AIRCRAFT ACCIDENT SHORT REPORT

CA18/2/3/9752: ZS-RPV, The helicopter landed hard due to turbulence at the peak of the mountain.

Date and time	**:**19 November 2018, 0732Z
Occurrence type	**:**Accident
Aircraft registration	**:**ZS-RPV
Aircraft manufacturer and model	**:**Robinson Helicopter Company, R44
Last point of departure	**:**Witfontein, Western Cape Province
Next point of intended landing	**:**Geelhoutboom Mountain, Western Cape Province
Location of accident site with reference to easily defined geographical points (GPS readings if possible)	**:**GPS coordinates: 33°53'54.4" South, 022°22'18.3" East
Meteorological Information	**:**Surface wind: 140° 6kts variable from 080° to 190°, visibility: 9999, temperature: 20°C, dew point:14°C, cloud cover: FEW, cloud base: 1500ft, QNH: 1012
Type of operation	**:**Commercial (Part 127)
Persons on board	**:**1 + 1
Injuries	**:**Nil
Damage to aircraft	**:**Substantial

All times given in this report are Coordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Purpose of the Investigation:

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (2011) this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and ***not to apportion blame or liability.***

Disclaimer:

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1. SYNOPSIS

1.1 The aircraft took off from a private farm in Witfontein, Western Cape with the pilot and one passenger on board. The purpose of the flight was to transport the passenger to a site on Geelhoutboom Mountain peak. On approach for the landing zone, the pilot stated that he encountered an updraft from the southern side of the mountain and therefore aborted the landing. He orbited to make a second attempt to land during which he encountered a downdraft. He then lifted the collective slightly to reduce the helicopter's rate of descent but the low RPM horn sounded and he quickly lowered the collective and rolled the throttle on. At this point the helicopter was too low to the ground for a safe recovery and therefore impacted the ground hard and tilted aft. The pilot then pulled the collective to get airborne and turned the helicopter to the right in an attempt to land away from the slope. The helicopter impacted a protruding rock and the helicopter rolled onto its right hand side before coming to rest.

1.2 The helicopter was substantially damaged. Both occupants were not injured.

1.3 Investigation revealed that the helicopter experienced a sudden downdraft and lost translational lift during landing and impacted with a protruding rock on the top of the mountain. Contributory factor is due to the helicopter being too close to the ground for a safe recovery.

2. FACTUAL INFORMATION

2.1 On Monday 19 November 2018, a Robinson R44 helicopter with registration marking ZS-RPV, took off on two separate flights from a private farm in Witfontein to transport two technicians to the top of Geelhoutboom Mountain to repair radio repeaters that were destroyed by the fire that occurred in October 2018.

2.2 The first flight to the top of the mountain with the first technician on board was completed uneventfully. The pilot then returned to Witfontein to collect the second technician and four solar panels that were secured to the back seat. As he approached the landing zone from the northern side of the mountain, he encountered an updraft from the southern side of the mountain and therefore

aborted the landing. He then orbited to make a second attempt to land and this time he encountered a downdraft. The pilot lifted the collective slightly to reduce the helicopter's rate of descent but the low RPM horn sounded and he quickly lowered the collective and rolled the throttle on. At this point the helicopter was too low to the ground for a safe recovery and therefore impacted the ground hard and tilted aft. The pilot immediately pulled the collective to get airborne because he was not comfortable with the tail boom being too close to the ground. He turned the helicopter to the right in an attempt to land away from the slope but impacted a protruding rock and the helicopter rolled onto its right hand side before coming to rest.

2.3 The helicopter sustained damage to the main rotor blades, swashplate, main rotor gearbox, fuel tanks, tail boom, tail rotor, cabin and skids. The pilot and passenger were not injured.

2.4 The accident occurred during daylight conditions at a geographical position that was determined to be 33°53'54.4" South 022°22'18.3" East at an elevation of 3 900ft above mean sea level (AMSL).

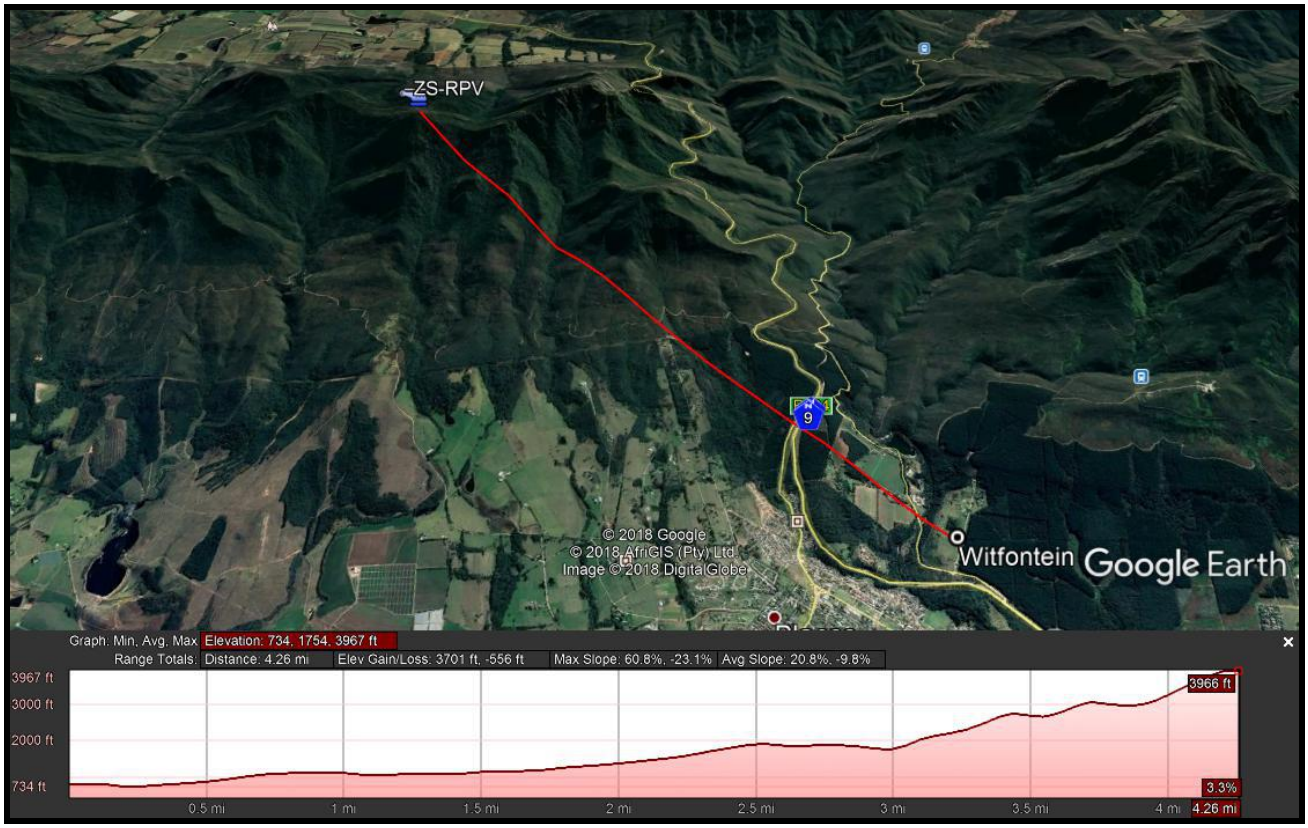

Figure 1: Profile of flight from departure to accident site

Figure 2: The helicopter as it came to rest

3. ADDITIONAL INFORMATION

3.1 Approach to a ridge or pinnacle (European Aviation Safety Agency (EASA):Techniques for Helicopter Operations in Hilly and Mountainous Terrain

The absence of obstacles and the opportunities for an 'escape route' make ridges and pinnacles a good choice for a landing site. However, as previously described, these sites are often affected by a turbulent rising and descending airflow over the top, the demarcation line has to be identified. A normal circuit should be flown above the elevation of a LS (landing site). For the final approach, if possible, rather than flying directly into wind towards the feature, the final approach may be flown at an offset angle (up to 45°) and out of wind to keep the aircraft out of the descending air and allow an escape route away from the feature. If there is little or no wind, the approach angle can be normal, however, it is essential to avoid reducing the speed too early and loose translational lift before gaining ground effect. If the wind is moderate or strong, an approach with a normal to steep angle can be flown as the wind will

maintain translational lift until entering in ground effect (avoiding flight through turbulent areas upwind of the LS).

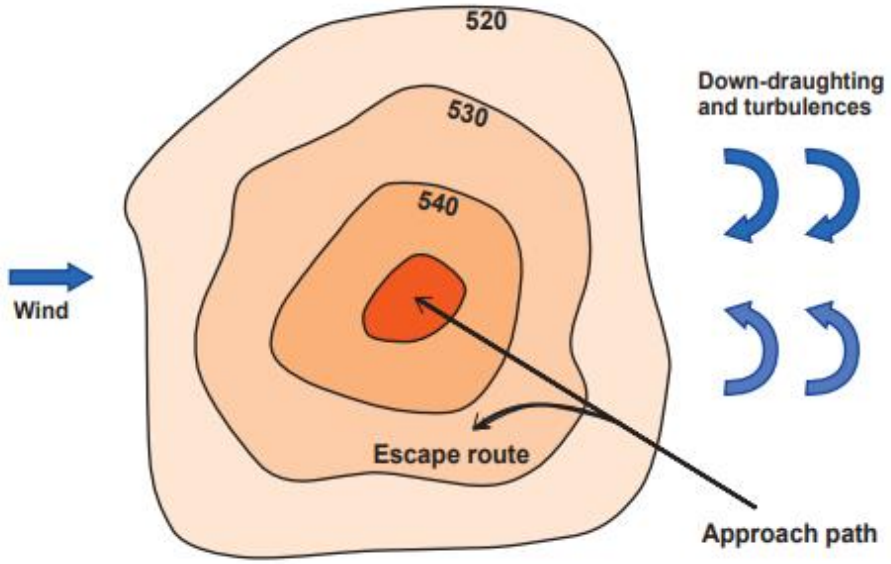

Figure 3: Demarcation Line

3.2 On the day the accident, 30L of fuel was in the helicopter on take-off. The maximum take-off weight (MTOW) is 2 500lbs and the helicopter weighed 2 125lbs prior to take-off. The helicopters take-off weight was 375lbs below the MTOW.

WEIGHT & BALANCE FOR AIRCRAFT	**ZS-RPV**	**Category:**	Transport
Robinson R44 Raven II			
	Arm	**Weight**	**Moment**
Item	**in. from datum**	**lbs**	**lb-in.**
Basic empty weight as equipped	104.8	1 600	167 680
Pilot (R seat)	49.5	202	10 019
Forward passenger (L seat)	49.5	231	11 435
Forward baggage	44.0	0	0
Aft passengers and baggage	79.5	44	3 498
Zero Usable Fuel	**92.7**	**2 077**	**192 631**
Usable fuel at 6 lbs/gal (Main Tank)	106.0	40	4 240
Usable fuel at 6 lbs/gal (Auxiliary)	102.0	8	816
MAUW	**79.1**	**2 500**	**197 687**
All Up Weight (take-off fuel)	**93.0**	**2 125**	**197 687**
	Balance (lbs)	**375**	

Figure 4: ZS-RPV weight and balance

4. Findings:

4.1 The pilot held a Commercial Pilot licence (Helicopter) which was issued on 16 August 2018 and was due to expire on 31 July 2019. The pilot conducted his last competency check on 31 July 2018 at Port Elizabeth Airport (FAKR).

4.2 The helicopter Robinson R44 was endorsed in the pilot's licence.

4.3 The pilot's aviation medical certificate was valid with the following restriction: hearing protection and corrective lenses. The medical licence was issued on 17 July 2018 and was due to expire on 31 July 2019.

4.4 The last mandatory periodic inspection (MPI) was carried out on 12 June 2018 at 2 058.2 airframe hours.

4.5 The helicopter had a total of 2 103.8 airframe hours at the time of the accident and had flown 45.6 hours since the last inspection.

4.6 The helicopter had a valid Certificate of Airworthiness which was issued on 31 October 2011 and was due to expire on 31 October 2019.

4.7 The flight was conducted under visual flight rules (VFR) by day.

4.8 The weather for the time of the accident is as follows: Wind 140°06KT 080°V190°, Visibility 9999, Clouds FEW 1500 feet, Temperature 20°C, Dew Point 14°C, QNH 1012hpa.

4.9 The weight of the helicopter according to the computed weight and balance sheet on take-off was 2 125lbs which was 375lbs below the MTOW of 2 500lbs.

4.10 The investigation concluded that at low level the helicopter experienced a sudden downdraft and lost translational lift during landing and impacted with a protruding rock on the top of the mountain. Contributory factor is due to the helicopter being too close to the ground for a safe recovery.

5. PROBABLE CAUSE/CONTRIBUTING FACTOR

5.1 The helicopter experienced a sudden down draft at low level and lost translational lift during landing and impacted with a protruding rock on the top of the mountain.

6. REFERENCES USED IN THE REPORT

6.1 European Aviation Safety Agency (EASA): Techniques for Helicopter Operations in Hilly and Mountainous Terrain

7. SAFETY RECOMMENDATION

7.1 None.

This Report is issued by:

Accident and Incident Investigation Division
South African Civil Aviation Authority
Republic of South Africa