

Interim Report AO-2018-009: MDHI (Hughes) 369D,
registration ZK-HOJ, Wanaka, 18 October 2018

The Transport Accident Investigation Commission is an independent Crown entity established to determine the circumstances and causes of accidents and incidents with a view to avoiding similar occurrences in the future. Accordingly it is inappropriate that reports should be used to assign fault or blame or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

The Commission may make recommendations to improve transport safety. The cost of implementing any recommendation must always be balanced against its benefits. Such analysis is a matter for the regulator and the industry.

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Interim Report

Aviation inquiry AO-2018-009
MDHI (Hughes) 369D, registration ZK-HOJ
Wanaka
18 October 2018

Approved for publication: December 2018

Transport Accident Investigation Commission

About the Transport Accident Investigation Commission

The Transport Accident Investigation Commission (Commission) is a standing commission of inquiry and an independent Crown entity responsible for inquiring into maritime, aviation and rail accidents and incidents for New Zealand, and co-ordinating and co-operating with other accident investigation organisations overseas. The principal purpose of its inquiries is to determine the circumstances and causes of the occurrences with a view to avoiding similar occurrences in the future. Its purpose is not to ascribe blame to any person or agency or to pursue (or to assist an agency to pursue) criminal, civil or regulatory action against a person or agency. The Commission carries out its purpose by informing members of the transport sector and the public, both domestically and internationally, of the lessons that can be learnt from transport accidents and incidents.

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Important notes

Nature of this report

The Commission believes that this interim report is necessary or appropriate in the interests of transport safety. The interim report presents the facts and circumstances established up to this point in the Commission's inquiry, and contains no analysis or findings. Any extrapolation of the information given in this report would be speculation.

Final report may include different information

The Commission intends completing a final report on the accident after it completes its inquiry. That report will contain an analysis of the facts of the accident, findings and recommendations. The information contained in the Commission's final report may differ from the information contained in this interim report.

Citations and referencing

Information derived from interviews during the Commission's inquiry into the occurrence is not formally cited in this interim report. Documents that would normally be accessible to industry participants only and not discoverable under the Official Information Act 1980 have been referenced as footnotes only. Other documents referred to during the Commission's inquiry that are publicly available are cited.

Photographs, diagrams, pictures

Unless otherwise specified, photographs, diagrams and pictures included in this interim report are provided by, and owned by, the Commission.

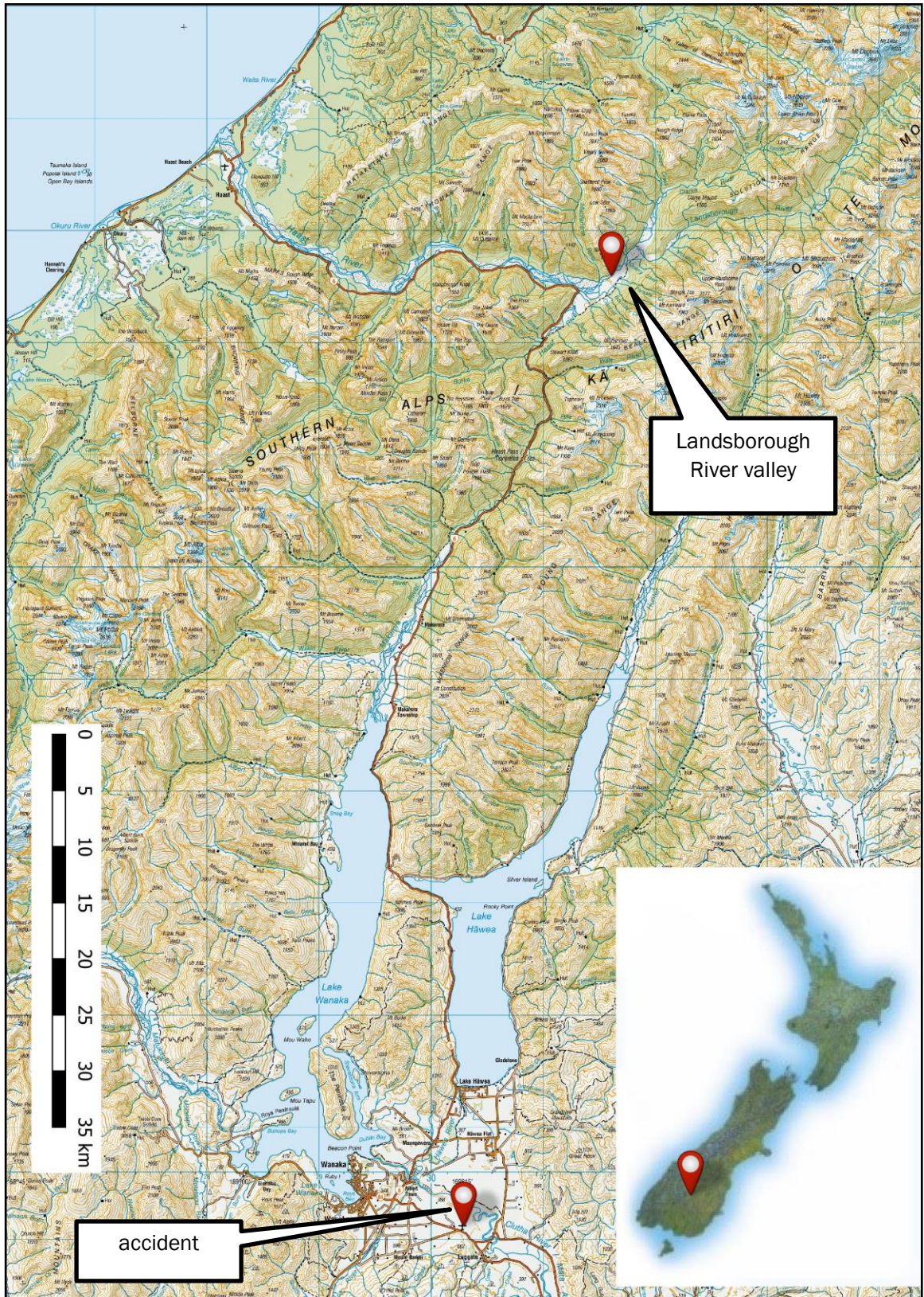
Verbal probability expressions

The expressions listed in the following table are used in this report to describe the degree of probability (or likelihood) that an event happened or a condition existed in support of a hypothesis.

Terminology (Adopted from the Intergovernmental Panel on Climate Change)	Likelihood of the occurrence/outcome	Equivalent terms
Virtually certain	> 99% probability of occurrence	Almost certain
Very likely	> 90% probability	Highly likely, very probable
Likely	> 66% probability	Probable
About as likely as not	33% to 66% probability	More or less likely
Unlikely	< 33% probability	Improbable
Very unlikely	< 10% probability	Highly unlikely
Exceptionally unlikely	< 1% probability	



The helicopter
(Photograph courtesy Airwork)



Source: mapsof.net

Location of accident

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Abbreviations

CAA	Civil Aviation Authority of New Zealand
Commission	Transport Accident Investigation Commission
GPS	global positioning system
m	metre(s)
MDHI	MD Helicopters Incorporated

Data summary

Aircraft particulars

Aircraft registration:	ZK-HOJ
Type and serial number:	MD Helicopters Incorporated (Hughes) 369D, #490491D
Number and type of engines:	one, Rolls-Royce series 250 C20B turbine, #CAE830589
Year of manufacture:	1979
Operator:	The Alpine Group Limited, trading as Alpine Helicopters
Type of flight:	commercial transport operation
Persons on board:	three

Personnel data

Pilot's licence:	commercial pilot licence (helicopter)
Pilot's total flying experience:	5,368.6 hours helicopter and 314.5 hours aeroplane

Date and time 18 October 2018 at 1055¹

Location Wanaka, two kilometres northeast of the aerodrome
latitude: 44° 42' 30.09"S
longitude: 169° 15' 50.37"E

Injuries three fatal

Damage helicopter destroyed

¹ Times are in New Zealand Daylight Time (co-ordinated universal time plus 13 hours) and expressed in the 24-hour format.

1. Conduct of the inquiry

- 1.1. The Civil Aviation Authority of New Zealand (CAA) notified the Transport Accident Investigation Commission (the Commission) of the accident soon after it occurred on 18 October 2018. The Commission opened an inquiry in accordance with section 13(1)b of the Transport Accident Investigation Commission Act 1990 and appointed an investigator in charge.
- 1.2. The United States National Transportation Safety Board was notified and appointed a non-travelling Accredited Representative in accordance with Annex 13 to the Convention on International Civil Aviation. The Accredited Representative appointed MD Helicopters Incorporated (MDHI) and Rolls-Royce as their advisors.
- 1.3. A team of three investigators and a communications advisor travelled to Wanaka that day. New Zealand Police secured the accident site and managed site activities in co-ordination with the investigator in charge.
- 1.4. A joint briefing was held at the Wanaka police station at 0800 on 19 October 2018 to co-ordinate site management and wreckage recovery. New Zealand Police provided resources to assist the Commission's investigators in locating and mapping debris.
- 1.5. The wreckage was removed from the site on 20 October 2018, but some components were known to be missing. A further aerial and ground search located several items. These items were handed to the Commission's investigators.
- 1.6. In order to ensure that any other items found were made available to the investigation team, the Commission issued an Evidence Protection Order on 1 November 2018. This was passed directly to the operator, the local police station and the local Department of Conservation office. These parties assisted the Commission in distributing the order to aerodrome users, residents near the crash site and users of the riverside tracks. The order was also published by the local press.
- 1.7. The wreckage was transported to the Commission's technical facility in Wellington for further detailed examination. Investigators remained in the area until 24 October 2018 while they collected evidence and conducted interviews.
- 1.8. The wreckage was laid out in the technical facility and examined during the following week.
- 1.9. On 21 November 2018 the Commission approved a draft of the interim report to be circulated to seven interested persons for comment.
- 1.10. Four submissions were received. The Commission considered the submissions, and changes as a result of those submissions have been included in the interim report.
- 1.11. On 12 December 2018 the Commission approved the interim report for publication.

2. Factual information

2.1. Narrative

- 2.1.1. At 1053 on 18 October 2018, an MDHI (Hughes) 369D helicopter registered ZK-HOJ (the helicopter) departed from Wanaka Aerodrome with a pilot and two other occupants on board. The helicopter was to be used for an airborne wildlife culling operation in the Landsborough River valley area. The flight was a positioning² flight to a remote staging point.
- 2.1.2. The pilot was in the front left seat and the two other occupants sat in the front right and rear right seats.
- 2.1.3. The helicopter did not have external load-carrying containers (pods), so all the equipment required for the day was loaded within the cabin and all four doors were fitted. All the front centre and front right seat cushions and the two rear seat back cushions had been removed in preparation for the culling operation.
- 2.1.4. The major items packed within the cabin were: two 20-litre plastic fuel containers filled with Jet A-1 fuel; four rifles; four boxes of ammunition; an ammunition box of tools; an insulated food container; a plastic storage box with loose items; and clothing, including two pairs of thermal overalls (one pair of black, padded, bib over-trousers and one pair of red, padded overalls). Some of the ammunition had been used to preload plastic magazines for the rifles and these were carried in the helicopter.
- 2.1.5. The pilot made a broadcast radio call to local traffic, advising that they were lifting off from the heli-hold area and intending to take off on runway 11, then vacate from the downwind leg towards Hawea. The Hughes helicopter followed the runway centreline until about 300 feet (91 metres [m]) above the ground. The pilot called the pilot of a Robinson helicopter that was in the circuit to advise it of their intention to conduct an early turnout and remain clear on the left-hand side of the Robinson helicopter. The pilot of the Robinson helicopter acknowledged the call. The Hughes helicopter then turned left and headed out on track at about 500 feet (152 m) above the aerodrome (see Appendix 1).
- 2.1.6. Less than one minute later the helicopter was seen by several witnesses at the aerodrome to be conducting what they considered to be unusual manoeuvres. Several witnesses recalled seeing the helicopter descending near vertically, with items trailing behind it, and the helicopter rotating at various angles. These witnesses lost sight of the helicopter as it descended below the escarpment to the north of the aerodrome.
- 2.1.7. Two experienced instructors flying the Robinson helicopter in the circuit pattern had been watching the helicopter to maintain their separation. They saw items coming out of the helicopter towards the tail rotor. The instructors described the helicopter starting to rotate and descend. Moments later they saw the tail section separate from the helicopter in flight. They saw the helicopter continue to descend with both the main rotor blades and the fuselage rotating. One of the witnesses saw what appeared to be a chilly bin³ falling down. They saw the helicopter rotating in an upright attitude until it struck the ground. The helicopter caught fire after impact.
- 2.1.8. The accident occurred in daylight at 1055. The accident site was at 272 m (892 feet) above mean sea level and 65 m (213 feet) below the level of the aerodrome.
- 2.1.9. The pilot and the two other occupants died in the accident.

² A flight to take the helicopter to the location where the intended wildlife culling operation was to begin.

³ An insulated container of rugged plastic material intended for keeping food cool. The unit from this accident had an approximately 25-litre volume.

2.2. Damage to the aircraft

- 2.2.1. The post-impact fire consumed most of the main helicopter wreckage.
- 2.2.2. Aircraft parts and items that had been in the cabin were scattered over a distance of about 500 m from the main wreckage (see Appendix 2).
- 2.2.3. The first items discovered in the wreckage trail of the helicopter included the pair of black, padded, bib over-trousers and the pair of red, padded overalls that had been inside of the cabin. These were found close to the separated tail section, along with two pieces of the tail rotor blades and the tip of one of the main rotor blades.
- 2.2.4. There were paint transfer marks on the inside of one leg of the black over-trousers that matched the colour and profile of the tail rotor blades. Also, the paint on one of the tail rotor blades was marked with impressions of a zip and dome connector matching those on the over-trousers. These markings are a strong indicator that the over-trousers had come out of the helicopter and become entangled with the tail rotor at some point (see Figure 1).



Figure 1
Tail rotor impact impressions

- 2.2.5. A large section of the tail rotor gearbox, still attached to one complete tail rotor blade, was found approximately 100 m forward of the main wreckage, along with a 450-millimetre section of a main rotor blade tip. Small fragments of the tail rotor gearbox were found between the tail section and the main wreckage. Impact marks on the tail rotor blade and tail rotor gearbox matched the profile of the leading edge of the main rotor blade.

- 2.2.6. The tail section had separated from the tail boom near to a point where a main rotor blade had struck the tail boom.



Figure 2
Photograph of separated tail section

- 2.2.7. Heavy items that had been stowed in the cabin were found embedded in the ground away from the main wreckage.
- 2.2.8. Other items, including personal items, a cell phone, three GPS (global positioning system) units, rope strops, fragments of Perspex, fragments of the tail boom, the complete tail rotor drive shaft and the left rear door, were spread over several hundred metres to the left of the flight track. Some paper debris was found across the river.

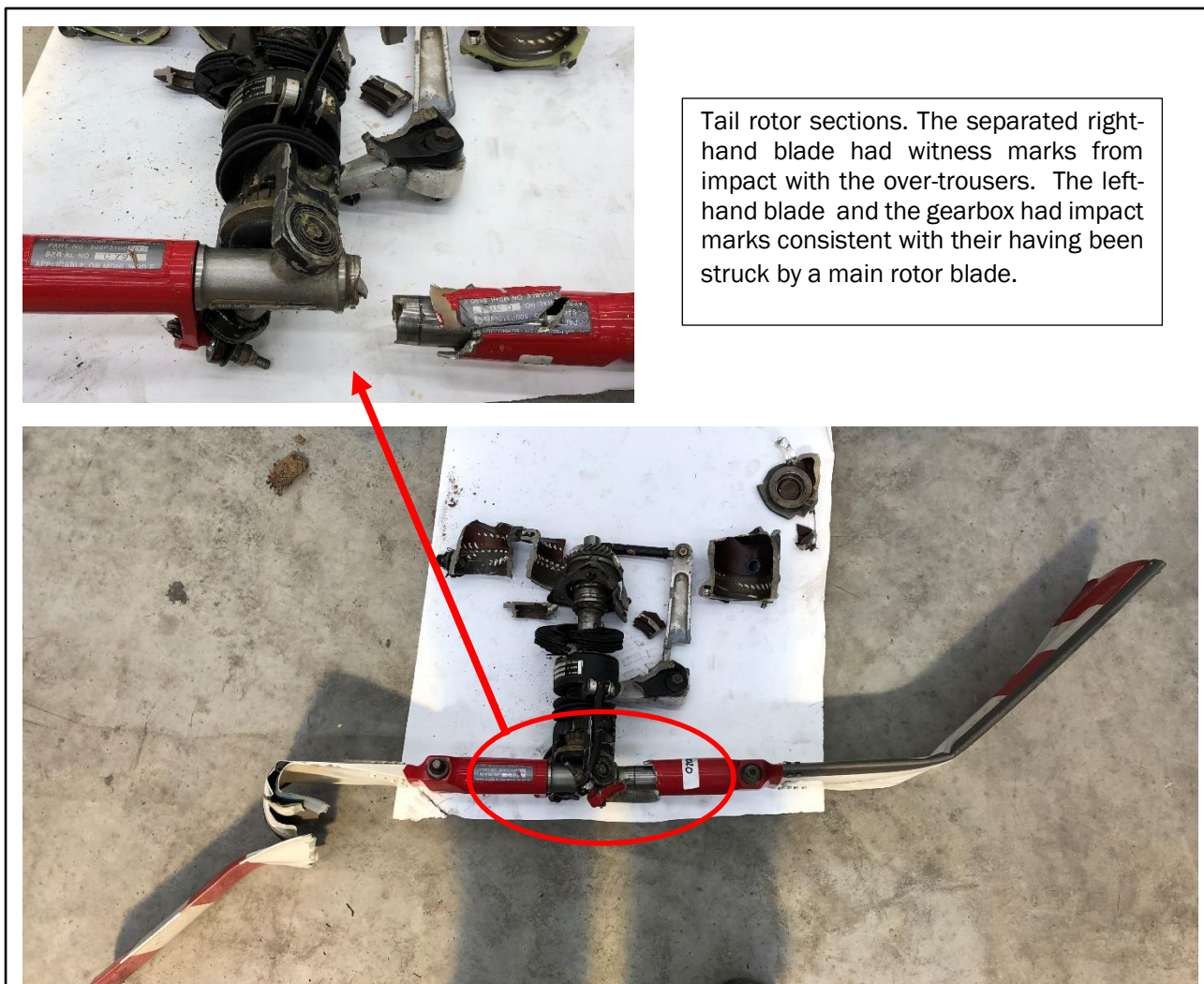


Figure 3
Photographs showing tail rotor damage

2.2.9. The helicopter had struck the ground in a steep descent, with a slight nose-down and left-bank attitude. The left landing gear skid was embedded in the ground under the main fuselage. The depression in the ground after the wreckage had been removed was approximately 600 millimetres deep.

2.3. Aircraft

2.3.1. The helicopter type had a five-bladed, fully articulated main rotor. The turbine engine provided 313 kilowatts (420 shaft horsepower) and it had a cargo-carrying capacity of 590 kilograms (1,300 pounds). The helicopter was configured to carry five persons, with three in the front and two in the back.

2.3.2. The helicopter was on a short-term lease to the operator that had commenced on 31 August 2018. The helicopter had been included in the operator's Operations Specification, which had been approved by the CAA on 25 September 2018.

2.3.3. The helicopter had a non-terminating certificate of airworthiness and it had accrued 19,497 hours' total flight time. There were 33 hours remaining before the next 100-hour maintenance inspection was due.

- 2.3.4. Three incidents in which one of the helicopter doors had opened in flight were known to have occurred in the month prior to the accident. None of these occurrences was notified as a defect or in-flight incident through the operator's incident reporting system. It is important for an effective safety management system that such incidents are reported and addressed.
- 2.3.5. The helicopter was fitted with an early door-latch style with a multi-point, standard latch tongue-and-strike-plate system. The door-latch type was changed to a different latching mechanism⁴ in newer models of the MD (Hughes) 500 series. The cabin door windows were available in either flat or 'bubble' style. The helicopter had the bubble-style windows on the rear doors.

2.4. Personnel information

- 2.4.1. The pilot was the operator's maintenance controller and chief executive. The pilot had a current class 1 medical certificate, a commercial helicopter pilot licence and approximately 5,700 hours' total flying experience. Most of that experience had been in helicopters, which included ratings on Robinson R22 and R44 helicopter types, Airbus Helicopters AS350 and EC120, the Hiller UH-12E and the MDHI (Hughes) 369.
- 2.4.2. The two occupants besides the pilot were both experienced with helicopters, shooting from a helicopter and working with the operator.

2.5. Meteorological information

- 2.5.1. The weather was fine with a clear sky and a light wind from the east. Weather conditions were not considered to be a factor in this accident.

2.6. Aerodrome information

- 2.6.1. Wanaka Aerodrome is non-certificated and has no air traffic service. The aerodrome elevation is 1,142 feet (348 m) above mean sea level. Transmissions on the Wanaka Aerodrome radio frequencies are recorded. The aerodrome operator has closed-circuit television cameras to monitor general movements in the area.

2.7. Recorded data

- 2.7.1. There was no requirement for a flight data recording device to be fitted to the helicopter, and none was fitted.
- 2.7.2. The pilot's cell phone was found near the main wreckage and was fully operational. A GPS tracking application installed in the phone had recorded the flight track and this data was extracted and used to construct the flight path shown in Appendix 1.
- 2.7.3. The helicopter had a Garmin 296 GPS mounted on the centre console. This had been ejected from the helicopter and was found about 100 m from the wreckage. The unit was operational, and the flight track data was able to be extracted and used to construct the flight path shown in Appendix 1.
- 2.7.4. A Garmin 64s handheld GPS device belonging to one of the occupants had been used on a previous flight earlier that week but had not been set to record the accident flight. The track data for the previous flight was extracted from the current track in the GPS.
- 2.7.5. An emergency locator transmitter was fitted to the helicopter, but it was destroyed in the fire. No signal from it was received by the satellite network.
- 2.7.6. A flight tracking device was fitted to the helicopter. The track record matched the information already obtained from the cell phone and the GPS unit.

⁴ Hook-latch and pin strike type.

3. Further lines of inquiry

3.1. The investigation is continuing. Further lines of inquiry include, but are not limited to, the following topics:

- evidence suggests that the left rear door of the helicopter opened and separated from the helicopter in flight. This line of inquiry will explore:
 - the door latching system
 - the door maintenance
 - if there have been other similar events with the helicopter type
 - if there are any relevant differences between the bubble and flat windows in respect of their aerodynamic behaviour or security
- the helicopter weight and balance
- the helicopter engine condition and performance
- the helicopter maintenance records.

4. Safety actions

4.1. Civil Aviation Authority

- 4.1.1. The CAA published a safety message on 14 November 2018 titled 'Loose items can be fatal' and sent the same message directly to all affected participants.
- 4.1.2. The safety message was placed on the CAA website, together with a link to the Robinson Helicopter Company's Safety Notice Video SN30 'Loose Objects Can Be Fatal'.
- 4.1.3. Although not related to this accident, the independently issued safety notice from Robinson Helicopter Company was an update of an existing Robinson safety notice and covered the same subject as the CAA safety message.

5. Recommendations

General

- 5.1. The Commission may issue, or give notice of, recommendations to any person or organisation that it considers the most appropriate to address the identified safety issues, depending on whether these safety issues are applicable to a single operator only or to the wider transport sector. In this case two safety issues have been identified early in the investigation. The CAA has taken action to address one of these safety issues (see section 4) and a safety recommendation has been issued to the CAA to address the remaining safety issue.
- 5.2. In the interests of transport safety, it is important that this recommendation is implemented without delay to help prevent similar accidents or incidents occurring in the future.

To the Civil Aviation Authority

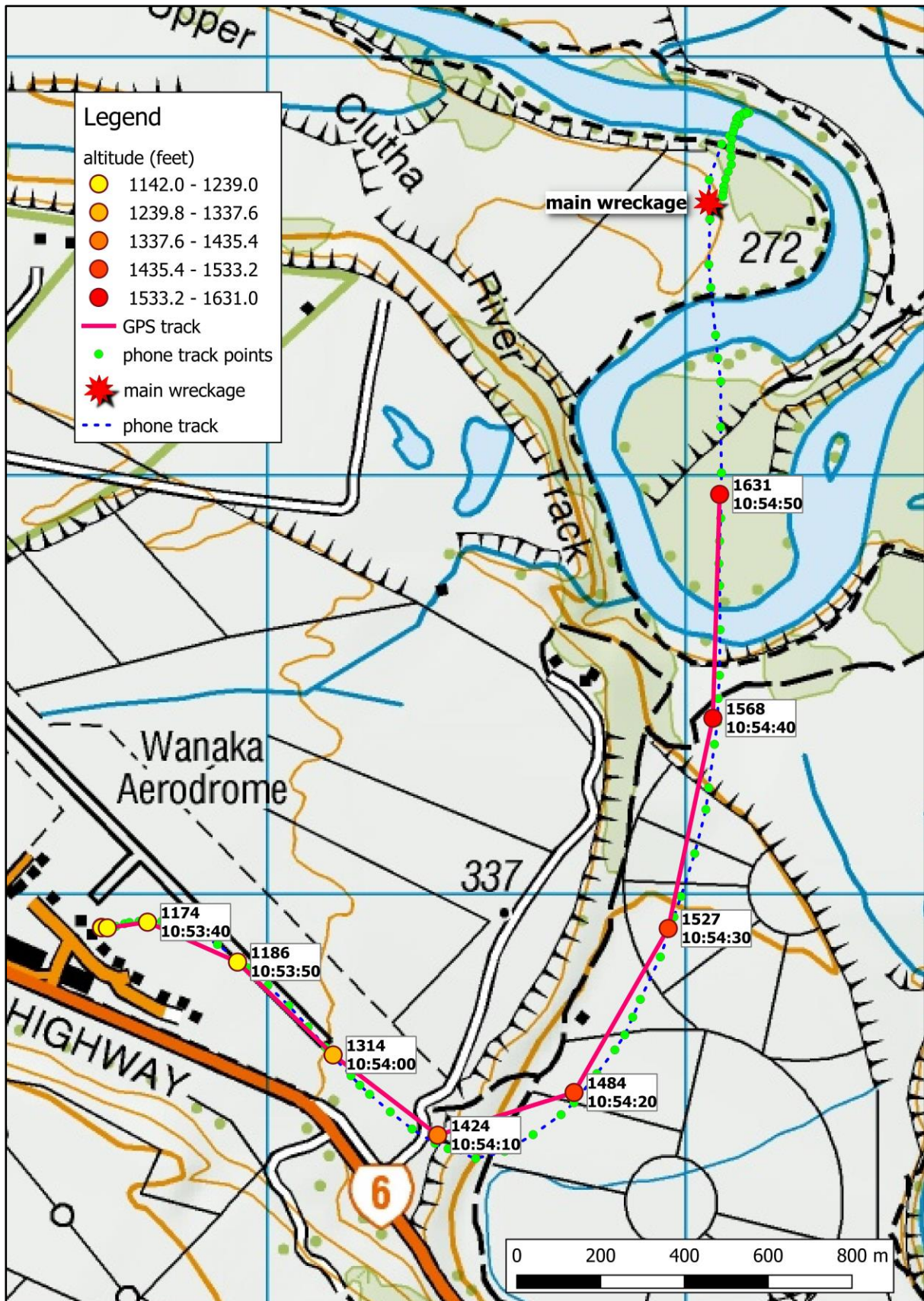
- 5.3. There have been three recent incidents involving the doors on this helicopter opening in flight that were not notified. It is important that incidents such as these are notified and investigated, and actions taken to prevent further accidents and incidents.

On 12 December 2018 the Commission recommended that the Director of Civil Aviation urgently remind aviation participants of the importance of incident notification in accordance with Part 12 of the Civil Aviation Rules. (035/18)

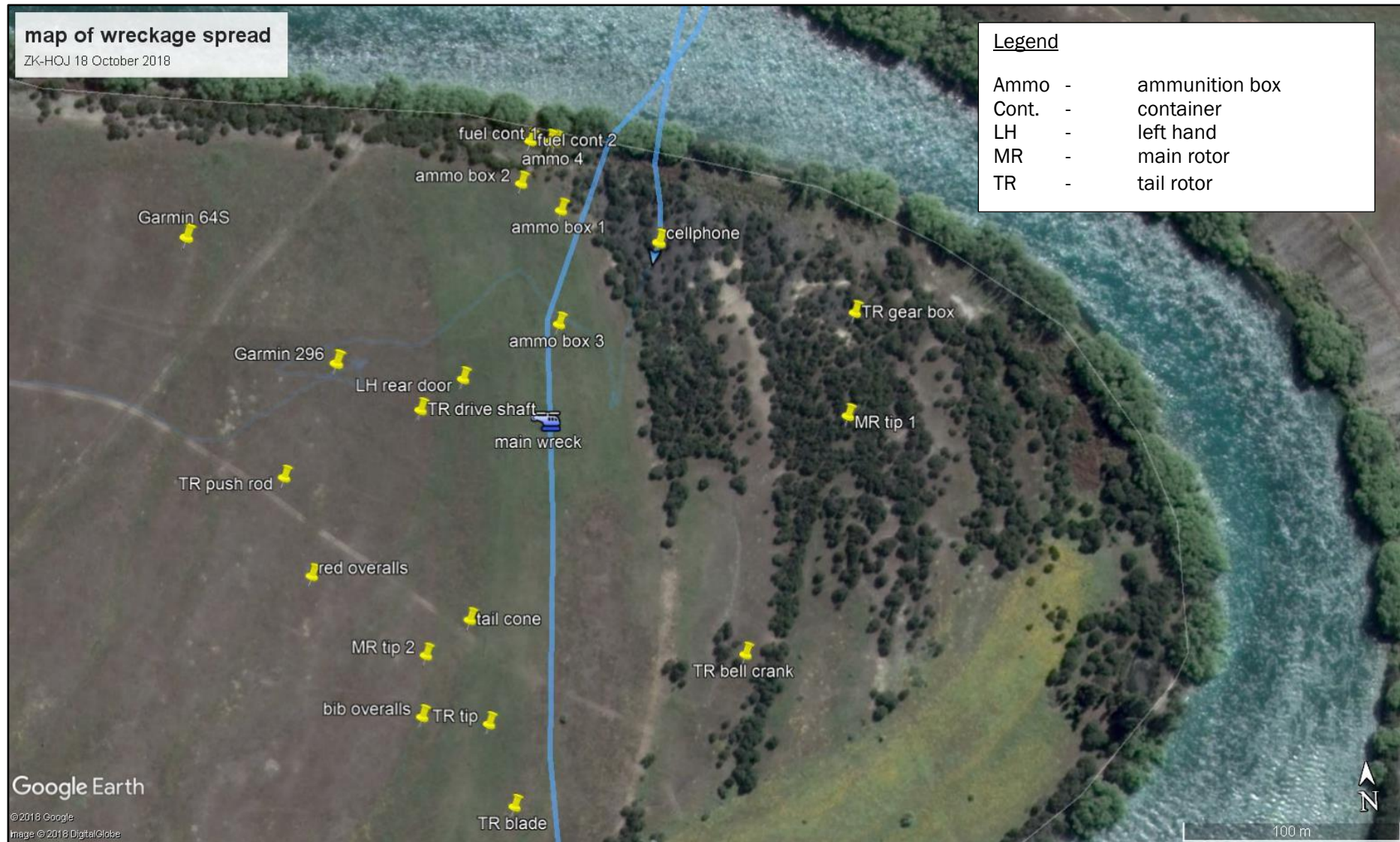
On 12 December 2018, the Civil Aviation Authority replied:

The Director accepts the final recommendation 035/18. The CAA will implement the recommendation by end of January 2019. The Commission will be advised on completion.

Appendix 1: Flight track



Appendix 2: Map of wreckage

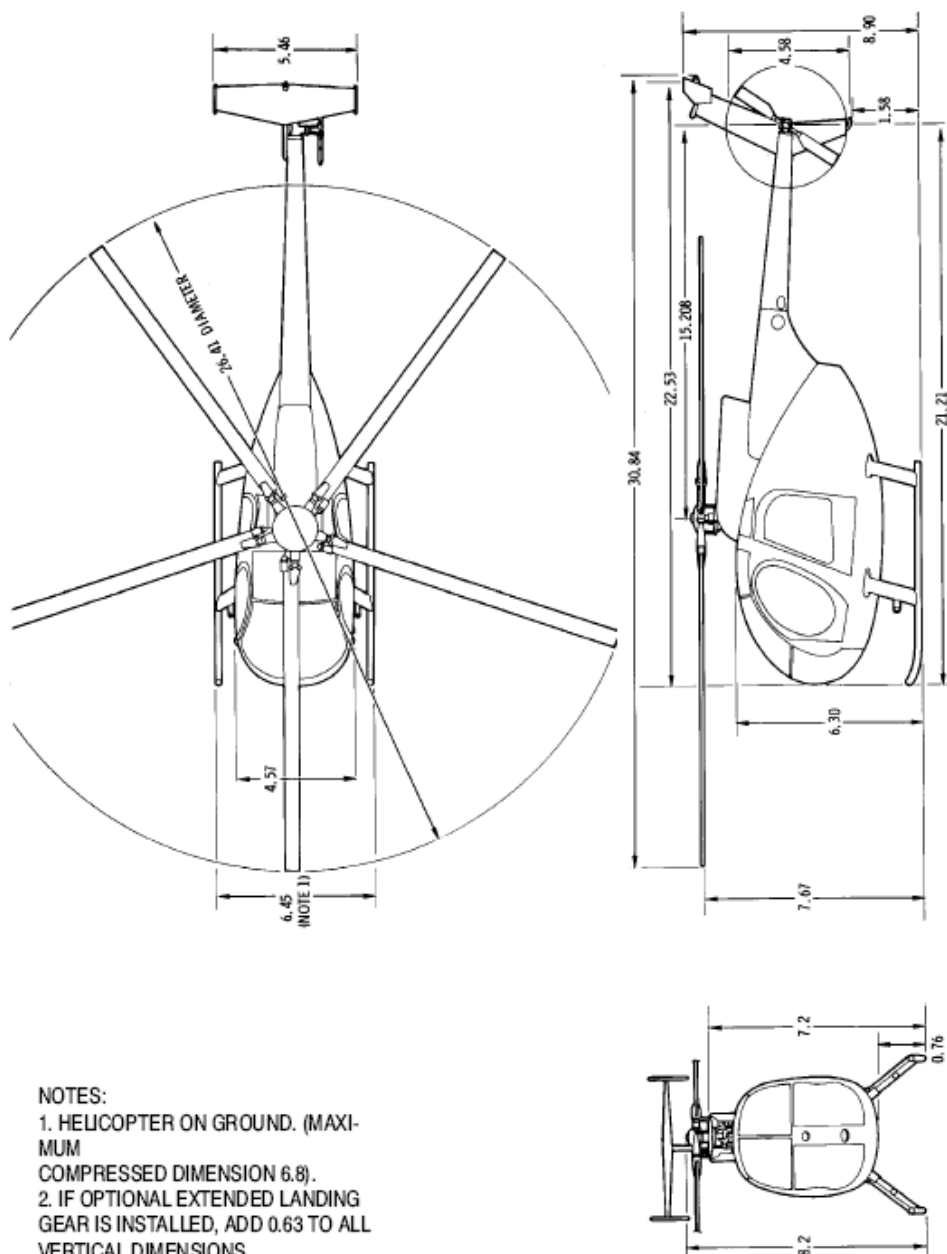


Appendix 3: MD 500D principal dimensions

MD 500D
(Model 369D)

ROTORCRAFT FLIGHT MANUAL

CSP-D-1
General



F02-001

Figure 1-1. MD 500D Principal Dimensions – Standard Landing Gear



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AO-2015-003	Robinson R44, Main rotor blade failure, Waikaia, Southland, 23 January 2015
AO-2014-005	Eurocopter AS350-B2 (ZK-HYO), collision with terrain, during heli-skiing flight, Mount Alta, near Mount Aspiring National Park, 16 August 2014
AO-2015-005	Unplanned interruption to national air traffic control services, 23 June 2015
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AO-2015-001	Pacific Aerospace Limited 750XL, ZK-SDT, Engine failure, Lake Taupō, 7 January 2015
AO-2013-010	Aérospatiale AS350B2 'Squirrel', ZK-IMJ, collision with parked helicopter, near Mount Tyndall, Otago, 28 October 2013
Addendum to final report AO-2015-002	Mast bump and in-flight break-up, Robinson R44, ZK-IPY, Lochy River, near Queenstown, 19 February 2015
Interim Report AO-2017-001	Collision with terrain, Eurocopter AS350-BA, ZK-HKW, Port Hills, Christchurch, 14 February 2017
AO-2013-011	Runway excursion, British Aerospace Jetstream 32, ZK-VAH, Auckland Airport, 2 November 2013

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