



AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8734	
Aircraft Registration	ZU-CWW	Date of Accident	09 January 2010		Time of Accident	1000Z
Type of Aircraft	Marabou Stork		Type of Operation		Private	
Pilot-in-command Licence Type		Private pilot	Age	53	Licence Valid	Yes
Pilot-in-command Flying Experience		Total Flying Hours	420.0		Hours on Type	350
Last point of departure		Rhino Park Aerodrome – Gauteng.				
Next point of intended landing		Rhino Park Aerodrome – Gauteng.				
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
Rhino Park Aerodrome next to Runway 03.						
Meteorological Information		Wind direction: 30°/08 kts, Temperature: 21°C, Visibility: <10 km, Cloud base: SCT at 2500 ft, Cloud cover: SCT at 3500 ft.				
Number of people on board	1 + 1	No. of people injured	0	No. of people killed	0	
Synopsis						
<p>According to the pilot, he decided to fly from Rhino Park Aerodrome to Petit Aerodrome at 1000Z. The pilot noted that the surface wind was 030°/8 kts, directly down Runway 03. As the runway was muddy due to rain the previous day, he elected to take off from the grass surface to the left of Runway 03.</p> <p>The pilot completed the pre-takeoff checks and commenced with the takeoff run on the grass surface next to Runway 03. During the initial stages of the take-off roll, the aircraft veered to the left. The pilot applied right rudder to correct the situation, but was unsuccessful. The aircraft was still continuing to veer off to the left. As the aircraft approached the minimum rotation speed of 45 mph during takeoff roll, and obstacles (hangars) to the left of the end of the runway, he rotated the aircraft in ground effect at 55 mph. The aircraft gained approximately 3 metres in height, but failed to turn to the right with right rudder and aileron input. The aircraft collided with the hangar.</p>						
Probable Cause						
<p>During takeoff run, the aircraft collided with a hangar.</p>						
IARC Date				Release Date		

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : Benn R.J
Manufacturer : KirkPatrick A.J.
Model : Marabou Stork
Nationality : South African
Registration Marks : ZU-CWW
Place : Rhino Park Aerodrome
Date : 09 January 2010
Time : 1000Z

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 (1997) 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 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 Saturday morning, 09 January 2010 at approximately 0600Z, the pilot accompanied by a passenger, departed from Petit Aerodrome on a private flight to Rhino Park Aerodrome under Visual Flight Rules by day. The flight was considered to be uneventful and at 0630Z the aircraft landed on Runway 27 at Rhino Park Aerodrome.
- 1.1.2 According to the pilot, he decided to return to Petit Aerodrome at 1000Z. The pilot noted that the surface wind was 030°/8 kts, directly down Runway 03. As the runway was muddy due to rain on the previous day, he elected to take off from the grass surface on the left side of Runway 03. The pilot also decided to start the takeoff run from the intersection of Runways 03/21 and Runway 19/27. The runway length from the intersection was 300 metres (990 ft) long and considered sufficient to do the takeoff safely with this type of aircraft. The pilot completed the pre-takeoff checks and commenced with the takeoff run on the grass surface next to Runway 03. During the initial stages of the takeoff roll, the aircraft veered to the left. The pilot applied right rudder to correct it, but was unsuccessful. The aircraft was still continuing to veer off to the left. As the aircraft approached the minimum rotation speed of 45 mph during takeoff roll, and obstacles (hangars) to the left of the end of the runway, he rotated the aircraft in ground effect at 55 mph. The aircraft gained approximately 3 metres in height, but failed to turn to the right with right rudder and aileron input. The aircraft collided with the hangar.

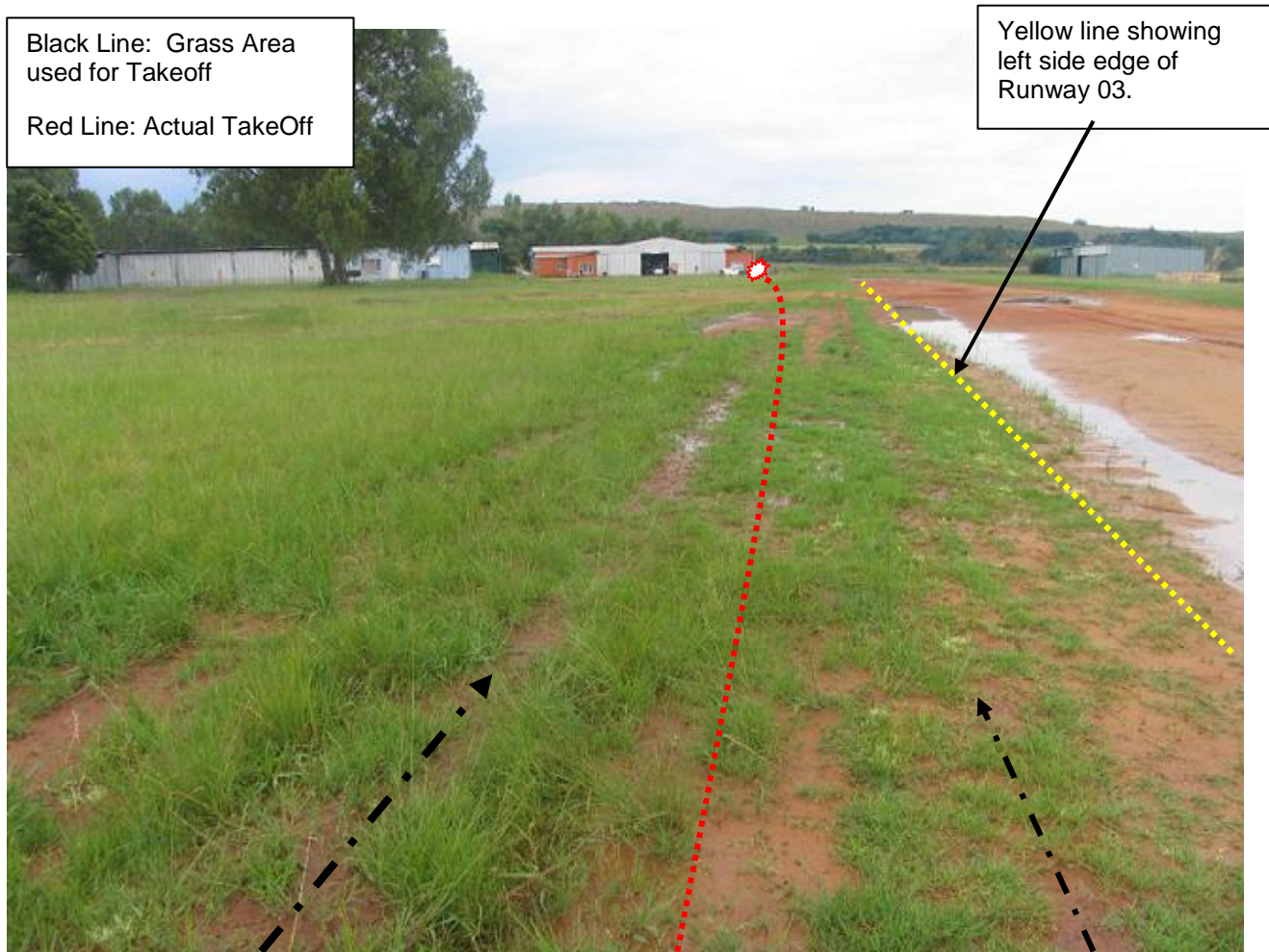


Figure 1, showing the location of the grass area where the aircraft started the takeoff run.

1.2 Injuries to Persons

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

1.3 Damage to Aircraft

1.3.1 The aircraft sustained substantial damage in the impact sequence.



Figure 2, showing damage caused to the aircraft in the accident.

1.4 Other Damage

- 1.4.1 The aircraft collided with a hangar. There was minor damage caused to the hangar structure.

1.5 Personnel Information

Pilot- in- command

Nationality	South African	Gender	Male	Age	53
Licence Number	xxxxxxxxxxxxxx	Licence Type	Private Pilot		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Flight Tests – Single Engine Piston				
Medical Expiry Date	28 February 2010				
Restrictions	None				
Previous Accidents	None				

Flying Experience:

Total Hours	420.0
Total Past 90 Days	15.0
Total on Type Past 90 Days	15.0
Total on Type	350.0

- 1.5.1 The type rating of the accident aircraft was issued to the pilot after he had completed type conversion training.

1.6 Aircraft Information

Airframe:

Type	Marabou Stork	
Serial Number	002	
Manufacturer	KirkPatrick A.J.	
Date of Manufacture	07 January 2003	
Total Airframe Hours (At time of Accident)	350.0	
Last Annual Inspection (Date & Hours)	30 April 2009	265.8
Hours since Last MPI	84.2	
Authority to Fly (Issue Date)	05 May 2009	
C of R (Issue Date) (Present owner)	07 December 2005	
Operating Categories	Private Authority to Fly	

Engine:

Type	Lycoming-O-320
Serial Number	L-17295-27A
Hours since New	350.0
Hours since Overhaul	TBO not reached.

Propeller:

Type	Sensenich W80 DM7-38
Serial Number	AF 6855
Hours since New	200.0
Hours since Overhaul	TBO not reached.

- 1.6.1 The owner, who was also the pilot, operated and maintained the aircraft in accordance with requirements of Civil Aviation Regulations (CAR), Part 24 and 94.
- 1.6.2 According to the owner/pilot, the aircraft was in a serviceable condition prior to the accident. All the aircraft systems were functioning as required and no defects were reported.

- 1.6.3 The remaining fuel on board the aircraft was determined to be an estimated 50 litres. The fuel on board the aircraft was considered to be sufficient for the intended flight.

1.7 Meteorological Information

Wind direction	NE	Wind speed	10 knots	Visibility	good
Temperature	20°C	Cloud cover	5/8	Cloud base	9000 ft
Dew point	10°C				

- 1.7.1 The weather information in the column above was obtained from the pilot's questionnaire. According to the pilot, there was no official weather information obtained from the weather services prior to the flight.
- 1.7.2 In order to determine if the weather information which the pilot had given was correct, an official weather report was also obtained from the South African Weather Services.

Wind direction	030° TN	Wind speed	08 knots	Visibility	>10 km
Temperature	21°C	Cloud cover	SCT at 2500 ft	Cloud base	SCT at 3500 ft
Dew point	15°C				

- 1.7.3 The weather information in the column above was obtained from the South African Weather Services. According to the weather report, a lot of moist air in circulation east of the trough caused cloudy rainy conditions over the central and eastern parts of the country.

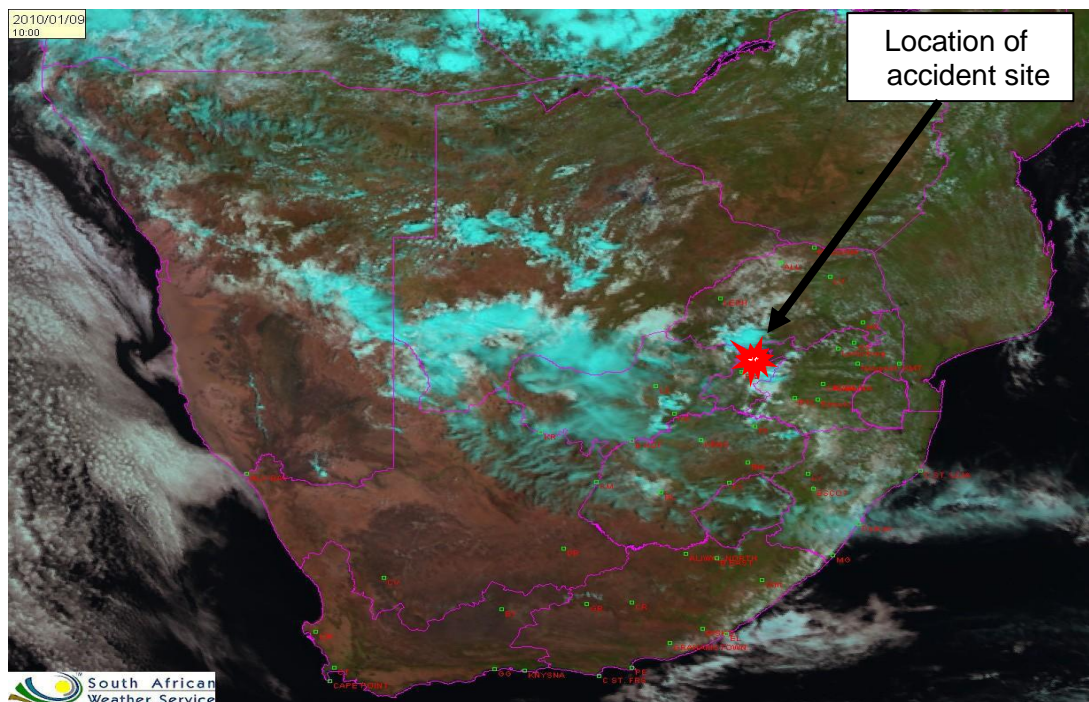


Figure 3, Satellite image showing weather conditions in vicinity of the accident.

1.8 Aids to Navigation

- 1.8.1 The aircraft was operating at an unmanned aerodrome. There were no land-based aids to navigation available at the aerodrome.
- 1.8.2 The aircraft had standard navigation equipment installed which had been approved for the type. The navigation equipment was in a serviceable condition prior to the flight.

1.9 Communications

- 1.9.1 The aerodrome does not have Air Traffic Control (ATC) services available to offer the necessary communication assistance to aircraft.
- 1.9.2 The aircraft had an Icom IC 22 E type radio installed. The pilot was broadcasting his intentions on the VHF frequency 135.6 MHz, which was the designated frequency for Rhino Park. The radio equipment of the aircraft was found to be in a serviceable condition.

1.10 Aerodrome Information

Aerodrome Location	Rhino Park	
Aerodrome Co-ordinates	S25°49'59.4" E028°32'26.4"	
Aerodrome Elevation	4784 ft	
Runway Designations	03/21	19/27
Runway Dimensions	450 m x 20 m	850 m x 20 m
Runway Used	Grass on left side of Runway 03	
Runway Surface	Compacted soil	
Approach Facilities	None	

- 1.10.1 Rhino Park is an unmanned aerodrome, and is not in possession of an Aerodrome Licence. The aerodrome is under private management and used by the recreational aviation industry (microlight aircraft). The management of the aerodrome was not obliged to comply with the requirements of CAR, Part 139. All flying activities at the aerodrome were done at the discretion of the flying crew.
- 1.10.2 There are no emergency services based at the aerodrome. When the accident occurred, the pilot and passenger were assisted by private people at the aerodrome.



Figure 4, showing an aerial view of the aerodrome and location where the aircraft was taking off.

1.10.3 The figure above shows the aerial view of the aerodrome. During the on-site investigation, it was discovered that the runways at the aerodrome did not have identification markings. The location of the hangars on the left side of Runway 03 was not at the recommended minimum safe distance (40 metres) from the runway.

1.11 Flight Recorders

1.11.1 The aircraft did not have FDR and CVR recorders installed and neither was it a requirement in the existing regulations.

1.12 Wreckage and Impact Information

1.12.1 The aircraft was taking off in a north-westerly direction from the grass on the left side of Runway 03 at Rhino Park Aerodrome. During the takeoff run, the left-side wing of the aircraft collided with a hangar structure. The wing struck the hangar wall at a height of approximately 3.5 metres from the ground. The aircraft then swung to the left side wall of the hangar. The nose section struck the wall approximately 500 centimetres from the ground.

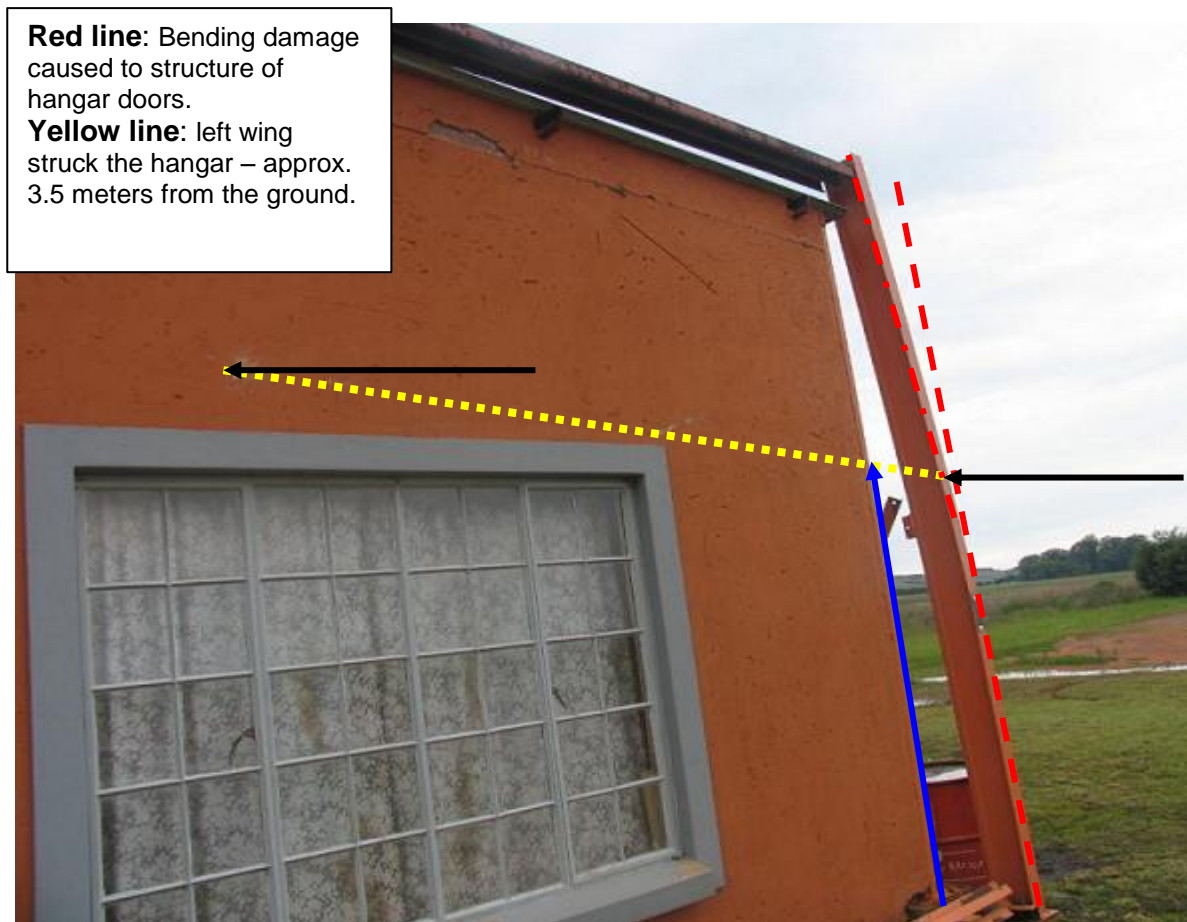


Figure 5, showing the height at which the left wing struck the hangar and damage caused to structure of hangar doors.



Figure 6, showing location where wreckage came to rest

on the left side of the hangar.

Propeller Damage

- 1.12.2 During the impact sequence, the propeller (wooden construction) was destroyed. There were small pieces of wood from the propeller found around the place where the nose section had struck the hangar wall. On the basis of this information it was concluded that the propeller was rotating at the time of impact.

Engine Damage

- 1.12.3 The pilot reached airspeed of 55 mph when the aircraft collided with the hangar. All indications are that the engine was operating as required when the aircraft was involved in the accident.

Aircraft Structural Damage

- 1.12.4 The main wheel on the left side broke off and separated from the aircraft in the impact sequence. The aircraft came to rest on its left side and on the left side of the hangar. The wreckage was approximately 5 meters away from the initial point of impact.

1.13 Medical and Pathological Information

- 1.13.1 None.

1.14 Fire

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

1.15 Survival Aspects

- 1.15.1 The accident was considered to be survivable. The cabin area of the aircraft was not exposed to high impact forces and found reasonably intact after the impact. The pilot and passenger did not sustain any injury. Both occupants were properly restrained with the aircraft seat safety belts and harnesses. There were no emergency services dispatched to the location of the accident site. The pilot and passenger received assistance from private people at the aerodrome to evacuate the aircraft.

1.16 Tests and Research

- 1.16.1 In order to clearly understand the sequence of events during the takeoff, it was deemed necessary to read up on the performance characteristics of the aircraft. As such the following relevant information was extracted:

“The difference between tail draggers and tricycle gear aircraft is the centre of gravity which is forward of the main gear on tricycle gear aircraft and behind the main gear of tail draggers. The identified difference accounts for a significant difference in the way the aircraft behave on the ground during takeoff and landing.

- (i) During takeoff in a tail dragger, a lot more work is required compared to a tricycle gear aircraft. The right rudder input is required to keep the aircraft rolling straight down the runway, but also constant rudder corrections are necessary to keep it rolling straight as the aircraft rolls down the runway, with the tail wheel still on the ground. The aircraft will be right at the stall angle of attack. The normal takeoff procedure would be to raise the tail section of the aircraft a little to a proper angle of attack for the aircraft to fly itself off the ground. When the tail section of the aircraft comes up, the traction of the tail wheel is lost and a little right rudder is needed to keep it going straight. When the tail comes up, since the propeller is rotating clockwise viewing it from behind, the gyroscopic reaction comes in effect as if it were pushing on the aircraft’s right side and tends to turn the aircraft to its left while the tail is actually moving up. So as the tail moves up, extra right rudder is needed.*

Note: If more engine power is applied, more gyroscopic reaction, torque and rudder input is required.

- (ii) Once the tail is up and stopped at desired pitch attitude, the aircraft will pick up significant speed and the rudder becomes very effective. When the appropriate airspeed is reached, the takeoff is initiated.”*

1.16.2 The pilot stated that he felt the aircraft drifting to the left and attempted to correct it with the right rudder. Based on the information obtained about the aircraft drifting. The conclusion is that such a scenario could only happen if the wind direction was other than directly aligned with the runway or grass area used.

- (i) The drift was caused by the wind effect on the aircraft, implying that the wind was coming at an angle (crosswind) which resulted in the aircraft deviating from its desired track. In order to stay on track, the heading of the aircraft was supposed to be corrected either to the left or right, depending on the direction of the wind. In this case the wind was coming from the right side and the aircraft subsequently drifted towards the left, off its original course. To correct the drift, the pilot decided to apply right rudder input to get the aircraft to turn to the right or into the wind.*

Preventing drifting

1.16.3 The pilot should lower (using right aileron) the right side wing into the wind. To prevent the aircraft from turning in that direction, the pilot should have used opposite rudder input as necessary to keep the nose of the aircraft aligned with the runway. The turning momentum of the aircraft can be counteracted by using the left rudder to push the nose back to the runway alignment. However, there are specific airspeed considerations to be taken into account.

1.17 Organisational and Management Information

- 1.17.1 The pilot was also the owner of the aircraft. He was operating the aircraft privately, which was in accordance with CAR, Part 24 and 94.
- 1.17.2 The aircraft was maintained by an Approved Person (AP) who was accredited by the Aero Club of South Africa. The Approved Person was responsible for scheduled and unscheduled maintenance carried out on the aircraft.

1.18 Additional Information

- 1.18.1 According to the pilot, it had rained in the area on the previous day. During the on-site investigation, there was proof found of rainfall at the location of the accident and surrounding area on that day. The construction of Runway 03/21 did not provide for proper storm-water drainage. The result was that water pools were forming on the runway surface. The runway soil was compacted and did not allow the water to seep into the ground. The runway surface therefore became muddy and slippery. The runway was no longer conducive or appropriate for flying operations on that day.
- 1.18.2 The takeoff run was initiated from the crossing of runways 03/21 and 19/27. The location as identified was approximately 200 metres from the threshold of Runway 03.
- 1.18.3 The aircraft was taking off from a grass surface on the left side of Runway 03. The grass was not even and this made it possible for pools of water to form. Due to the wetness, the soil which was not covered by grass also became muddy and slippery. According to the markings that were found on the ground indicating main and tail wheels, the indication is that the takeoff run was affected by the wet ground. The markings show that the pilot was struggling to keep the aircraft straight according to the runway centre line. At some places the pilot was avoiding going through the pools of water.
- 1.18.4 According to the Pilot Operating Handbook (POH), the airspeed limitation (Vne) is 110 miles per hour (mph), takeoff and landing distance in zero wind is <150 metres and with a 5-knot headwind < 80 metres. The takeoff and landing speed (long and short runways) is 50 mph, with 2 notches of flaps. All this information has a bearing on takeoff from a prepared runway. There was no information about requirements for wet or grass surfaces.

1.19 Useful or Effective Investigation Techniques

- 1.19.1 None.

2. ANALYSIS

Man

- 2.1 The pilot had a valid licence and the aircraft type rating was endorsed on it. The pilot's flying competency is best shown by the training and number of hours accumulated in the aviation industry. The pilot also had a valid Medical Certificate with no restrictions. He was in good physical health and had no medical complications which may have prevented him from flying the accident aircraft on the day.
- 2.2 The sequence of events which led to the aircraft being involved in the accident was investigated. The contribution of the pilot in terms of the decisions he had made and what role they had played in the occurrence were also investigated. The factors identified were as follows:
- (i) The decision to fly the aircraft in the indicated weather conditions.
 - (ii) The decision to start his takeoff run from the grass on the left side of Runway 03.
 - (iii) The decision to do the takeoff run from the location where the two runways (03/21 and 09/27) were crossed.
 - (iv) The decision not to abort the takeoff.
- 2.3 The pilot was taking off from the grass in a north-westerly direction into the wind (head wind). The pilot had effectively only approximately 200 metres of ground in front of him to use for the takeoff run. Another factor was that the takeoff run was aiming directly towards the hangar. The pilot had put himself in an undesirable, unsafe situation which potentially had the ingredients of a disaster waiting to happen.
- 2.4 During the takeoff run, the wind conditions changed. There was a cross-wind coming from the right side of the aircraft. The aircraft drifted towards the left side. Simultaneously there was a downward moving vertical force (downdraft) also acting on the aircraft. Both these forces (downdraft and cross-wind) made it difficult for the pilot to initiate a climb-out. The pilot could not correct the heading of the aircraft towards the right side. At this stage in the takeoff run the aircraft had already reached its takeoff speed and it was going to be difficult for the pilot to apply brakes or do an aborted takeoff. The aircraft was heading straight towards the hangar with the pilot sitting behind the controls of the aircraft, totally helpless to do anything about the situation.
- 2.5 The left wing collided with the hangar. The force with which the wing impacted the hangar was very hard and resulted in total destruction of the wing. The extent of damage caused to the wing rendered the aircraft unfit for flight.
- 2.6 According to the available information, it appears that the aircraft experienced loss of directional control during the initial stages of the takeoff run. The grass area which the pilot used was not suitable for normal takeoff. It is possible that the loss of

directional control was induced by the waterlogged grass surface. By the time that the aircraft finally managed to lift off the ground, it was already approaching the hangar and the pilot had no chance of avoiding the collision.

Environment

- 2.7 Rhino Park is a privately owned and managed aerodrome. As a result of this fact, the owners are not required to comply with the required technical standards for licensed aerodromes in accordance with applicable regulations. The aerodrome is mainly used by recreational aircraft (microlight) visiting and/or operating from the facility.
- 2.8 The two runways at the aerodrome are constructed of compacted soil, which is graded to a flat, smooth and level surface. Ideally, the runways should be sufficiently prepared and ready for use. However, this does not appear to be the case at Rhino Park. The runway conditions drastically changed when the weather changed. There was no provision made to have a storm-water drainage system to clear off the standing water from the surface of the runway. The result was that the runway became a hazardous and unsuitable take-off surface. Under normal circumstances, such a runway would be closed until the risk has subsided or improved or been completely removed.
- 2.9 The decision taken by the pilot to use the grass area as an alternative is considered to be very dangerous, especially on the basis of the fact that the aircraft was lined up straight toward the hangar. The water on the grass area was also considered to be much worse than on the runway. During the on-site investigation, the indication was that initially the pilot must have struggled a bit to keep the aircraft straight in the takeoff run, because the grass was not evenly cut or growing and its main wheels were sliding in the muddy soil exposed between the patches of grass. This obviously had an effect on the direction of the aircraft. At the same time also, he experienced a cross-wind which forced the aircraft towards the left side. Obviously, this situation caused great concern to the pilot. The implication was that potentially the aircraft could have struck any of the obstacles situated on the left side of the runway. The pilot was also under tremendous pressure to take off, when he initiated the rotation and attempting a climb out, the aircraft was exposed to another force (downdraft) which pushed it down and prevented it from climbing out. Everything that the pilot attempted to do to correct the situation was unsuccessful until the aircraft finally collided with the hangar.

3. CONCLUSION

3.1 Findings

- 3.1.1 The pilot had a valid Private Pilot's Licence (PPL) and the aircraft type rating was endorsed on it.
- 3.1.2 The pilot had a valid Medical Certificate with no restrictions.
- 3.1.3 The owner/pilot was operating the aircraft privately in accordance with CAR, Part 24 and 94.
- 3.1.4 The aircraft had a valid Private Authority to Fly and was considered to be airworthy on the day of the accident.

- 3.1.5 The pilot, accompanied by a passenger, flew the aircraft on a private flight under visual flight rules (VFR) by day from Rhino Park.
- 3.1.6 The pilot started the takeoff run from the crossing of Runway 03/21 and 09/27, at approximately 200 metres from the end of Runway 03.
- 3.1.7 The aircraft was taking off in a north-westerly direction (NW) from the grass on the left side of Runway 03 and collided with a hangar at the end of the runway.
- 3.1.8 The left side wing of the aircraft struck the hangar and sustained damage.
- 3.1.9 The pilot and passenger did not sustain any injury in the accident.
- 3.1.10 The runway surface had pools of water from the rain of the previous day, which resulted in a decision by the pilot to start the takeoff run from the grass area.
- 3.1.11 During the takeoff run the pilot experienced a force of wind which caused the aircraft to drift towards the left side of the runway.
- 3.1.12 The pilot attempted to correct the situation by applying right rudder and aileron input, but he was unsuccessful due to limited speed at the time, with limited rudder authority.
- 3.1.13 At the time of the accident, the runway was considered as being unsafe for takeoff or landings, due to the fact that the runway was waterlogged.
- 3.1.14 The distance between the hangar buildings and Runway 03 was found to be too close to the runway.
- 3.1.15 The aerodrome is privately owned and managed. The aerodrome does not have a licence and was not required to comply with applicable regulations.

3.2 Probable Cause/s

- 3.2.1 During the takeoff run, the aircraft collided with a hangar.

Contributory Factors

- 3.2.2 The decision of the pilot to continue with the takeoff under the prevailing conditions.
- 3.2.3 The grass terrain was an unprepared surface and was waterlogged, which influenced the takeoff run.
- 3.2.4 A limited cross-wind component from the left side caused the aircraft to drift to the left.
- 3.2.5 The takeoff run started at the intersection of Runway 03/21 and 09/27, reducing the option to abort the takeoff.

4. SAFETY RECOMMENDATIONS

- 4.1 It is recommended that the Director for Civil Aviation should document minimum procedures for private aerodromes, in terms of safety requirements.

5. APPENDICES

- 5.1 None

Report reviewed and amended by the Advisory Safety Panel on 20 April 2010.

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