



## AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA 18/2/3/8548	
<b>Aircraft Registration</b>	<b>ZS-NZU</b>	<b>Date of Accident</b>	11 September 2008	<b>Time of Accident</b>	0900Z	
<b>Type of Aircraft</b>	<b>AIR TRACTOR 502B (Aeroplane)</b>		<b>Type of Operation</b>	Agricultural		
<b>Pilot-in-command Licence Type</b>		Commercial	<b>Age</b>	67	<b>Licence Valid</b>	Yes
<b>Pilot-in-command Flying Experience</b>		Total Flying Hours	21000		Hours on Type	4000
<b>Last point of departure</b>		Caledon Aerodrome (Western Cape)				
<b>Next point of intended landing</b>		Caledon Aerodrome (Western Cape)				
<b>Location of the accident site with reference to easily defined geographical points (GPS readings if possible)</b>						
Cornfield on the farm Franskraal in the Caledon area (Western Cape) (S 34° 14.833 E 019° 20.247)						
<b>Meteorological Information</b>		Temperature: 14°C, Visibility: >10 km, Dew point: 1°C, Surface wind: 04006KT				
<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>On 11 September 2008 the aircraft was utilized in an agricultural spraying detail on the farm Franskraal in the Caledon district.</p> <p>After the successful completion of four loads, the pilot landed and uplifted 200 litres of fuel and 1500 litres of chemicals. The pilot then took off to complete his sixth load of the day.</p> <p>At approximately 0900Z on 11 September 2008, a witness who was working in the area where the pilot was spraying, heard the noise of the aircraft followed by a dull explosion. When he looked up in the direction from where he had heard the explosion, he saw what looked to him like a cloud of dust. He immediately proceeded to the area where he had seen the cloud of dust.</p> <p>On arrival at the scene, he found the aircraft in an inverted position in a cornfield. The pilot, who was the sole occupant of the aircraft, was still strapped into his seat but was fatally injured.</p> <p>Damage was caused to the cornfield due to the aircraft's wing and canopy which made scoring marks on the ground over a distance of 15 metres and by fuel leaking from the wings.</p> <p>Evidence in and around the wreckage indicate a bird strike on the windscreen sometime before the collision with the ground.</p>						
<b>Probable Cause</b>						
The aircraft collided with the ground while being utilized in an agricultural spraying detail.						
<b>Contributing Factor</b>						
Collision with a bird (Blue Crane) in flight.						
IARC Date				Release Date		



## AIRCRAFT ACCIDENT REPORT

**Name of Owner/Operator** : AG-Sprayers (PTY) LTD  
**Manufacturer** : Air Tractor  
**Model** : AT-502B  
**Nationality** : South African  
**Registration Marks** : ZS-NZU  
**Place** : Caledon (Western Cape Province)  
**Date** : 11 September 2008  
**Time** : 0900Z

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

### Purpose of the Investigation:

*In terms of Regulation 12.03.1 of the Civil Aviation Regulations (1997) this report was compiled in the interests of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and **not to establish legal liability.***

### Disclaimer:

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

## 1. FACTUAL INFORMATION

### 1.1 History of Flight

- 1.1.1 On 11 September 2008, at approximately 0900Z, an Air Tractor AT-502B aircraft, ZS-NZU, was conducting aerial spraying of cornfields in the Caledon area. During one of the spray runs, the aircraft impacted the ground 7.44 km West of the Caledon Municipal Aerodrome at geographical point S 34° 14.894 E 019° 20.182. The aircraft was destroyed by the impact forces. The aircraft was being operated under visual flight rules (VFR) and outside controlled airspace. The pilot, who was the sole occupant, was fatally injured.
- 1.1.2 On the morning of the accident, before the fatal flight, the pilot completed five (5) loads. After the fifth load, the pilot landed and uplifted 200 litres of fuel and 1500 litres of chemicals. While the aircraft was being refuelled and loaded with the chemicals, the pilot conferred with the ground staff at the Aerodrome and all seemed to be going well with the spraying.
- 1.1.3 At approximately 0900Z a witness on the ground, who was approximately 700 metres from the accident site, heard the aircraft and immediately thereafter a dull explosion. As he looked up, he saw what looked to him like a cloud of dust. He immediately proceeded to the scene where he located the aircraft in an inverted position in a cornfield.

- 1.1.4 The on-site investigation of the wreckage did not reveal any mechanical defects on the aircraft. During the on-site investigation, a significant amount of bird remains and feathers were present inside the cockpit of the aircraft. A piece of the glass windshield was found within the cockpit at the rudder pedals, that were covered with bird remains and bird feathers.
- 1.1.5 On inspection of the area around the wreckage, the carcass of a bird (Blue Crane) was found at a distance of approximately 53 m from the aircraft wreckage.

## 1.2 Injuries to Persons

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

## 1.3 Damage to Aircraft

- 1.3.1 The aircraft was destroyed as a result of impact forces with the ground.

## 1.4 Other Damage

- 1.4.1 Some 15 metres of cornfield were damaged and there was some fuel contamination of cultivated land.

## 1.5 Personnel Information

Nationality	South African	Gender	Male	Age	67
Licence Number	*****	Licence Type	Commercial		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Agricultural pilot and Night rating				
Medical Expiry Date	31 January 2009				
Restrictions	Corrective lenses				
Previous Accidents	Yes				

Flying Experience:

Total Hours	21000
Total Past 90 Days	31.8
Total on Type Past 90 Days	31.8
Total on Type	4000

## 1.6 Aircraft Information

### Airframe:

Type	AT-502B	
Serial Number	502B-0405	
Manufacturer	Air Tractor	
Year of Manufacture	1997	
Total Airframe Hours (At time of Accident)	4041.2	
Last MPI (Date & Hours)	03/03/2008	4000 hrs
Hours since Last MPI	41.2	
C of A (Issue Date)	17 June 1997	
C of R (Issue Date) (Present owner)	7 January 1997	
Operating Categories	Standard	

### Engine:

Type	Pratt & Whitney (PT6A-15A6)
Serial Number	PCE-PD0085
Hours since New	741.2
Hours since Overhaul	T.B.O. not reached

### Propeller:

Type	Hartzell
Serial Number	BUA 30474
Hours since New	741.2
Hours since Overhaul	T.B.O. not reached

#### 1.6.1 Additional equipment

The aircraft was fitted with an AG-NAV 2, Silver series navigational system. See Par. 1.18.1 for details

## 1.7 Meteorological Information

#### 1.7.1 Meteorological information was obtained from the South African Weather Service.

Wind direction	Westerly	Wind speed	5 KTS	Visibility	>10 km
Temperature	14°C	Cloud cover	None	Cloud base	None
Dew point	4°C				

## 1.8 Aids to Navigation

#### 1.8.1 The aircraft was equipped with standard navigational equipment as per the approved Minimum Equipment List approved by the Regulator. There were no recorded defects to navigational equipment prior or during the flight.

## 1.9 Communications

1.9.1 The aircraft was equipped with one (1) VHF (Very High Frequency) radio which was approved within the Minimum Equipment List as approved by the Regulator. There were no recorded defects to communication equipment prior or during the flight.

## 1.10 Aerodrome Information

1.10.1 This accident did not occur at or near an aerodrome. The accident occurred at the following coordinates: S 34 14.833 E 019 20.247.

## 1.11 Flight Recorders

1.11.1 The aircraft was not fitted with a Cockpit Voice Recorder (CVR) or a Flight Data Recorder (FDR) and neither was it required by regulations to be fitted to this type of aircraft.

## 1.12 Wreckage and Impact Information

1.12.1 The accident site

The aircraft first impacted the ground on an uphill of rocky terrain. The aircraft's track of impact was approximately 013° Magnetic at a height of 547 feet above mean sea level (amsl). After the first impact, the aircraft bounced twice before it came to rest in an inverted position, pointing in the direction of 200° Magnetic at a height of 618 feet above mean sea level (amsl).

First ground contact was made with the right-hand main landing gear and thereafter the propeller progressively made contact with the ground. Following ground contact by the propeller, the aircraft bounced off a slight embankment at a height of 581 feet. The lower surface of the right wing made contact with the ground, approximately 88 metres past the embankment.

The right-hand wing made scoring marks on the ground over a distance of 15 metres before the left-hand wing made contact with the ground and caused the aircraft to nose over. The aircraft then skidded in an inverted position into a cultivated field for about 15 metres before coming to a halt approximately 103 metres after the collision with the embankment.

Except for the wing tips, left-hand aileron and the right-hand landing gear, the aircraft was structurally intact when it came to rest. **(Figure 1)**



**Figure 1 Damage to the aircraft.**

### **1.13 Medical and Pathological Information**

1.13.1 A post-mortem examination was performed on the deceased pilot on 11 September 2008 at 1530Z. According to the Forensic Pathologist report, death resulted from multiple injuries sustained during the aircraft accident.

1.13.2 The toxicology report was not available at the time of writing the report, but is not considered to be a factor in the cause of this accident.

1.13.3 According to the pilot's medical certificate, he had to wear corrective lenses while flying. Damaged corrective lenses were found on the scene and ground personnel communicating to the pilot before take-off, confirmed that he was wearing corrective lenses.

### **1.14 Fire**

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

### **1.15 Survival Aspects**

1.15.1 This accident was considered not survivable, due to the high vertical and longitudinal impact loads on the canopy of the cockpit. A contributing factor to the non-survivability of this accident was the fact the pilot was not wearing his shoulder harness, only the lap strap.

1.15.2 The local police at Caledon were informed of the accident, who in turn informed the local Fire and Rescue services of the Caledon municipality. As the accident happened in a rural area, the emergency services took approximately 20 minutes to locate the crash site. Upon their arrival at the scene, they found the pilot still strapped to his seat in an inverted position in the cockpit.

1.15.3 Personnel from the Worcester Pathology Services were also on the scene to determine the common mechanisms of traumatic injury incurred in the aircraft impact.

## 1.16 Tests and Research

### 1.16.1 Examination of the aircraft on site

There was no post- or pre-impact fire. The entire canopy of the cockpit was deformed backwards. The roof had separated from the front window pillars where it is attached to the roof structure.

The right wing had a hole at the bottom in the area where the fuel tanks are situated. Although fuel from the right-hand wing had leaked out during the impact sequence, it had not ignited.

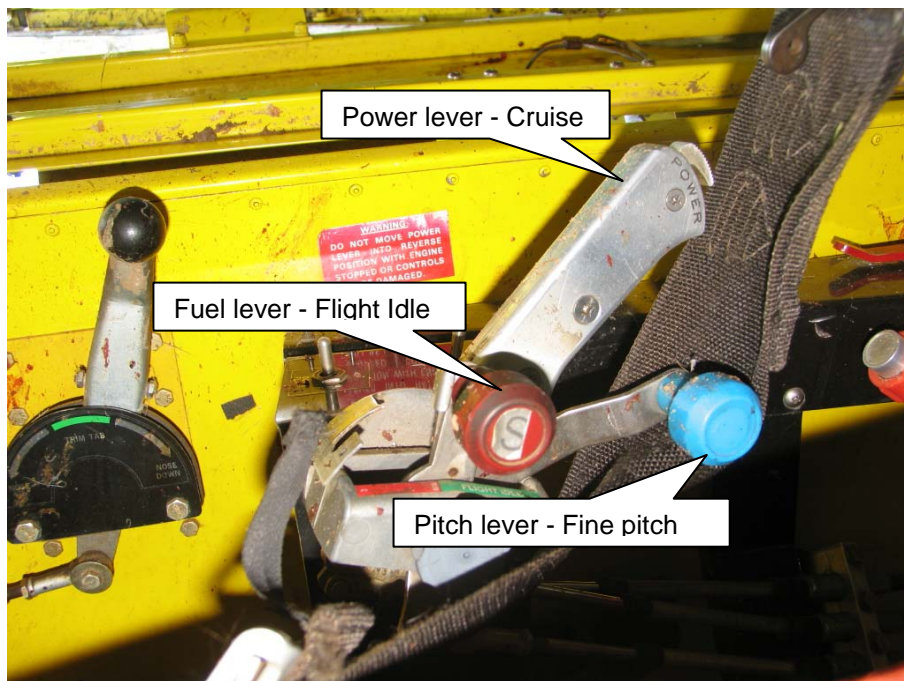
The left wing was still intact, but as a result of the inverted position, the fuel had drained from the right wing via the vent port.

The control stick's forward and aft movement were free and the elevators responded normally in relation to stick movement. No sideways movement was possible, due to damages caused during the accident sequence.

The aircraft was found to be structurally intact except for the left aileron, both wing tips and the left main landing gear that separated from the aircraft during the impact sequence.

All the spray nozzles and booms at the trailing edge of each wing, as well as the spray pump were ripped off during the impact and the spray booms were scattered at the accident site.

The flaps were found retracted and the flap selector switch was in the neutral position. The elevator trim lever was set for a slight nose-down attitude. The engine control pedestal was not damaged. The power lever was set to a cruise power setting. The fuel lever (red) was set in flight idle which was normal for flight operation. The propeller pitch lever (blue) was fully forward, indicating that the propeller was in full fine pitch. **(Figure 2)**



**Figure 2 Power lever quadrant settings**

### 1.16.2 Propeller

The propeller was still attached to the engine. Ground slashes, which could be associated with rotation of the propeller, were found. The slashes were respectively 600, 550, 680, 700, 850, 920 and 1500 millimetres apart. The blade tip of each blade was broken off approximately 100-150 millimetres from the blade tip. All the blades were bended towards the aircraft and opposite to the direction of rotation. Scoring marks were evident on all three blades along most of the span, slightly from the leading edge to the trailing edge of the blades. **(Figure 3)**



**Figure 3 Scoring marks on the blades.**



### 1.16.3 Examination of the engine

Dismantling of the engine was not considered, as engine performance was not considered to be a factor with regard to the cause of the accident. The engine was nevertheless examined on site. All damages to the engine were caused by the accident sequence, and no evidence of any foreign object damage was visible. The engine mounting points were deformed but did not fail.

### 1.16.4 Damage to the seat and cabin floor

The structural damage to the cabin and seat was assessed, both at the accident site and after the aircraft wreckage was recovered and taken to a hangar at Caledon Aerodrome.

The safety harness and attachments remained intact, retaining the pilot in his seat. The lap strap was cut by the emergency services in order to remove the body.

There was no damage to the lower seat frame and cushion. The frame of the backrest is attached to a sub-frame, which is attached to the bulkhead at the rear of the cockpit. As the backrest was attached to the bulkhead, it also deformed backwards during the accident sequence. The seat frame was not damaged, only the material cover was torn.

No evidence was present that the frame of the lower cabin structure had been subjected to high vertical and longitudinal impact loads. **(Figure 4)**



**Figure 4 Damage to the cockpit.**

1.16.5 Slash marks on the ground were measured and used to determine the ground speed at impact. Evidence shown, (Figure 2) indicates that the power lever was at a cruise throttle setting and according to the Pilot Operating Manual, at cruise throttle setting the propeller produces 2000 rpm.

The following formula was used to determine the approximate ground speed at impact:

$$V = [(N) (L) \text{ RPM } (e)] / [(1216) (1/1)]$$

Where:

- RPM(e) = Engine RPM
- G = Engine/Propeller gear ratio
- N = Number of propeller blades
- L = Distance between prop bites in inches
- V = Ground speed at impact in knots

$$\begin{aligned} V &= [(N) (L) \text{ RPM } (p)] / 1216 \\ &= [(3) (23.62) (2000)] / 1216 \\ &= 141720/1216 \\ &= 116.54 \text{ knots at ground impact (215.83 km/h)} \end{aligned}$$

## 1.17 Organisational and Management Information

1.17.1 This aircraft was operated by AG-Sprayers (PTY) Ltd at the time of the accident which was in possession of a valid Operating Certificate issued on 24 June 2008 and valid until 26 June 2009.

## 1.18 Additional Information

1.18.1 The aircraft was equipped with an AG-NAV2 Silver series system. The AG-NAV system is a DGPS navigation system designed for crop spraying and forest protection. It provides the pilot with swath and directional guidance and other navigational information required to carry out precision applications. After the accident, the information from this system was downloaded, according to which it was possible to see the coordinates, track, height and speed of the aircraft until approximately 370 metres before the impact point. **(Appendix A)**

1.18.2 The last recorded point of the aircraft before the impact point was at position S 34° 15.080' E 19° 20.093'. The aircraft track was 013° magnetic, and the aircraft was at an altitude of 212 meters (695.53 feet), at a speed of 225.3 km/h (121.65 knots).

1.18.3 The initial point of impact was at a point 370 metres after the AG-NAV system had stopped operating and at a height of 547 feet; approximately 148.53 feet lower than the last known height of the aircraft.

1.18.4 The aircraft manufacturer, Air Tractor was informed about the accident and within 14 days they informed the investigator of a new thicker windshield that is being tested and will be available to fit to all their models.

1.18.5 Evidence received from another pilot, who had experienced a bird strike on the light bar of the AG-NAV system, indicated that he had lost all information until such time that he was able to reset the system. **(Appendix B)**

1.18.6 The ground personnel conferring with the pilot before the last take-off confirmed to the investigator that the pilot was not wearing his shoulder harness. According to

the ground personnel the pilot always flew while only wearing his lap strap.

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

1.19.1 The aircraft was equipped with an AG-NAV2 Silver series system. The AG-NAV system is a DGPS navigation system designed for crop spraying and forest protection. It provides the pilot with swath and directional guidance and other navigational information required to carry out precision applications. This device was used to determine the track and height of the aircraft.

## **2. ANALYSIS**

2.1 The pilot was properly certified and qualified. Although the pilot had done four loads the morning before the accident, no evidence was found that fatigue degraded the performance of the pilot on the day of the accident.

2.2 The accident airplane was properly certified, equipped, and maintained in accordance with prescribed regulations. The recovered components showed no evidence of any pre-existing system, structural or power plant failures.

2.3 The engine was found attached to the aircraft with no evidence of fire, structural damage or foreign object damage.

2.4 Weather was not a factor in this accident. Emergency response teams were not certain of the correct location of the accident, as it was in a rural area and as a result the site was only found after approximately 20 minutes. The accident was not survivable for the pilot as he was subjected to high impact forces.

2.5 Evidence in and around the wreckage indicated a collision with a bird (Blue Crane) presumably at the time that the AG-NAV system stopped transferring information to the AG-NAV screen within the cockpit.

2.6 Although there was some fuel spillage as a result of the damages caused by the accident and the final position of the wreckage, there was no post-impact fire.

2.7 The flight controls (flaps and elevator trim, engine and propeller controls) were in the correct configuration for flight at the time of the accident.

2.8 Multiple injuries sustained during the sequence of the accident, resulted in the pilot being fatally injured. The pilot was wearing corrective lenses as restricted by his medical certificate. It was not possible to determine if the pilot was incapacitated or fatally injured as a result of the collision with the bird before the impact with the ground.

2.9 Although the aircraft was fitted with a shoulder harness, the pilot was not wearing the shoulder harness during the fatal flight.

### **3. CONCLUSION**

#### **3.1 Findings**

- 3.1.1 The pilot was properly certified and qualified according to current regulation.
- 3.1.2 The accident aircraft was properly certified, equipped and maintained in accordance with current regulations. Recovered components showed no evidence of structural, engine or system failure other than those as a result of the accident sequence.
- 3.1.3 The weather was not a contributing factor to this accident.
- 3.1.4 The aircraft collided with a bird (Blue Crane) before colliding with the ground.
- 3.1.5 The pilot was not wearing a shoulder harness, although the aircraft was fitted with it.

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

- 3.2.1 The aircraft collided with the ground, while utilized in an agricultural spraying detail.

#### **3.3 Contributing factor**

- 3.3.1 Collision with a bird (Blue Crane) in flight.

### **4. SAFETY RECOMMENDATIONS**

- 4.1.1 As a result of its investigation of the September 11, 2008 accident involving an Air Tractor AT-502B, the Accident and Incident Division of the South African Civil Aviation Authority made the following recommendations:

a) Require the Air Tractor manufacturer to investigate the possibility of replacing the existing windshield with a thicker, stronger windshield to be used by clients operating these aircraft in areas of high bird activity.

### **5. APPENDICES**

**Appendix A** Flight path as recorded by the AG-NAV system.

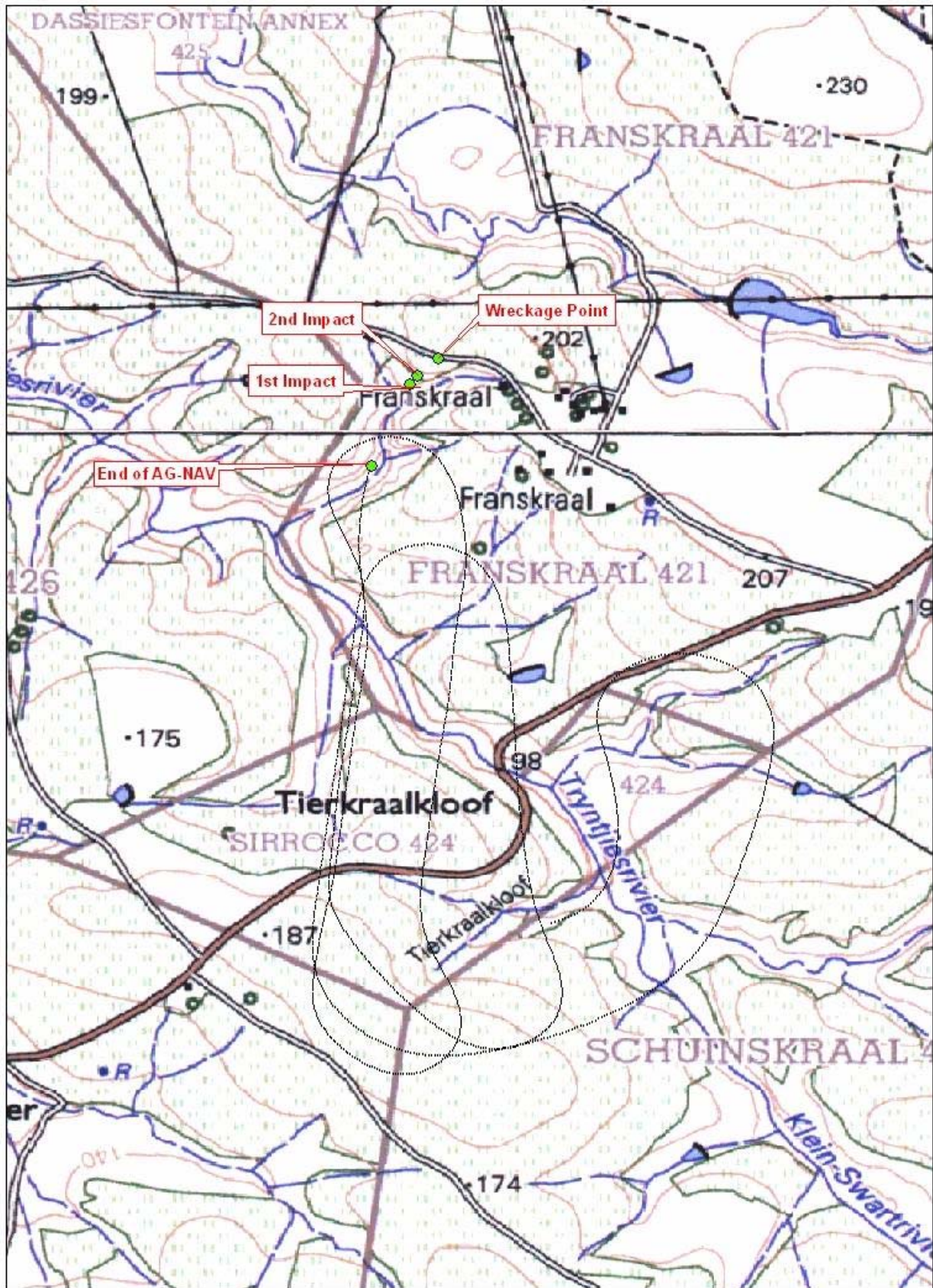
**Appendix B** Customer Letter

-END-

Report reviewed and amended by Advisory Safety Panel

27 January 2009

Appendix A



Flight path as recorded by the AG-NAV system.

**AgriFlight cc**  
Agriculture & Aviation Service



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Douglas  
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9 February 2009

Chris Williams  
CAA

**RE: CROP SPRAYER ACCIDENT REF: CA18/2/3/8528**

Dear Sir,

*Regarding the fatal accident of Mr Chris Genis, I hereby report that in the week of the 1<sup>st</sup> October 2008 I had a bird strike (suspect a bird of 1 Kg or less) that went through the propeller and impacted on the left side of the Ag-Nav guidance system's light bar. Here was no visible damage but the light bar went off and I had to reset the system in the air as it stopped giving guidance information. It worked fine afterwards.*

I was on a spray run, height 3 meters agl. Ground speed approximately 220 Km/h.  
Aircraft AT-401 ZS-NLP

Sincerely,

George Zondagh  
CA 0270253784

Customer Letter