



## AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

|  |   |                              |                          |                             |                         |       |
|--|---|------------------------------|--------------------------|-----------------------------|-------------------------|-------|
|  |   |                              |                          | Reference:                  | CA18/2/3/9619           |       |
| <b>Aircraft Registration</b>   | ZS-RIT  | <b>Date of Accident</b>      | 20 May 2017              |                             | <b>Time of Accident</b> | 1145Z |
| <b>Type of Aircraft</b>  | Robinson R22  |                              | <b>Type of Operation</b> | Agricultural Part (137)     |                         |       |
| <b>Pilot-in-command Licence Type</b>   | CPL   | <b>Age</b>                   | 49                       | <b>Licence Valid</b>        | Yes                     |       |
| <b>Pilot-in-command Flying Experience</b>  | Total Flying Hours  | 1603.6                       |                          | Hours on Type               | 1044.2                  |       |
| <b>Last point of departure</b>   | Margate Airport (FAMG), Kwa-Zulu Natal Province   |                              |                          |                             |                         |       |
| <b>Next point of intended landing</b>  | Emtentweni (temporary landing zone), Kwa-Zulu Natal   |                              |                          |                             |                         |       |
| <b>Location of the accident site with reference to easily defined geographical points (GPS readings if possible)</b> |   |                              |                          |                             |                         |       |
| 2.17nm north west of Port Shepstone GPS coordinates S30° 42' 55" E030° 26' 08.9" at an elevation of 44ft.            |   |                              |                          |                             |                         |       |
| <b>Meteorological Information</b>  | Wind light and variable; CAVOK; Temperature 29°C Dew Point 12°C   |                              |                          |                             |                         |       |
| <b>Number of people on board</b>   | 1+0   | <b>No. of people injured</b> | 0                        | <b>No. of people killed</b> | 1                       |       |
| <b>Synopsis</b>  | <p>The pilot of ZS-RIT was scheduled to crop spray six sugar cane fields in the Port Shepstone area. He finished spraying 5 fields and was preparing for the sixth one which was 1.3nm from the loading zone. The helicopter took off at 1140Z and climbed to 500ft AGL and headed for the sugar cane field. The helicopter descended to approximately 6ft AGL and started spraying from east to west. On reaching the end of the field, the pilot pulled up to initiate a turning manoeuvre but then collided with the high tension electrical cables running across the field. The helicopter's main rotors flexed downwards and severed the helicopter's tail boom into two pieces. The pilot lost control of the helicopter which entered into an uncontrollable spin. This resulted in the helicopter losing height and crashing into a stream approximately 60 meters from the point of impact. The pilot was fatally wounded and the helicopter destroyed.</p> |                              |                          |                             |                         |       |
| <b>Probable Cause</b>  |   |                              |                          |                             |                         |       |
| The helicopter impacted high tension electrical cables during a climb.   |   |                              |                          |                             |                         |       |
| SRP Date   | 12 September 2017   |                              | Release Date             | 19 September 2017           |                         |       |



## AIRCRAFT ACCIDENT REPORT

**Name of Owner** : KKS SAND AND STONE CC  
**Name of Operator** : Triple R Aviation  
**Manufacturer** : Robinson Helicopter Company  
**Model** : R22  
**Nationality** : South African  
**Registration Marks** : ZS-RIT  
**Place** : Port Shepstone  
**Date** : 20 May 2017  
**Time** : 1145Z

*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 (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 establish blame or liability.***

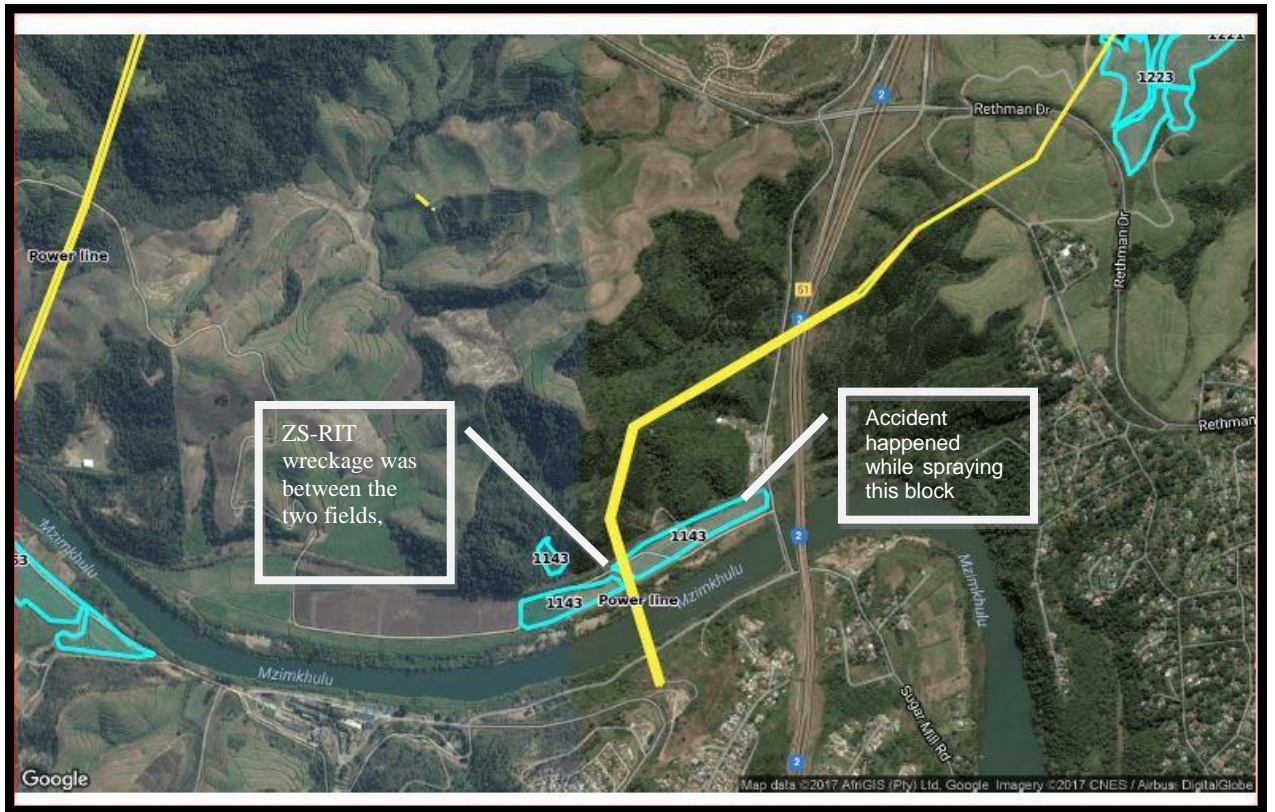
### **Disclaimer:**

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

## **1. FACTUAL INFORMATION**

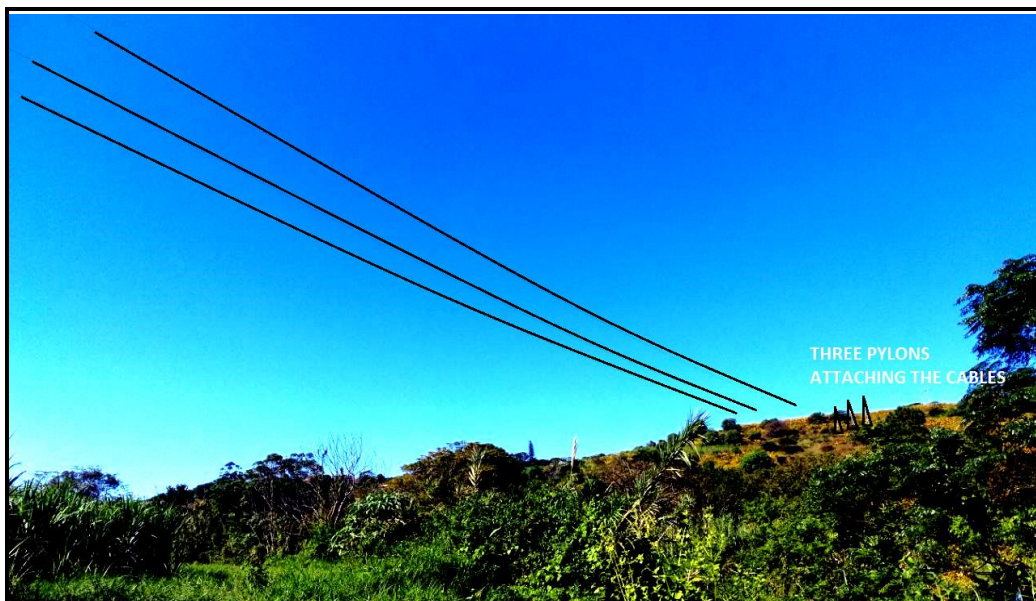
### **1.1 History of Flight**

1.1.1 The pilot of ZS-RIT was scheduled to crop spray six separate sugar cane fields in the Port Shepstone area. The sugar cane fields belonged to one of the local sugar cane milling companies. The flight departed Margate Airport (FAMG) at approximately 0830Z, with both doors removed to save weight, and would relocate to a loading zone (1.3nm east of the spray zone) where an insecticide was mixed and loaded for the next detail.



**Figure 1:** The sugar cane blocks to be sprayed indicating the position of the power lines. Picture supplied by the sugar milling company.

1.1.2 After spraying 5 fields on figure 1, the assistant indicated that they made 50 litres of the solution and they filled the helicopter with 12 litres of AVGAS 100LL. At 38L/h, the helicopter would fly for at least 18 minutes. The assistant indicated that the helicopter took off at 1140Z and that they were spraying this field for the first time.



**Figure 2:** The high tension electrical cables impacted by the helicopter.

- 1.1.3 The investigating team enquired about safety briefing held before the flight and the safety officer indicated that they normally have safety meetings regularly to enforce adherence to proper safety standards. The pilot used a system called “Tracmap (the device was waterlogged and damaged. A download was not possible.)” to accurately follow spray lanes on the fields. The pilot would arrive at safe height approximately 500ft AGL to survey and then once satisfied he would descend to approximately 6 feet above the sugar cane and start spraying. In this particular case it seems the pilot started on the eastern side and proceeded to the west and when he was near the end of the field he initiated a climb to make a turn for the return leg.
- 1.1.4 On his climb, the helicopter’s main rotor blades impacted some of the three high tension power cables that were running north to south, see figure 2&4. After the impact, the helicopter’s main rotor blades curled downwards and started to inflict damage to the tail boom, tail rotor and the spray equipment. The components were severed into two parts and the pilot lost control of the helicopter and entered into an uncontrollable spin which resulted in the helicopter crashing approximately 60 meters west of the point of impact.
- 1.1.5 The pilot was fatally injured and the helicopter was destroyed. The helicopter crashed into a river stream which feeds UMzimkhulu River and ended up on its bank. The river was shallow considering the height of its bank and that made the recovery manageable. The accident happened at a sugar plantation that is 1.7nm from Port Shepstone with the following coordinates GPS S30° 42’ 55” E030° 26’ 08.9” elevation 44ft.

## 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.

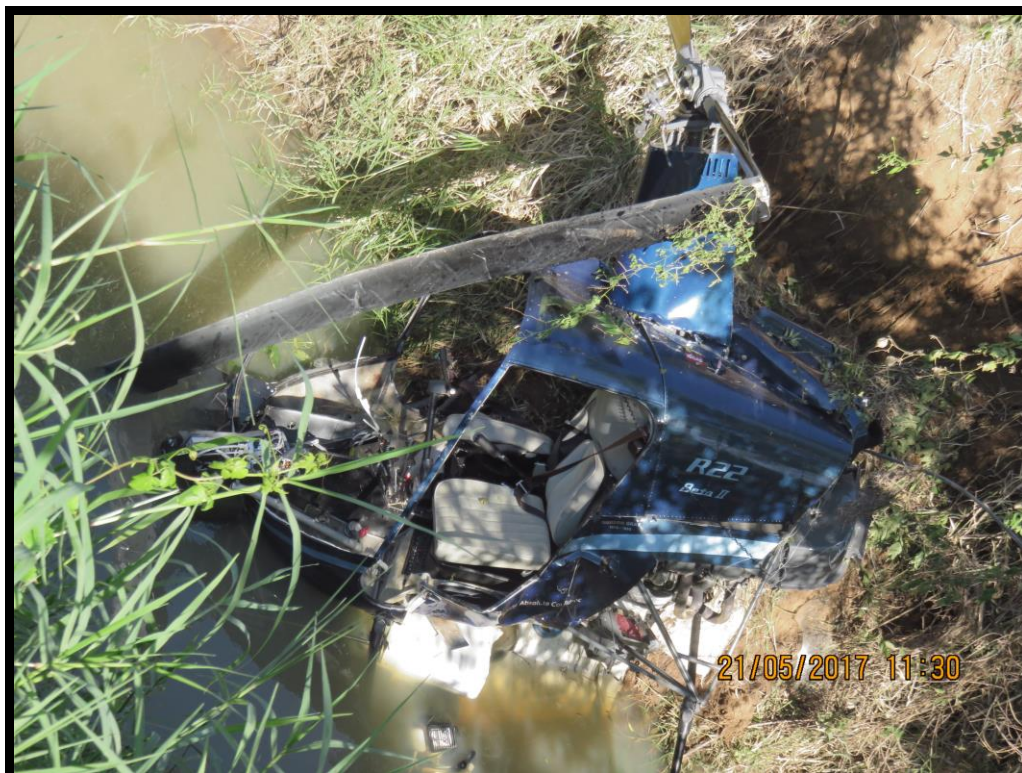


Figure 3: The River is approximately 3m deep. Water depth was less than 1m.

### 1.4 Other Damage

1.4.1 None. There was no visible oil or Avgas spillage in the river. The high tension power cables impacted by the helicopter did not break.

### 1.5 Personnel Information

|                     |  |               |      |     |    |
|---------------------|--|---------------|------|-----|----|
| Nationality         | South African  | Gender        | Male | Age | 49 |
| Licence Number      | 0272320656   | Licence Type  | CPL  |     |    |
| Licence valid       | Yes  | Type Endorsed | Yes  |     |    |
| Ratings             | Agricultural, test pilot, instructors GII, Night   |               |      |     |    |
| Medical Expiry Date | 31/12/2017   |               |      |     |    |
| Restrictions        | Corrective lenses  |               |      |     |    |
| Previous Accidents  | CA18/2/3/9535 – On the 27/02/2017 the pilot lost control during a climb. One of the skids dug into the ground and the helicopter entered a dynamic rollover and crashed. The accident report has not been finalised. |               |      |     |    |

Flying Experience:

|                            |        |
|----------------------------|--------|
| Total Hours                | 1603.6 |
| Total Past 90 Days         | 24.6   |
| Total on Type Past 90 Days | 24.6   |
| Total on Type              | 1044.2 |

- 1.5.1 The pilot satisfied the hours set out by the company and has the correct rating. The company minimum requirements are 500 hours on type and 1000 hours on helicopters. See Appendix A

## 1.6 Aircraft Information

**Airframe:**

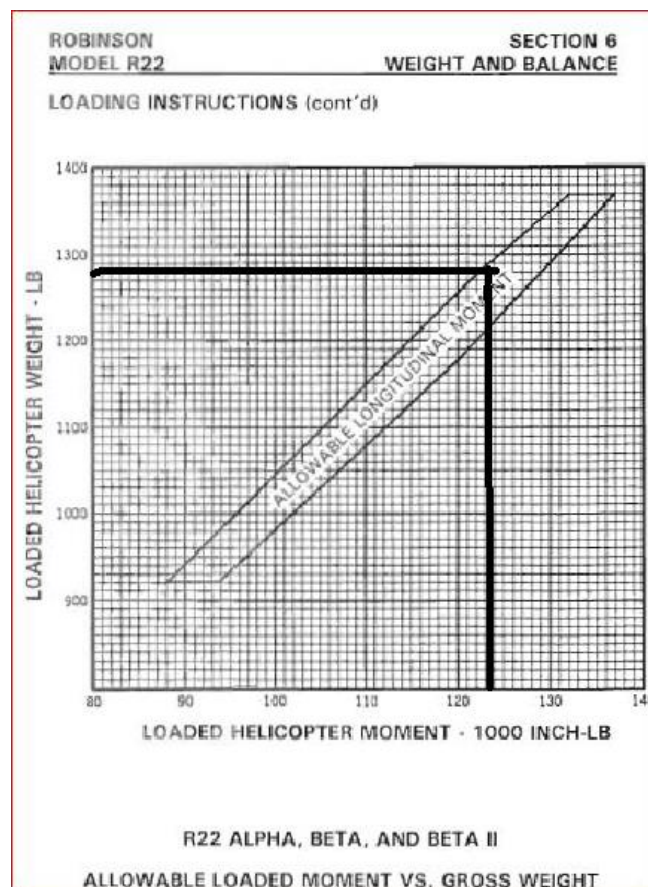
|  |                             |        |
|--|-----------------------------|--------|
| Type                                       | R22 Beta                    |        |
| Serial Number                              | 4119                        |        |
| Manufacturer                               | Robinson Helicopter Company |        |
| Date of Manufacture                        | 05 September 2006           |        |
| Total Airframe Hours (At time of Accident) | 1921.8                      |        |
| Last MPI (Date & Hours)                    | 26/04/2017                  | 1890.9 |
| Hours since Last MPI                       | 30.9                        |        |
| C of A (Date Of Expiry)                    | 27/08/2017                  |        |
| C of R (Issue Date) (Present owner)        | 29/07/2015                  |        |
| Operating Categories                       | Part 137                    |        |

**Engine:**

|                      |                    |
|----------------------|--------------------|
| Type                 | Lycoming O-360-J2A |
| Serial Number        | L-40394-36A        |
| Hours since New      | 1921.8             |
| Hours since Overhaul | TBO not reached    |

## WEIGHT AND BALANCE

| Item                              | Entered Load | Weight (lb.) | Arm (inches) | Moment (in.lb) |
|-----------------------------------|--------------|--------------|--------------|----------------|
| Basic empty weight                | 400.4        | 881.0        | 102.88       | 90637.28       |
| Right front pilot (96kg)          | 96.0kg       | 211.6        | 78.00        | 16504.8        |
| Removable controls                | no           | -2.7         | 66.80        | -180.36        |
| Right door                        | no           | -5.2         | 77.50        | -403           |
| Left door                         | no           | -5.2         | 77.50        | -403           |
| Apollo Spray system               | 30.9         | 68.0         | 75.40        | 5127           |
| Spray contents                    | 50           | 110.2        | 87.7         | 9664.5         |
| Zero fuel                         | 571.4        | 1257.1       | 95.9         | 122919.49      |
| Main fuel tank in U.S Gallons (5) | 18L          | 31.7         | 108.8        | 3449           |
| Full weight and balance           | 585.8        | 1288.9       | 96.2         | 123992.18      |



1.6.1 The weight and balance was within limits. The aircraft did not exceed the maximum allowable weight of 1370lb.

## 1.7 Meteorological Information

|                |      |             |           |            |      |
|----------------|------|-------------|-----------|------------|------|
| Wind direction | Calm | Wind speed  | 0-3 knots | Visibility | 9999 |
| Temperature    | 29°C | Cloud cover | Clear sky | Cloud base | N/A  |
| Dew point      | 12°C |             |           |            |      |

1.7.1 The weather was taken from a South African Weather Service (SAWS) report.

## 1.8 Aids to Navigation

1.8.1 The aircraft was equipped with standard navigational equipment for the aircraft type as approved by the regulating authority.

## 1.9 Communications.

1.9.1 The aircraft was equipped with standard communication equipment for the aircraft type as approved by the regulating authority.

## 1.10 Aerodrome Information

1.10.1 The accident did not happen at an aerodrome but at Port Shepstone area with the following coordinates GPS S30° 42' 55" E030° 26' 08.9" elevation 44ft.

## 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.

## 1.11 Wreckage and Impact Information

1.12.1 The helicopter left the loading zone with both doors removed and headed for the sixth sugar cane field for the day. The helicopter started spraying from an easterly direction to a westerly one and when it was close to the end of the half a kilometre area it initiated a climb during which, its main rotor blades impacted the electrical cables running north to south on figure 4.



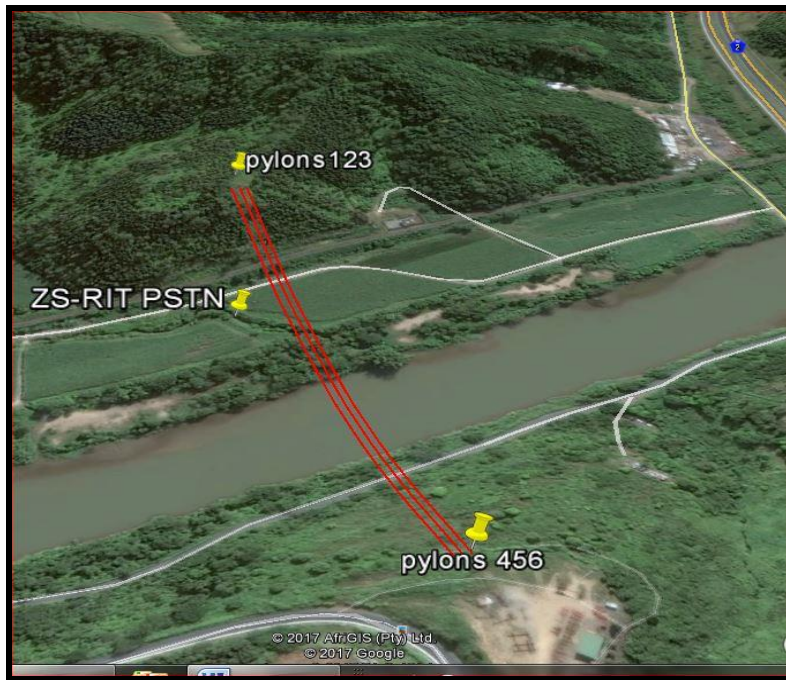


Figure 4: The pylons attaching cables are approximately 600m apart.

1.12.2 The helicopter's main rotor blades flexed downwards and severed the tail boom into two pieces as well as the spraying gear below the helicopter. The pilot lost control of the helicopter and it crashed into a stream approximately 60m from the electrical cables. The wreckage was facing south in the water against a river bank but was not submerged. Some debris which included fuselage panels, tail rotor, piece of the tail boom - were scattered between the electrical cables and the wreckage. The helicopter suffered further damages to the skids and spraying equipment fitted below the helicopter.



Figure 5: The stream is deep. Not easy to get down without ropes.

### **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. The cause of death was not yet determined. Should any of the results have any bearing on the circumstances leading to this accident; it will be treated as new evidence that will necessitate the reopening of this investigation.

### **1.14 Fire**

1.14.1 There was no evidence of a pre- or post-impact fire.

### **1.15 Survival Aspects**

1.15.1 The accident was not survivable due to the severe dynamic and impact forces involved.

### **1.16 Tests and Research**

1.16.1 None

### **1.17 Organizational and Management Information**

1.17.1 The maintenance records indicated that the helicopter was equipped and maintained in accordance with existing regulations and approved procedures.

1.17.2 The last mandatory periodic inspection (MPI) was certified on 26 April 2017 by helicopter maintenance organization (AMO) no. 824 at 1890.8 Hobbs hours. The helicopter had flown a further 30.9 hours before the accident.

1.17.3 The operator was approved by the Regulator to conduct agricultural spraying, under the Air Operator Certificate, FO 11711, valid until 31 March 2018. ZS-RIT appeared as one of the helicopter listed for these operations.

### **1.18 Additional Information**

1.18.1 None

## **1.19 Useful or Effective Investigation Techniques**

1.19.1 None

## **2. ANALYSIS**

- 2.1 The pilot's agricultural licence and medical certificate were both valid.
- 2.2 The pilot had sprayed at least five sugar cane fields before the accident happened. According to the chemical handler, he had mixed 50 L of insecticide and the aircraft had refuelled with 12 L of Avgas. The flight would only last 18 minutes. The aircraft took off at 1140Z and proceeded to the spraying site, which was west of their temporary loading zone. The weather was fine with clear sky.
- 2.3 A map of the fields they are supposed to spray had the electrical power lines clearly indicated (Figure 1). It is not clear if the pilot followed the company SOPs, which state that before commencing with spraying one should familiarise oneself with the field and identify where power lines lie. The pilot started to spray from east to west; when he reached the end he initiated his climb and collided with the high-tension electrical cables running north to south. As a result, the main rotor blades flexed downwards, severing the tail boom, and the pilot lost control of the aircraft before crashing into a stream nearby.
- 2.4 It is the opinion of the investigator that even though the pilot did not do proper surveillance before starting. The pilot would have been unable to see the power cables because their pylons are approximately 600m apart. If the pylons were at least 100m to 200m apart, they would have been easy to identify.

## **3. CONCLUSION**

### **3.1 Findings**

- 3.1.1 The pilot was licensed and qualified for the flight in accordance with existing regulations.
- 3.1.2 The helicopter was certified, equipped and maintained in accordance with existing regulations.
- 3.1.3 The helicopter was airworthy when it was dispatched for the flight.
- 3.1.4 The helicopter was under power when it impacted the high tension electrical cables.
- 3.1.5 This was the pilot's first time spraying these specific sugar cane fields; he was therefore not familiar with the environment.
- 3.1.6 The pilot did not conduct a proper surveillance of the area before commencing with the crop spraying detail.

- 3.1.7 The electrical cables were not fitted with red and white marker spheres.
- 3.1.8 The helicopter was extensively damaged but there was no post-impact fire.
- 3.1.9 The weight and balance of the aircraft was within limits.

### **3.2 Probable Cause/s**

- 3.2.1 The helicopter collided with high tension electrical cables during a crop spraying detail.

## **4. SAFETY RECOMMENDATIONS**

- 4.1 AIID has issued a safety article on 15 November 2016 and this article can be accessed following the link below:  
<http://www.caa.co.za/Accidents%20and%20Incidents%20Research%20Articles/Wire%20Strikes%20Articles.PDF>

## **5. APPENDICES**

- 5.1 Appendix A - Sections of Triple R Aviation flight operations manual.
- 5.2 Appendix B – Weather summary from SAWS

#### 6.8. PRE-FLIGHT BRIEFING

Sometime before the day of operation, the pilot will have a technical briefing with the Estate concerned on site, to assess the Landing Zones (LZ), to discuss field marking and required operations.

On the day of operation, the pilot will contact the Estate concerned before taking off from the airport to confirm the weather condition at the site of operation will be as scheduled or delayed or postponed for another day.

On arrival at the site of operation, the pilot will have a pre-flight briefing with the Estate personnel before the operation start.

#### 6.15.3. OBSTRUCTIONS

Whilst spraying, the aircraft will regularly encounter obstructions in the field. Each field shall be carefully surveyed in order that the pilot establishes exactly what obstructions exist and where these exist.

At high all up weight the pull-up must be carefully monitored.

Severe downdraft can occur over tall trees at the end of fields. Initial entry and pullouts should allow for this possibility.

Flying too low is not only dangerous, with the risk of striking hidden obstacles, but also results in poor application and distribution of the chemical.

#### 6.15.4. Ground Safety

### 7. AERIAL APPLICATION TRAINING AND TESTING

In order to ensure the highest standard the organization has set the following minimum standards regarding pilot experience and qualification:

#### 7.1. MINIMUM QUALIFICATION

- CPL (H) and Typing Rating
- Total time on Helicopter – 1000 hours (including 500 hrs as pilot-in- command)



## 10. AREA OF OPERATION SAFETY PROCEDURE

The pilot must take note of general area of operation by preferably flying around the area prior to commencing with chemical application. This will allow the pilot to assess the area for any potential obstacles such as wires, trees, fences, buildings or obstructions that may pose a threat.

The pilot must also take note the shape, size and marking of the field to be sprayed in order to ensure the correct field is being sprayed as well as the orientation of the application direction with respect to wind and terrain shape to reduce risk as much as possible.

Fields to be sprayed should be marked in the follows:

- Flags shall be placed approximately 30 meters apart.
- White flags for Etherpon, Blue for Fusillade, or;
- as briefed by the farmer.

## Appendix B

```
201705201200 AAXX 20124 68591 16/// /0000 10297 20120 30034 40207 57015 60001  
333 10297 20173 91004==
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201705201200 : Date/hour of observation (\*) -> 05/20/2017 at 12:00 UTC

AAXX Identification letters of the report : FM 12-XI Ext. SYNOP. Land Station

20124 Day of month (UTC) : 20

20124 Nearest whole Hour (UTC) for actual observation time : 12

20124 Indicator for source and units used in speed wind data : Wind speed from anemometer, in knots

68591 Station WMO index : Margate (South Africa). 30-51S 030-20E 154 m. WMO region: Africa.

16/// Indicator for inclusion or omission of precipitation data : Group 6RRRtr is included in section 1

16/// Indicator for type of station operation (manned or automatic) and for present and past weather : Automatic, group 7wwW1W2 ó  
7w1w2W1W2 omitted (not observed, data not available)

16/// Height of base of lowest observed cloud : Unknown cloud base, or cloud base below and cloud top above the station level

16/// Horizontal visibility at surface : Unknown

/0000 Total cloud cover : Cloud cover is indiscernible for reasons other than fog or other meteorological phenomena, or observation is not made

/0000 True direction, in tens of degrees, from which wind is blowing : Calm

/0000 Wind speed : 0 kt (0.0 Km/h, 0.0 m/s)

10297 Temperature : 29.7 C (85.5 F)

20120 Dew point temperature : 12.0 C (53.6 F)

30034 Pressure at station level : 1003.4 hPa (mb)

40207 Pressure at sea level : 1020.7 hPa (mb)

57015 Characteristic of pressure tendency during the three hours preceding the time of observation : Decreasing (steadily or unsteadily);  
atmospheric pressure now lower than three hours ago

57015 3 Hour Pressure tendency : -1.5 hPa (mb)

60001 Amount of precipitation : 0.0 mm

60001 Duration of period of reference for amount of precipitation, ending at the time of the report : Total precipitation during the 6 hours  
preceding the observation