

# ALPERAFTACCIDENT REPORT

**No. 92-019**

**Westland Wasp**

**NZ3094**

**Taupo Aerodrome**

**20 November 1992**

**Transport Accident Investigation Commission**

**Wellington - New Zealand**

**TRANSPORT ACCIDENT INVESTIGATION COMMISSION**

**AIRCRAFT ACCIDENT REPORT No. 92-019**

**Aircraft Type,  
and Registration:** Westland Wasp  
NZ3094

**Number and Type of Engines:** One Rolls Royce Nimbus

**Year of Manufacture:** 1964

**Date and Time:** 20 November 1992, 1016 NZDT

**Location:** Taupo Aerodrome

**Type of Flight:** Operational

**Persons on Board:** Crew: 2

**Injuries:** Crew: 2 Nil

**Nature of Damage:** Substantial

**Pilot in Command's Licence:** Royal Navy Helicopter Pilot

**Pilot in Command's Age:** 34 years

**Pilot in Command's Total  
Flying Experience:** 3369 hours

**Information Sources:** Joint Civil/Military  
Investigation

**Investigator in Charge:** Mr D V Zolov

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

**1. ABSTRACT**

1.1 This report relates to a loss of control due to the ingestion of a foreign object by the rotor of Westland Wasp NZ3094 at Taupo Aerodrome on 20 November 1992. The safety issues discussed in the report are the implementation of facilities and inspections at Taupo Airport to enhance the safety of helicopter operations, Certification of Aerodromes by the Civil Aviation Authority, CAA advice to aerodrome operators, the promulgation of information on legislation relating to civil aerodromes to military pilots and the inspection of civil aerodromes by military flight safety teams.

**2. NARRATIVE**

2.1 Two RNZAF "Wasp" helicopters called at Taupo Aerodrome to refuel. They descended to hover height over the runway as a pair, then one aircraft went to the control tower to get the key to the fuel pump, while the second hover-taxied to the fuelling point (see Diagram 1: Layout of Taupo Aerodrome).

2.2 The Wasp had castoring wheels which were locked before flight with the forward wheels parallel to the centreline, and the rear wheels toed-in at 45°. Prior to touchdown it was therefore necessary for the aircraft to come to a stationary hover, to ensure that there was no forward or sideways motion when the aircraft touched the ground. Stabilizing the hover took, typically, about three seconds. The aircraft usually hovered at 5 to 6 feet.

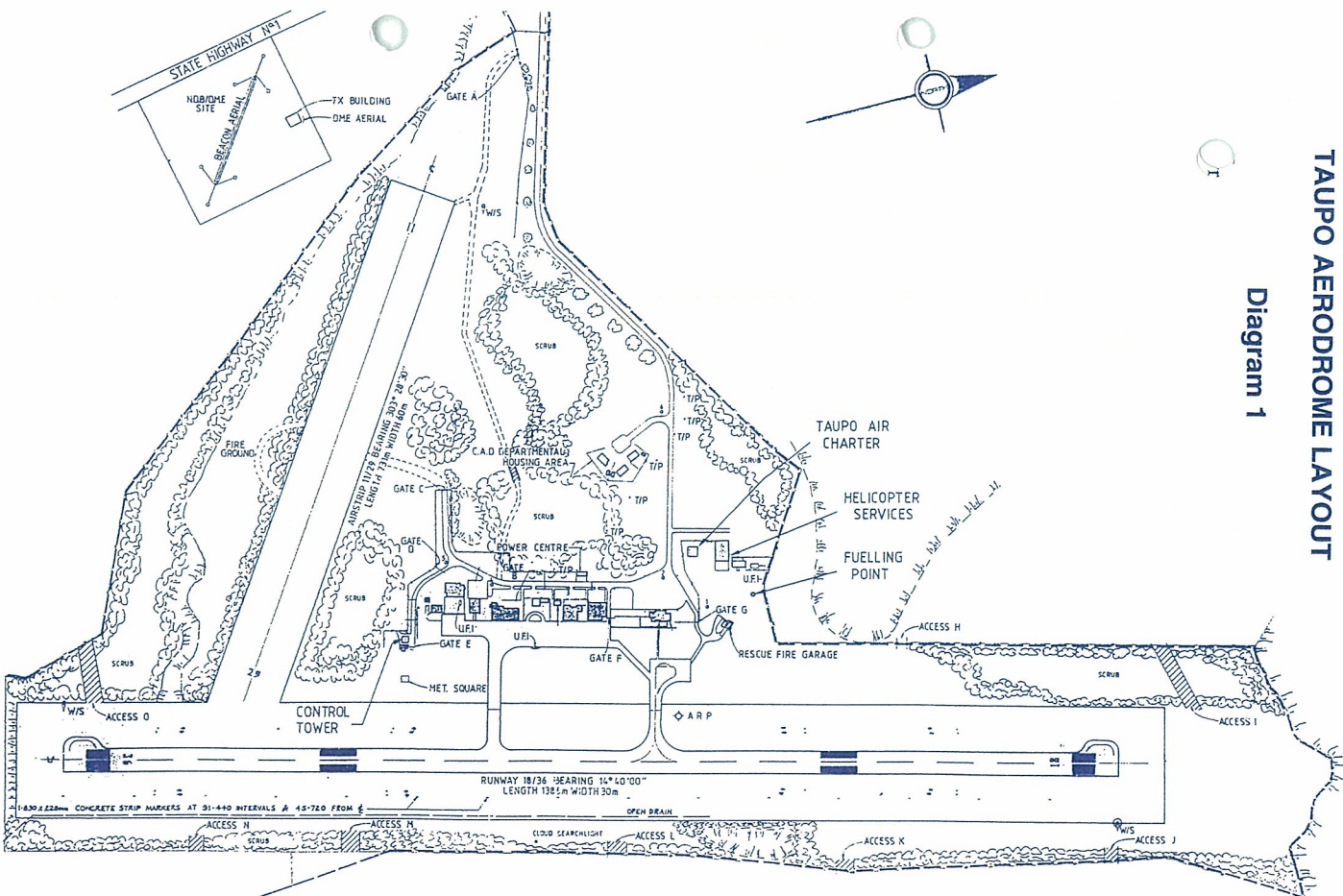
2.3 Adjacent to the fuelling point were two civil helicopters (a Bell 206 and a Hughes 369) which had landed there shortly beforehand and refuelled, and a large powerboat (about 11 m long) which had been put there ready to be towed away (see Diagram 2 : Accident Site). The Wasp commander was unconcerned about the powerboat as it was sufficiently large as to be unaffected by the Wasp's downwash, but he was concerned about the civil helicopters, because they were much lighter than the Wasp, and because it was necessary to ensure clearance between them and the Wasp's tail rotor. The second pilot who was the pilot flying (in the right hand seat) therefore brought the Wasp to the hover close to the powerboat, while the commander released his harness and ducked down so that he could see the tailrotor.

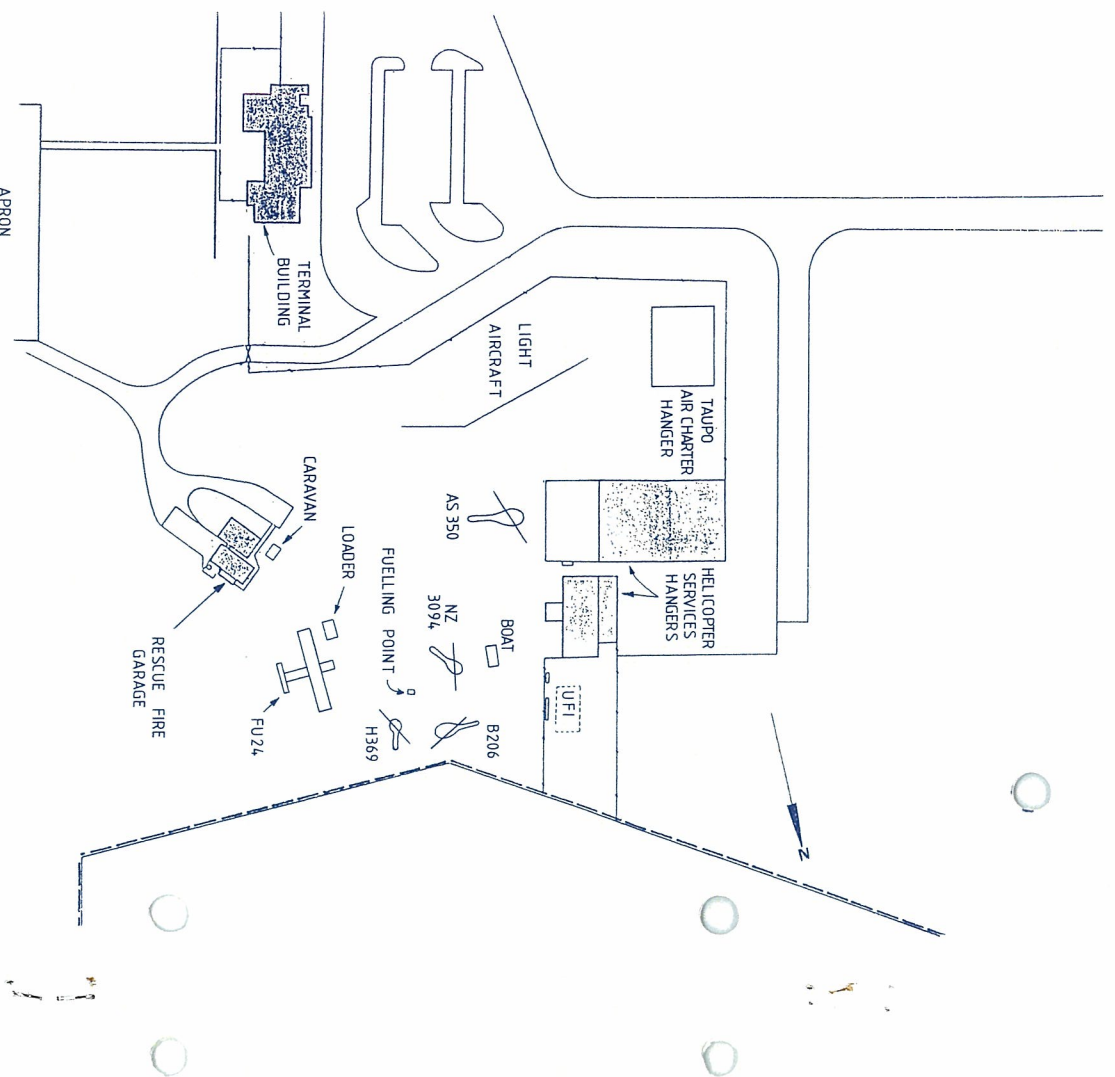
2.4 The Wasp pitched forward abruptly and struck the ground. The main gearbox casing fractured and the gearbox flailed through the cockpit at the height of the tops of the seatbacks. The commander's helmet was struck, but he was saved from injury by having previously released his harness and ducked down. Both pilots' flying suits were soaked with transmission oil but there was no flash fire and they were able to vacate the aircraft which came to rest on its wheels.

2.5 Bystanders observed a light nylon cover, which had been stowed between the boat and its trailer, extracted from beneath the boat and flung into the air by the Wasp's downwash. It was then sucked down into the main rotor disc from above. Marks on the fabric and one rotor blade showed that the blade had struck the cover. Damage to the masthead bump stops, and a main rotor blade strike on the top of the tailboom, were consistent with blade flailing. This in turn would have resulted in rotor disc imbalance, which was probably responsible for the main transmission casing fracture.

**TAUPO AERODROME LAYOUT**

**Diagram 1**





**HELICOPTER OPERATING AREA**  
(Diagrammatic)

**Diagram 2**

2.6 Parts of the Wasp were thrown a considerable distance, and a bystander close to the boat was fortunate to escape injury.

2.7 A fire broke out in the vicinity of the Wasp's engine, probably due to rupture of a fuel line during the accident sequence. The smoke was seen by a baggage handler who was also one of two volunteer firemen at Taupo Aerodrome. He took the fire vehicle (a 4 wheel drive van with 250 litres of aqueous film-forming foam) and, deciding that vital time would be lost in putting on his protective clothing, proceeded to fight the fire dressed only in his light working clothes. He extinguished the fire just as the foam was exhausted. If the crew had been trapped, his prompt action had the potential to save lives, and was commendable. However, it would be highly desirable for the protective clothing to be arranged so that it could be donned rapidly at any time, and for the firemen to be trained in doing so.

2.8 The fire vehicle was provided to deal with the possibility of a fire should there be an accident to a HS 748 aircraft operated on a scheduled service to Taupo. It met the requirements of the Manual of Aerodrome Standards in force at the time of the accident. The rationale was that the amount of extinguishing agent would be sufficient to protect passengers while they made their escape after an accident.

2.9 The fuelling point at which the Wasp was about to land was commonly called "the Air Force pump" but was in fact a common-user outlet. Originally the fuelling point was adjacent to the helicopter hangars (Diagram 2) but some years ago it was moved to its present position. When this was done, it was in the middle of an open space which was, de facto, the helicopter operating area, though it was never officially designated as such.

2.10 A number of developments combined to produce considerable clutter in the area.

- (a) About seven years previously a lease of land adjacent to the helicopter hangars was granted to a firm flying aeroplanes (ie. fixed-wing aircraft) on charter. This firm, which previously occupied rented space beside the apron (see Diagram 1) built new accommodation on its leasehold land, and subsequently parked its aircraft in the area shown in Diagram 2.
- (b) In 1990, an agricultural operator began using the area beside the former Rescue Fire Service Station to park his aeroplane and loading vehicle; his caravan was also parked behind the RFS Station. The aeroplane blocked one possible hover-taxi route from the aerodrome to the fuelling point.
- (c) At the time of the accident the resident helicopter operator operated two AS 350 helicopters, which were parked in front of his hangar.
- (d) The resident operator had a need to bring a variety of vehicles (trucks, cranes, loaders) into the area to facilitate his operations.
- (e) Helicopter traffic around Taupo had built up progressively, and was busy during the hunting season.

2.11 Aeroplanes were liable to damage from the downwash of helicopters, especially when the latter were hover-taxiing. The helicopters therefore gave the aeroplanes as wide a berth as practicable, the effect being that the aeroplanes obstructed the area to a greater extent than was apparent from their size alone.

2.12 Some of the local aeroplane operators were not aware of the factors which could present a hazard to helicopters. For example, it was one operator's practice to place aircraft covers on the boundary fence. This practice did not concern the local helicopter operator: being aware of the hazard he avoided it. He obviated the downwash problem by flying direct to his touchdown point rather than hover-taxiing.

2.13 The boat which was near to the fuelling point had been stored in a hangar for some time. On the day of the accident it was to be towed away. The trailer had to go through the gate in the security fence adjacent to the terminal building, so it was positioned conveniently for the towing vehicle, but clear of the apron taxiway and gates. The helicopter operator's personnel were accustomed to having a variety of vehicles in the vicinity, so they did not consider the boat on its trailer was a hazard.

2.14 The helicopter operator was called on to provide assistance in an emergency, so the removal of the boat was delayed.

2.15 A helicopter pilot, who was aware of the imminent arrival of two civil helicopters, thought that the boat's cover might present a hazard. It was made of lightweight nylon, and fitted over the entire topside of the powerboat, being held in place by a bungy stitched around its edge. He therefore removed the cover and stowed it under the boat. The trailer had covered sides and bottom, so this seemed to him a secure stowage.

2.16 The civil helicopters flew in from the north and landed in the positions shown on Diagram 2. They refuelled, and their pilots went to the nearby terminal building for refreshment.

2.17 While civil helicopters frequently flew directly to the ground, this technique was not feasible with the Wasp (see paragraph 2.2). The difference in handling techniques probably accounted for the civil helicopters landing without disturbing the boat cover, while the Wasp's downwash extracted it. Flying directly to the ground minimised the downwash in the vicinity of the touchdown point, and this was one reason the technique was adopted by civil operators, who operated regularly in an environment where foreign objects might be present. By contrast, the technique of coming to a high hover was likely to set up recirculating flow, as occurred during the Wasp's arrival.

2.18 The downwash from the Wasp would in any event be greater than that from, for example, a Bell 206. The Wasp was not only the heavier aircraft, but had a smaller rotor disc: the higher disc loading increased the downwash velocity.

2.19 No aspect of the operation was regarded by the participants as being out of the ordinary and all used their best endeavours to make it safe. The question thus arose as to how unsafe circumstances came about. The essence of the situation was that, over the years, the area around the common user fuelling point had become cluttered to the extent that it was hazardous for visiting pilots.

2.20 The Taupo Airport Authority had prepared an Operations and Certification Manual which was in force at the date of the accident (although it was not a legal requirement to have such a manual until 6 January 1993). The Manual made comprehensive provisions for the safe operation of the aerodrome, but although it referred to "aircraft" throughout (ie aeroplanes and helicopters)

it was predicated on the operation of aeroplanes. Thus while regular inspections of the "manoeuvring area" were prescribed, these inspections were largely limited to the taxiways and runways, and associated lighting. There was no recognition that the traditional helicopter operating area was also a part of the manoeuvring area, which should have been examined for potential hazards to helicopter operations.

2.21 There was no recognition, in the long-term plan, of the desirability of segregating helicopter and aeroplane operations. Prior to the management of the aerodrome by the Taupo Airport Authority a lease was granted to an aeroplane operator resulting in routine fixed-wing operations within the traditional helicopter operating area, and the Authority found it impracticable to break this lease. There were no designated helicopter areas: not only would such a designation have been a useful guide to visiting pilots, but also it could have alerted the Civil Aviation Authority, on routine visits, to examine the area for potential hazards to helicopters.

2.22 The presence of the agricultural operator was due to deterioration of the development of sites to the south of the Tower, which in turn was due to a falling demand in recent years. Again, no consideration had been given to possible adverse effects on helicopter operations when the agricultural operation was sited in the vicinity of the fuelling point.

2.23 Helicopter operations had increased from being a small proportion of the movements at Taupo Aerodrome, to being a significant part. This gradual change had not been taken into account sufficiently in the long-term planning and day-to-day inspection.

2.24 It would have been difficult for the Authority to take immediate action to restore the northern area as a segregated helicopter operating area. For the local operator this would, in any case, have been unnecessary. However, it was essential that visiting helicopters be able to land and refuel in an area less cluttered and less liable to potential foreign object hazards. The fuel company concerned advised that it would be feasible to re-locate the common-user fuelling point further east, and it was recommended to the airport management that this be done. In combination with removal of the old Rescue Fire Service Station from the manoeuvring area, this should result in an open environment for helicopter refuelling.

2.25 The RNZAF did not send Flight Safety teams to examine aerodromes from which it intended to operate. It relied instead on licensed aerodromes being inspected by the aerodrome management and therefore being free from avoidable hazards. This accident demonstrated that such an assumption could be invalid. The advisability of any operator making their own inspection was brought to the attention of the President of the RNZAF Court of Inquiry into this accident.

2.26 It was desirable that helicopter and aeroplane operations be segregated at any aerodrome, to the greatest extent feasible. Helicopter and aeroplane operations had incompatibilities both in flight and on the ground, and the ordinary operations of the one could prove a hazard to the other.

2.27 It was desirable, at any aerodrome with a significant proportion of helicopter operations, for:

- (a) Designated helicopter operating areas to be promulgated.

- (b) Safety inspections to take account of hazards to helicopters as well as to fixed-wing operations.

Recommendations to this effect were made to the Director of Civil Aviation.

### 3. FINDINGS

- 3.1 The helicopter was properly maintained.
- 3.2 The helicopter crew was properly trained and authorised to make the flight.
- 3.3 The helicopter was operated in accordance with standard operating procedures.
- 3.4 A boat cover stowed beneath a boat which was on the manoeuvring area was entrained into the helicopter's main rotor, while the helicopter was hovering prior to landing.
- 3.5 The resulting rotor imbalance caused the main transmission to fail and the helicopter struck the ground in a nose-down attitude.
- 3.6 The Taupo Aerodrome Rescue Fire Service was off watch at the time of the accident but attended promptly and extinguished the ensuing fire.
- 3.7 The Taupo Aerodrome Rescue Fire Service was manned and equipped to the requirements of the Aerodrome Standards Manual.
- 3.8 No-one was injured but the helicopter was substantially damaged.
- 3.9 The boat, on its trailer, was positioned on the manoeuvring area in readiness for towing off the aerodrome.
- 3.10 A variety of vehicles on this part of the manoeuvring area was commonplace at Taupo.
- 3.11 The boat cover had been stowed beneath the boat because the cover had been perceived to be a potential hazard in its previous position covering the boat.
- 3.12 The helicopter was preparing to land at a common-user fuelling point, at the time of the accident.
- 3.13 There had been encroachments in the vicinity of the fuelling point, over a considerable period, and these resulted in potential hazards to visiting helicopters.
- 3.14 Aerodrome planning and inspections had been directed towards aeroplane rather than helicopter operations.

### 4. SAFETY RECOMMENDATIONS

- 4.1 It was recommended to the Taupo Airport Authority that they:
- (a) Modify their Operations and Certification Manual to reflect helicopter operations specifically.
  - (b) Promulgate designated helicopter operating areas.

- (c) Consider moving the fuelling point for visiting helicopters to a less cluttered location.

- (d) Consider removing the former Rescue Fire Service building.

- (e) Include the inspection of helicopter operating areas in the normal inspection of the manoeuvring area.

4.2 In response to the above recommendations the Taupo Airport Manager advised:

- (a) The Taupo Aerodrome Exposition [would be] amended to reflect helicopter operations,

- (b) The promulgation of designated helicopter operating areas would be studied after completing 4.2(c) and 4.2(d) below,

- (c) The refuelling point would be relocated,

- (d) The target date for removing the former Rescue Fire Service building was mid-April 1993,

- (e) Helicopter operating areas were subsequently involved in [aerodrome] inspections.

4.3 It was recommended to the Director of Civil Aviation that:

In accepting the expositions required of aerodrome operators whose aerodromes were being certificated under Part 139, the Authority:

- (a) Ensure that these took account of helicopter operations, whenever these formed a significant part of the total traffic.

- (b) Ensure that helicopter operating areas were designated, when helicopter operations formed a significant part of the total traffic.

- (c) Ensure that the expositions dealt with the factors to be considered in long-term planning.

The Authority issue an Advisory Circular to bring to the attention of aerodrome operators, matters pertaining to helicopter operations which they ought to consider in preparing expositions, and

Safety inspections performed by the Authority should take account of hazards to helicopters as well as to fixed-wing aircraft.

4.4 It was recommended to the Chief of Defence Staff that he:

Promulgate to aircraft commanders the ramifications of legislation pertaining to civil aerodromes, and

Consider sending Flight Safety teams to civil aerodromes from which he intended to operate.

24 June 1993

M F Dunphy  
Chief Commissioner

**GLOSSARY OF ABBREVIATIONS USED IN THIS REPORT**

M	Metres
NZDT	New Zealand Daylight Time
RFS	Rescue Fire Service
RNZAF	Royal New Zealand Air Force