AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:		CA18/2/3/9842	
Aircraft Registration	**ZS-RRS**	**Date of Accident**	5 December 2019			**Time of Accident**	0900Z
Type of Aircraft	Robinson R44		**Type of Operation**			Agriculture (Part 137)	
Pilot-in-command Licence Type	Commercial Pilot Licence (Helicopter)		**Age**	34		**Licence Valid**	Yes
Pilot-in-command Flying Experience	Total Flying Hours		3903.8			Hours on Type	3557.4
Last point of Departure	Entumeni, KwaZulu-Natal Province						
Next Point of Intended Landing	Semungu, KwaZulu-Natal Province						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
Private farm at Semungu 11 nm south-west of Eshowe, KwaZulu-Natal (GPS position: be 29°02'54.81" South 031°22'1.72" East, at an elevation of 1255 feet)							
Meteorological Information	Wind: 225° 6kts gusting 17kts, Temperature: 16°C, Dew Point: 14°C, Visibility: 9999m, QNH: 1026 hPa						
Number of People On-board	1+0	**No. of People Injured**	0	**No. of People Killed**	1		
Synopsis							

On 5 December 2019, a pilot on-board a Robinson R44 helicopter with registration mark ZS-RRS, took off from Entumeni in KwaZulu-Natal with the intention of carrying out agricultural crop-spraying operation in Semungu, in the same province. The aircraft was operated under Part 137 of the Civil Aviation Regulations (CAR) 2011 as amended.

A second Robinson R44 helicopter with registration mark ZS-HIG was also conducting crop spraying in the area and was in constant communication with ZS-RRS helicopter. During the crop-spraying operation at approximately 0900Z, the ZS-HIG helicopter lost radio contact with ZS-RRS and, thus, initiated a search for the helicopter. After approximately 20 minutes of searching, the pilot of the ZS-HIG helicopter spotted black smoke rising from a valley. The pilot then flew towards the direction of the smoke where he located the wreckage of ZS-RRS helicopter, which was on fire.

After a witness account, it was established that the ZS-RRS aircraft had impacted powerlines along the ridge leading to the valley. One main rotor blade detached from the helicopter on impact with the powerlines. The helicopter then banked to the right and flew over the farm houses for a further 50 metres before impacting the ground. A post-impact fire ensued thereafter. The farm occupants rushed to the scene of the accident where they removed the pilot from the burning wreckage. However, the pilot had succumbed to his injuries and the helicopter was destroyed during the accident.

The investigation revealed that during a low-level crop-spraying operation, the helicopter impacted high-tension wires that spanned along its flight path, resulting in a loss of control and a subsequent crash.

Contributory factor was attributed to situational awareness.

SRP Date	13 October 2020	Publication Date	8 December 2020

ABBREVIATION	DESCRIPTION
AIID	Accident Incident Investigations Division
AMO	Aircraft Maintenance Organisation
AMSL	Above Mean Sea Level
AOC	Air Operating Certificate
CAR	Civil Aviation Regulation
C of A	Certificate of Airworthiness
C of R	Certificate of Registration
CPL (H)	Commercial Pilot Licence (helicopter)
CVR	Cockpit Voice Recorder
FDR	Flight Data Recorder
ft	Feet
G	Gusting
GPS	Global Positioning System
hPa	Hectopascal
kts	Knots
M	Meter
METAR	Meteorological Aeronautical Report
MPI	Mandatory Periodic Inspection
N/A	Not Applicable
NM	Nautical Mile
NTSB	National Transportation Board
PIC	Pilot in Command
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	**:** CA18/2/3/9842
Name of Owner	**:** Mormodes Investments CC
Name of Operator	**:** Vortx Aviation
Manufacturer	**:** Robinson Helicopter Company
Model	**:** R44
Nationality	**:** South African
Registration markings	**:** ZS-RRS
Place	**:** Semungu, KwaZulu-Natal Province
Date	**:** 5 December 2019
Time	**:** 0900Z

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****.*

Investigations process:

The accident was notified to the Accident and Incident Investigations Division (AIID) on 5 December 2019 at about 1000Z. The investigators dispatched to the accident site on 5 December 2019. 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 of the 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 Robinson R44 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 were limited to cropping, magnification, file compression; or enhancement of colour, brightness, contrast; or addition of text boxes, arrows or lines.

Disclaimer:

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

1. FACTUAL INFORMATION

1.1. History of Flight

1.1.1 On 5 December 2019, two Robinson R44 helicopters with registration marks ZS-RRS and ZS-HIG, each with a pilot on-board, departed Entumeni in KwaZulu-Natal province on a flight to Semungu, in the same province, with an intention to perform crop-spraying operation under Part 137 of the Civil Aviation Regulations (CAR) 2011 as amended.

1.1.2 Upon arrival at Semungu, the pilots divided the crop-spraying area into two sections, which were 6 kilometres (km) apart. The ZS-RRS helicopter took the east section and the ZS-HIG, the west. The helicopters had maintained radio contact with each other. At 0830Z, the ZS-HIG helicopter had completed the western section and had proceeded to land where the ground support team (crew) was stationed to uplift fuel and to fill the hopper tank. A short while later, the ZS-RRS helicopter also landed to uplift fuel and to fill the hopper tank. Thereafter, both helicopters took off to the east section to complete crop-spraying operation. The helicopters were now spraying within 3km of each other and still maintaining radio contact. At approximately 0900Z, the ZS-HIG helicopter made a radio call to ZS-RRS but there was no response. The pilot tried again seconds later, but there was still no response. The pilot then flew to the area where he had last spotted the ZS-RRS helicopter and did a grid search for it until he was low on fuel. He then flew back to where the ground support team was stationed to uplift fuel. One of the ground crew members got on-board the ZS-HIG helicopter to assist the pilot with the grid search. The pilot took off and flew back to the eastern section. Approximately five minutes into the second search, the pilot spotted black smoke and flew towards that direction. He spotted the wreckage of ZS-RRS which was engulfed in flames. The pilot landed close to the accident scene and shut down his helicopter engine.

1.1.3 An eye witness, who is the farm owner, stated that he observed the helicopter impacting high-tension wires. Thereafter, the helicopter flew towards his direction and over the house he was standing next to in a nose-down attitude, before it turned sharply to the right and impacted terrain. A post-impact fire ensued soon after and the farmer, together with his son, rushed to the accident site where they pulled out the pilot from the burning wreckage.

1.1.4 The pilot sustained fatal injuries during the accident sequence and the helicopter was destroyed by impact forces and a post-impact fire.

1.1.5 The accident occurred during daylight at Global Positioning System (GPS) co-ordinates determined to be 29° 02’ 54.81” South 031° 22’ 1.72” East at an elevation of 1 255 feet (ft) above mean sea level (AMSL).

Figure 1: Location of the accident site in the valley. (Source: Operator)

1.2. Injuries to Persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	1	-	-	-
Serious	-	-	-	-
Minor	-	-	-	-
None	-	-	-	-

1.3. Damage to Aircraft

1.3.1 The helicopter was destroyed during the accident sequence.

Figure 2: The helicopter wreckage post-impact.

1.4. Other Damage

1.4.1 The helicopter had struck powerlines that spanned along its flight path, which were approximately 10 metres from the ground. The cables were severed by the main rotor blades.

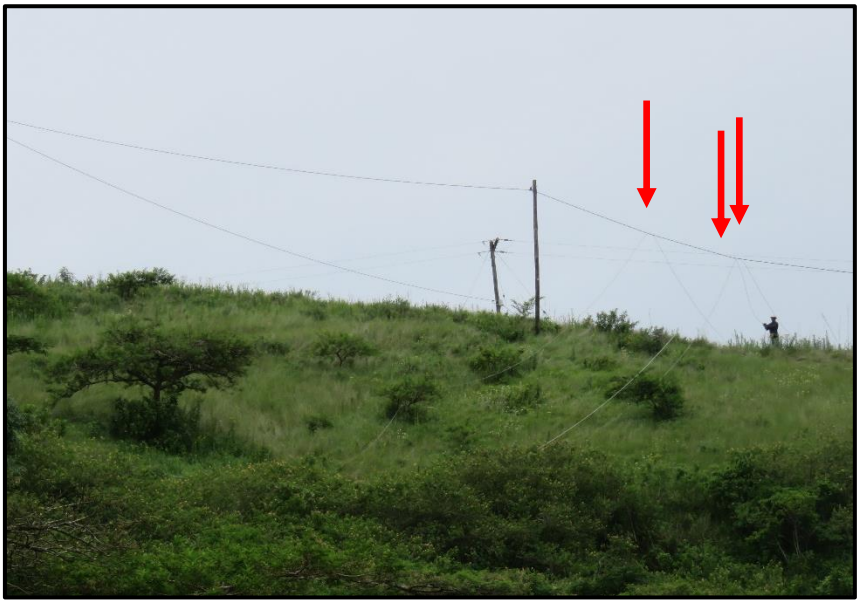

Figure 3: Damaged high-tension wire.

1.5. Personnel Information

1.5.1 Pilot-in-Command (PIC)

Nationality	South African	Gender	Male	Age	34
Licence Number	0272249087	Licence Type	CPL (H)		
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Cull/Livestock				
Medical Expiry Date	31 July 2020				
Restrictions	None				
Previous Accidents	None				

Flying Experience:

Total Hours	3903.8
Total Past 90 Days	unknown
Total on Type Past 90 Days	unknown
Total on Type	3557.4

1.5.2 The pilot's logbook could not be located at the time of completion of this report. A summary of his total flight hours was logged from 7 February 2019 to 16 October 2019. The information about the flight hours was gathered from the logbook copies submitted for the pilot's annual licence renewal at the SACAA.

According to the logbook copies dated from 7 February 2019 to 16 October 2019, the pilot had flown several flights in the KwaZulu-Natal province with a total of 62 hours in the Eshowe area. The logbook copies do not specify which part of Eshowe. The pilot had flown both ZS-RRS and ZS-HIG helicopters previously, which are fitted with the Simplex Spray system.

1.5.3 No evidence could be obtained to indicate that the pilot was in possession of an agricultural rating stipulated in Part 137.01.2 of the CAR 2011 as amended (see Appendix A). The operator stated that the pilot did not have an agricultural rating as he was still training under supervision to obtain the rating.

1.5.4 The operator was requested to provide the investigation team with the following documents: the pilot's Pest Control Operator's Certificate, the pilot's logbook copies indicating the agricultural dual training, the name of the flight instructor who conducted the dual training and the name of the flight instructor who supervised the 10 hours stipulated in Part 61.25.1 subpart 1d of the CAR 2011 as amended (see Appendix A). The operator submitted the documents on 29 October 2020, which was 20 days after they were sent a draft final report, and these documents indicated the following:

a. The operator stated that the pilot completed the Pest Management course and was working towards attaining his Pest Control Operator's Certificate. An Aerial Application Certificate dated 21 January 2019 was forwarded to the investigating team on 29 October 2019.

b. The operator stated that the pilot undertook his dual training on 10 January 2019 with an agricultural-rated instructor and, on the day of the accident, the pilot who flew the ZS-HIG aircraft, also an agricultural-rated pilot, was supervising the (accident) pilot. A flight authorisation sheet dated 10 January 2019 indicating the dual training was forwarded to the investigating team on 29 October 2019.

c. The flight folio pages from four different Robinson R44 helicopters, dated between 10 January 2019 and 29 September 2019, indicated that the pilot flew 2.0 hours dual flights, 1.8 solo flights and a further 85.9 hours of agricultural flights under supervision. The above flight folio copies were forwarded to the investigating team on 29 October 2019.

1.6. Aircraft Information

1.6.1 *Robinson R44 Pilot Operating Handbook, Section 7: System description*

The R44 is a four-place, single main rotor, single engine helicopter constructed primarily of metal and equipped with skid-type landing gear. The primary fuselage structure is welded steel tubing and riveted aluminium sheet. The tail-cone is a monocoque structure in which aluminium skins carry most primary loads. Fiberglass and thermoplastics are used in secondary cabin structure, engine cooling shrouds, and various other ducts and fairings. The cabin doors are also constructed of fiberglass and thermoplastics. Four right-side cowl doors provide access to the main gearbox, drive system and engine. A left-side engine cowl door provides access to the engine oil filler and dip stick. Additional access to controls and other components for maintenance are provided by removable panels and cowlings. Stainless steel firewalls are located forward of and above the engine. The four cabin doors are removable.

Airframe:

Type	R44	
Serial Number	0857	
Manufacturer	Robinson Helicopter Company	
Date of Manufacture	2000	
Total Airframe Hours (At time of Accident)	3192.1	
Last MPI (Date & Hours)	20 February 2019	3123.1
Hours since Last MPI	69.0	
C of A (Initial Issue Date)	27 September 2009	
C of A (Expiry Date)	30 September 2020	
C of R (Issue Date) (Present owner)	3 August 2015	
Operating Categories	Agricultural (Part 137)	

Engine:

Type	Lycoming O-540-F1B5
Serial Number	L-25692-40A
Hours since New	3192.1
Hours since Overhaul	1193.5

Main Rotor blades:

Type	CO16-7	CO16-7
Serial Number	15101	15112
Hours since New	1193.5	1193.5
Hours since Overhaul	TBO not reached	TBO not reached

1.6.2 Both helicopters had refuelled from the same bowser on the day of the accident. The pilot flying the ZS-HIG helicopter did not report any fuel-related anomalies. According to available records, the last fuel sample taken from the fuel bowser was on 29 November 2019.

The last known fuel upload was at 0830Z when both helicopters uploaded fuel to continue with crop-spraying operation. There were no records found to determine how much fuel was uploaded.

1.6.3 On 11 August 2015, the accident helicopter was fitted with a Simplex Helipod III agricultural spray. The aircraft was reweighed, and the weight and balance report was updated with a new empty weight of 1657.2 lbs.

1.6.4 *DART's Simplex Aerospace Model 244 Spray System for the Robinson R44*

The system consists of a belly mounted carbon fiberglass tank, which holds 284 litres (75 gallons) of liquid. The forward mounted boom has a width of 10 metres/33 feet. Other features include a gas-driven spray pump and motor, simultaneous use of cargo hook capable, and flow meter.

Figure 4: A R44 helicopter with a Simplex Spray System. (Source: Dart Aerospace)

1.7. Meteorological Information

1.7.1 The weather report, a Meteorological Aeronautical Report (METAR), was obtained from the South African Weather Service (SAWS) for 5 December 2019 at 0900Z.

Wind direction	225°	Wind speed	6G17kts	Visibility	9999m
Temperature	16°C	Cloud cover	Nil	Cloud base	Nil
Dew point	14°C	QNH	1026hPa		

1.8. Aids to Navigation

1.8.1 The helicopter was equipped with standard navigational equipment as approved by the Regulator (SACAA) for the helicopter type. No defects that rendered the navigation system unserviceable were recorded prior to the flight.

1.9. Communication

1.9.1 The helicopter was equipped with standard communication equipment as approved by the Regulator for the helicopter type. No defects that rendered the communication system unserviceable were recorded prior to the flight. The pilot of ZS-RRS helicopter was in constant radio contact with the pilot of ZS-HIG helicopter during the crop-spraying operation.

1.10. Aerodrome Information

1.10.1 The accident did not occur at or close to any aerodrome. The location of the accident was at Semungu, which is 12 nautical miles (nm) south-west of Eshowe, KwaZulu-Natal, at GPS co-ordinates 29°02'54.81" South 031°22'1.72" East.

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 for these to be fitted to this helicopter type.

1.12 Wreckage and Impact Information

1.12.1 The helicopter approached the eastern farm from the west and, as the helicopter attempted to fly over the farm, one of the main rotor blades impacted the powerlines which were running from a south-westerly to a north-easterly direction. After impacting the powerlines, one main rotor blade detached from the helicopter and the pilot lost control before the helicopter flew towards the farm houses. The helicopter flew over the house next to where the farm owner was standing, turned right towards the kraal, and impacted the ground on its right-side before settling on both skids.

1.12.2 The helicopter came to rest on the eastern slope of a hill facing south. A post-impact fire ensued and further destroyed the helicopter, excluding the tail boom and tail rotor.

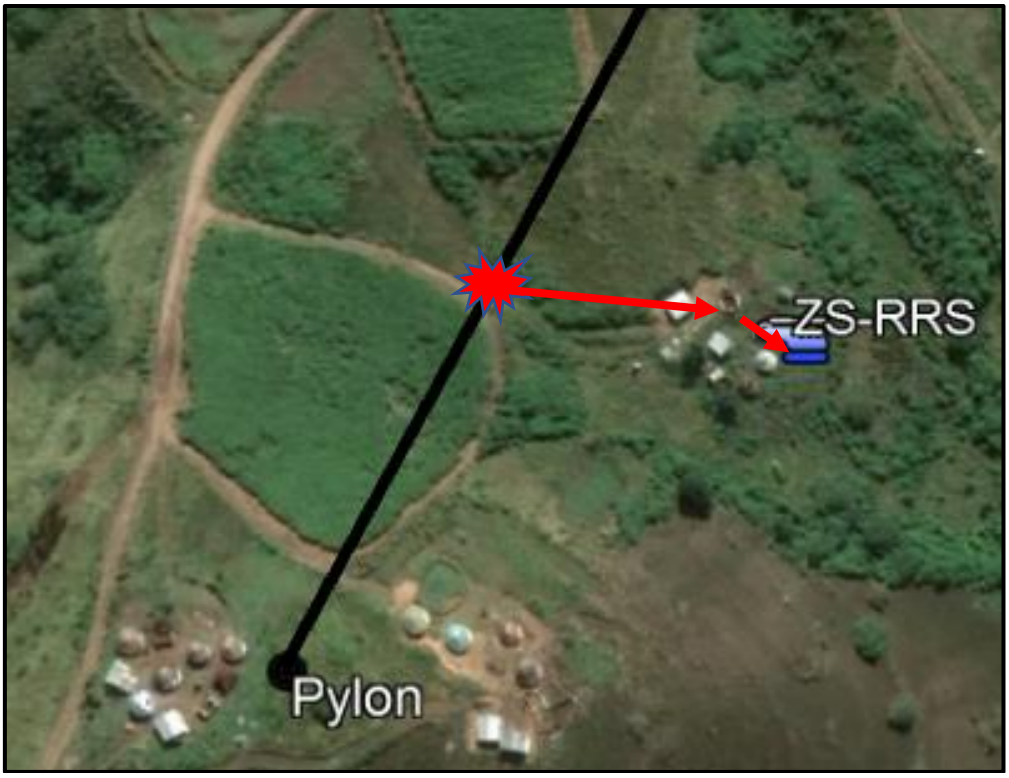

Figure 5: The flight path of the helicopter's impact with powerlines and, later, the ground. (Source: Google Earth)

1.12.3 One of the main rotor blades remained attached to the main rotor hub. It displayed signs of an impact damage (bends at two points). A part of the other main rotor blade was severed when the helicopter impacted the powerlines; it was located in tall grass approximately 200m to the west of the wreckage (same position where the powerlines were severed).

Figure 6: The main rotor blade assembly after the accident.

1.12.4 The tail boom root section exhibited compression load stress, indicative of high-energy impact, and was also bent (See Figure 7). The vertical fin was intact, but the horizontal fin was bent, an indication that the helicopter impacted the ground on its right-side before settling on both skids. The tail rotor blades were still attached to the tail rotor hub, with one of the blades exhibiting damage on the tip; an indication of impact with the ground. The tail stinger was not damaged. The tail gearbox showed no signs of damage on the shaft and there were no signs of oil splatter.

Figure 7: Tail rotor section: the first frame shows the left-side view and the second frame shows the rear view.

1.12.5 The cockpit and the cabin section were consumed by post-impact fire. The turn co-ordinator on the instrument panel indicated that the helicopter was banking to the right before impact.

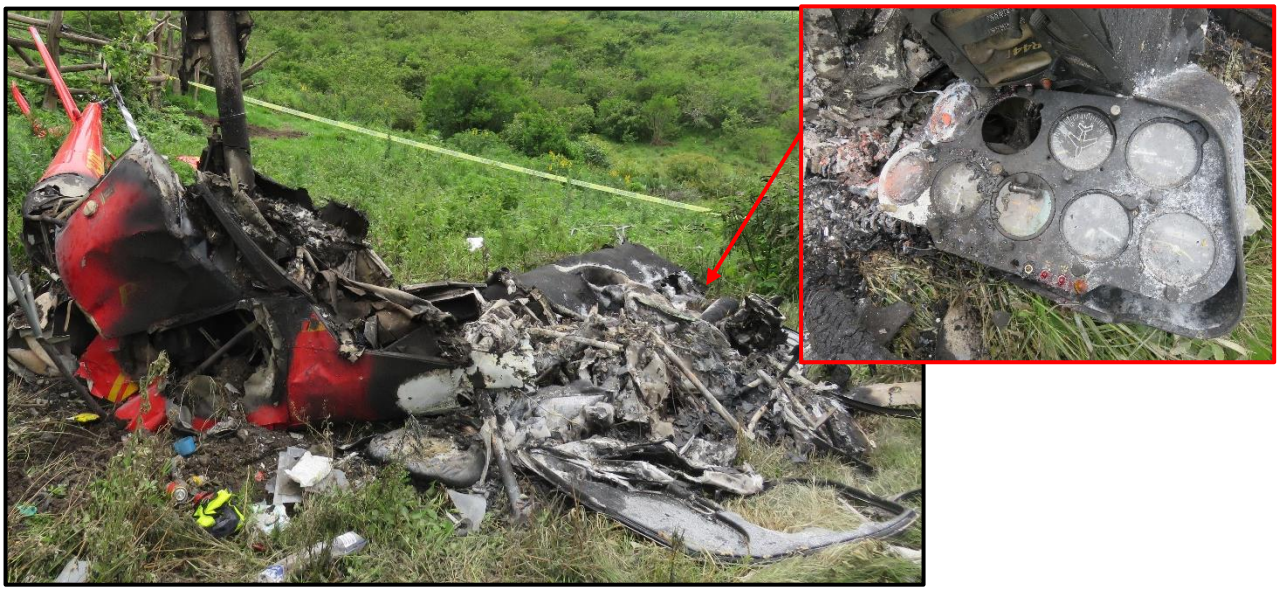

Figure 8: Destroyed cockpit and cabin area.

1.12.6 The tail rotor drive shaft had signs of being twisted as a result of the tail boom bending (away) from the rest of the helicopter during impact (see Figure 9, top-left frame). The vee belts on the sheave that are directly bolted onto the engine output shaft were severed as a result of sudden stoppage, indicative of an engine that was producing power when the helicopter impacted the ground (see Figure 9, top-right frame). There was a crack that spanned all around the mast, also indicative of a sudden stoppage; half of the mast cover was burnt (see Figure 9, bottom-left frame). The engine was still attached onto its mounts in a relatively good condition, with outer burn marks (see Figure 9, bottom-right frame).

Figure 9: The drive system section.

1.12.7 The bottom half and part of the top half of the crop-spraying tank were burnt. The tank was found on the left-side of the wreckage. The tank's strainer was found under the wreckage while the hoses were recovered on the left- and right-side of the wreckage.

Figure 10: The crop-spraying kit.

1.13 Medical and Pathological Information

1.13.1 The pilot's post-mortem report was not yet available at the time of finalising this report. Should any of the results have a bearing on the circumstances leading to the accident, they will be treated as new evidence and that will necessitate the reopening of the investigation.

1.14 Fire

1.14.1 There was no pre-impact fire, but the helicopter was consumed by the fuel-fed post-impact fire.

1.15 Survival Aspects

1.15.1 The accident was deemed unsurvivable due to the impact damage sustained in the cockpit/cabin area.

1.16 Tests and Research

1.16.1 Not applicable.

1.17 Organisational and Management Information

1.17.1 The operator was issued an Air Operator Certificate (AOC) on 14 May 2019 with an expiry date of 28 February 2020. The helicopter was authorised to operate in air services in terms of Part 127 of the Civil Aviation Regulations of 2011 as amended, with the air service G5, agricultural spraying seeding and dusting.

1.17.2 The operator was requested to furnish the investigators with documents stated in paragraph 1.5.4 and had failed to submit the requested documents until the AIID submitted a draft final report to them for comments on 9 October 2020. The operator only sent the requested

documents to the investigators on 29 October 2020, which was 20 days after the operator had received the draft final report. This was in contravention of CAR 2011 Part 12.01.9 as amended which states:

(1) In addition to any other power granted to or duty imposed on an Investigator-in-Charge (IIC) or an Investigator under any part of the regulations, such IIC or Investigator may—

(k) call upon the owner, operator or PIC of any aircraft to produce or cause to be produced for inspection or investigation any licence, certificate, manual, logbook or other document relating to the aircraft or crew.

1.17.3 The aircraft maintenance organisation (AMO) was issued a Part 145 Approval Certificate on 13 November 2019 with an expiry date of 30 November 2020. The AMO had carried out the installation of the spray kit on 11 August 2015.

1.18 Additional Information

1.18.1 Extract from lookupandlive.com.au

There are electrical overhead powerlines criss-crossing the country. Often unnoticed, they are essential to provide electricity to our towns and communities. Contact with overhead powerlines can cause serious injury or death.

Practice safe work habits

• Before starting work, take the time to plan.
• Conduct a pre-flight briefing and do a pre-flight reconnaissance.
• Apply appropriate flying techniques.
• Maintain situational awareness for co-pilot and crew.
• Read the physical structure indicators, e.g. poles and insulators and identify verbally all structures if flying with others.
• Know the location of powerlines on and around the property or the area you are flying in.
• Consider weather conditions.
• Guard against deviating from low-flying routes and areas that have been previously checked for powerlines and other cables.
• Cross over powerlines at poles or structures rather than mid–span where possible.
• Be aware of reduced powerline heights resulting from damage, often indicated by uneven cables, excessive sag or slack stays.
• Ensure all new members of the crew are inducted on the risks so they understand potential electrical hazards with powerlines.

1.19 Useful or Effective Investigation Techniques

1.19.1 None.

2. ANALYSIS

General

From the evidence available, 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 Man

The pilot was issued a Commercial Pilot Licence (CPL) with the helicopter type endorsed on it. The operator had stated that the pilot was under supervised training for an agricultural rating. The pilot completed the Pest Management course and was certified with an Aerial Application Certificate. He conducted his dual training with an agricultural-rated pilot and was

still flying under supervision during the accident flight.

The pilot had accumulated 3903.8 total flight hours, with 3557.4 hours on the Robinson R44 helicopter type as of the last skills test. Logbook copies dated 7 February 2019 to 16 October 2019 showed that the pilot flew a total of 62 hours in Eshowe, but they do not specify whether any of these flights were specifically in the Semungu area where the accident occurred. The flight folio pages from four different Robinson R44 helicopters, dated between 10 January 2019 and 29 September 2019 indicated that the pilot accumulated approximately 89.7 agricultural flight hours. It is likely that the pilot did not maintain situational awareness during the flight which resulted in the wire strike.

2.2 Aircraft

The helicopter was properly maintained by the AMO and no mechanical defects or malfunctions were reported prior to the flight that could have contributed to the accident. The AMO, which maintained the helicopter, was issued a Maintenance Approval Certificate which allowed the organisation to maintain the helicopter.

The last Mandatory Periodic Inspection (MPI) was carried out and certified by the approved AMO on 20 February 2019 at 3123.1 airframe hours. The helicopter flew a further 69.0 hours until the accident flight.

2.3 Mission

The ZS-RRS helicopter was on a crop-spraying operation at a farm in the eastern section of Semungu area. At approximately 0900Z, the second helicopter (ZS-HIG) that was also involved in crop spraying in the vicinity, lost radio contact with the ZS-RRS pilot. The ZS-HIG pilot then flew to the area where he last spotted the ZS-RRS helicopter and did a grid search until he was low on fuel. He then flew back to the fuelling / loading zone to uplift more fuel, where after, one of the ground crew members got on-board with the pilot to help with the grid search. About five minutes into the search, the pilot spotted black smoke and he flew towards it where he located the wreckage of the ZS-RRS which was engulfed in flames. A witness stated that the ZS-RRS helicopter was flying above a ridge when the main rotor blade made contacted with high-tension wires. The helicopter then flew towards the farm houses, banked towards the right and subsequently impacted the ground. A post-impact fire ensued soon after, burning most of the aircraft except for the tail boom and tail rotor. The pilot was fatally injured during the accident.

2.4 Environment

The accident occurred during daylight at GPS co-ordinates determined to be 29°02’54.81” South 031°22’1.72” East at an elevation of 1255ft AMSL.

At the time of the accident, the weather was visual meteorological condition (VMC) with no reports of any significant conditions that may have adversely affected the operation of the helicopter. The helicopter was operating under visual flight rules (VFR) by day.

The accident occurred on a farm in a valley that had high-tension powerlines running from a south-westerly to a north-easterly direction.

2.5 The investigation revealed that during a low-level crop-spraying operation, the helicopter impacted high-tension wires that spanned along its flight path, resulting in loss of control and a subsequent crash. Contributory factor was attributed to situational awareness.

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 conclusions 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 initially issued a Commercial Pilot Licence (CPL) on 21 May 2010 and, after his last skills test which was carried out on 13 November 2019, he was issued a renewed licence with an expiry date of 30 November 2020. The pilot held the necessary aircraft type rating to operate the helicopter but did not possess an agricultural rating as he was still flying under supervision. He had flown a total of 3557.4 hours on type. The pilot was issued a Class 1 aviation medical certificate on 24 July 2019 with an expiry date of 31 July 2020 with no limitations.

3.2.2 The helicopter was issued a certificate of airworthiness on 27 September 2009 with an expiry date of 30 September 2020. The helicopter was initially issued a certificate of registration on 3 August 2015.

3.2.3 The last scheduled MPI was certified on 20 February 2019 at 3123.1 airframe hours. The helicopter had accumulated an additional 69.0 airframe hours since its last inspection.

3.2.4 The operator was issued an Air Operator Certificate (AOC) on 14 May 2019 with an expiry date of 28 February 2020. The helicopter was authorised to operate in air services in terms of Part 127 of the Civil Aviation Regulations 2011 as amended, with the air service G5, agricultural spraying seeding and dusting.

3.2.5 The aircraft maintenance organisation (AMO) was issued a Part 145 Approval Certificate on 13 November 2019 with an expiry date of 30 November 2020. The AMO had carried out the installation of the spray kit on 11 August 2015.

3.2.6 The weather at the time of the accident was visual meteorological condition (VMC) with no reports of any significant conditions that may have adversely affected the operation of the helicopter. The helicopter was operating under visual flight rules (VFR) by day.

3.2.7 The operator was requested to furnish the investigators with documents stated in paragraph 1.5.4 and had failed to submit the requested documents until the AIID submitted a draft final report to them for comments on 9 October 2020. The operator only sent the requested documents to the investigators on 29 October 2020, which was 20 days after the operator had received the draft final report. This was in contravention of CAR 2011 Part 12.01.9 as amended.

3.2.8 The investigation revealed that during a low-level crop-spraying operation, the helicopter impacted high-tension wires that spanned along its flight path, resulting in loss of control and a subsequent crash. Contributory factor was attributed to situational awareness.

3.3. Probable Cause

3.3.1 The helicopter collided with powerlines during an agricultural crop-spraying operation, which caused the pilot to lose control of the helicopter before impacting the ground.

3.4 Contributory Factor

3.4.1 Lack of situational awareness.

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 organisation.

4.2. Safety Recommendation

4.2.1 None.

5. APPENDICES

5.1 Appendix A: Extracts from CAR 2011 as amended

5.2 Appendix B: Flight Authorisation Sheet

5.3 Appendix C: Aerial Application Certificate

This Report is issued by:

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

Appendix A: Extracts from CAR 2011 as amended

Part 61.25.1 Requirements for an Agricultural Pilot Rating

(1) An applicant for an Agricultural Pilot Rating must—

(a) hold a valid pilot licence issued in terms of Part 61 or Part 62 in the category aeroplane or helicopter, as applicable, and in the event of acting for remuneration, hold at least a valid CPL (Aeroplane or Helicopter) or a valid Part 96 authorisation, as applicable;

(b) hold the appropriate class or type rating;

(c) hold a current Pest Control Operator's Certificate issued in terms of the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947);

(d) have acquired the experience that include at least completion of not less than 300 hours of flight time, which must include not less than 30 hours in the case of aeroplanes and 10 hours in the case of helicopters, of flight experience in aerial application under supervision; and

(e) have undergone the skills test referred to in regulation 61.25.2.

(2) At least 2 hours of the flight experience referred to in sub regulation (1) must be dual instruction conducted by the holder of an appropriately rated Grade I or a Grade II flight instructor who shall be the holder of the appropriate category, class or type rating and the Agricultural Pilot Rating. The balance of the prescribed flight experience may be conducted under the supervision of the holder of a valid CPL or ATPL (Aeroplane or Helicopter, as the case may be) with an Agricultural Pilot Rating, designated by the Director in writing for the purpose.

Part 137.01.2 Requirements for ratings of flight crew and competency of operations personnel:

(1) A pilot of an aircraft engaged in an agricultural operation, shall hold—

(a) a valid agricultural pilot rating issued in terms of Subpart 25 of Part 61 for the category of aircraft used; and

(b) pest control operator's certificate issued in terms of the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947).

Part 12.01.9 Powers of the Investigator-in-Charge or an Investigator

(1) In addition to any other power granted to or duty imposed on an Investigator-in-Charge (IIC) or an Investigator under any part of the regulations, such IIC or Investigator may—

(k) call upon the owner, operator or PIC of any aircraft to produce or cause to be produced for inspection or investigation any licence, certificate, manual, logbook or other document relating to the aircraft or crew.

FLIGHT AUTHORISATION SHEET

DATE: From – 10 / 01 / 2019 To – / /

Date	Aircraft	P.I.C.	Student/Pax	Type of Flight	Duration of Flight	Task	Authorisation	Student/Pilot Signature	Time Start	Time Stop	Duration	Pilot Signature After Flight
10/01/19	ZS-RNF			Agg O.	1 hour	Agg Int			3143.1	3144.2	1.1	
10/01/19	ZS-RNI			Agg P	1 hour	Agg Int			3144.2	3145.2	1.0	
11/01/19	ZS-RNI			Agg T	1 hour	Agg Tr			3145.2	3146.4	1.2	
11/01/19	ZS-RNI			Agg T	1 hour	Agg Tr			3146.4	3147.4	1.0	
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NOTE: The pilot signature in column 8 signifies that:

a) He/she has ascertained that the flight has been authorised in accordance with the requirements of the Civil Aviation Regulations, Technical Standards, 1997, as amended, and Air Navigation Regulations, 1976.

b) He/she is fully conversant with the sequence of instructions authorised, or the nature of the flight authorised and understands that the flight is not to include any exercised that are not authorised.

c) He/she is fully conversant with the applicable Air Navigation Regulations, 1976, as amended, as well as the Civil Aviation Regulations & Civil Aviation Technical Standards, 1997, as amended.

d) The aircraft is properly equipped for the proposed flight in terms of the regulations mentioned in (a) above.

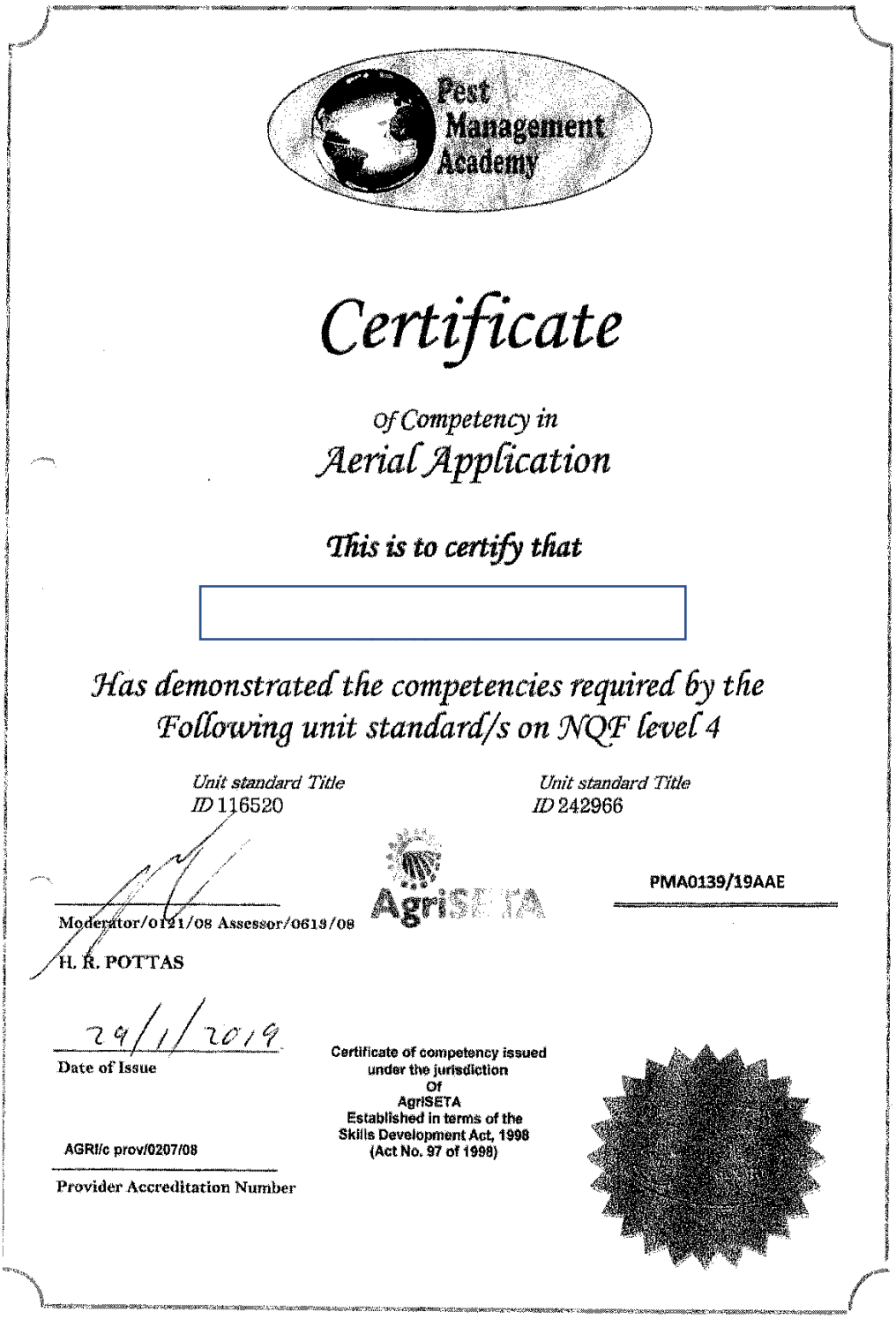
e) There is sufficient fuel and oil in the aircraft for the duration of the proposed flight.

f) That he/she is to carry out a pre-flight inspection on the aircraft in accordance with the relevant manufacturer handbook or approved maintenance schedule of the aircraft about to be flown and that he/she is satisfied that the aircraft is in every way fit for flight.

(g) The after flight initials of the pilot in column 13 signifies that:

The pilot/accepts that he/she has completed the flying sequences as detailed and that he/she is liable for payment of the time flown as indicated in column 12.

Appendix C: Aerial Application Certificate



Pest Management Academy

Certificate

Of Competency in

Aerial Application

This is to certify that

Has demonstrated the competencies required by the Following unit standard/s on NQF level 4

Unit standard Title *ID* 116520

Unit standard Title *ID* 242966

PMA0139/19AAE

Moderator/0121/08 Assessor/0613/08

H. R. POTTAS

29/1/2019

Date of Issue

AGRI/c prov/0207/08

Provider Accreditation Number

Certificate of competency issued under the jurisdiction Of AgriSETA Established in terms of the Skills Development Act, 1998 (Act No. 97 of 1998)