

**AIRCRAFT ACCIDENT REPORT  
OCCURRENCE NUMBER 05/3501**

**Eurocopter EC120B**

**ZK-HTF**

**6 nm south-west of Raglan**

**4 November 2005**



## FOREWORD

Aviation safety investigations are conducted in New Zealand pursuant to New Zealand's international obligations under the Convention on International Civil Aviation 1944 – also known as the Chicago Convention. Pursuant to Articles 26 and 37 of the Chicago Convention, the International Civil Aviation Organisation (“ICAO”) has issued Annex 13 to the Convention setting out International Standards and Recommended Practices in respect of the investigation of aircraft accidents and incidents. Paragraph 3.1 of Annex 13 describes the sole objective for the investigation of such accidents as follows:

*3.1 The sole objective of the investigation of an accident or incident shall be the prevention of accidents and incidents. It is not the purpose of this activity to apportion blame or liability.*

This philosophy of prevention for the future promotion of aviation safety is reflected in the New Zealand domestic law by virtue of the provisions of the Civil Aviation Act and Part 12 of the Civil Aviation Rules. CAA accident investigations operate under this philosophy.

CAA accident investigations are conducted in accordance with ICAO guidelines. The sole objective of such investigations is the prevention of accidents by determining the contributing factors or causes and then implementing appropriate preventive measures - in other words restoring safety margins to provide an acceptable level of risk.

CAA safety investigations are performed to establish the causes of the accident on the balance of probability. Accident investigations do not always identify one dominant or ‘proximate’ cause. Often, an aviation accident is the last event in a chain of several events or factors, each of which may contribute to a greater or lesser degree, to the final outcome.

## Abbreviations used in this report:

|        |   |
|--------|---|
| AMSL   | above mean sea level  |
| BEA    | Bureau d'Enquêtes et d'Analyses<br>(French accident investigation organisation) |
| CAA    | Civil Aviation Authority  |
| CAR    | Civil Aviation Rule(s)  |
| E      | east  |
| ft     | foot or feet  |
| GPS    | Global Positioning System   |
| G/S    | ground speed  |
| IFIS   | Internet Flight Information Service   |
| IMC    | Instrument Meteorological Conditions  |
| km     | kilometre(s)  |
| kt(s)  | knot(s) – nautical miles per hour   |
| m      | metre(s)  |
| MHz    | megahertz   |
| NM     | nautical mile   |
| NPRM   | Notice of Proposed Rule Making  |
| NZDT   | New Zealand Daylight Time   |
| PPL(H) | Private Pilot Licence (Helicopter)  |
| RCCNZ  | Rescue Coordination Centre New Zealand  |
| S      | south   |
| SE     | south-east  |
| SSR    | secondary surveillance radar  |
| SW     | south-west  |
| TAF    | Terminal Area Forecast  |
| UTC    | Coordinated Universal Time  |
| VEMD   | vehicle engine multifunction display  |
| VFR    | visual flight rules   |
| VMC    | Visual Meteorological Conditions  |
| WGS 84 | World Geodetic System 1984  |
| Z      | Time UTC  |

## AIRCRAFT ACCIDENT REPORT

### OCCURRENCE No 05/3501

|   |  |
|---|--|
| <b>Aircraft type, serial number and registration:</b> | Eurocopter EC120B, 1384, ZK-HTF  |
| <b>Number and type of engines:</b>                    | 1 Turbomeca ARRIUS 2F  |
| <b>Year of manufacture:</b>                           | 2004   |
| <b>Date and time:</b>                                 | 4 November 2005, 1014 hours <sup>1</sup> (approx)  |
| <b>Location:</b>                                      | 6 nm South of Raglan<br>Latitude <sup>2</sup> : S 37° 51.171'<br>Longitude: E 174° 49.757' |
| <b>Type of flight:</b>                                | Private  |
| <b>Persons on board:</b>                              | Crew: 1<br>Passengers: 1   |
| <b>Injuries:</b>                                      | Crew: 1 (Fatal)<br>Passengers: 1 (Fatal)   |
| <b>Nature of damage:</b>                              | Aircraft destroyed   |
| <b>Pilot's licence:</b>                               | Private Pilot Licence (Helicopter)   |
| <b>Pilot's age:</b>                                   | 49 years   |
| <b>Pilot's total flying experience:</b>               | 237.2 hours,<br>155 hours on type  |
| <b>Information sources:</b>                           | Civil Aviation Authority field investigation   |
| <b>Investigator in Charge:</b>                        | Mr T P McCready  |

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<sup>1</sup> Times are NZDT (UTC + 13 hours)

<sup>2</sup> WGS 84 co-ordinates.

## Synopsis

The Civil Aviation Authority was notified at 1613 hours NZDT on Friday 4 November 2005 that helicopter ZK-HTF was overdue. The helicopter was located near Raglan on 19 November 2005 following a 15 day search. The Transport Accident Investigation Commission was notified of the wreckage discovery, but declined to investigate the accident. A CAA field investigation was commenced on 20 November 2005.

The pilot and passenger were on a private flight from Papakura to Queenstown. The helicopter was not reported missing until the SARTIME for arrival at destination had elapsed.

Both occupants were found deceased in the wreckage.

## 1. Factual information

### 1.1 History of the flight

- 1.1.1 The flight was a planned scenic flight by the helicopter owner/pilot with an international business associate visiting New Zealand as his passenger.
- 1.1.2 The pilot had obtained weather reports from the Airways Internet Flight Information Service (IFIS) website the evening prior to the accident flight and again on the morning of that flight.
- 1.1.3 A flight plan had been filed to fly from Papakura to Queenstown Aerodrome, via planned fuel stops at Wanganui and Rangiora Aerodromes with a transponder code of 0372 assigned to the helicopter.
- 1.1.4 At 0938 hours on Friday 4 November 2005 the owner/pilot of ZK-HTF and his passenger departed from the owner's home near Papakura, en route for the first planned refuel stop at Wanganui Aerodrome.
- 1.1.5 The pilot did not make radio contact with Air Traffic Services to activate his flight plan. Such contact would have been normal procedure.
- 1.1.6 Later analysis of the SSR (radar) plots of an aircraft showing transponder code 0372 indicated that the helicopter tracked south-west from Papakura until overhead the Waikato River where the helicopter turned west and followed the river to the river mouth. See Figure 1.
- 1.1.7 On reaching the Waikato River mouth the helicopter then followed the coastline south to a point abeam of Raglan. Recorded radar altitude and ground speed for the majority of the flight along the coast was 600 ft AMSL and 110 knots.
- 1.1.8 From the point abeam of Raglan the helicopter maintained a direct track for Wanganui Aerodrome rather than continuing to follow the coastline. In doing so, the helicopter tracked inland to the east of Mount Karioi and continued in a south-easterly direction for approximately six nm towards ground rising to 900 ft AMSL.

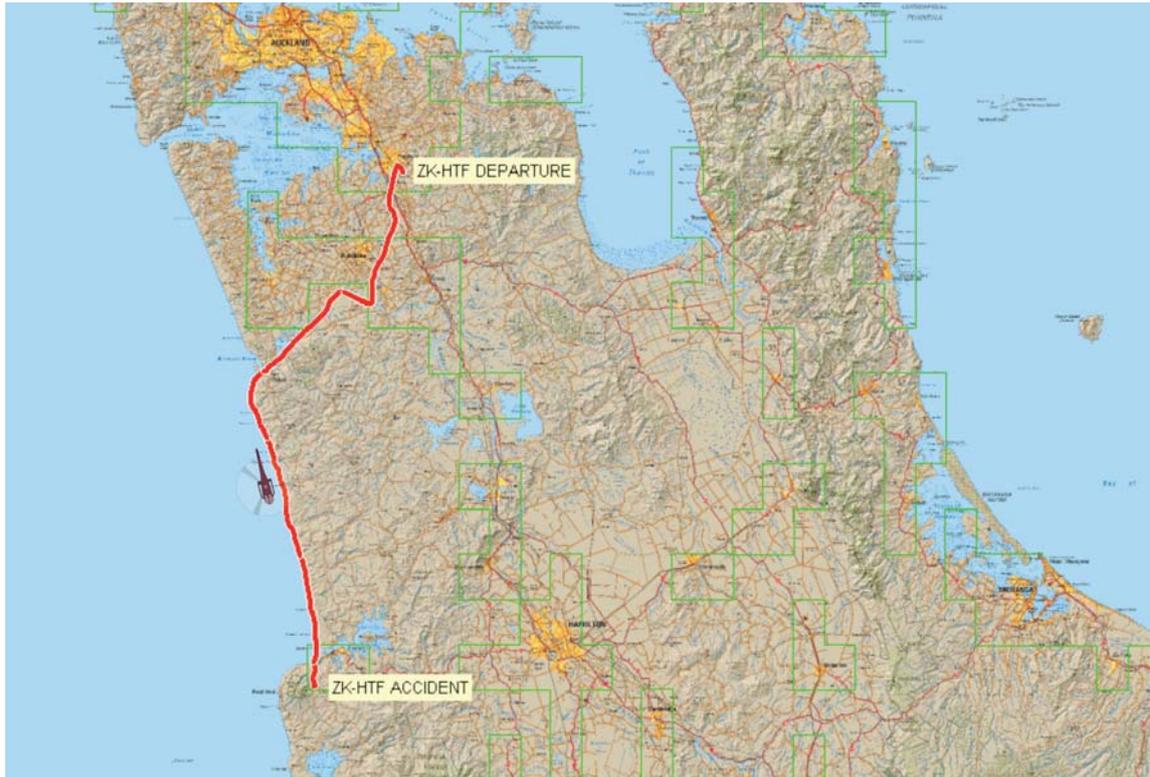


Figure 1

ZK-HTF flight track depicted in red.

- 1.1.9 The last one minute period of radar contact, recorded at five-second intervals, indicated that the helicopter altitude increased from 800 ft to 1100 ft AMSL and the ground speed decreased from 91 to 85 knots.
- 1.1.10 The last recorded radar plot, at 1014 hours, indicated that the helicopter altitude was 1100 ft with a ground speed of 85 knots.
- 1.1.11 Numerous reports of poor weather conditions around Mount Karioi at about the time of the accident were received during the subsequent search.
- 1.1.12 A farmer noted “*low cloud rolling with some speed*” over the 900 ft ridgeline from the south.
- 1.1.13 A group of builders at the Aotea Harbour noted that while working during the day they could not see across the harbour mouth due to mist and low cloud – a distance of 0.5 nm.
- 1.1.14 A witness near the accident site described the mountain being obscured two thirds by black cloud, and noted the helicopter was flying low. She also stated that the “*weather at the time was drizzly on and off, with a quite strong gusty south-westerly wind*”.
- 1.1.15 At 1500 hours Airways New Zealand air traffic control staff became concerned as the helicopter SARTIME approached, and notified the RCCNZ at 1510 hours that the helicopter was unaccounted for.

1.1.16 After an extended search, the helicopter was eventually located on 19 November 2005 in a small grove of trees at the bottom of a valley near the last position recorded on the radar plot.

1.1.17 The accident occurred in daylight, at approximately 1014 hours on 4 November 2005 in the vicinity of Mount Karioi, at an elevation of 705 ft AMSL. Latitude: S37° 51.171 longitude: E174° 49.757.

## 1.2 Injuries to persons

| <i>Injuries</i> | <i>Crew</i> | <i>Passengers</i> | <i>Other</i> |
|-----------------|-------------|-------------------|--------------|
| Fatal           | 1           | 1                 | 0            |
| Serious         | 0           | 0                 | 0            |
| Minor/None      | 0           | 0                 |              |

## 1.3 Damage to aircraft

1.3.1. The helicopter was destroyed.

## 1.4 Other damage

1.4.1 Not Applicable.

## 1.5 Personnel information

1.5.1 The pilot held a Private Pilot Licence (Helicopter) obtained after 64.3 hours of dual instruction and 17.9 hours solo flight on a Schweizer 300CB helicopter.

1.5.2 The pilot held a current Class 2 medical certificate appropriate for that licence.

1.5.3 The pilot gained a type rating on the EC120B helicopter on 6 January 2005.

1.5.4 The pilot had flown a total of 237.2 hours, which included 155 hours on the EC120 helicopter until the last logbook entry on 27 October 2005.

1.5.5 Although recorded as pilot-in-command hours, the pilot often flew the EC120 with an accompanying instructor as a safety pilot.

1.5.6 The pilot did not hold an Instrument Rating permitting flight into instrument meteorological conditions (IMC).

## 1.6 Aircraft information

1.6.1 Eurocopter EC120B, ZK-HTF, had flown 169 hours up to the time of the accident. The most recent maintenance check was an Annual Airframe Inspection with a 500 hour/18 month engine inspection on 29 September 2005.

1.6.2 The Turbomeca ARRIUS 2F engine, serial number 34415, fitted since new had also run a total of 169 hours.

- 1.6.3 The helicopter was fitted with a Kannad 406 AF-H ELT which, when the transmission is detected, enables accurate location of the ELT by satellites and provides digital identification of the helicopter.
- 1.6.4 The helicopter was not certified for flight in IMC, however this is not unusual for private helicopters.

## **1.7 Meteorological information**

- 1.7.1 On the day of the accident a high pressure system was centred to the north-west of the North Island and a cold front associated with a low pressure system was approaching the South Island from the Tasman Sea. The west coast of the North Island was affected by a moist westerly air-stream between these two weather systems.
- 1.7.2 The pilot's pre-flight planning began on the evening before the accident. The pilot accessed IFIS for forecast weather information for the route of the planned flight. IFIS presents weather information for 17 Area Forecast (ARFOR) Regions of New Zealand as shown in Figure 2.
- 1.7.3 Flight information was also available on IFIS for aerodromes in the form of forecast and actual weather conditions. The pilot would need to request the specific information that is required.

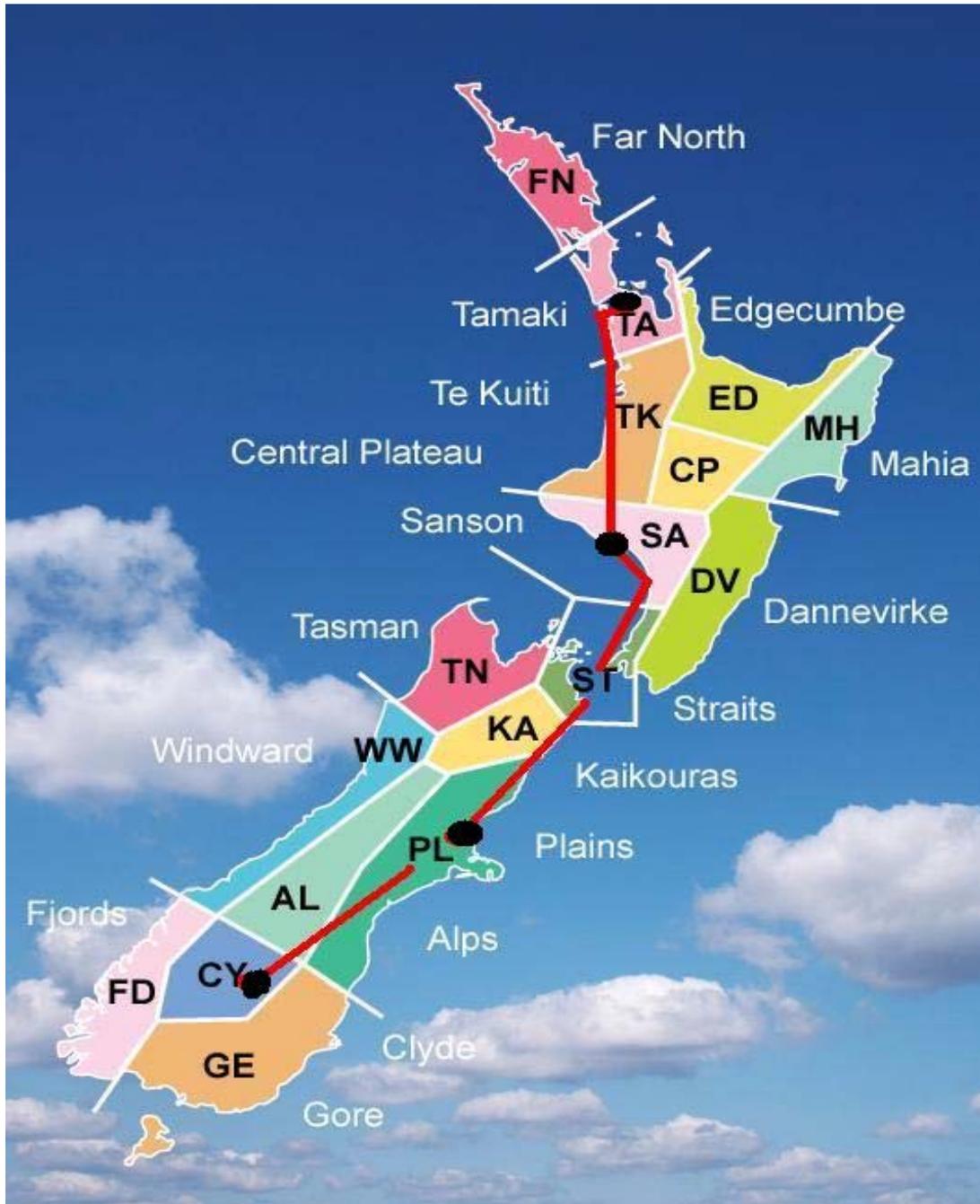


Figure 2

Area Forecast (ARFOR) Regions of New Zealand.

*(Note – The red line depicts planned route).*

- 1.7.4 The majority of the first leg of the flight, from the pilot’s home to Wanganui Aerodrome, was planned to be flown in the Te Kuiti (TK) ARFOR followed by the Sanson (SA) ARFOR.
- 1.7.5 A summary of the generated weather report details from IFIS, obtained by the pilot in the 14 hours prior to take-off, are shown in Table 1.

| <b>Date/Time of Request</b> | <b>IFIS Report</b> | <b>Area Forecast</b>  | <b>Aerodrome Weather Information</b>  |
|-----------------------------|--------------------|---|---|
| 3 Nov 2005<br>7:56pm        | M0300786           | <i>Not requested.</i>   | NZHN, NZAP, NZNP, NZWU, NZOH, NZPM, NZNS, NZWN, NZWB, NZHK, NZMC, NZTU, NZMF, NZQN, NZDN, NZNV, NZZC. <i>Aerodrome locations along the intended North and South Island route and South Island West Coast options.</i> |
| 3 Nov 2005<br>8:00pm        | M0300792           | ST, KA, PL, <b>CY</b> .<br><i>Cook Strait and South Island areas only.</i>                            | NZHN, NZAP, NZNP, NZWU, NZOH, NZPM, NZNS, NZWN, NZWB, NZCH, NZTU, NZMF, NZQN, NZDN, NZNV, NZZC. <i>Aerodrome locations along the intended North and South Island route.</i>   |
| 3 Nov 2005<br>8:02pm        | M0300796           | <b>CY</b> .<br><i>Destination (Queenstown) area only.</i>   | <i>Not requested.</i>   |
| 4 Nov 2005<br>8:21am        | M0301625           | TK, SA, ST, KA, PL, <b>CY</b> .<br><i>Area forecasts for the entire North and South Island route.</i> | <i>Not requested.</i>   |
| 4 Nov 2005<br>8:46am        | M0301687           | TK, SA, ST, KA, PL, <b>CY</b> .<br><i>As above</i>  | NZCH, NZMC, NZTU, NZMF, NZQN, NZDN, NZNV, NZZC. <i>South Island aerodrome locations only.</i>   |

Table 1

Summary of weather information requested by the pilot.

- 1.7.6 In the first IFIS report the pilot requested aerodrome weather locations. In the second report he requested South Island area forecasts, and aerodrome weather locations along the route. The third report appears to be part duplication obtained in the second report.
- 1.7.7 In the fourth report obtained approximately 80 minutes before take-off he requested area forecasts but no aerodrome information. The Te Kuiti (TK) area forecast indicated:
- The visibility was 20 km reducing to 5000 metres in drizzle, but reducing further to 1500 metres in mist.
  - The cloud base was generally 2500 ft AMSL, with areas of Stratus at 1200 ft AMSL. The cloud base further reduced to 800 ft AMSL in drizzle and 400 ft in mist.
  - Areas of mist and drizzle clearing by 1300 hours.

1.7.8 The current local area forecast for Te Kuiti obtained by the pilot on the morning of the flight stated the following:

**TK** Area Forecast for 031800Z-042100Z  
 Issued 031620Z  
 ARFOR **TK** VALID 1600 TO 0100 UTC  
 1000 24015  
 3000 22025  
 5000 22030PS09  
 7000 22030PS07  
 10000 22035PS02  
 FZL 11 500FT  
 VIS 20KM, REDUCING TO 5000M IN DZ, BUT TO 1500M IN BR.  
 CLD OFTEN BKN CUSC 2500 TOPS 9000, WITH AREAS BKN ST 1200. ST  
 LOWERING TO 800 IN DZ, BUT TO 400 IN BR.  
 WX AREAS BR/DZ CLEARING BY 0000Z  
 TURB OCNL MOD

1.7.9 The plain English decode of the ARFOR is as follows:

Visibility 20 km reducing to 5000 metres in drizzle, but reducing further to 1500 metres in mist.

Cloud base generally 2500 ft AMSL, with areas of Stratus at 1200 ft AMSL. The cloud base would further reduce to 800 ft AMSL in drizzle and 400 ft in mist.

Areas of mist and drizzle clearing by 1300 hours on 4 November.

1.7.10 CAR 91.301 outlines the minimum in-flight meteorological conditions required for flight under VFR in Class G airspace, in which this accident occurred.

|   | Class of Airspace   | Distance from Cloud                        | Flight Visibility |
|---|---|--|-------------------|
| G | At or below 3000 feet AMSL or 1000 feet above the terrain whichever is the higher | Clear of cloud and in sight of the surface | 5 km              |

1.7.11 Due to the unique nature of helicopter operations, CAR 91.301(c)(1) allows a pilot-in-command of a helicopter to operate in Class G airspace with a flight visibility of less than 5 km if manoeuvred at a speed that gives adequate opportunity to observe other traffic or any obstructions in order to avoid collisions.

## **1.8 Aids to navigation**

- 1.8.1 The helicopter was equipped with a King GPS and Garmin MX20 display which provided a large screen moving map display to the pilot. Analysis of the video footage recovered from the passenger's mobile phone indicated that the pilot was utilizing the GPS for navigation. Current aeronautical charts were discovered in the wreckage neatly folded and stowed.

## **1.9 Communications**

- 1.9.1 The helicopter track was recorded by radar, however, as the helicopter remained clear of controlled airspace, no communication with air traffic services was required.

## **1.10 Aerodrome information**

- 1.10.1 Not Applicable.

## **1.11 Recorded flight information**

- 1.11.1 Air Traffic Control Radar detected the helicopter, but the flight was not monitored because the flight plan had not been activated, and the helicopter was not operating in controlled airspace.
- 1.11.2 The radar records were used during the investigation to establish position and altitude of the helicopter. However, as the radar is designed to be used for aircraft separation, there are known limitations in the accuracy of position and altitude information.
- 1.11.3 Recording of the flight departure was found on the passenger's mobile phone video.
- 1.11.4 Accident flight duration was verified from recordings on three independent devices:
- Helicopter vehicle engine multifunction display (VEMD)
  - Radar plot
  - Helicopter Hobbs Meter

These recordings correlate to provide a consistent flight duration of 36-37 minutes.

- 1.11.5 Video footage recovered from the passenger's flight departure recording indicated that the displayed engine instrument parameters in the helicopter were normal, the GPS was selected to track to Wanganui Aerodrome (NZWU) as flight planned, and that the fuel quantity was approximately three quarters of maximum capacity.

## **1.12 Wreckage and impact information**

- 1.12.1 The wreckage was extremely difficult to locate visually because damaged foliage completely enveloped the helicopter. The helicopter wreckage was not visible from the ground at a distance of 20 metres.
- 1.12.2 The location was initially identified when the dead foliage browned off during the 15 days following the accident. The helicopter was painted a dark copper colour which blended with the foliage, making detection even more difficult.

- 1.12.3 The accident site was located in a small grove of trees situated in a valley surrounded by open farmland, but adjacent to the lower forested area of Mount Karioi where extensive searching had taken place.
- 1.12.4 The helicopter had cut a swath through the trees and undergrowth for a distance of approximately 50 metres, coming to rest against a large tree.
- 1.12.5 All of the wreckage, including the fragments of the 10 metre diameter main rotor blades, was contained within the 13 metre width of the grove.
- 1.12.6 The wreckage trail and damage to the surrounding foliage at the accident site indicated that the direction of travel of the helicopter was opposite to the direction of flight determined from the last recorded radar plot.
- 1.12.7 The first indication of main rotor strike which was visible in the tree tops was consistent with the helicopter being in a approximately 10 degree nose high and left skid low flight attitude when it contacted the trees.
- 1.12.8 The attitude of the helicopter placed the tail boom lower than the main fuselage and in a position to contact the surrounding vegetation. The Fenestron<sup>3</sup> tail rotor made contact with a number of tree branches and became separated from the tail boom early in the accident sequence.
- 1.12.9 After the Fenestron tail rotor became separated, the helicopter continued with a descent angle of approximately 10 degrees below the horizontal. The main cabin remained upright, and as a result of the tail rotor separation the helicopter rotated nose left while the tail boom separated from the fuselage.
- 1.12.10 The force of the impact with trees caused the two under floor main beams to fracture and cut the helicopter fuselage in half.
- 1.12.11 The helicopter fuselage, between the rear passenger seats and the tail boom to fuselage bulkhead, was relatively undamaged. This section of fuselage contained the main rotor gearbox, fuel tanks, baggage hold, ELT, and engine. The ELT installation to the antenna remained intact.
- 1.12.12 The main rotor head became anchored in the fork of a large tree and the fuselage was suspended from this point. The engine continued to run and, in attempting to drive the main rotor, fractured the engine to gearbox driveshaft in torsion. See Figure 3.

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<sup>3</sup> A Fenestron is a shrouded tail rotor of a helicopter that is essentially a ducted fan.



Figure 3  
Torsional twisting of drive shaft.

### **1.13 Medical and pathological information**

- 1.13.1 No useful information could be gained from the tests for toxicological substances.
- 1.13.2 The injuries received by both occupants were consistent with a high speed, rapid deceleration impact.

### **1.14 Fire**

- 1.14.1 A small post-crash fire occurred near the exhaust. Damage was limited to superficial burning of the helicopter skin and the fire did not spread beyond that point.

### **1.15 Survival aspects**

- 1.15.1 The accident was not survivable due to the impact forces.
- 1.15.2 The ELT activated. The antenna wiring remained intact, however no signal was detected because the antenna had been broken above the base.

### **1.16 Tests and research**

- 1.16.1 Testing of the Kannad AF-H 406 ELT recovered from the helicopter was conducted, confirming its correct function.

- 1.16.2 Further testing of the ELT was carried out by substituting the damaged antenna with a serviceable antenna. Testing of the damaged antenna showed a significantly degraded signal when compared with an undamaged antenna. The ELT data card recorded that the ELT had transmitted in excess of 3,000 times.
- 1.16.3 The Turbomeca engine was sent to the manufacturer's facility in France for disassembly and testing.
- 1.16.4 The VEMD was recovered from the helicopter and the information data downloaded by the BEA in France. Data from 31 previous flights was obtained.
- 1.16.5 Reports of previous EC120 accidents were researched. Previous accidents attributed to mechanical failure were identified and compared with the subject accident.

### 1.17 Organisational and management information

1.17.1 Not Applicable.

### 1.18 Additional information

1.18.1 A review of weather related accident reports in New Zealand revealed that since the early 1960's 53 aircraft accidents resulted in 129 deaths. Since 1994 eight such accidents involving helicopters were identified which resulted in 20 deaths and two injuries. See Table 2.

| Ref                    | Date        | Type/Reg             | Location                | Outcome   |
|------------------------|-------------|----------------------|-------------------------|-----------|
| CAA Occurrence 05/3501 | 4 Nov 2004  | EC120B<br>ZK-HTF     | Mount Karioi,<br>Raglan | 2 fatal   |
| CAA Occurrence 04/3    | 3 Jan 2004  | Hughes 500<br>ZK-HNW | Fiordland               | 2 missing |
| TAIC 01-012            | 3 Dec 2001  | R44<br>ZK-HTK        | Ureweras                | 2 fatal   |
| CAA Occurrence 01/304  | 26 Jan 2001 | Hughes 300<br>ZK-HDN | Auckland<br>Motorway    | 2 injured |
| TAIC 00-003            | 7 Mar 2000  | AS350B<br>ZK-HWK     | Mount Karioi,<br>Raglan | 4 fatal   |
| TAIC 96-011            | 31 Mar 1996 | R44<br>ZK-HJD        | Gisborne                | 1 fatal   |
| TAIC 96-007            | 12 Feb 1996 | Hughes 500<br>ZK-HLE | Windwhistle             | 2 fatal   |
| TAIC 94-023            | 29 Oct 1994 | AS350B<br>ZK-HMV     | Fox Glacier             | 7 fatal   |

Table 2

Helicopter Weather Related Accident Summary.

## 1.19 Useful or effective investigation techniques

1.19.1 Not Applicable.

## 2. Analysis

- 2.1 The pilot departed his home base in acceptable weather, in the local area, for flight under VFR.
- 2.2 Video footage taken by the passenger during the departure revealed that recent rain had occurred, evidenced by residual water droplets running down the windscreen. Overcast skies were evident with small patches of blue sky and approximately a 1000 ft cloud base. Visibility extended from the owner's home base to the Manukau Harbour, a distance of at least 15 km.
- 2.3 Further video analysis showed that the GPS was selected to track to Wanganui Aerodrome (NZWU) as flight planned and that the fuel quantity was approximately three quarters of maximum capacity.
- 2.4 On reaching the Waikato River the helicopter turned right through approximately 90 degrees from the planned flight track and followed the river to the river mouth on the west coast. The west coast is a popular low level route transited by both fixed wing and helicopter pilots to avoid the hills inland when the cloud base is low. The coast line also provides an easily navigated route.
- 2.5 The flight continued south along the coast at approximately 600 ft AMSL. The helicopter was witnessed just seaward of the coast by a farmer who noted low cloud above the helicopter.
- 2.6 The current local area forecast for Te Kuiti on the day of departure for the accident area indicated that some of the flight in the area was possible under VFR. The visibility was expected to deteriorate and reduce to 5000 metres in drizzle, further reducing to 1500 metres in mist. The weather south of Raglan did deteriorate as forecast.
- 2.7 The cloud base at Raglan was forecast to be generally 2500 ft AMSL with areas of stratus at 1200 ft AMSL, lowering to 800 ft AMSL in drizzle and 400 ft in mist. Witness statements from people close to the accident site confirmed that the actual weather was similar to the forecast conditions. This is characteristic of a south-west flow building up behind Mount Karioi and spilling over the ridgeline near the accident site.
- 2.8 To gain a more comprehensive picture of the weather conditions on the leg to Wanganui Aerodrome, which was the first planned fuel stop, it would have been prudent for the pilot to have obtained current aerodrome weather information on Hamilton (NZHN), New Plymouth (NZNP) and Wanganui (NZWU). It is also useful to consider en route aerodromes for diversion options if any were needed due to deteriorating weather, or to provide contingency fuel options. As it was, New Plymouth was reporting very poor weather conditions with a 200 ft cloud base which is below VFR minima probably precluding it as a diversion option. See Table 1.

- 2.9 The pilot probably did not appreciate the significance of the forecast deteriorating weather.
- 2.10 The pilot appears not to have considered better weather options in the central and eastern areas of the North Island, but may have decided on the route before checking the weather because the pilot had flown the route previously.
- 2.11 Radar plots show the helicopter passed 1.5 nm seaward of Raglan Aerodrome and continued on a direct route to Wanganui Aerodrome. In doing so the helicopter was flying towards high ground of approx 900 ft, rather than following the coastline around Mount Karioi. See Figure 4.

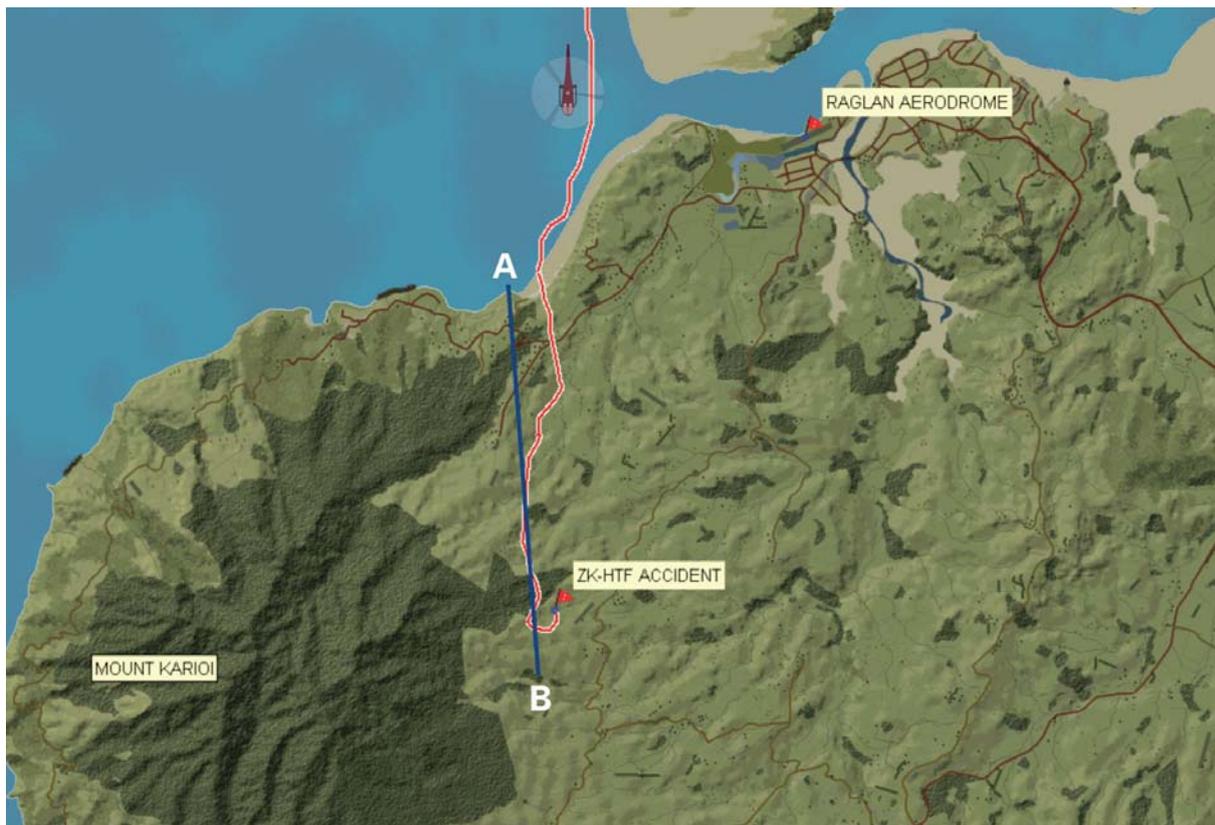


Figure 4

Representation of the Helicopters flight path.

*(Note – The red line depicts Radar Plots of ZK-HTF. The line from point A to point B is shown as a cross section in Figure 5).*

- 2.12 The decision to fly inland could have been his response to seeing a cloud/mist build up seaward of Mount Karioi or a desire to follow the more direct route.
- 2.13 The helicopter was recorded by radar plots as initially climbing in response to the rising terrain from the coastline.

- 2.14 Witness statements suggest the helicopter encountered weather conditions of increasing wind strength, low cloud and drizzle at this stage.
- 2.15 The combination of rising terrain, weather conditions, and helicopter ground speed would have limited the pilot's ability to manoeuvre in the clear air available to maintain VFR flight. Light precipitation on the windscreen of the helicopter would have further reduced the pilot's forward visibility. See Figure 5.

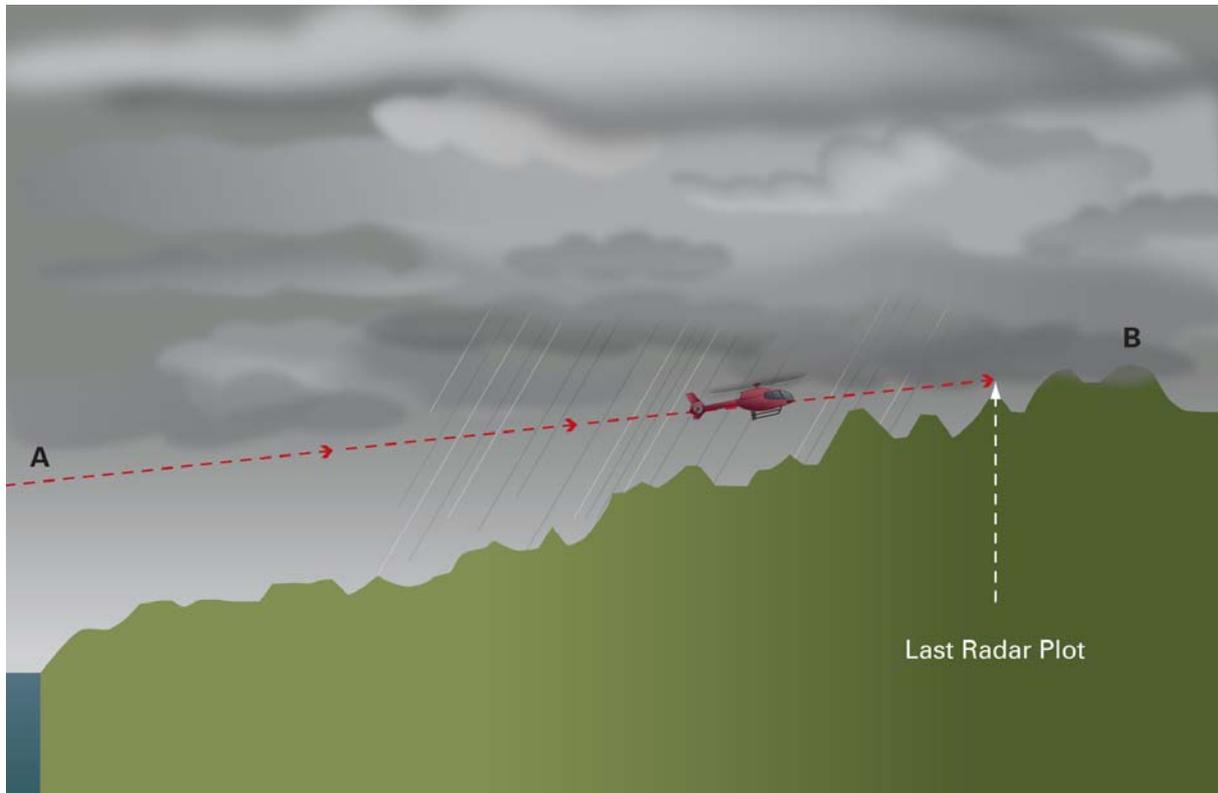


Figure 5

Cross section representation of the helicopter's flight path.

*(Note – The cross section is for illustrative purposes only).*

- 2.16 In encountering these conditions the pilot may have lost control of the helicopter as a result of:
- a loss of visual reference due to inadvertently entering IMC, or
  - while turning away from high ground and/or weather in an effort to maintain visual reference with the ground.
- 2.17 The helicopter had turned through 180 degrees from the direction of travel shown on the radar plots and was located 605 metres from the last radar plot.
- 2.18 The accident occurred at a high forward speed, as evidenced by the size of the trees dislodged and the fracturing of the main under floor beams of the helicopter.

- 2.19 The engine was producing power at impact as evidenced by the twist of the driveshaft. The engine examination revealed no similarities with previous known engine failures in this type of helicopter.
- 2.20 The VEMD did not record any engine limitations being exceeded during the accident flight, and the mobile phone video footage confirmed normal engine operating performance during departure.
- 2.21 Realisation that the helicopter was missing was significantly delayed because the SARTIME had been nominated for completion of the flight at Queenstown and the pilot had not activated the flight plan.
- 2.22 The pilot had limited first-hand experience in extended cross country flight and weather decision-making, having flown with instructors or safety pilots on most such flights since obtaining his PPL(H).

### **3. Conclusions**

- 3.1 The pilot was appropriately licensed to conduct the flight.
- 3.2 The helicopter had a valid Airworthiness Certificate.
- 3.3 The pilot departed from his home base having received a current weather area forecast which accurately forecast conditions to deteriorate along the chosen route of the flight. The pilot probably did not appreciate the significance of the forecast deteriorating weather.
- 3.4 The pilot did not obtain current weather information for the North Island aerodromes on route prior to departure.
- 3.5 The weather along some of the intended route of the flight was less than that required for VFR flight, and was forecast to be so.
- 3.6 The pilot appears not to have considered better weather options in the central and eastern areas of the North Island.
- 3.7 The pilot continued along a flight path towards rising ground, low cloud and decreasing visibility that left few alternatives to avoid flight into cloud and terrain in the last stage of the flight.
- 3.8 The pilot flew the helicopter towards rising ground and into forecast deteriorating weather, possibly resulting in inadvertent IMC and/or subsequent loss of control.
- 3.9 The pilot had limited first-hand experience in extended cross country flight and weather decision-making.
- 3.10 The accident was not survivable due to impact forces.
- 3.11 The 406 Mhz ELT was correctly installed in this helicopter in accordance with CAR's and manufacturer's instructions current at the time. The beacon activated, however transmissions were not received due to the damaged antenna.

#### 4. Safety actions

- 4.1 The CAA conducts an annual safety education programme which includes ‘AvKiwi’ safety seminars. These seminars are free to attend. During 2009, 29 seminars were held throughout New Zealand and a total of 1995 aviators attended.
- 4.2 The 2009 AvKiwi topic was “Weather to Fly”, which has relevance to this accident. The weather-related accident example used in the seminars was a Cessna 182 aircraft that crashed into the sea in August 2005, due in part to incomplete weather information obtained by the pilot and poor weather conditions.
- 4.3 The CAA agreed with a recommendation from the ZK-HTF Independent Review<sup>4</sup> carried out in 2006 to encourage the practice of submitting a SARTIME for each sector on multi-sector flights. A SARTIME nominated for Wanganui Aerodrome would have enabled earlier notification that the helicopter was overdue.
- 4.4 CAA is intending to introduce an instrument flying component (NPRM 09-02) in a pending revision to the PPL(H) training syllabus in line with current fixed wing training.
- 4.5 A CAA safety action (No 10A387) has been raised to undertake a review to determine whether the rules and training provided for helicopter pilots are adequate for planning cross country flights and when flying into deteriorating weather conditions.
- 4.6 A CAA safety action (No 10A400) has been raised to undertake a review to determine the reliability of ELT’s. This review should include, but not be limited to, installation, activation, crashworthiness and alternative technologies.

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<sup>4</sup> ZK-HTF Search and Rescue Operation Independent Review, commissioned by the New Zealand Search and Rescue Council, written by Paul Fitzharris, 28 April 2006.