Air Accident Investigation Unit Ireland

FACTUAL REPORT

ACCIDENT

BRM, Land Africa (Citius), EI-FBY
Ballyheelan, Co. Cavan

21 April 2021

An Roinn Iompair
Department of Transport

Foreword

This safety investigation is exclusively of a technical nature and the Final Report reflects the determination of the AAIU regarding the circumstances of this occurrence and its probable causes.

In accordance with the provisions of Annex 13[1] to the Convention on International Civil Aviation, Regulation (EU) No 996/2010[2] and Statutory Instrument No. 460 of 2009[3], safety investigations are in no case concerned with apportioning blame or liability. They are independent of, separate from and without prejudice to any judicial or administrative proceedings to apportion blame or liability. The sole objective of this safety investigation and Final Report is the prevention of accidents and incidents.

Accordingly, it is inappropriate that AAIU Reports should be used to assign fault or blame or determine liability, since neither the safety investigation nor the reporting process has been undertaken for that purpose.

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[1] **Annex 13**: International Civil Aviation Organization (ICAO), Annex 13, Aircraft Accident and Incident Investigation.

[2] **Regulation (EU) No 996/2010** of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation.

[3] **Statutory Instrument (SI) No. 460 of 2009**: Air Navigation (Notification and Investigation of Accidents, Serious Incidents and Incidents) Regulations 2009.

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In accordance with Annex 13 to the Convention on International Civil Aviation, Regulation (EU) No 996/2010 and the provisions of SI No. 460 of 2009, the Chief Inspector of Air Accidents on, 06 May 2021, appointed Daniel Delaney as the Investigator-in-Charge to carry out an Investigation into this Occurrence and prepare a Report.

Aircraft Type and Registration:	BRM Construções Aeronáuticas LDA, Land Africa (Citius), EI-FBY
No. and Type of Engines:	1 x BRP-Rotax 912 ULS
Aircraft Serial Number:	0118/KIT/08-CT
Year of Manufacture:	2008
Date and Time (UTC)[4]:	21 April 2021 @ 10.00 hrs
Location:	Ballyheelan Airfield, Co Cavan
Type of Operation:	General Aviation
Persons on Board:	Crew – 1 Passengers – Nil
Injuries:	Nil
Nature of Damage:	Substantial
Commander's Licence:	National Private Pilot Licence (Aeroplanes) issued by the United Kingdom (UK) Civil Aviation Authority (CAA)
Commander's Age:	42 years
Commander's Flying Experience:	553 hours, of which 500 were on type
Notification Source:	Safety Report submitted by an Approved Maintenance Organisation and AAIU Report Form submitted by the Pilot.
Information Source:	AAIU Report Form submitted by Pilot.

[4] **UTC**: Co-ordinated Universal Time. All times in this report are quoted in UTC; local time was UTC plus one hour on the date of the occurrence.

SYNOPSIS

The BRM Land Africa (Citius) aircraft departed Ballyheelan Airfield, Co Cavan for a local flight on 21 April 2021. The Pilot, who was the sole occupant, estimated the wind speed to be 25 miles per hour (mph) at departure. The Pilot stated that one hour later, when returning to land, the wind speed had increased and was gusting to an estimated 35 mph. He said that as the aircraft crossed the runway threshold, he reduced engine power and just before touchdown the aircraft appeared to sink and stall, resulting in a hard landing on the runway. The aircraft sustained substantial damage to its undercarriage. The Pilot was uninjured. There was no fire.

NOTIFICATION

The AAIU received initial notification from a safety report submitted by an Approved Maintenance Organisation on 4 May 2021. The Pilot submitted an AAIU Report Form on 6 May 2021.

1. FACTUAL INFORMATION

1.1 History of the Flight

The Pilot reported that the flight departed Ballyheelan Airfield, Co Cavan at 09.00 hrs for a Visual Flight Rules[5] (VFR) local flight. The Pilot estimated the wind speed at the time of departure to be approximately 25 mph[6]. The Pilot also reported that during the flight, the thermal activity was '*severe*'. The Pilot recalled that when the flight returned to the airfield, the wind speed had increased and estimated that it was gusting to 35 mph[7]. The Pilot reported that the approach was made with '*stage 2 flap*' and, as the aircraft crossed the threshold of Runway (RWY) 17, the engine power was reduced as normal for landing, but when the aircraft was '*approximately four feet from the ground*', he felt '*a sink in the air*'. He said that the aircraft stalled onto the beginning of the runway. The hard landing caused substantial impact damage to the aircraft. The Pilot reported that the aircraft was partially dismantled and moved from the airfield to a workshop on the day of the occurrence.

1.2 Injuries to Persons

No injuries arising from the occurrence were reported to the Investigation.

[5] **Visual Flight Rules**: Operation in accordance with Single European Rules of the Air SERA.5005.
[6] 25 mph is equivalent to approximately 22 knots (kt).
[7] 35 mph is equivalent to approximately 30 kt.

1.3 Aircraft Information

1.3.1 General

The aircraft, a Land Africa (Citius), was manufactured by BRM Construções Aeronáuticas LDA, in 2008, and registered in Ireland in the microlight aeroplane category on 5 July 2013 as EI-FBY (**Photo No. 1**). The aircraft was powered by a 73.5 kW BRP-Rotax 912 ULS piston engine driving a Kiev 283 three-bladed propeller. The aircraft's flight permit was issued by the Irish Aviation Authority (IAA) on 27 May 2019. The first extension to the flight permit validity was certified on 4 May 2020 and was valid until 26 May 2021. The maximum take-off mass was 450 kg and the stall speed published by the manufacturer was 45 km/h[8].

Photo No. 1: General view of the aircraft (*Source: The Pilot*)

1.3.2 Aircraft History

The aircraft logbooks recorded that at the time of the occurrence, the airframe and engine had completed 1,347 hours flight time. The most recent maintenance recorded in the aircraft logbooks was a 100-hour airframe maintenance check on 30 December 2019 at 1,231 airframe hours, and a 100-hour engine service on 10 October 2020 at 1,299 engine hours. An annual inspection for permit renewal was logged on 4 May 2020.

1.3.3 Damage to the Aircraft

When inspected by the Investigation on 17 May 2021, the aircraft had been recovered to a workshop and partially dismantled. The wings and wing-struts were not available for inspection; however, the Pilot informed the Investigation that they were undamaged. The Pilot provided photographs to the Investigation of the aircraft in the workshop prior to removal of the undercarriage legs. The Pilot also provided photographs of the wings and wing-struts.

[8] **45 km/h**: 45 kilometres per hour is equivalent to 24.3 Knots (kt).

No photographs were available of the aircraft prior to its removal from the airfield following the occurrence. When the Investigation inspected the aircraft, it was found that the left undercarriage leg was distorted and had rotated upwards about a point on the undercarriage crossbeam inboard of the left leg attachment point. This rotation of the leg had caused bending and cracking of the crossbeam and buckling of the fuselage skin in the vicinity of the attachment point (**Photo No. 2** and **Photo No. 3**).

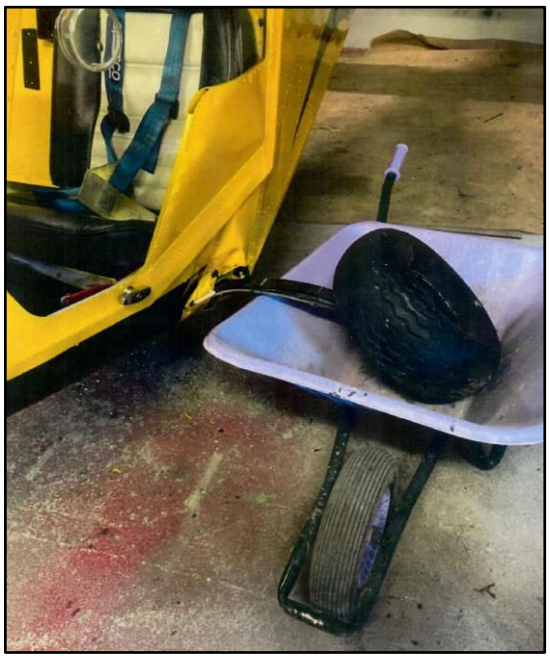

Photo No. 2: Damage to left landing gear

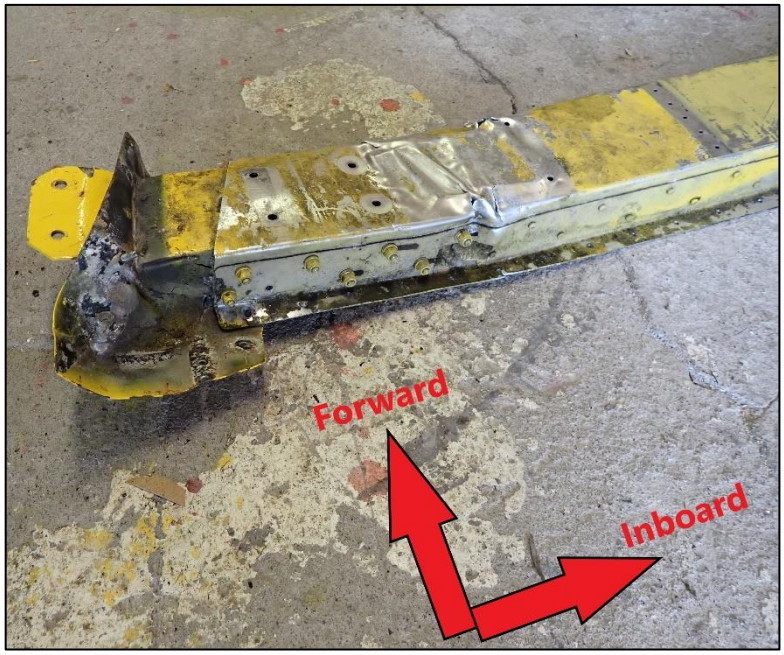

Photo No. 3: Damage to undercarriage crossbeam

In addition to the buckling of the fuselage in the vicinity of the left undercarriage attachment point, further wrinkling of the skin was also identified, which extended along the left side of the fuselage (**Photo No. 4** and **Photo No. 5**).

Photo No. 4 and **Photo No. 5:** Wrinkling of aircraft skin

The reinforced slot on the left side of the fuselage behind the cockpit, that accommodated the actuating mechanism for the aircraft's flaperons[9], had wrinkle damage at the top and impact damage to the paintwork at the bottom of the slot (**Photo No. 6** and **Photo No. 7**).

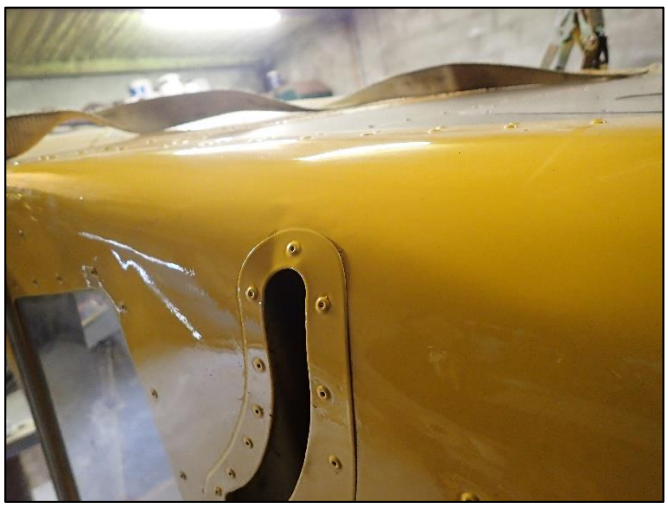

Photo No. 6 and **Photo No. 7:** Damage to reinforced slot for flaperon mechanism

The windscreen was cracked in the vicinity of the seal between the screen and the inboard part of the left wing leading edge. The right undercarriage leg did not show any evidence of bending or other damage and the nose leg did not appear to be damaged. There was no evidence of impact or damage to the propeller.

[9] **Flaperons**: Flaperons combine both aspects of flaps and ailerons. In addition to controlling the bank angle of an aircraft like conventional ailerons, flaperons can be lowered together to function much the same as a dedicated set of flaps (FAA- Pilot's Handbook of Aeronautical Knowledge, 2016).

1.4 Other Damage

No other damage was reported to the Investigation.

1.5 Personnel Information

The Pilot held a National Private Pilot's Licence (NPPL) (Aeroplanes) which was issued by the UK CAA on 14 March 2017. The licence contained a Microlight Aeroplanes class rating that was revalidated by experience on 22 December 2020 and was valid until 28 February 2023.

A UK-NPPL licence is not issued in accordance with international standards and therefore is not automatically validated by the IAA for use in Ireland. The IAA's Aeronautical Notice P.21 (AN P.21), '*Acceptance of Flight Crew Licenses*' (2017), contains details of the arrangements for holders of UK-NPPL licenses to exercise the privileges of their licence within the State. The Pilot stated that he was familiar with the requirements of AN P.21 and provided the Investigation with a copy of the prior notification that he had submitted in accordance with Section 4 (a) of the notice. The Pilot also provided a copy of an email sent to the IAA at the same time regarding the online AN P.21 notification advising the IAA that the notification had been submitted.

The Pilot's flight experience is shown in **Table No. 1**, and included 1.1 hours of refresher training on 22 December 2020.

Total all types:	553 hours
Total on type:	500 hours
Total on type P1:	490 hours
Last 90 days:	20 hours
Last 7 days:	Nil
Last 24 hours:	Nil

Table No. 1: Pilot's flying experience

The Pilot also held an EASA Class 2 medical certificate, issued by the IAA, which was valid until 8 November 2022.

1.6 Meteorological Information

The Irish Meteorological Service, *Met Éireann*, provided the Investigation with a description of the estimated meteorological conditions for the vicinity of Ballyheelan Airfield on 21 April 2021 at 10.00 hrs (**Table No. 2**).

The general meteorological situation was that Ireland lay in a moderate to fresh east-northeast airflow on the southern side of a 1026 hPa anticyclone. A recent decaying cold front remained embedded in the flow and was clearing southwards.

Estimated meteorological conditions for around Ballyheelan Airfield, Co. Cavan on 21st April 2021 at 10.00 UTC:		
Wind:	**Surface:**	Easterly 7 - 10 Kt
	2000 ft:	Easterly 10 - 15 Kt
	Between Surface and 300 ft:	Similar to surface, with gusts up to 15 Kt
Visibility:	30 km+	
Weather:	Cloudy and dry	
Cloud:	A broken (5-7/8th oktas[10]) layer of stratus clouds with bases around 1,500 ft and a second layer of broken cloud at 3,500 ft.	
Surface Temperature/ Dew Point Temperature:	10/7 degrees Celsius	
Mean Sea Level (MSL) Pressure:	1022 hPa	
Freezing Level:	6,000 ft	
Other Comments:	Nil	

Table No. 2: Estimated meteorological conditions (*Met Éireann*)

1.6.1 Wind Shear

The Manual on Low-level Wind Shear (ICAO, 2005) explains wind shear in general terms as; '*a change in wind speed and/or direction in space, including updrafts and downdrafts*. It also states that '*any atmospheric phenomenon or any physical obstacle to the prevailing wind flow that produces a change in wind speed and/or direction, in effect, causes wind shear*'.

[10] **Okta**: The World Meteorological Organisation unit of cloud cover. One okta covers 1/8th of the sky.

In relation to wind flow around obstacles the Manual on Low-level Wind Shear states:

> '*A combination of strong surface winds and obstacles to the prevailing wind flow situated upwind of the approach or departure path (such as large buildings, low hills or close-planted stands of tall trees) can create localized areas of low-level wind shear. In these circumstances the wind shear is usually accompanied by clear air turbulence (CAT). The effect that the obstacles have on the prevailing wind flow depends on a number of factors, the most important being the speed of the wind and its orientation relative to the obstacle, and the scale of the obstacle in relation to the runway dimensions.*' […] '*Where a range of low hills lies alongside a runway, the height of the range may be insufficient to divert the flow, but as the airflow is forced over the hills it acquires a vertical component (downwards) which, depending upon the proximity of the hills to the runway, can cause localized low-level downdrafts along the runway.*'

The Federal Aviation Administration (FAA) states in its Airplane Flying Handbook, Chapter 17, that; '*Smaller, lighter weight airplanes are more easily affected by strong winds (especially crosswinds), turbulence, terrain influences, and other hazardous conditions*.' (Federal Aviation Administration (FAA), 2021).

1.7 Airfield Information

Ballyheelan is a private, unlicensed airfield located approximately 6.5 nautical miles west of Ballyjamesduff, Co Cavan at an approximate elevation of 279 feet (ft) AMSL[11]. The runway in use was RWY 17, which had a grass surface approximately 325 metres (m) long, on a magnetic bearing of 171°. A view from the threshold along RWY 17 is shown in **Photo No. 8**.

Photo No. 8: RWY 17 at Ballyheelan Airfield

[11] **AMSL:** Above Mean Sea Level.

A high voltage powerline crossed RWY 17 approximately 110 m from the threshold, with the eastern-most supporting pole located approximately 30 m west of the runway centre line.

The threshold and approach area of RWY 17 are shown in **Photo No. 9**. The area immediately prior to the threshold of RWY 17 consisted of hedgerows and scrubland. More substantial trees were situated to the east of the approach and threshold. A wind direction indicator (windsock) was situated to the west of the threshold. The hedgerow defining the eastern boundary of the airfield was approximately 30 m east of the RWY 17 centre line in the vicinity of the threshold.

Photo No. 9: The approach area for RWY 17

1.8 IAA Records of notification required by IAA Aeronautical Notice P.21

1.8.1 General

The IAA informed the Investigation that there was no record of the Pilot submitting the required AN P.21 notification. Further enquiries by the Investigation indicated that the IAA did not have a record of similar AN P.21 notifications made by several other Pilots. In relation to the system in place at the time of the occurrence for Pilots to make the required notification, the IAA stated that '*There is no feedback for a submission of a form so we can't advise whether something was submitted or not. That is the same whether something is submitted physically or electronically.*'

1.8.2 Action Taken

After further discussions, the IAA informed the Investigation that a new system is being introduced that will '*provide for an individual, who will have to register with the IAA, to provide a notification for those areas that P21 will continue to be active for, through their unique portal where they will retain a copy of same and have a reference of a submission.*'

1.9 Requirement to Report Accidents and Serious Incidents

In accordance with Article 2(3) and Annex 1 of Regulation (EU) 2018/1139, the European common rules in the field of aviation did not apply to the operation of an aircraft in the Microlight category and therefore National regulations applied.

The requirements for the reporting and investigation of Accidents, Serious Incidents and Incidents under National regulations are contained in Statutory Instrument (SI) No. 460 of 2009, *Air Navigation (Notification and Investigation of Accidents, Serious Incidents, and Incidents Regulations) 2009*. The Air Accident Investigation Unit (AAIU), which is functionally independent of the State aviation authorities, carries out investigations when considered appropriate by the Chief Inspector of Air Accidents. The sole purpose of any such investigation is to prevent aviation accidents and serious incidents. It is not the purpose of any such investigation and the associated investigation report to apportion blame or liability. In addition to reporting requirements, SI 460 of 2009 also lays down requirements in relation to access to or movement of damaged aircraft or wreckage.

To improve safety, those not subject to mandatory reporting requirements are also encouraged to report all occurrences on a voluntary basis via the IAA occurrence reporting website.

2. AAIU COMMENT

11 During the approach to land on RWY 17 at Ballyheelan Airfield, the Pilot experienced a gusting crosswind from the east. The terrain in the general vicinity of the airfield was undulating and a hedgerow with trees lay to the east of the approach and runway. The conditions were conducive to wind shear. Microlight aircraft, due to their low mass and low operating speeds, have low momentum and therefore are more easily affected by strong winds (especially crosswinds), turbulence and terrain influences. The Pilot's description of the occurrence indicates a probable windshear encounter at a low height above the runway from which he was unable to prevent a hard landing.

The aircraft was registered, and the aircraft's airworthiness documents were valid.

The Pilot provided the Investigation with evidence of holding a valid licence, Class Rating, medical certificate and that the required notification had been provided to the IAA in accordance with AN P.21.

The IAA did not have a record of receiving the notification, however, the Investigation notes the action being taken by the IAA, through the introduction of a new online system that will improve the handling and recording of AN P.21 notifications.

The Pilot was not aware of the requirement of SI 460 of 2009 to notify the AAIU of the occurrence. Consequently, the aircraft was inadvertently recovered from the airfield before the Investigation could carry out an initial site inspection and photographic survey.

- END -

In accordance with Annex 13 to the Convention on International Civil Aviation, Regulation (EU) No. 996/2010, and Statutory Instrument No. 460 of 2009, Air Navigation (Notification and Investigation of Accidents, Serious Incidents and Incidents) Regulation, 2009, the sole purpose of this investigation is to prevent aviation accidents and serious incidents. It is not the purpose of any such investigation and the associated investigation report to apportion blame or liability.

A safety recommendation shall in no case create a presumption of blame or liability for an occurrence.

Produced by the Air Accident Investigation Unit

AAIU Reports are available on the Unit website at www.aaiu.ie

An Roinn Iompair
Department of Transport

Air Accident Investigation Unit,
Department of Transport,
2nd Floor, Leeson Lane,
Dublin 2, D02TR60, Ireland.
Telephone: +353 1 604 1293 (24x7)
Email: info@aaiu.ie
Web: www.aaiu.ie
Twitter: @AAIU_Ireland