuel in its tank, with the two occupants. No fuel samples were recovered from the wreckage.
- 1.20 An aftercast of the weather was prepared by the Meteorological Service of New Zealand. It reported that a cold front, lying north to south, had moved to the east across South Island during the afternoon, passing Christchurch at about 1700 hours. Behind the front a weak ridge developed over Otago, and the airflow quickly turned south-easterly. Low cloud which initially spread along the coast to the north behind the front would have been pushed inland by the south-easterly airflow. The cloud base, which was 800 feet agl at Timaru, would have lowered to ground level as it reached the Windwhistle area. This was estimated to have occurred by 2100 hours.
- 1.21 There were no weather observations available to MetService from the area of the accident, to indicate the extent of low cloud and fog across the Canterbury Plains.
- 1.22 A motorist who drove along State Highway 72 through Windwhistle to Methven at about 2205 hours reported reduced visibility in light rain or heavy drizzle, but not fog. He thought there was continuous low cloud in the area but could not estimate the height of its base.
- 1.23 Another local report, from a resident in Windwhistle, was of clear conditions, with no fog, at 2230 hours.
- 1.24 Local enquiries established that the helicopter had been heard by various people in the area, but not seen. As a result its route could not be established in any detail. These ear witnesses were located at the Rakaia Gorge, at Windwhistle and at a farm 1 km south, and at the farm 1 km south east of the accident site. (See Figure 1.)
- 1.25 Air Traffic Control radar data recordings were examined by Airways Corporation for any radar targets which could have been ZK-HLE. No data was found, probably because the flight was below the primary radar horizon. The secondary radar at Cass Peak was out of service at the time for maintenance. ZK-HLE was not in receipt of any Air Traffic Control service, and had not been in radio contact with Air Traffic Control.
- 1.26 ZK-HLE was equipped with two fixed landing lights in its nose, pointing ahead and angled down 20° and 45°. These were reportedly effective for low level visual flying at night, by reference to ground features. No high power swivellable light source, such as a "Night Sun", was fitted. The aircraft instruments included an artificial horizon and gyro direction indicator. Radio navigation aids fitted included an ADF, and a GPS receiver. The aircraft was approved for VFR night local and cross country operations with the radio equipment fitted.
- 1.27 The pilot was reported to have flown numerous tasks at night, in varying weather conditions, the most recent being at a plantation fire near Christchurch on 3 and 4 February, totalling 13.75 hours flying time. His computerised flight record system, however, which was used for maintenance as well as pilot flying records, did not differentiate between day and night flying. As a result there was no logbook record of night flying since February 1990. At that time he had logged 23.65 hours night time.
- 1.28 The pilot, with another experienced helicopter pilot, had flown three sessions of night instrument training with an instructor in a light aeroplane in May 1993. This was to gain some practical experience of IFR operations and instrument approach procedures, as well as to revise basic instrument flying.



- 1.29 The pilot's Commercial Pilot Licence (Helicopter) contained no restriction for night VFR cross-country flying. It included Agricultural and Chemical Ratings, and Type Ratings for AS 350, Bell 47 and 206, Hiller UH 12 and Hughes 269 and 369 helicopters. His Class 1 Medical Certificate was valid to 3 March 1996, with a requirement that distance vision spectacles must be worn.
- 1.30 The post-mortem and toxicological investigation of the pilot showed no abnormalities which may have affected his ability to conduct the flight.

2. Analysis

- 2.1 This accident evidently involved the helicopter colliding with trees while flying at low level, at night. The inference of this is that the pilot was unable to see the trees in time to avoid them. There was no direct evidence that it was flying in bad weather causing reduced visibility, such as drizzle, rain, low cloud or fog, but such conditions were likely. This was because such weather had been noted on the road nearby half an hour before; because the pilot had reported to the Police by radio that he had a problem with "low fog" near Mount Hutt Lodge, 7 km away; and because the accident location and direction of flight were both away from the objective of the flight, suggesting a diversion as a result of bad weather.
- 2.2 The weather was apparently not consistently bad, as clear conditions had been reported at about that time in Windwhistle, 3 km west; and the Police unit with the stranded tourists at Rakaia, some 40 km downriver, reported to the pilot that it was clear there. The general weather situation, however, did make it likely that a band of low cloud or fog would prevail over the inland Canterbury Plains area, and this was supported by the observations of the Iroquois crew some three hours later.
- 2.3 The actual circumstances immediately preceding the collision with the trees are not conclusively evident. The swath cut through the tree branches was initially nearly level, suggesting that the helicopter was in level flight, and thus probably under control. A descent through low cloud would have produced a markedly different pattern. The rotor head damage evidence indicated that appreciable power was being delivered, consistent with level flight.
- 2.4 The direction of the tree swath and the wreckage trail was in close alignment with the pine hedge which led to the thicket of trees, and this suggested that the pilot may have been following the line of the hedge, perhaps just above and to the right of it (he was flying from the left seat), using the helicopter's landing lights to illuminate the way ahead. The height of the swath, just above the height of the hedge, was consistent with this also.
- 2.5 Such a procedure, following a prominent line feature at low level using the landing lights, is a useful tactic to maintain visual reference at night in poor visibility, but really requires a pilot to know where the line feature is and what it leads to. The pilot of ZK-HLE was flying in his familiar local area and probably did know where he was. What he intended to do is not known, but one possibility is that he planned to follow the hedge to the main road, then follow the road back towards his base, perhaps abandoning the mission because of the weather.
- 2.6 One anomaly is that the tree swath evidence suggests that the helicopter was flying at quite high speed, perhaps at 100 knots. The length of the swath, and the high energy damage to the airframe from branch impacts were not consistent with the sort of low speed, perhaps 40 knots, to be expected of an experienced pilot finding his way at low level in poor visibility. No explanation for such apparently high speed is evident.

- 2.7 If the helicopter was flying at such a speed, this could have contributed to the pilot not being able to see the trees ahead in sufficient time to avoid them. Other potential factors contributing to his not seeing the trees could have been drizzle or mist on the bubble of the helicopter, reducing his vision; a possible obscuration of the tree tops by a low cloud base or local thickening of the cloud, so that the hedge appeared to continue as a hedge, rather than being differentiated from the taller trees ahead. However, as there is no evidence of the actual conditions the pilot encountered, the part any such factors could have played can only be speculation.
- 2.8 The total route of the helicopter from Mount Hutt Station was not established, other than a descent into the Rakaia Gorge to the east, near the pilot's reported position by Mount Hutt Lodge. The ear witness reports only generally indicate that it was flown up the terraces to the east of the river for 4 or 5 km, then to the north to the accident site. It may be that the pilot followed hedge lines and roads after leaving the river, but insufficient evidence was available to confirm this.
- 2.9 It seems likely that the pilot's plan to get to Rakaia to carry out the rescue mission was to descend to the bed of the Rakaia River at the Gorge, then fly downriver at low level, in visual contact with the riverbed. Since the riverbed was some 500 feet lower than his home base, and lowered further downstream, there was a reasonable chance that such a route would take him down into the clear conditions at Rakaia which had been reported to him.
- 2.10 In the event, the conditions which he encountered at the Gorge were not good enough to follow such a plan. He reported "having a problem with low fog round Mount Hutt (Lodge)". What his subsequent plan might have been is not known, but he had said to the Police that he anticipated being on the way shortly. If he had decided at that stage to return home, retracing his route might have been an option, but this was evidently not done. Flying over to the Windwhistle side of the river may have been part of a local exploration, over known terrain, to look for clearer conditions to enable a climb in VMC above the low cloud.
- 2.11 An alternative plan which the pilot could have considered, but evidently did not follow, was to climb the helicopter from his base, on instruments, through the low cloud to VMC on top. Since the report of clear conditions at Rakaia was available to him such a course of action could have remained an option at any stage of the flight. Any reluctance to climb into cloud would have been reasonable, however, since he could not know the vertical extent of the cloud, and the possibility of other hazards such as icing. As the pilot did not hold an Instrument Rating, and the helicopter was not approved for IFR operations, such a procedure would not be expected. Anecdotal evidence suggested that he was careful to avoid flying into cloud.
- 2.12 This discussion of ways of conducting a night VFR flight in weather conditions which were well below those approved for normal night operations acknowledges the pressures which can be perceived by a pilot when asked to try to carry out a SAR mission. While it must remain the pilot's prerogative to accept or decline a task in the conditions prevailing, many pilots will respond to the full extent which their experience and judgement indicates possible, if the safety of life may be at stake. This is likely to mean accepting a significantly greater degree of risk than normal, but such a decision can only be made by the pilot involved, on the information available at the time. In this accident, a very experienced and well regarded helicopter pilot accepted a task in difficult weather conditions, but in which he thought he could achieve the objective of rescuing the stranded tourists from the river. Helicopter rescues have become commonplace, but highly valued in the New Zealand community. They may well often be carried out in conditions considered unsuitable for any other types of operations, and the generally high success and low accident rates on these missions suggest that the level of judgement being exercised by helicopter pilots is of an appropriate standard.

3. Findings

- 3.1 The pilot was appropriately licensed for the flight.
- 3.2 The pilot was undoubtedly well experienced to undertake the night rescue flight, although his relevant night flying experience had not been recorded.
- 3.3 The pilot knew that the weather was not good before he undertook the rescue flight.
- 3.4 The helicopter had a valid Certificate of Airworthiness and Maintenance Release, and was suitably equipped for the night flight.
- 3.5 The helicopter was probably operating normally and in level controlled flight when the accident occurred.
- 3.6 The helicopter collided with a thicket of trees, causing a substantial break-up of its structure, before falling to the ground.
- 3.7 The accident was unsurvivable.
- 3.8 The pilot was probably flying in conditions of limited visibility resulting from low cloud, drizzle, or fog.
- 3.9 The pilot was flying in his familiar local area.
- 3.10 The details of the flight which led to the collision were not established.

21 August 1996

M F Dunphy
Chief Commissioner

Glossary of Aviation Abbreviations

AD	Airworthiness Directive
ADF	Automatic direction-finding equipment
agl	Above ground level
AI	Attitude indicator
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
amsl	Above mean sea level
AOD	Aft of datum
ASI	Airspeed indicator
ATA	Actual time of arrival
ATC	Air Traffic Control
ATD	Actual time of departure
ATPL (A <i>or</i> H)	Airline Transport Pilot Licence (Aeroplane <i>or</i> Helicopter)
AUW	All-up weight
°C	Degrees Celsius
CAA	Civil Aviation Authority
CASO	Civil Aviation Safety Order
CDI	Course Deviation Indicator
CFI	Chief Flying Instructor
C of A	Certificate of Airworthiness
C of G (<i>or</i> CG)	Centre of gravity
CPL (A <i>or</i> H)	Commercial Pilot Licence (Aeroplane <i>or</i> Helicopter)
DME	Distance measuring equipment
E	East
ELT	Emergency location transmitter
ERC	Enroute chart
ETA	Estimated time of arrival
ETD	Estimated time of departure
°F	Degrees Fahrenheit
FAA	Federal Aviation Administration (United States)
FL	Flight level
ft	Foot/feet
g	Acceleration due to gravity
GPS	Global Positioning System
h	Hour
HF	High frequency
hPa	Hectopascals
hrs	Hours
HSI	Horizontal Situation Indicator
IAS	Indicated airspeed
IFR	Instrument Flight Rules
IGE	In ground effect
ILS	Instrument landing system
IMC	Instrument meteorological conditions

in	Inch(es)
ins Hg	Inches of mercury
kg	Kilogram(s)
kHz	Kilohertz
KIAS	Knots indicated airspeed
km	Kilometre(s)
kt	Knot(s)
LAME	Licensed Aircraft Maintenance Engineer
lb	Pounds
LF	Low frequency
LLZ	Localiser
Ltd	Limited
m	Metre(s)
M	Mach number (e.g. M1.2)
°M	Degrees Magnetic
MAANZ	Microlight Aircraft Association of New Zealand
MAP	Manifold absolute pressure (measured in inches of mercury)
MAUW	Maximum all-up weight
METAR	Aviation routine weather report (in aeronautical meteorological code)
MF	Medium frequency
MHz	Megahertz
mm	Millimetre(s)
mph	Miles per hour
N	North
NDB	Non-directional radio beacon
nm	Nautical mile
NOTAM	Notice to Airmen
NTSB	National Transportation Safety Board (United States)
NZAACA	New Zealand Amateur Aircraft Constructors Association
NZDT	New Zealand daylight time (UTC + 13 hours)
NZGA	New Zealand Gliding Association
NZHGA	New Zealand Hang Gliding and Paragliding Association
NZMS	New Zealand Mapping Service map series number
NZST	New Zealand Standard Time (UTC + 12 hours)
OGE	Out of ground effect
okta	Eighths of sky cloud cover (e.g. 4 oktas = 4/8 of cloud cover)
PAR	Precision approach radar
PIC	Pilot in command
PPL (A or H)	Private Pilot Licence (Aeroplane or Helicopter)
psi	Pounds per square inch
QFE	An altimeter subscale setting to obtain height above aerodrome
QNH	An altimeter subscale setting to obtain elevation above mean sea level
RNZAC	Royal New Zealand Aero Club
RNZAF	Royal New Zealand Air Force
rpm	revolutions per minute
RTF	Radio telephone or radio telephony

s	Second(s)
S	South
SAR	Search and Rescue
SSR	Secondary surveillance radar
°T	Degrees True
TACAN	Tactical Air Navigation aid
TAF	Aerodrome forecast
TAS	True airspeed
UHF	Ultra high frequency
UTC	Coordinated Universal Time
VASIS	Visual approach slope indicator system
VFG	Visual Flight Guide
VFR	Visual flight rules
VHF	Very high frequency
VMC	Visual meteorological conditions
VOR	VHF omnidirectional radio range
VORTAC	VOR and TACAN combined
VTC	Visual terminal chart
W	West