Air Accident Investigation Unit Ireland

FACTUAL REPORT

ACCIDENT

Cessna T303 Crusader, G-PUSI

Navan Airfield, Co Meath, Ireland

6 December 2022

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, on 6 December 2022, the Chief Inspector of Air Accidents appointed Clive Byrne as the Investigator-in-Charge to carry out an Investigation into this Accident and prepare a Report.

Aircraft Type and Registration:	**Cessna T303 Crusader, G-PUSI**
No. and Type of Engines:	**2 x Teledyne Continental TSIO-520-AE (Left) LTSIO-520-AE (Right)**
Aircraft Serial Number:	**T303-00273**
Year of Manufacture:	**1984**
Date and Time (UTC)[4]:	**6 December 2022 @ 12:00 hrs**
Location:	**Navan Airfield (EIHH), Co. Meath, Ireland**
Type of Operation:	**Private**
Persons on Board:	**Crew – 1 Passengers – 2**
Injuries:	**Nil**
Nature of Damage:	**Substantial**
Commander's Licence:	**Private Pilot Licence (PPL), Aeroplane (A), issued by the Civil Aviation Authority (CAA) of the United Kingdom (UK)**
Commander's Age:	**27 years**
Commander's Flying Experience:	**412 hours, of which 27 were on type**
Notification Source:	**Airfield Owner**
Information Source:	**AAIU Field Investigation AAIU Report Form submitted by the Pilot**

[4] **UTC**: Co-ordinated Universal Time. All times in this report are quoted in UTC unless otherwise stated; local time was the same as UTC on the date of the occurrence.

SYNOPSIS

During a landing attempt onto Runway 09 at Navan Airfield, Co. Meath, the twin engine Cessna T303 Crusader aircraft experienced a crosswind which raised the left wing as the aircraft entered the flare, and the right wing impacted with the grass. The aircraft touched down on soft ground to the left of the runway. The main wheels dug into the soft ground before stopping adjacent to the boundary markings of Runway 07, which is situated to the left of Runway 09. The Pilot and two passengers on board exited the aircraft normally. There was no fire, and no injuries were reported to the Investigation.

NOTIFICATION AND RESPONSE

The airfield Owner notified the AAIU on the afternoon of the accident after the aircraft had been secured at the side of the airfield. Two Inspectors of Air Accidents deployed to the airfield the following morning and commenced an Investigation.

1. FACTUAL INFORMATION

1.1 History of the Flight

The aircraft departed Bagby Airfield (EGNG), located near Thirsk in Yorkshire, UK, at 10:30 hrs for the flight to Navan Airfield (EIHH) in Co. Meath. As the aircraft approached Runway (RWY) 09 at EIHH, the Pilot was attempting to '*land long*' and to the left of the runway centreline as runway conditions were reported as being soft. The Pilot reported that during the flare, the aircraft experienced a crosswind from the left causing the left wing to lift and the right wing to lower resulting in the right wing contacting the ground. The right main wheel touched down almost immediately afterwards and dug into the soft surface of the grass area situated between the two runways at the airfield. The aircraft came to rest adjacent to the boundary markings of the other runway (Runway 07). The Pilot and two passengers on board exited the aircraft normally. There was no fire.

1.2 Injuries to Persons

No injuries were reported to the Investigation.

1.3 Interview with the Pilot

The Pilot reported that he had checked the weather and airfield conditions at EIHH (by phone) prior to his departure from EGNG. Weather conditions were reported as good, and the runway conditions were described as soft in places. He said he was advised to '*land long after the trees, to the left of the runway centreline*'.

The Pilot said that he performed a short field landing technique at an approach speed of approximately 80 knots (kt). The Pilot stated that he was planning on '*landing long'*, and past the trees which were situated on either side of the runway for the first 200 metres (m). He said he remained above the trees until the aircraft had passed them. Consequently, the landing was '*quite far up the runway*' [as planned]. As the aircraft was still above the trees, the Pilot completed a slight left turn.

Once past the trees he completed a right turn to align the aircraft to the right of the white cones (which were demarcating the edges of RWY 07). This right turn was conducted just before entering the flare. As the wind was coming from a northerly direction, the Pilot reported approaching the runway with a slight left bank to compensate for the wind.

The Pilot said that just prior to touching down he moved the throttles to idle as normal, '*where the aircraft settles for a landing*'. He said that during the flare manoeuvre, the left wing lifted, and the right wing dropped. He believed that he felt the right main wheel touch the ground first followed by the right wingtip making contact with the ground just after. The Pilot had no recollection of the stall warning horn sounding during the landing.

The Pilot said that he was possibly concentrating on the positioning of the aircraft as it was transiting through the area of trees and may have momentarily lost awareness as the airspeed decreased and the left wing lifted at the point of flare, due to the northerly crosswind.

When asked what he understood the purpose of the white cones to the right of RWY 07 to be, the Pilot said that the cones '*were marking a boundary between two runways'* and '*a segregation between the two runways'*. He said that he thought that the grass between the cones was indicating '*the other runway* [RWY07]'.

The Pilot said he said he *'wanted to be quite close to the white cones*' because of the advice to land to the left of the runway centreline. He noted that close to the white cones was an area of longer grass which he believed would aid in slowing down the aircraft after landing.

1.4 Airfield Information

Navan Airfield is a private grass airfield located three nautical miles north-east of Navan, County Meath, at an elevation of 250 feet above mean sea level. The general layout of the airfield, which has two runways, RWY 07/25 and RWY 09/27 is shown in **Figure No. 1**.

The IAA informed the Investigation that at the time of the accident, the Airfield Operator had declared compliance with the requirements of IAA Aeronautical Notice T.15[5] for the purposes of allowing training flights to be conducted at the airfield. Pursuant to this declaration, and following a subsequent airfield inspection, Navan Airfield was prescribed in writing by the IAA as a place suitable for flight instruction under certain conditions. These conditions include requirements for the aerodrome operator, and infrastructure, as well as a safety policy and emergency service requirements. The prescribed conditions were issued by the IAA in respect of RWY 09/27 only. RWY 07/25 was assessed as unsuitable for flight training activities.

[5] **Aeronautical Notice T.15**: Irish Aviation Authority Aeronautical Notice T.15, Use of an Unlicensed Aerodrome by aircraft engaged in instruction in flying. Issue 01, Date of issue: 06/09/19.

Figure No. 1: Navan Airfield (runway markings added by Investigation) (*Google Earth*)

The white dashed lines have been added by the Investigation to provide clarity regarding the proximity of both runways and do not indicate actual runway markings on the day of the accident. RWY 07/25 is approximately 530 m in length and RWY 09/27 is approximately 700 m in length. There is a forest of mature trees on either side of the first 200 m approximately of RWY 09 and the distance between the trees on either side of the runway is approximately 35 m. There is approximately 500 m of remaining runway after the trees and a wedge-shaped grass area separating both runways to the east of the trees.

1.5 Aircraft Information

1.5.1 General

The Cessna T303 Crusader (**Photo No. 1**) is an all-metal six-seater low wing aircraft which is 9.27 m long, 4.06 m high and has a wingspan of 11.9 m. The aircraft has a standard empty weight of 1,525 kg. The aircraft is powered by two 250 brake horsepower (at 2,400 rpm) Teledyne Continental engines. A TSIO-520-AE model engine is fitted on the left side and a LTSIO-520-AE model engine is fitted on the right side. Each engine is fitted with a 3-bladed variable-pitch McCauley propeller. The propellers are contrarotating. The aircraft is equipped with a retractable tricycle type landing gear. The aircraft Manufacturer's records state that the subject aircraft was manufactured in 1984.

Photo No. 1: G-PUSI parked and secured at the side of the airfield

The aircraft's Maximum Take-Off Mass (MTOM) was 2,336 kg with a maximum demonstrated crosswind[6] for take-off or landing of 20 kt. The Pilot Operating Handbook (POH) states that '*the maximum crosswind velocity is generally dependent on pilot proficiency rather than airplane limitations*.'

1.5.2 Airworthiness Certification

The aircraft's Certificate of Airworthiness was issued by the UK CAA on 10 July 2008. The Airworthiness Review Certificate was issued on 3 August 2022 and was valid until 2 August 2023.

1.6 Damage to Aircraft

The aircraft sustained substantial damage during the accident sequence. The underside of the right wing sustained impact damage due to contact with the runway surface. The upper wing surface was buckled forward of the right aileron and a portion of the upper wing skin was torn (**Figure No. 2**). There was significant damage visible to the internal framework of the right wing; part of this damage was visible through an inspection port in the wing (**Figure No. 3**).

Figure No. 2: Right wing surface

Figure No. 3: Internal structural damage

1.6.1 Pilot Operating Handbook

Landing Performance

The Landing Performance section in the Pilot's Operating Handbook (Cessna Aircraft Company, 1984 Model T303, Pilots Operating Handbook, Original Issue, 21 July 1983) states as follows:

LANDING PERFORMANCE

Ground Roll ..... *820 FT* [250 m]

Total Distance Over 50-Ft Obstacle ..... *1450 FT* [442 m]

[6] **Maximum Demonstrated Crosswind:** Before an airplane is type certificated by the Federal Aviation Administration (FAA), it must be flight tested and meet certain requirements. Among these is the demonstration of being satisfactorily controllable with no exceptional degree of skill or alertness on the part of the pilot in 90° crosswinds up to a velocity equal to 0.2 VSO [Stall speed in the landing configuration]. This means a windspeed of two-tenths of the airplane's stalling speed with power off and landing gear/flaps down (FAA Airplane Flying Handbook, FAA-H-8083-3C, 2021).

The POH states the following regarding Short Field Landing procedures:

1. *Airspeed -- 90-100 KIAS (flaps UP).*
2. *Wing Flaps -- FULL DOWN (30^0).*
3. *Airspeed -- 81 KIAS (at maximum landing weight).*
4. *Trim -- ADJUST.*
5. *Touchdown -- MAIN WHEELS FIRST.*
6. *Brakes -- APPLY HEAVILY.*
7. *Wing Flaps -- RETRACT.*

1.7 Site Survey

During a site survey conducted on the day after the accident, ground markings were identified on the wedge-shaped grass area between the two runways, and to the left of RWY 09. The dimensions between the ground markings were consistent with the aircraft undercarriage dimensions. The markings began 323 m from the beginning of RWY 09 and are depicted in **Figure No. 4**. The white runway cones which outlined RWY 07 as shown in **Figure No. 4** have been added by the Investigation to show which runway was marked with cones on the day of the accident.

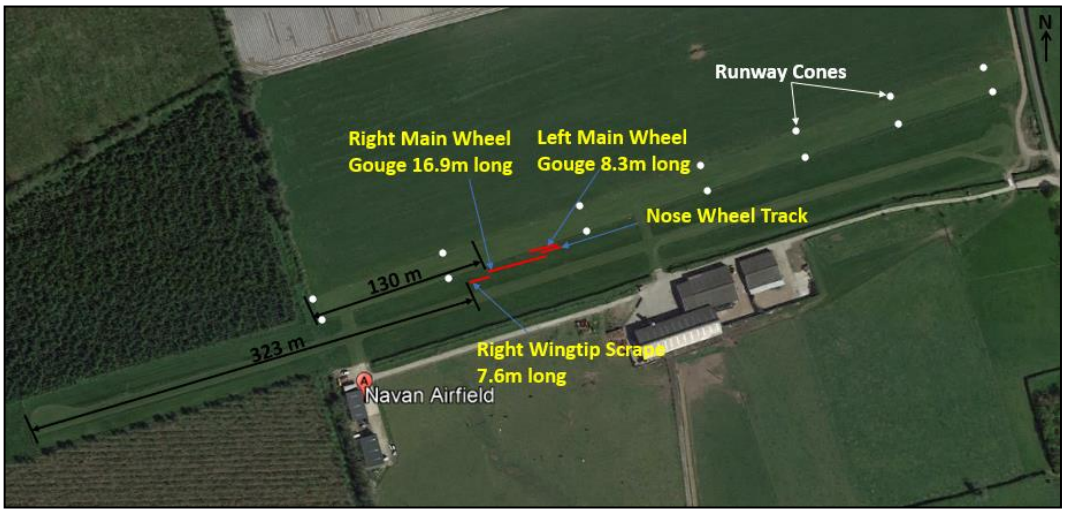

Figure No. 4: Site survey (*Google Earth*)

The markings indicate that the first ground contact occurred when the right wing touched the ground in the wedge-shaped grass area approximately 123 m from the end of the treeline, followed by the right main wheel which caused a gouge in the soft surface. The left main wheel touched down next, causing a more significant gouge. The nose wheel then touched down. All of the impact marks were noted to be on the wedge-shaped grass area between the two runways, and to the left of RWY 09. White cones marked the sides of RWY 07, whereas RWY 09 did not have white cones marking its edges on the day of the accident.

The ground impact marks as observed during the site survey are shown in **Figure No. 5** (looking east) and **Figure No. 6** (looking west).

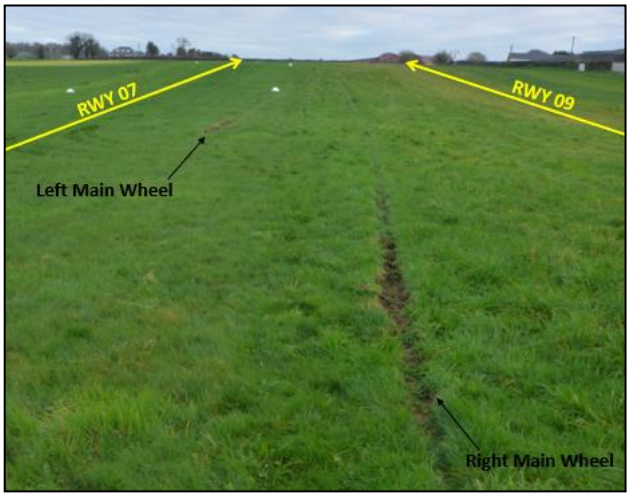

Figure No. 5: Ground impact marks looking east

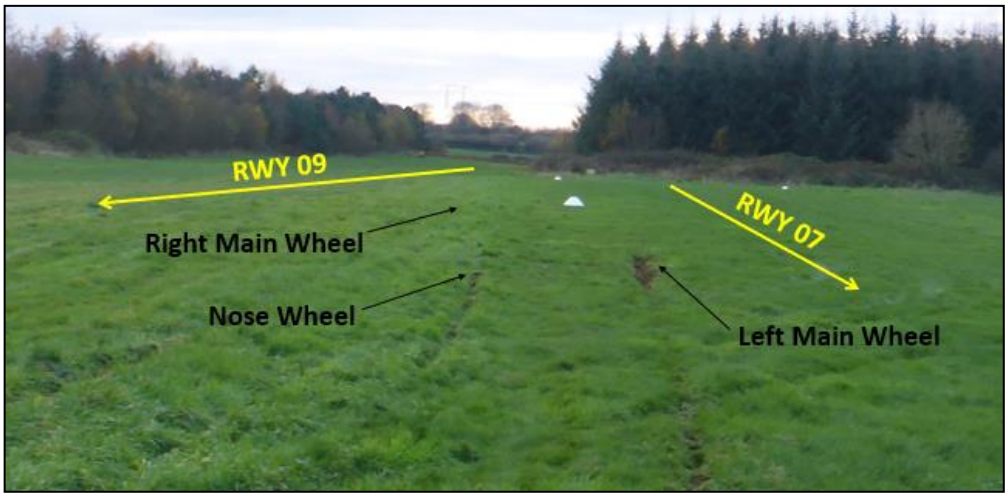

Figure No. 6: Ground impact marks looking west (Approach)

1.8 Personnel Information

The Pilot held a PPL (A) licence, which was issued by the UK CAA on 4 April 2022. The licence contained a Multi-Engine Piston (MEP (land)) class rating which was valid until 30 September 2023. The Pilot's Class 1 Medical Certificate was valid on the date of the event.

The Pilot's Flying Experience prior to the accident flight, as reported by the Pilot is outlined in **Table No. 1**.

Total all types:	412 hours
Total on type:	27 hours
Total on type P1:	27 hours
Last 90 days:	36 hours
Last 28 days:	30 hours
Last 24 hours:	3 hours 35 minutes

Table No. 1: Pilot's Flying Experience

1.9 Meteorological Information

Met Éireann, the Irish meteorological service, was asked to provide an aftercast of the weather conditions prevailing in the EIHH area at the time of the occurrence. The report contained the following estimated conditions (**Table No. 2**).

Meteorological Situation:	Ireland lies in a moderate to fresh north-east airflow between an extensive area of high pressure centred over Iceland and low pressure to the southwest of Ireland.
Surface Wind: **Wind at 2,000 feet (ft):** **Between surface and 300 ft:**	Varying between north-east and north-west, 4-7 kt, with gusts 10-12 kt. East to north-east, 15-20 kt. Similar to surface
Visibility:	25 kilometres (km)
Weather:	A mix of sunny spells and cloudy patches
Cloud:	Few (1-2/8^{ths} oktas[7]) with bases around 1,500-2,500 ft and a broken layer (5-7/8^{ths} oktas) of cloud with bases around 3,500 ft
Surface Temperature/Dew Point:	5 / 2 degrees Celsius
Mean Sea Level (MSL) Pressure:	1028 hPa (Hectopascals)
Freezing Level:	2,000-3,000 ft

Table No. 2: Estimated meteorological conditions for EIHH at time of accident

1.10 Crosswind Landings

Approaches to land in a crosswind are typically addressed by the use of two methods, namely, the wing low method or the crab method, both of which require co-ordinated inputs to be made by the pilot in order to maintain directional control of the aircraft as the airspeed is decreasing. The aircraft's POH states that '*A wing-low drift correction technique with wing flaps fully extended is the preferred method of performing crosswind landings*.'

[7] **Okta:** A unit of cloud amount, expressed as a number of eights of the sky dome covered by clouds.

2. AAIU COMMENT

The Pilot was using a short field landing technique with the intention of landing both long and to the left of the centreline of RWY 09. Once the aircraft had passed the trees at either side of the earlier part of the runway, the Pilot manoeuvred at low level and low speed in an attempt to line up to the left of the runway centreline. Once clear of the trees, the aircraft was flying over the wedge-shaped area of grass located between RWY 09 and RWY 07 and not over the prepared surface of RWY 09.

On the day of the accident, white cones marked the edges of RWY 07. The edges of RWY 09 were not marked with white cones. From the Pilot's view on approach, the line of cones that outline RWY 07 appeared to segregate RWY 07 from RWY 09. The Pilot had been advised to land long after the trees and to the left of the runway centreline. However, he thought that the white cones located on the right-hand edge of RWY 07 were a boundary line between the two runways. He stated that he wanted to be quite close to the white cones and intentionally landed there on the longer grass which he believed was part of RWY 09 and would provide a better surface during braking.

The Pilot was likely concentrating on positioning the aircraft to what he perceived as the left of RWY 09 centreline and was conscious of the reduced landing distance available. A series of low level and low speed manoeuvres were made once the aircraft was clear of the trees to align with his intended touchdown area which was in an area between RWY 07 and RWY 09. The low level and low speed manoeuvres were completed over a distance of approximately 123 m from the treeline.

The Pilot stated that during the flare, the left wing lifted, and the right wing dropped. This may have been due to the effect of the Pilot reported crosswind on the unsheltered part of the runway and the flight controls becoming less effective at lower speeds. At a low height above the ground during the landing phase, there is limited time for correction. As the right wing dropped, it impacted the ground with considerable force which caused significant structural damage to the wing. The ground markings and damage to the aircraft indicate that the right wing impacted first, followed by the right main wheel and then the left main wheel.

The estimated local wind conditions were reported in the aftercast as varying between north-east and north-west, 4-7 kt, with gusts of 10-12 kt. The aircraft's maximum demonstrated crosswind for landing is stated as 20 kt in the POH, therefore the aircraft was operating within the demonstrated crosswind capabilities of the aircraft.

- 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.

Produced by the Air Accident Investigation Unit

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