AIRCRAFT ACCIDENT SHORT REPORT

CA18/2/3/9724	:	Incorrect approach resulting in a hard landing
Date and time	:	30 June 2018; 0742Z
Aircraft registration	:	ZS-PYG
Aircraft manufacturer and model	:	Robinson Helicopter Company, Raven II R44
Last point of departure	:	Virginia Airport (FAVG): KwaZulu-Natal Province
Next point of intended landing	:	Virginia Airport (FAVG): KwaZulu-Natal Province
Location of accident site with reference to easily defined geographical points (GPS readings if possible)	:	Grass area next to runway 23, GPS approximately 29˚46´12.62˝ South 031˚03´29.87˝ East
Meteorological information	:	Wind direction, 190˚ ; Wind speed, 5kts; CAVOK; Temperature, 25˚C
Type of operation	:	Domestic Charter Flight (Part 127)
Persons on board	:	1+3
Injuries	:	0
Damage to aircraft	:	Substantial

All times given in this report is Co-ordinated 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 accidents and ***not to apportion blame or liability.***

Disclaimer:

This report is produced without prejudice to the rights of the CAA, which are reserved.

1. SYNOPSIS

1.1 A pilot accompanied by three passengers on board took off on a domestic charter flight from Virginia Airport (FAVG) with the intention to land back at FAVG. The pilot stated that on their return during descent from 500 ft above ground level (AGL) the helicopter began slowing down in forward flight. The pilot noticed that the helicopter was losing transitional lift and she pulled the collective to stop the helicopter from sinking, but the helicopter continued to descend until the skids made a very hard contact with the ground. The pilot stated that the helicopter landed hard and she heard a loud screeching noise on landing. She then proceeded to shut the helicopter down.

1.2 The investigation revealed that the pilot was unable to arrest the rate of descent due to the power available being at maximum resulting on hard impact with the ground.

2. FACTUAL INFORMATION

2.1 On 30 June 2018, a pilot accompanied by three passengers on board a Robinson R44, registration ZS-PYG, took off on a domestic charter flight from FAVG with the intention to land back at FAVG. The weather conditions were visual meteorological conditions (VMC) and the flight was conducted under visual flight rules (VFR).

2.2 The pilot stated that she was on final approach for FAVG runway 23 and was descending from 500 ft above ground level (AGL) at 200ft/min. As the helicopter began slowing down in forward flight, the pilot noticed that she was losing transitional lift and the helicopter started to descend faster. She pulled the collective to arrest the descent, but the helicopter continued with a faster rate of descend and landed hard on the ground. The pilot stated that she heard a loud screeching noise on landing. She then proceeded to shut the helicopter down.

2.3 The helicopter sustained damage to the main rotor blades and the tail boom. None of the four occupants sustained injuries.

2.4 During the post-accident discussion between the safety officer and the pilot, it was suspected that the probable cause of the accident was as a result of an incorrect approach technique.

Figures 1 & 2: Damage to the tail boom

2.5 The incident occurred during daylight conditions at GPS coordinates determined to be approximately 29˚46´12.62˝ South 031˚03´29.87˝ East, at an elevation of 26 ft.

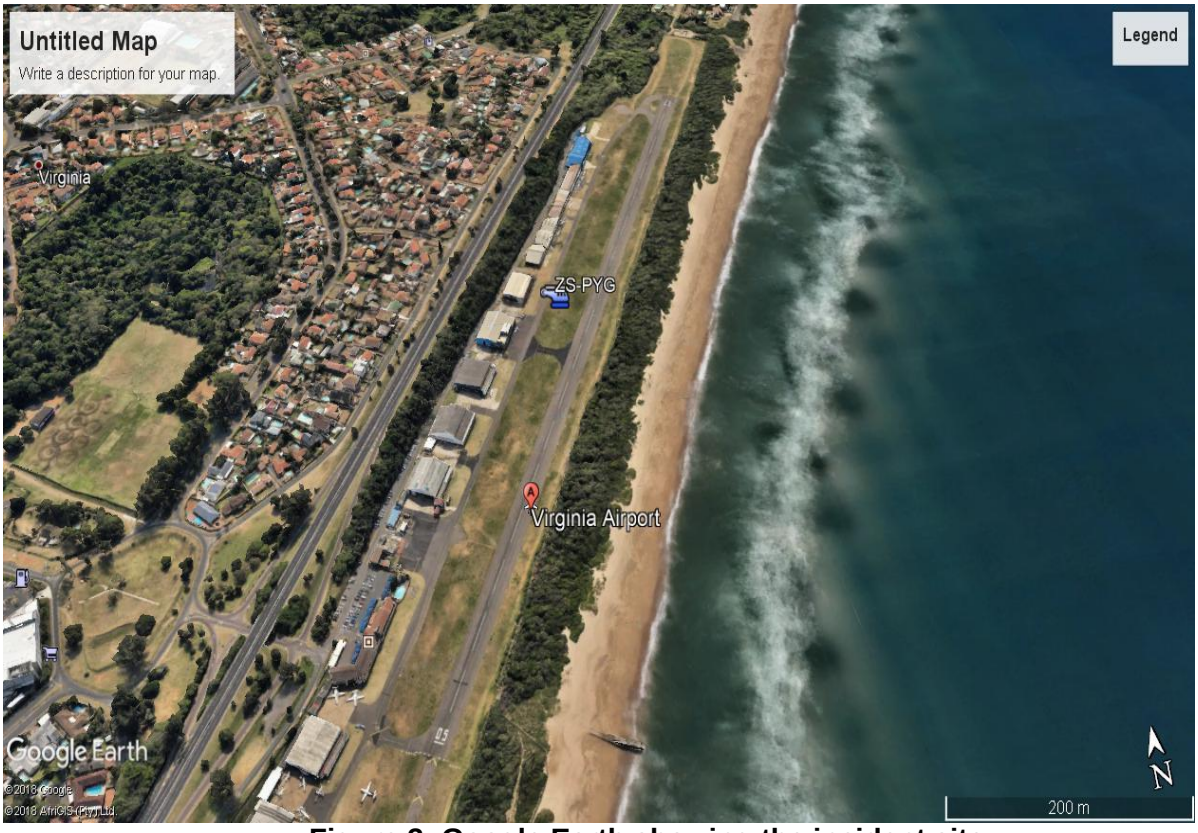
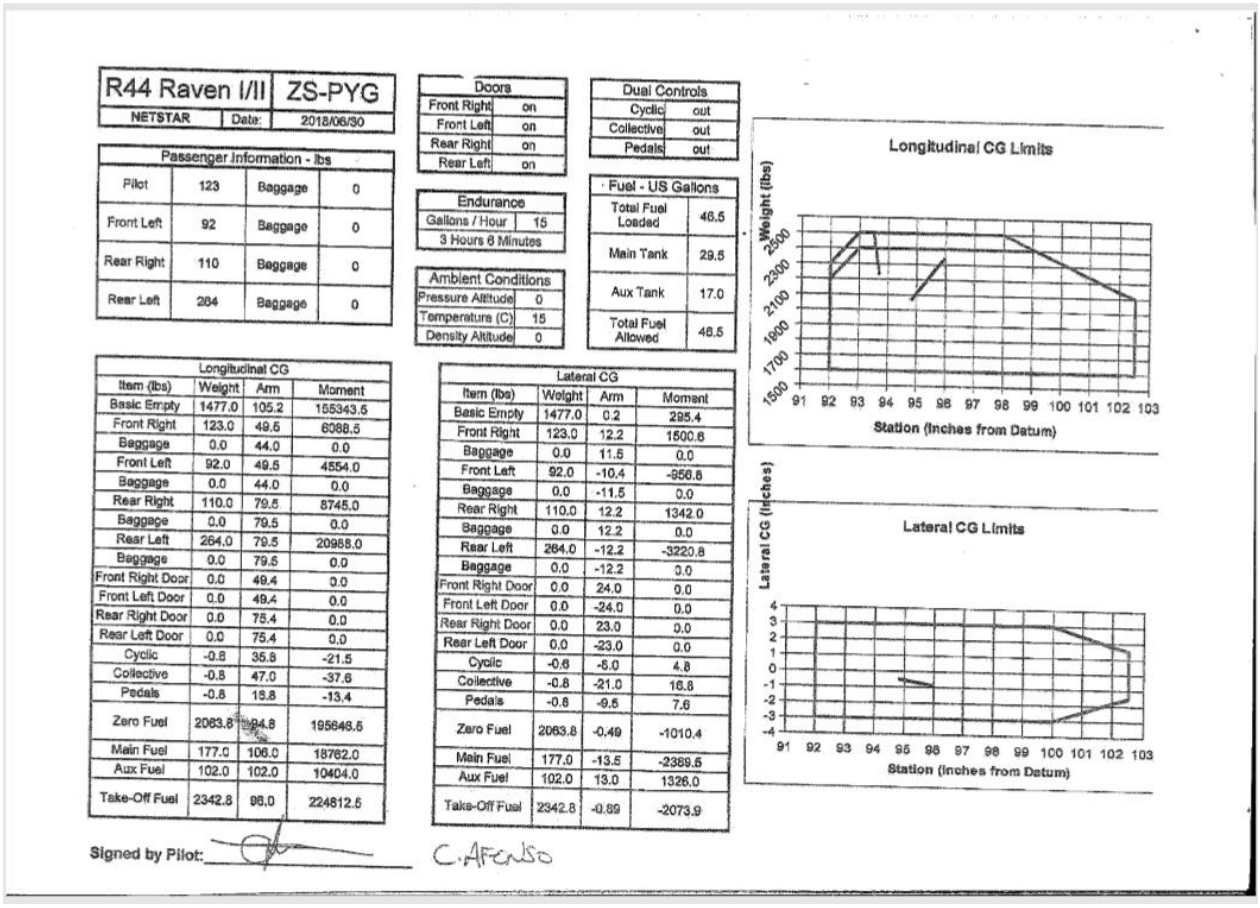


Figure 3: Google Earth showing the incident site

3. Additional information



R44 Raven I/II	ZS-PYG
NETSTAR	Date: 2018/06/30

Passenger Information - lbs			
Pilot	123	Baggage	0
Front Left	92	Baggage	0
Rear Right	110	Baggage	0
Rear Left	264	Baggage	0

Doors	
Front Right	on
Front Left	on
Rear Right	on
Rear Left	on

Endurance	
Gallons / Hour	15
3 Hours 6 Minutes	

Ambient Conditions	
Pressure Altitude	0
Temperature (C)	15
Density Altitude	0

Dual Controls	
Cyclic	out
Collective	out
Pedals	out

Fuel - US Gallons	
Total Fuel Loaded	46.5
Main Tank	29.5
Aux Tank	17.0
Total Fuel Allowed	46.5

Longitudinal CG			
Item (lbs)	Weight	Arm	Moment
Basic Empty	1477.0	105.2	155343.5
Front Right	123.0	49.5	6088.5
Baggage	0.0	44.0	0.0
Front Left	92.0	49.5	4554.0
Baggage	0.0	44.0	0.0
Rear Right	110.0	79.5	8745.0
Baggage	0.0	79.5	0.0
Rear Left	264.0	79.5	20988.0
Baggage	0.0	79.5	0.0
Front Right Door	0.0	49.4	0.0
Front Left Door	0.0	49.4	0.0
Rear Right Door	0.0	75.4	0.0
Rear Left Door	0.0	75.4	0.0
Cyclic	-0.8	35.8	-21.5
Collective	-0.8	47.0	-37.6
Pedals	-0.8	16.8	-13.4
Zero Fuel	2063.8	94.8	195648.5
Main Fuel	177.0	106.0	18762.0
Aux Fuel	102.0	102.0	10404.0
Take-Off Fuel	2342.8	98.0	224812.5

Lateral CG			
Item (lbs)	Weight	Arm	Moment
Basic Empty	1477.0	0.2	295.4
Front Right	123.0	12.2	1500.6
Baggage	0.0	11.5	0.0
Front Left	92.0	-10.4	-956.8
Baggage	0.0	-11.5	0.0
Rear Right	110.0	12.2	1342.0
Baggage	0.0	12.2	0.0
Rear Left	264.0	-12.2	-3220.8
Baggage	0.0	-12.2	0.0
Front Right Door	0.0	24.0	0.0
Front Left Door	0.0	-24.0	0.0
Rear Right Door	0.0	23.0	0.0
Rear Left Door	0.0	-23.0	0.0
Cyclic	-0.8	-5.0	4.8
Collective	-0.8	-21.0	16.8
Pedals	-0.8	-9.5	7.6
Zero Fuel	2063.8	-0.49	-1010.4
Main Fuel	177.0	-13.5	-2389.5
Aux Fuel	102.0	13.0	1326.0
Take-Off Fuel	2342.8	-0.89	-2073.9

Signed by Pilot: C. AFONSO

Figure 4: Weight and balance

3.1 On the day of the accident, 46.5 gallons (176 liters) of fuel was in the helicopter and 3 passengers each weighing 41kg, 50kg and 120kg. According to the pilot's weight and balance calculations, the helicopter weighed 2342.8lbs prior to take-off. The maximum take-off weight (MTOW) of the helicopter is 3 200lbs, therefore; the helicopter's take-off weight was within limits.

4. INVESTIGATION REVEALED THE FOLLOWING:

4.1 The pilot had a valid commercial pilot helicopter licence (CPL) which was issued on 28 August 2017, expiring 31 July 2018 and a valid medical certificate which was expiring on 31 March 2019. She had a total of 290.6 flying hours and 112.4 hours on type at the time of the accident.

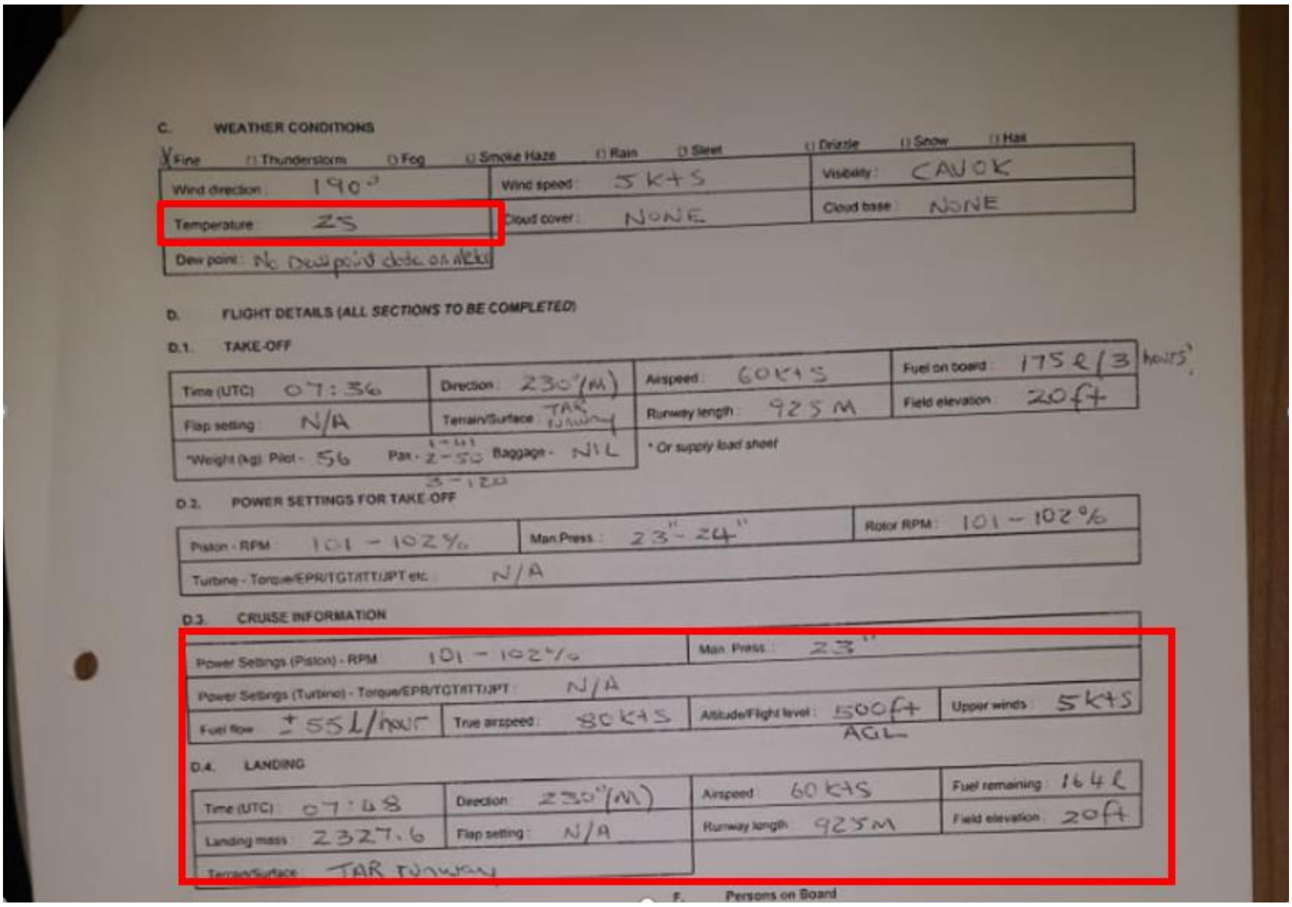
4.2 The helicopter had a valid Certificate of Airworthiness (C of A) expiring on 07 October 2018 and a valid Certificate of Registry (C of R).

4.3 The helicopter's mandatory periodic inspection (MPI) was last carried out on 2 June2018 at 3350.5 hours. The aircraft had a total of 3385.3 hours at the time of the incident and had flown a total of 34.8 hours since the last MPI.

4.4 The weather conditions were fine at the time of the occurrence.

4.5 The helicopter's weight and balance were within limits.

4.6 The helicopter landed hard and the main rotor blades severed the tail boom.



C. WEATHER CONDITIONS

X Fine () Thunderstorm () Fog () Smoke Haze () Rain () Sleet () Drizzle () Snow () Hail

Wind direction: 190°	Wind speed: 5kts	Visibility: CAVOK
Temperature: 25	Cloud cover: NONE	Cloud base: NONE
Dew point: No Dew point data on Metar		

D. FLIGHT DETAILS (ALL SECTIONS TO BE COMPLETED)

D.1. TAKE-OFF

Time (UTC): 07:36	Direction: 230°(M)	Airspeed: 60kts	Fuel on board: 175ℓ/3 hours
Flap setting: N/A	Terrain/Surface: TAR runway	Runway length: 925 M	Field elevation: 20ft
*Weight (kg): Pilot - 56 Pax - 1-41 2-50 3-120 Baggage - NIL			

* Or supply load sheet

D.2. POWER SETTINGS FOR TAKE-OFF

Piston - RPM: 101 - 102%	Man.Press.: 23" - 24"	Rotor RPM: 101 - 102%
Turbine - Torque/EPR/TGT/ITT/JPT etc.: N/A		

D.3. CRUISE INFORMATION

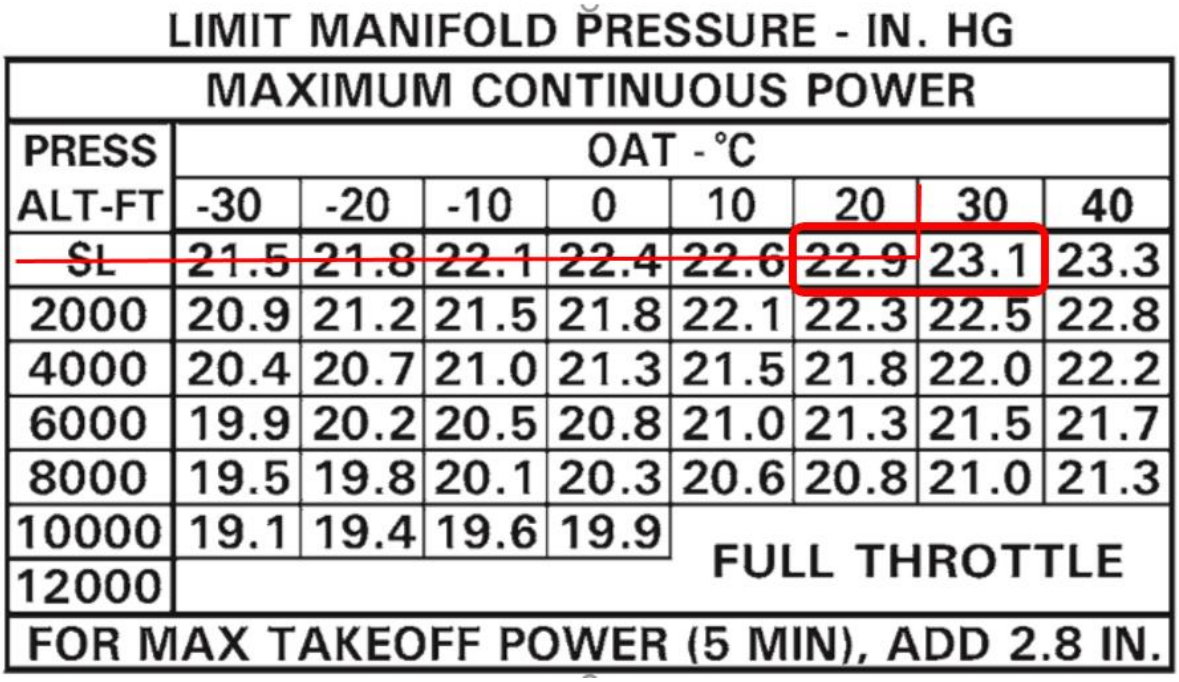
Power Settings (Piston) - RPM: 101 - 102%		Man. Press.: 23"	
Power Settings (Turbine) - Torque/EPR/TGT/ITT/JPT: N/A			
Fuel flow: ± 55L/hour	True airspeed: 80kts	Altitude/Flight level: 500ft AGL	Upper winds: 5kts

D.4. LANDING

Time (UTC): 07:48	Direction: 230°(M)	Airspeed: 60kts	Fuel remaining: 164ℓ
Landing mass: 2327.6	Flap setting: N/A	Runway length: 925M	Field elevation: 20ft
Terrain/Surface: TAR runway			

F. Persons on Board

Figure 5: Extarct from pilot questionnaire



LIMIT MANIFOLD PRESSURE - IN. HG

MAXIMUM CONTINUOUS POWER								
PRESS ALT-FT	OAT - °C							
	-30	-20	-10	0	10	20	30	40
SL	21.5	21.8	22.1	22.4	22.6	22.9	23.1	23.3
2000	20.9	21.2	21.5	21.8	22.1	22.3	22.5	22.8
4000	20.4	20.7	21.0	21.3	21.5	21.8	22.0	22.2
6000	19.9	20.2	20.5	20.8	21.0	21.3	21.5	21.7
8000	19.5	19.8	20.1	20.3	20.6	20.8	21.0	21.3
10000	19.1	19.4	19.6	19.9	FULL THROTTLE			
12000								
FOR MAX TAKEOFF POWER (5 MIN), ADD 2.8 IN.								

Figure 6: Maximum continuous power table

4.7 According to the pilot's questionnaire attached above (figure 5), the manifold pressure was at 23 inches and the maximum weight during landing was 2327.6 lbs which is 850.6 lbs more than the empty weight of 1477lbs. According to Robinson R44 POH, the maximum continuous power at sea level is 23 inches when the temperature is 25˚C.

4.8 During the descent, the helicopter started to descend faster than normal and that made it impossible for the pilot to arrest the descent since the power available was already at maximum according to the table on figure 6 above.

5. PROBABLE CAUSE / CONTRIBUTING FACTOR

5.1 Incorrect approach resulting in a hard landing

6. REFERENCES USED IN THE REPORT

6.1 Operator's incident/accident report.

6.2 Weight and balance.

6.3 Helicopter flying handbook (FAA-H-8083-21A)

7. SAFETY RECOMMENDATION

7.1 None.

8. ORGANISATION

8.1 As a result of this occurrence, the aircraft operator's Aviation Safety Officer has advised the AIID that they are taking the following safety actions:

The information below was extracted from Legend Aviation (PTY) LTD safety report.

Comments by Aviation Safety Officer:

After discussing the incident with the pilot, we are under the assumption that the technique for the approach was incorrect and a bit too steep to complete a successful landing.

Corrective action taken:

The pilot has been briefed on a possibly better approach as well as limited power landings. We have advised a proficiency check of the following in order to familiarise herself and gain confidence before commencing her next commercial flight.

9. Attachment

9.1 None

This report is issued by:
Accident and Incident Investigation Division
South African Civil Aviation Authority
Republic of South Africa