AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9888		
Aircraft Registration	ZT-RHC	**Date of Accident**	17 June 2020		**Time of Accident**	1457Z	
Type of Aircraft	Bell 206B		**Type of Operation**		Private (Part 91)		
Pilot-in-command Licence Type	PPL (Helicopter)		**Age**	54	**Licence Valid**	Yes	
Pilot-in-command Flying Experience	Total Flying Hours		447.6		Hours on Type	209.4	
Last Point of Departure	Kitty Hawk Airfield (FAKT), Gauteng Province						
Next Point of Intended Landing	Grand Central Airport (FAGC), Gauteng Province						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
New Road adjacent FAGC, Gauteng province (GPS position: 25°59'16.81" South, 028°8'19.37" East, elevation 5302 ft)							
Damage to Helicopter	Destroyed						
Meteorological Information	Wind: 120° 17kts gusting 24kts, Temperature: 6°C, Dew Point: 4°C, Visibility: 9999m, QNH: 1034 hPa						
Number of People On-board	1+1	**No. of People Injured**	0		**No. of People Killed**	2	
Synopsis							

On 17 June 2020, a Bell 206B helicopter with registration ZT-RHC took off on a private flight from Kitty Hawk Airfield (FAKT) in Gauteng province to the Grand Central Airport (FAGC), also in Gauteng province. On-board the helicopter were the pilot and a passenger. The helicopter was due to undergo a mandatory periodic inspection (MPI) which was to be conducted at FAGC.

The ZT-RHC pilot approached FAGC from the east and crossed over Runway 17. He then turned south (to the left of the airport) and began his approach for the helipad located at the aircraft maintenance organisation (AMO) area. Inspection of the close-circuit television (CCTV) footage from the airport showed the helicopter approaching the helipads too quickly than permissible; and it then yawed slightly to the left. The helicopter subsequently flew over the intended helipads and, at this point, the footage showed that it had yawed further to the left. The helicopter is then seen rotating to the left, completing two rotations while ascending and drifting towards the hangars located to the west of the airport. A review of another CCTV footage showed the helicopter drifting over the hangars and descending in a nose-down attitude. It is then seen flying between two trees on the curb side of New Road before impacting the road with the front part of the skids first. A post-impact fire ensued thereafter, destroying most of the lower section of the helicopter.

The pilot and the passenger were fatally injured during the accident, and the helicopter was destroyed.

Probable Cause and/or Contributory Factors

The pilot lost control while flaring the helicopter in preparation for landing, which resulted in an uncontrolled spin. The helicopter drifted westerly toward the hangars before losing lift and, thus, impacted the ground.

SRP Date	16 February 2021	Publication Date	22 February 2021

ABBREVIATION	DESCRIPTION
AIID	Accident and Incident Investigations Division
AMO	Aircraft Maintenance Organisation
AMSL	Above Mean Sea Level
AOC	Air Operating Certificate
CAR	Civil Aviation Regulation
CCTV	Close Circuit Television
CPL (H)	Commercial Pilot Licence (Helicopter)
C of A	Certificate of Airworthiness
C of R	Certificate of Registration
CVR	Cockpit Voice Recorder
FDR	Flight Data Recorder
ft	Feet
G	Gusting
GPS	Global Positioning System
hPa	Hectopascal
kts	Knots
m	Metre
METAR	Meteorological Aeronautical Report
MPI	Mandatory Periodic Inspection
nm	Nautical Mile
n/a	Not Applicable
NTSB	National Transportation Safety Board
SACAA	South African Civil Aviation Authority
SAR	Search and Rescue
SAWS	South African Weather Service
SOP	Standard Operating Procedure
UTC	Co-Ordinated Universal Time
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
Z	Zulu

Reference Number	**:** CA18/2/3/9888
Name of Owner/Operator	**:** Leboa Investments 16 (PTY) LTD
Manufacturer	**:** Bell Helicopter Textron
Model	**:** Bell 206B
Nationality	**:** South African
Registration markings	**:** ZT-RHC
Place	**:** New Road, adjacent FAGC, Gauteng Province
Date	**:** 17 June 2020
Time	**:** 1457Z

All times given in this report are 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 (CAR) 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****.*

Investigation Process:

The accident was notified to the Accident and Incident Investigations Division (AIID) on 17 June 2020. The investigators dispatched to the site on 17 June 2020. The investigators co-ordinated with all authorities on site by initiating the accident investigation process according to CAR Part 12 and investigation procedures. Notifications were sent to the National Transportation Safety Board (NTSB), which nominated a non-travelling accredited representative. The AIID, a division within South African Civil Aviation Authority (SACAA), is leading the investigation as the Republic of South Africa is the state of occurrence.

Notes:
1. Whenever the following words are mentioned in this report, they shall mean the following:

- *Accident – this investigated accident*
- *Aircraft – the Bell 206B involved in this accident*
- *Investigation – the investigation into the circumstances of this accident*
- *Pilot – the pilot involved in this accident*
- *Report – this accident report*

2. Photos and figures used in this report were taken from different sources and may be adjusted from the original for the sole purpose of improving clarity of the report. Modifications to images used in this report are limited to cropping, magnification, file compression; or enhancement of colour, brightness, contrast; or addition of text boxes, arrows or lines.

Disclaimer:

1. FACTUAL INFORMATION

1.1. History of Flight

1.1.1 On 17 June 2020, a Bell 206B helicopter with registration ZT-RHC took off on a private flight with a pilot and a passenger on-board from Kitty Hawk Airfield (FAKT) in Gauteng province to the Grand Central Airport (FAGC), also in Gauteng. The purpose of the flight was to deliver the helicopter to the aircraft maintenance organisation (AMO) for a mandatory periodic inspection (MPI). The flight from FAKT to FAGC was uneventful until the helicopter arrived at FAGC when the pilot attempted to land the helicopter on the helipad located at the AMO area.

1.1.2 A witness, who is a fixed-wing instructor pilot, had just returned from a training flight and was preparing to land at FAGC. When the fixed-wing instructor pilot was downwind Runway 17, he stated that he heard the Bell 206B helicopter pilot requesting clearance to enter the airfield airspace from the east. FAGC tower did not respond as it had closed for operations at 1400Z. The fixed-wing instructor pilot then alerted the Bell 206B helicopter pilot that the tower had closed for the day and that it was unmanned. The Bell 206B helicopter pilot then asked for the fixed-wing instructor pilots' position before reporting that he was positioned east of the airport and would be crossing Runway 17 to land on the AMO helipad, which was situated west of the runway. When the fixed-wing instructor pilot was approximately 1.5 nautical miles (nm) from FAGC and on his final approach, the Bell 206B helicopter pilot reported that he was ready to cross the runway. The Bell 206B helicopter then crossed the runway and turned left towards the south to approach the AMO helipads. The fixed-wing instructor pilot further stated that while taxiing on Runway 17, he observed the helicopter spiralling upwards, pivoting around the nose and reaching an approximate height of 100 feet (ft) above ground level (AGL) whilst drifting towards the hangars situated to the west of the helipads before disappearing (behind the hangars). He also stated that the helicopter pilot made no emergency radio calls.

1.1.3 Video evidence collected from the close-circuit television (CCTV) cameras fitted at FAGC buildings, as well as buildings around the accident site confirmed the witness's statement.

1.1.3.1 The first video footage showed the helicopter approaching the helipads. The helicopter was then seen making a descent with forward movement (a normal approach for landing on a helipad). As the helicopter passed the airbus helipads, it slowly started to yaw left with its nose facing east. The helicopter pilot then flew past both the first and the second sets of helipads, ending up in the area between the helipads and the parked aircraft on the apron, facing east.

Figure 1: A video footage of the helicopter when is started to yaw to the left. (Source: Airbus Helicopters)

1.1.3.2 The second video footage showed the helicopter yawing left, completing three full turns while ascending and drifting towards the west of the airport. It then disappeared off the top-left frame of the video. A few seconds later, a person was seen running out of the terminal building towards the fire-fighting station. Two fire trucks were dispatched to the scene.

1.1.3.3 A third video footage, which was facing New Road, showed one of the witnesses walking towards the hangar looking up as though something had caught his attention. Three seconds later, the helicopter was observed making a descent from the hangar side (east of his position) with the tail high, and later, impacted New Road's surface. A cloud of white smoke which later turned black was seen immediately after impact.

1.1.3.4 The fourth video footage, also facing New Road, showed the helicopter with its nose-low and the tail-high attitude, and in a high-rate of descent before impacting the ground. The helicopter impacted the ground hard with both front ends of the skid gears before turning sharply in a south-westerly direction and rolling onto its left side. White smoke was immediately seen coming from the helicopter and, 10 seconds later, a post-impact fire with black smoke ensued from the engine side, engulfing the middle section of the helicopter. The fire-fighters responded to the scene shortly thereafter and extinguished the fire. It was also noted that ample fuel had leaked from the helicopter and was ignited by the hot section of the engine.

Figure 2: The helicopter engulfed in flames. (Source: Eyewitness)

1.1.4 The helicopter was destroyed by impact forces and a post-impact fire, and both occupants were fatally injured.

1.1.5 The accident occurred during daylight on New Road adjacent to FAGC in Gauteng province at Global Positioning System (GPS) co-ordinates determined to be: 25°59'16.81" South, 028°8'19.37" East at an elevation of 5302ft.

1.1.6 Figure 3 shows the path the helicopter followed as it crossed the runway from the east and turning south to approach the helipads before losing control and drifting towards the west, and subsequently crashing on New Road, which is located adjacent to FAGC.

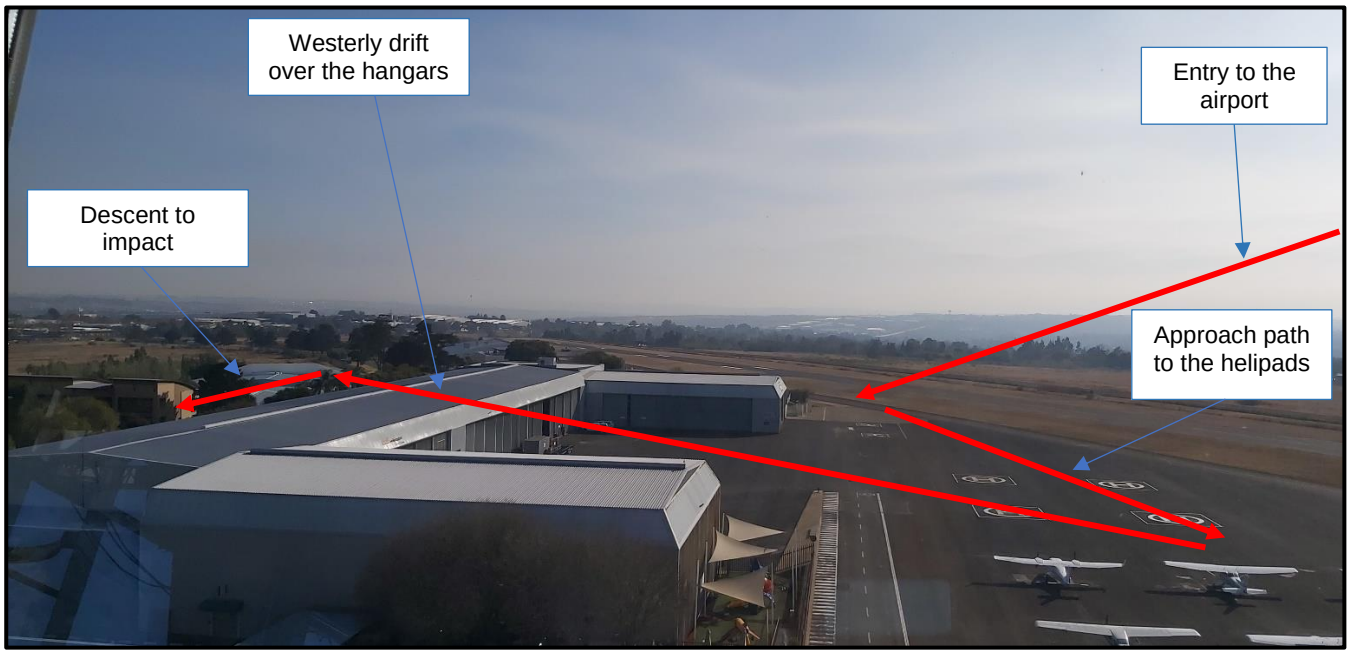

Figure 3: The red line depicts the flight path of the helicopter. (Source: Google Earth)

1.2. Injuries to Persons

Injuries	Pilot	Crew	Pass.	Total On-board	Other on Ground
Fatal	1	-	1	2	-
Serious	-	-	-	-	-
Minor	-	-	-	-	-
None	-	-	-	-	-
Total	1	-	1	2	-

1.3. Damage to Aircraft

1.3.1 The helicopter was destroyed during the accident sequence and by a post-impact fire (see Figure 2).

1.4. Other Damage

1.4.1 During the impact sequence, the main rotor severed some tree branches which broke a window and cut off an electric fence of a building adjacent to the accident site. The main rotor impacted the road and left a mark on it, while the post-impact fire caused some damage on the tarred road.

Figure 4: A broken window, severed electric fence and the burnt tarred road surface caused during the accident sequence.

1.5. Personnel Information

Nationality	South African	Gender	Male	Age	54
Licence Number	0272456468	Licence Type	Private Pilot Licence (H)		
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	31 October 2020				
Restrictions	None				
Previous Accidents	None				

Flying Experience:

Total Hours	447.6
Total Past 90 Days	Unknown
Total on Type Past 90 Days	Unknown
Total on Type	209.4

1.5.1 The pilot's logbook could not be located at the time of completion of this report. A summary of total flight hours until 27 April 2020 are presented. The hours were obtained from the logbook copies submitted for the pilot's annual licence renewal at the SACAA and from the flight folio copies submitted for the April 2020 special permit application.

1.6. Aircraft Information

Airframe:

Type	Bell 206B	
Serial Number	3825	
Manufacturer	Bell Helicopter Textron	
Date of Manufacture	1984	
Total Airframe Hours (time of accident)	7470.7	
Last MPI (Date & Hours)	28 June 2019	7373.3
Hours Since Last MPI	97.4	
C of A (Issue Date)	28 November 2017	
C of A (Expiry Date)	30 November 2020	
C of R (Issue Date) (Present Owner)	19 October 2017	
Operating Categories	Private (Part 91)	
Recommended Fuel Used	Jet A1	

Engine:

Type	Rolls Royce (Allison) 250-C20J
Serial Number	CAE-270222
Hours Since New	7470.7
Hours Since Overhaul	TBO not yet reached

Main Rotor:

Type	Bell 206-040-002-029
Serial Number	BKW 12915
Hours Since New	7470.7
Hours Since Overhaul	1348.7

Tail Rotor:

Type	Bell 206-040-400-013
Serial Number	BKW 12915
Hours Since New	7470.7
Hours Since Overhaul	1348.7

1.7. Meteorological Information

1.7.1 An official weather report for the day and time of the accident was obtained from the meteorological aeronautical report (METAR), which was made available for FAGC.

Wind direction	120°	Wind speed	17 G 24kts	Visibility	9999m
Temperature	6°C	Cloud cover	Broken	Cloud base	6500ft
Due point	4°C	QNH	1034hPa		

1.7.2 The wind condition at the accident site was confirmed by a video footage provided by an eyewitness showing smoke from the burning wreckage which was moving from the east to the west moments after impact (see Figure 5).

Figure 5: Video footage showing movement of smoke at the accident site. (Source: Eyewitness)

1.8. Aids to Navigation

1.8.1. The helicopter was equipped with standard navigational equipment as approved by the Regulator (SACAA). There were no recorded defects reported with the navigational equipment prior to the flight.

1.9. Communication

1.9.1. The helicopter was equipped with standard communication equipment as approved by the Regulator. No defects were reported with the communication equipment prior to the flight.

1.10. Aerodrome Information

1.10.1 The accident occurred on New Road, 100m north of FAGC's main entrance, Gauteng province, at GPS co-ordinates determined to be: 25°59'16.81" South, 028°8'19.37" East at an elevation of 5302ft.

Aerodrome Location	Midrand, Gauteng Province
Aerodrome Coordinates	S25°59'11" E028°8'24"
Aerodrome Elevation	5327 feet
Runway Designations	17/35
Runway Dimensions	1830m x 23m
Runway Used	n/a
Runway Surface	Asphalt
Approach Facilities	PAPI lights, NDB

1.11. Flight Recorders

1.11.1 The helicopter was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR), nor was it required by regulation to be fitted to this helicopter type.

1.12 Wreckage and Impact Information

1.12.1 The helicopter was observed coming from the east, flying above the hangars at an undetermined height; it then spiralled in an anti-clockwise direction. It flew between two trees wherein the main rotor impacted the trees and, later, the helicopter impacted the road in a nose-down attitude. After impacting the road, it swivelled on the ground facing south-west and rolled on its left side. Shortly after impact, the helicopter caught fire around the engine and fuel tank areas. The fire burnt the centre bottom section of the helicopter before it was extinguished by the Airport Rescue and Fire-fighting services personnel.

1.12.2 The bottom centre section of the cockpit floor was burnt; it had separated from the rest of the helicopter during recovery. The skid gear had broken off at different points. The front cross tube was bent downwards; it had separated as a result of high-vertical impact force, indicating a nose-down attitude on impact. The rear cross tube was still intact although it had separated from the attachment mounts.

Figure 6: The skid gear assembly after the accident.

1.12.3 The main rotor blades were still attached to the hub, but the mast had failed as a result of overload fracture. One of the main rotor blades showed impact damage at the tip, whereas the other rotor blade had dents, creases and scratches on the surface, indicating impact damage.

Figure 7: The main rotor blade assembly after the accident.

1.12.4 The tail boom mid-section exhibited compression load stress at the bottom, indicating a high-energy impact; it was also burnt where it attaches to the fuselage. The tail drive shaft assembly was still attached on the hangar assemblies. The lower section of the vertical fin was found crushed with the stinger detached. The tail rotor blades were still attached to the tail rotor output shaft. One of the blades exhibited damage on the tip, indicating impact with the ground (see Figure 9). The tail gearbox fairing had fracture damage near the output shaft. It was noted that both pedals were severed from the helicopter due to impact. The right pedals were found outside the helicopter while the left pedals were found inside.

Figure 8: Both tail rotor pedals were found severed.

Figure 9: The tail rotor section after the accident.

1.12.5 The main gearbox was still intact; however, the mounting strut was slightly bent. The outside condition of the gearbox was good and there were no oil leaks visible around the casing. The mast had fractured near the main rotor hub. The drive shaft was severely damaged and had separated from the gearbox. The swash plate rotating and non-rotating star were still intact (see Figure 10).

Figure 10: The swash plate assembly.

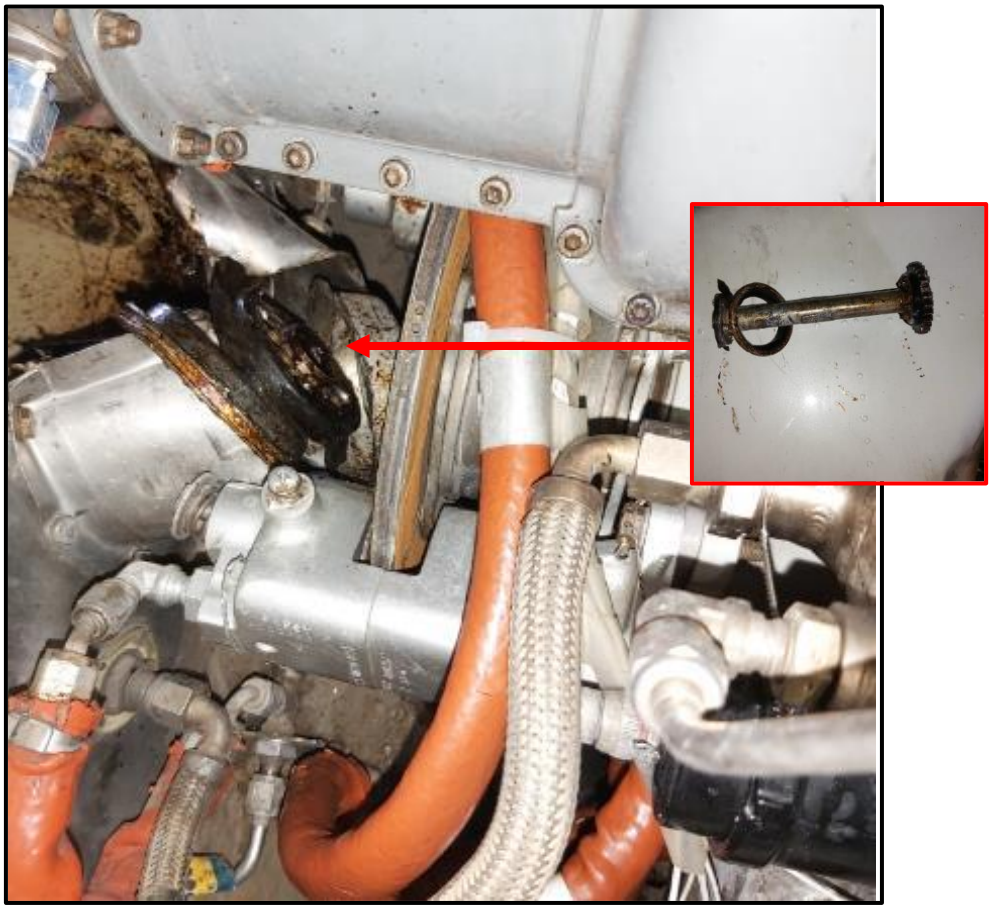

Figure 11: The damaged output drive shaft.

1.12.6 The left pitch change control tube was severely damaged and had separated from the hub assembly. The flight control actuators were still intact; there were no visible leaks on the upper deck. The continuity check was done on the control tubes by moving the tubes

individually by hand. All control tubes movement corresponded with the bell-cranks movement above the transmission deck, except for those that were damage by impact force. The helicopter was fitted with dual controls. The pilot-in-command collective handle had broken off and was found hanging by its electrical wires. The twist grip throttle was moved by hand; the movement caused a change on the interlinking control tube indicating continuity. The friction adjustment knob was found stuck as a result of a jam in the unit. The pilot cyclic stick was still attached; however, the connecting rods were found broken due to impact. The left cyclic had broken off from its mounting point.

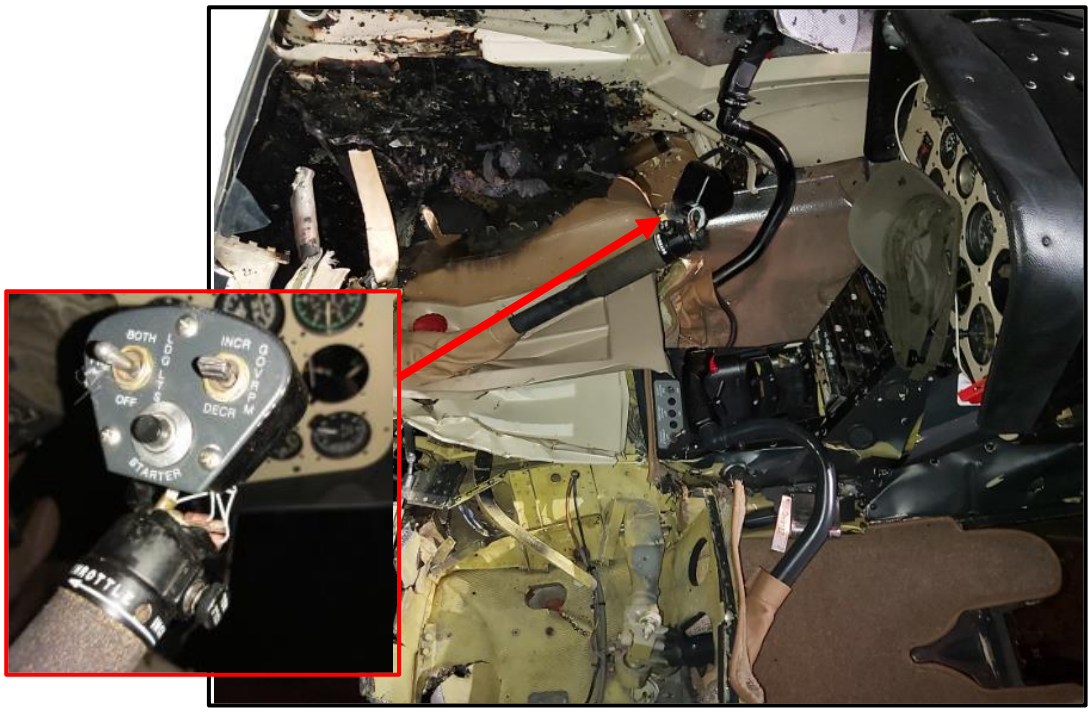

Figure 12: The damaged flight controls.

1.12.7 The main drive shaft assemblies were still attached to the main bearings. The input drive shaft had a twisted fracture as a result of a sudden stoppage, indicating an engine that was producing power when it suddenly stopped. The input shaft came off from the splines and was found lying underneath the engine compartment.

Figure 13: The damaged input shaft.

1.12.8 The engine was still attached to its mounts and its general condition was good. There were no visible oil leaks around the engine. The throttle control mechanism had separated as a

result of impact. The output shaft was severely damaged and had separated from the engine and gearbox as a result of a sudden stoppage (see Figure 11). The oil and fuel pipes were still intact and there were no visible ruptures or punctures.

1.12.9 On-site investigation and further visual investigation of the wreckage revealed no pre-existing failures prior to the accident; all damage was caused during the accident.

1.13 Medical and Pathological Information

1.13.1 The post-mortem and blood toxicology reports were still outstanding at the time of compiling this report. Should any of the results have a bearing on the circumstances leading to this accident, they will be treated as new evidence that will necessitate reopening this investigation.

1.14 Fire

1.14.1 Shortly after the helicopter had impacted the ground, a post-impact fire ensued around the engine and fuel tank areas, which destroyed the bottom area of the helicopter. The fire was extinguished by the Airport Rescue and Fire-fighting services personnel.

1.15 Survival Aspects

1.15.1 The accident was considered not survivable due to the helicopter's high velocity impact in a nose-down attitude, which damaged the cabin area, causing fatal injuries to the pilot and the passenger.

1.16 Tests and Research

1.16.1 None.

1.17 Organisational and Management Information

1.17.1 *The Republic of South Africa Civil Aviation Authority General Notice #. AIR-2020/001-COVID-19 issued 20 May 2020:*

- *South African Civil Aviation Authority ("SACAA") has put in place a contingency requirement to cater for the COVID-19 pandemic circumstances to ensure acceptable level of aircraft continuing airworthiness during the lockdown period.*

- *This provision is applicable to application for Special Flight Permit to aircraft with a valid certificate of airworthiness (C of A) or valid authority to fly (ATF) but the certificate of release to service (CRS) is due to expire during lockdown. To conduct the necessary or requisite positioning or ferry flight for maintenance purposes.*

- *The applicant must submit a copy of the current CRS if annual maintenance inspection is due. The applicant must also submit confirmation letter form the AMO where the aircraft is booked for such maintenance. Special flight permit application will also be required for a resultant return flight (ferry flight from maintenance facility back to base).*

1.17.2 The helicopter's Certificate of Release to Service (CRS) was due to expire on 27 June 2020 or at 7473.3 hours flight time, whichever occurs first. The helicopter's flight hours were 7470.1 at the time of special flight permit submission.

1.17.3 A letter dated 28 May 2020 was received from the aircraft maintenance organisation (AMO) stating that the CRS of the ZT-RHC helicopter would expire during the COVID 19 Lockdown and that the helicopter was due for its 100-hour mandatory periodic inspection (MPI) maintenance.

1.17.4 The helicopter was, therefore, issued two special flight permits, one from FAKT to FAGC and the other from FAGC to FAKT. Both permits had an expiry date of 15 June 2020, with a specific restriction of essential crew only.

1.17.5 The helicopter was originally issued a Certificate of Airworthiness on 28 November 2017 with an expiry date of 30 November 2020.

1.17.6 The flight was conducted as a private flight under provisions of Part 91 of the CAR 2011 as amended.

1.18 Additional Information

1.18.1 Bell 206B3 Flight Manual Section 4 *(Performance)*

Operation in Allowable Relative Wind
Satisfactory stability and control have been demonstrated in relative winds of 20 MPH (17 knots) sideward and rearward at all loading conditions.

1.18.2 LTE (FAA Helicopter Flying Handbook)

Unanticipated yaw is the occurrence of an uncommanded yaw rate that does not subside of its own accord and, which, if not corrected, can result in the loss of helicopter control. LTE is not related to an equipment or maintenance malfunction and may occur in all single-rotor helicopters at airspeeds less than 30 knots. It is the result of the tail rotor not providing adequate thrust to maintain directional control, and is usually caused by either certain wind azimuths (directions) while hovering, or by an insufficient tail rotor thrust for a given power setting at higher altitudes.

Three relative wind azimuth regions:

1. *Main Rotor Disk Interference (285–315°)*
Winds at velocities of 10–30 knots from the left front cause the main rotor vortex to be blown into the tail rotor by the relative wind. This main rotor disk vortex causes the tail rotor to operate in an extremely turbulent environment. During a right turn, the tail rotor experiences a reduction of thrust as it comes into the area of the main rotor disk vortex. The reduction in tail rotor thrust comes from the airflow changes experienced at the tail rotor as the main rotor disk vortex moves across the tail rotor disk. The effect of the main rotor disk vortex initially increases the AOA of the tail rotor blades, thus increasing tail rotor thrust. The increase in the AOA requires that right pedal pressure be added to reduce tail rotor thrust in order to maintain the same rate of turn. As the main rotor vortex passes the tail rotor, the tail rotor AOA is reduced. The reduction in the AOA causes a reduction in thrust and right yaw acceleration begins. This acceleration can be surprising, since previously adding right pedal to maintain the right turn rate. This thrust reduction occurs suddenly, and if uncorrected, develops into an uncontrollable rapid rotation about the mast. When operating within this region, be aware that the reduction in tail rotor thrust can happen quite suddenly and be prepared to react quickly to counter this reduction with additional left pedal input.

2. *Weathercock Stability (120–240°)*
   In this region, the helicopter attempts to weathervane, or weathercock, its nose into the relative wind. Unless a resisting pedal input is made, the helicopter starts a slow, uncommanded turn either to the right or left, depending upon the wind direction. If the pilot allows a right yaw rate to develop and the tail of the helicopter moves into this region, the yaw rate can accelerate rapidly. In order to avoid the onset of LTE in this downwind condition, it is imperative to maintain positive control of the yaw rate and devote full attention to flying the helicopter.

3. *Tail Rotor Vortex Ring State (210–330°)*
   Winds within this region cause a tail rotor vortex ring state to develop. The result is a nonuniform, unsteady flow into the tail rotor. The vortex ring state causes tail rotor thrust variations, which result in yaw deviations. The net effect of the unsteady flow is an oscillation of tail rotor thrust. Rapid and continuous pedal movements are necessary to compensate for the rapid changes in tail rotor thrust when hovering in a left crosswind. Maintaining a precise heading in this region is difficult, but this characteristic presents no significant problem unless corrective action is delayed. However, high pedal workload, lack of concentration, and overcontrolling can lead to LTE. When the tail rotor thrust being generated is less than the thrust required, the helicopter yaws to the right. When hovering in left crosswinds, concentrate on smooth pedal coordination and do not allow an uncommanded right yaw to develop. If a right yaw rate is allowed to build, the helicopter can rotate into the wind azimuth region where weathercock stability then accelerates the right turn rate. Pilot workload during a tail rotor vortex ring state is high. Do not allow a right yaw rate to increase.

1.18.3 *Landing - Stuck Left Pedal* (FAA Helicopter Handbook)

A stuck left pedal (high power setting), which might be experienced during take-off or climb conditions, results in the left yaw of the helicopter nose when power is reduced. Rolling off the throttle and entering an autorotation only makes matters worse. The landing profile for a stuck left pedal is best described as a normal to steep approach angle to arrive approximately 2–3 feet landing gear height above the intended landing area as translational lift is lost. The steeper angle allows for a lower power setting during the approach and ensures that the nose remains to the left. Upon reaching the intended touchdown area and at the appropriate landing gear height, increase the collective smoothly to align the nose with the landing direction and cushion the landing. A small amount of forward cyclic is helpful to stop the nose from continuing to the right and directs the aircraft forward and down to the surface. In certain wind conditions, the nose of the helicopter may remain to the left with zero to near zero groundspeed above the intended touchdown point. If the helicopter is not turning, simply lower the helicopter to the surface. If the nose of the helicopter is turning to the right and continues beyond the landing heading, roll the throttle toward flight idle the amount necessary to stop the turn while landing. If the helicopter is beginning to turn left, the pilot should be able to make the landing prior to the turn rate becoming excessive. However, if the turn rate begins to increase prior to the landing, simply add power to make a go-around and return for another landing.

1.18.4 Basic Helicopter Handbook *(Chapter 11: Helicopter Flight Manoeuvres)*

Normal Approach to a Hover
A normal approach to a hover is basically a power glide made at an angle of descent of approximately 10°. This type of approach is used in the majority of cases.

Technique:
1. Initiate the approach by lowering the collective pitch control the amount required to descend at an angle of approximately 10° on the final approach leg. As collective pitch is lowered, increase right pedal as necessary to compensate for the change in torque reaction to maintain heading, and adjust throttle to maintain proper RPM. Decelerate to the approximate airspeed, then further adjust attitude as necessary to maintain approach airspeed.
2. The angle of descent is primarily controlled by collective pitch, the airspeed is primarily

controlled by the cyclic control, and heading on final approach is maintained with pedal control. However, only by the coordination of all controls can the approach be accomplished successfully.
3. The approach airspeed should be maintained until the point on the approach is reached where, through evaluation of apparent groundspeed, it is determined that forward airspeed must be progressively decreased in order to arrive at hovering altitude and attitude at the intended landing spot with zero groundspeed.
4. As forward airspeed is gradually reduced by the application of rearward cyclic, additional power (collective pitch) must be applied to compensate for the decrease in translational lift and to maintain the proper angle of descent. As collective pitch is increased, left pedal must be increased to maintain heading, throttle adjusted to maintain RPM, and cyclic pitch coordinated to maintain the proper rate of closure to the desired spot (a continual decrease in groundspeed).
5. The approach is terminated at hovering altitude above the intended landing point with zero groundspeed. If power has been properly applied during the final portion of the approach, very little additional power should be required during the termination.
6. If the condition of the landing spot is unknown, the approach may be terminated just short of the spot so that it can be checked before moving forward for the landing.

Common Errors:
1. Failing to maintain proper RPM during the entire approach.
2. Improper use of the collective pitch in controlling the angle of descent.
3. Failing to make pedal corrections to compensate for collective pitch changes during the approach.
4. Failing to arrive at hovering altitude, hovering attitude, and zero groundspeed almost simultaneously.
5. Low RPM in transition to the hover at the end of the approach.
6. Using too much aft cyclic stick close to the surface, which may result in tail rotor strikes.

1.19 Useful or Effective Investigation Techniques

1.19.1 None.

2. ANALYSIS

2.1. General

From the available evidence, the following analysis was made with respect to this accident. These shall not be read as apportioning blame or liability to any particular organisation or individual.

2.1.1 Man

The pilot was issued a Private Pilot Licence (PPL) on 19 November 2019 with an expiry date of 30 November 2020. He was issued a Class 2 aviation medical certificate on 17 October 2019 with an expiry date of 31 October 2020 with no restrictions. The helicopter type was endorsed on his licence. Records indicate that the pilot was licensed and qualified to undertake the flight.

2.1.2 Aircraft

The last MPI was conducted on 28 June 2019 at 7373.3 airframe hours and the helicopter had a total of 7470.7 airframe hours at the time of the accident. The accident flight was a ferry to the AMO for the helicopter's MPI which was due at 7473.3 airframe hours or on 27

June 2020, whichever occurs first. According to the Pilot's Operating Handbook (POH), the maximum demonstrated wind component for this type of helicopter is 17 knots. On-site investigation and further visual investigation of the wreckage revealed no pre-existing failures prior to the accident; all damage was a result of the accident. Records indicate that the aircraft was airworthy and there were no recorded defects prior to the flight.

2.1.3 Environment

Wind condition at FAGC was reported to be 17 knots (kts) gusting 24kts and the helicopter is certified to operate at a maximum wind condition of 17kts, which means that the wind at the time of the accident could have been 7kts above the maximum for this helicopter type.

The accident occurred during daylight at GPS co-ordinates determined to be 25°59'16.81" South 028°8'19.37" East at an elevation of 5302ft AMSL. According to the FAGC METAR, the wind was 120° at 17kts gusting 24kts at the time of the accident.

2.1.4 Mission

This was a private flight from FAKT to FAGC during daylight. The helicopter was due to undergo an MPI which was to be conducted at FAGC. The helicopter approached FAGC from the east, crossed Runway 17 before turning left (south) to line up with the AMO's helipads. Therefore, as the helicopter turned left, it was now subjected to a left crosswind. The wind at the time was 120° at 17kts gusting 24kts. The helicopter type had a satisfactory stability and control demonstrated in relative winds of 17 knots sideward, but as the wind was also gusting 24kts, it made it difficult for the pilot to control the helicopter. The approach for the AMO helipads was stable initially, but as the helicopter flew past the AMO helipads, it yawed slightly to the left. It is probable that the pilot had not applied sufficient right pedal to compensate for collective pitch changes during approach with a strong left wind. This is when the pilot started to lose control of the helicopter. The helicopter flew past the intended landing helipads because the approach speed was fast; and it ended up between the helipads and the fixed-wing aircraft parked at the apron. The helicopter spun twice to the left whilst its height increased, reaching an approximate height of 100 feet AGL whilst drifting towards the hangars situated to the west of the helipads. The increase in altitude could be attributed to the pilot pulling in power to gain height and to stop the helicopter from yawing once the pilot realised that he was losing directional control. The gusting wind over the hangars had likely created turbulence above and to the lee side of the hangars which could have also affected the pilot's ability to regain control. The pilot lost control of the helicopter and could not recover, resulting in an impact with the ground.

It is not probable that the helicopter experienced a stuck left pedal since the left yaw would have initiated when the pilot lowered the collective to approach the airfield. The left yaw only started when the helicopter passed the AMO helipads. It is also not probable that the issue was an LTE because, on approach for landing, the wind was from the left and front of the helicopter. The main rotor disk interference would have caused the helicopter to have an

uncontrolled yaw to the right.

2.1.5 The investigation revealed that the pilot lost control during flaring in preparation to land, which resulted in an uncontrolled spin. The helicopter drifted westerly toward the hangars before losing lift and, thus, impacted the ground.

3. CONCLUSION

3.1. General

From the evidence available, the following findings, causes and contributing factors were made with respect to this accident. These shall not be read as apportioning blame or liability to any particular organisation or individual.

To serve the objective of this investigation, the following sections are included in the conclusion heading:

- **Findings —** are statements of all significant conditions, events or circumstances in this accident. The findings are significant steps in this accident sequence, but they are not always causal or indicate deficiencies.
- **Causes —** are actions, omissions, events, conditions, or a combination thereof, which led to this accident.
- **Contributing factors —** are actions, omissions, events, conditions, or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the accident or incident occurring, or mitigated the severity of the consequences of the accident or incident. The identification of contributing factors does not imply the assignment of fault or the determination of administrative, civil or criminal liability.

3.2. Findings

3.2.1 The pilot was issued a Private Pilot Licence (Helicopter) on 19 November 2019 with an expiry date of 30 November 2020. The pilot's Class 2 aviation medical certificate was issued on 17 October 2019 with an expiry date of 31 October 2020, with no restrictions.

3.2.2 The private flight was conducted under the provision of Part 91 of the CAR 2011 as amended and in visual flight rules (VFR) by day.

3.2.3 The helicopter was operated in wind conditions reported to be 17kts gusting 24kts, which indicated that the helicopter could have been operating at 7kts above its maximum permissible wind conditions.

3.2.4 The helicopter was originally issued a Certificate of Airworthiness on 28 November 2017 with an expiry date of 30 November 2020.

3.2.5 The last MPI was conducted on 28 June 2019 at 7373.3 airframe hours and the aircraft had flown a total of 97.4 hours since its last MPI. The helicopter was issued a CRS on 28 June 2019 with an expiry date of 27 June 2020 or 7473.3 hours, whichever occurs first. No evidence of pre-existing failures could be found on the helicopter during an on-site

investigation and wreckage examination post-accident. Also, there were no recorded failures prior to the flight.

3.2.6 The CRS was due to expire during the COVID 19 Lockdown alert level 3; therefore, the helicopter was issued two special flight permits to and from the maintenance facility for the 100-hour MPI. Both permits had an expiry date of 15 June 2020 with a specific restriction of essential crew only. The accident flight occurred on 17 June 2020, therefore, the helicopter was not permitted to fly as the special permits had expired. The passenger on this flight was not permitted to be on-board the aircraft as the special permit only allowed essential crew to be on-board; the passenger is not regarded as an essential crew member.

3.2.7 The pilot lost control while flaring the helicopter in preparation for landing, which resulted in an uncontrolled spin. The helicopter drifted westerly toward the hangars before losing lift and, thus, impacted the ground.

3.3 Probable Cause/s

3.3.1 The pilot lost control during flaring in preparation to land, which resulted in an uncontrolled spin. The helicopter drifted westerly towards the hangars before losing lift and, thus, impacted the ground.

3.4 Contributing Factor:

3.4.1 The wind at FAGC was 17kts gusting 24kts at the time of the accident which caused the pilot to lose control during landing.

4. SAFETY RECOMMENDATIONS

4.1. General

The safety recommendations listed in this report are proposed according to paragraph 6.8 of Annex 13 to the Convention on International Civil Aviation and are based on the conclusions listed in heading 3 of this report; the AIID expects that all safety issues identified by the Investigation are addressed by the receiving States and organisations.

4.2. Safety Recommendation/s

4.2.1 **Safety message:** It is quite critical for pilots to ensure that they obtain weather reports for the departure area/airport, en route and destination area/airport as part of their pre-flight planning in order to make an informed decision whether to undertake or abort the flight due to unfavourable (bad) weather conditions.

5. APPENDICES

5.1 None.

This report is issued by:

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