Air Accident Investigation Unit Ireland

FACTUAL REPORT

ACCIDENT

Solar Wings Pegasus XL-R, G-MNBI
Rathcash East, Co. Kilkenny

28 June 2019

An Roinn Iompair
Turasóireachta agus Spóirt
Department of Transport,
Tourism and Sport

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 28 June 2019, appointed Leo Murray as the Investigator-in-Charge, assisted by Clive Byrne, Inspector of Air Accidents, to carry out an Investigation into this Accident and prepare a Report.

Aircraft Type and Registration:	**Solar Wings Pegasus XL-R, G-MNBI**
No. and Type of Engines:	**1 x Rotax 447**
Aircraft Serial Number:	**SW-TB-1174 (trike), T8841161XL (wing)**
Year of Manufacture:	**1987 (trike), 1984 (wing)**
Date and Time (UTC)[4]:	**28 June 2019 @ 20.30 hrs**
Location:	**Rathcash East, Co. Kilkenny**
Type of Operation:	**General Aviation**
Persons on Board:	**Crew - 1 Passengers - Nil**
Injuries:	**Crew - 1 (Fatal)**
Nature of Damage:	**Destroyed**
Commander's Licence:	**National Private Pilot Licence (Aeroplanes), NPPL (A), issued by the UK Civil Aviation Authority (CAA)**
Commander's Age:	**51 years**
Commander's Flying Experience:	**Estimated at 130 hours, of which approximately 110 hours were on type**
Notification Source:	**Irish Aviation Authority (IAA)**
Information Source:	**AAIU Field Investigation**

[4] **UTC**: Co-ordinated Universal Time. All timings in this report are quoted in UTC; local time is UTC +1 hour.

SYNOPSIS

The microlight was on a local flight from a private airstrip at Rathcash East (Gowran), Co. Kilkenny, and was airborne for three to four minutes before the accident occurred at approximately 20.30 hrs. The Pilot was observed operating at low level in the area before proceeding back towards the airstrip. The microlight collided with one of two wooden poles supporting electrical power lines close to the private strip, and fell to the ground. The Pilot was fatally injured. There was no fire.

NOTIFICATION

The AAIU was notified by the IAA at 20.57 hrs. Two Inspectors of Air Accidents deployed to the scene and commenced an Investigation.

1. FACTUAL INFORMATION

1.1 History of the Flight

The Pilot had flown the microlight earlier that day and reported no problems when he spoke with the registered owner later by phone. That flight, which lasted approximately 15 minutes, took place between 16.00 hrs and 16.30 hrs. The microlight, which was kept fully rigged, had been removed from the hangar earlier that day to allow the space to be used for a family function and was positioned on the airstrip near the windsock. Later that evening, the Pilot decided to fly the microlight again. It was reported that the microlight was airborne for three to four minutes before the collision occurred. Witnesses reported that the Pilot was manoeuvring at low level to the north of the R702 road before proceeding in the direction of the hangar. The microlight was observed pitching and banking somewhat erratically before turning and colliding with one of two poles supporting high-voltage power lines. The engine noise was heard to decrease before impact. Following the collision, the microlight fell to the ground adjacent to a hedgerow in which the poles were situated (**Photo No. 1**). The Pilot was fatally injured in the accident. There was no fire.

Photo No. 1: Power lines, supporting poles and disposition of wreckage

1.1.1 Witness Statements

A graphic illustrating the location of witnesses, power lines and the airstrip is presented in **Appendix A.**

Witness No. 1

This witness was in a car on the R702 road routing east in the direction of Gowran. He first noticed the microlight flying at low level '*going up and down along the ditch line*' to the west of the airstrip. He parked his car for a few moments and saw the microlight pass behind him heading to the north. He lost sight of it when it went behind trees. When he observed it again, the microlight was crossing back across the road in front of him, heading south towards the hangar located on the airstrip. He described that '*when it came into our vision it seemed out of control*'. As it crossed in front of him he estimated that it was about '*50-60 feet'* above the ground. *'It started swaying and bobbing in the sky, left and right; I thought he recovered it as it went straight for 30-40 yards.*' He thought that the aircraft '*dropped in height*' and '*struck the top of the pole.*'

Witness No. 2

This witness was accompanying witness No. 1 and observed the aircraft to her right (west of the airstrip), manoeuvring and dipping down towards a ditch. '*It looked to me like he was coming to land, because when he came up to this field he was kind of going low, then he just hit the pole'*. The witness thought the microlight came from the direction of the road and turned left before it struck the pole. She described that '*the wings were dipping left and right*' and that it '*hit the pole up high and went straight down'.*

Witness No. 3

This witness, a microlight pilot, was situated in a garden off the R702 and observed the microlight flying between '*100 and 200 feet*' in a south-easterly direction. The witness recalled that the Pilot waved to him when passing by and continued towards the eastern side of the airstrip before turning to the right. He stated that he next observed it flying in a northerly direction from the direction of the airstrip. This witness stated that the aircraft looked like it was '*flying fine*' from the time he observed it to seconds before the collision, when he heard the engine note change. He thought it flew close to the access lane, where it turned right and collided with the pole near the top. On witnessing the collision, he made his way to the accident site to render assistance.

Witness No. 4

This witness was situated on the access lane between the hangar and the power lines at the time of the impact. He observed the microlight to the west of the access road flying in a northerly direction when it turned right and collided with the pole. This witness was the first person to arrive at the scene. The wing, which had separated from the trike, was moved to allow access to the Pilot who was found lying on the ground.

Witness No. 5

This witness was situated at the start of the access lane from the house to the hangar. She witnessed the microlight coming towards her and turning to the right when it struck the pole.

1.2 Injuries to Persons

The Pilot was fatally injured in the accident.

Injuries	Crew	Passengers	Others
Fatal	1	0	0
Serious	0	0	0
Minor /None	0	0	

1.3 Damage to Aircraft

The microlight was destroyed.

1.4 Other Damage

The microlight impacted one of two wooden poles that comprised Pole-set No. 22 of the Kilkenny-Goresbridge 38 kilo-Volt (kV) high voltage supply network. The support poles (15 m high) carried three, 150 mm^2 steel-core, aluminium conductors suspended through insulators from a steel cross-beam.

The impact occurred with the southern-most pole, causing a deflection of the pole structure resulting in the '*stranding*'[5] of the nearest electrical conductor and deformation of the cross beam (**Photo No. 2**).

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Photo No. 2: Damage to line and cross beam

Subsequent commissioning tests by the electricity network provider showed that no fault occurred on the Kilkenny-Goresbridge 38 kV circuit, nor did the overhead line trip.

[5] **Stranding**: Stretching of the aluminium conductor while the supporting steel core remains intact.

1.5 Personnel Information

The Pilot was the holder of an NPPL (A) issued by the UK CAA on 22 October 2007, together with a Microlight Aeroplanes (Landplanes) Class Rating. CAA records show that a '*Declaration of Medical Fitness*' (Group 2[6]) was made and the licence was issued accordingly. The associated Class Rating, for microlight aeroplanes, expired on 28 October 2008 and was not renewed.

Prior to the day of the accident, the Pilot had last flown sometime late the previous year, possibly around September. The Pilot did not keep a record of his flight hours, and the estimate of his flight experience (estimated at 130 hours) is based on the recollection of the microlight owner. There is no evidence of the Pilot undertaking any flights with an Instructor, nor did he undertake any skill test to renew his licence to operate microlight aeroplanes.

1.6 Aircraft Information

1.6.1 General

The Pegasus XL-R is a two-seat, weight-shift trike, with an '*XL*' wing utilising a fixed, tricycle undercarriage and a rear-mounted engine/pusher-propeller arrangement. The frame of the trike is constructed of aluminium alloy tubing assembled using high-tensile steel bolts. The wing is constructed of double-stitched 1 mm Dacron sailcloth formed over aluminium composite battens using bungee caps to provide chord-wise tension. The entire wing structure is supported from a single vertical post of aluminium alloy fixed to the trike aft of the rear seat.

The engine and fuel tank are also supported from this vertical post. Power is provided by a Rotax 447 two-stroke engine, driving a Newton 20R three-bladed, fixed-pitch propeller. The engine is equipped with a breakerless, single capacitor, discharge ignition unit, firing two spark plugs. The pilot controls the microlight in pitch and roll by means of a control frame connected by steel and nylon attachments fittings to the wing.

The primary throttle control is foot-operated (forward right-foot pressure for full power and rearward for power off); a similar control operated by a pilot's left foot operates the wheel brake. The primary throttle control is complemented by a friction-damped cruise control hand-operated lever situated on the right-hand side of the seat frame. A similar control on the left-hand side of the seat frame operates the choke control. An ignition cut-off switch is fitted on the front seat base bracket to stop the engine. The engine is started by means of a pull-cord running through a pulley system to a handle operable by a pilot in the front seat. The Investigation was informed that the microlight would typically cruise at an indicated air speed of 45 mph.

1.6.2 Accident Microlight G-MNBI

The microlight was built by Solar Wings Ltd in 1984 and was first registered as a Panther XL-S in the UK on 3 May 1985, later being re-designated as a Pegasus XL-R due to the trike being swapped on 15 September 2005.

[6] **Group 2**: Under the CAA's Medical Declaration notes for pilot licences, this is equivalent to the UK Driver and Vehicle Licensing Agency (DVLA) medical requirements for professional drivers.

The microlight was last weighed on 26 October 2005; the Maximum Take-Off Weight (MTOW) of 365 kg was noted. The microlight was registered to the owner on 27 January 2006.

The most recent Permit to Fly (Certificate No. *PR 014099/001*) was issued by the UK CAA on 25 February 1997. The microlight was inspected on 21 June 2008 and was test flown by a BMAA[7] check pilot on 22 June 2008 for the Certificate of Validity renewal. The most recent Certificate of Validity (Certificate No. *PR 014099-002*) was effective from 22 June 2008 to 21 June 2009. CAA records indicate that the microlight had accumulated a total of 369 operating hours on 31 December 2007. A flight-hour meter was recovered from the wreckage. The meter showed a time of 179.9 hours.

On 15 September 2005, the original trike unit (a Panther XL-S) was replaced with a Pegasus XL-R unit manufactured in 1987. A new engine/logbook was commenced at that date and shows a total of 266 hours being carried over from the previous logbook. The logbook recorded that maintenance was regularly carried out up to 21 September 2009, with a total time recorded of 416 hours; there were no logbook entries after that date. Maintenance was carried out by the owner and although a BMAA-approved Inspector was reported to have inspected the microlight on at least one occasion, there were no records of this inspection having taken place, nor any other inspection that may have been carried out.

1.7 Meteorological Information

Met Éireann, the Irish Meteorological service, provided the Investigation with the following aftercast for the Rathcash area, Co. Kilkenny for 20.30 hrs on 28 June 2019:

Meteorological Situation:		Ireland was in in a moderate southerly airflow between high pressure in the North Sea and low pressure near Biscay.
Wind:	**(at surface)**	Southerly, varying between southwest and southeast, 5 kts.
	(at 2,000 ft)	Southerly 20 kts.
	(surface to 300 ft)	Stable conditions with a slack pressure gradient which would have resulted in very little variation in the wind profile between surface and 300 ft.
Visibility:		7 to 10 kilometres.
Weather:		Cloudy to overcast skies with haze.
Cloud:		Broken (5-7/8 oktas) layered stratus cloud with bases between 1,000 and 1,500 ft.
Surface Temp/Dew Point:		Temp 16 °C, Dew Point 15 °C.
Mean Sea Level Pressure:		1018 hectoPascals (hPa).
Freezing Level:		Above 10,000 ft.

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[7] **BMAA**: British Microlight Aircraft Association.

1.8 Aerodrome Information

The microlight was operating from a private grass airstrip near Gowran, Co. Kilkenny. The declared runway length is 600 metres (m) with an orientation of 06-24 degrees magnetic. A hangar is situated towards the eastern end of the airstrip, on the northerly side of the runway. A single windsock was positioned near the western end of the runway.

A set of high-voltage power lines ran along an orientation of 080-260 degrees magnetic. The pole set that was struck was located at a distance of 160 m to the north of the airstrip, situated alongside a grass track that provides access between a nearby house and the hangar/flight strip. Because of the orientation of the runway, the power lines cross the extended runway centreline to the east of the airstrip at a distance of approximately 260 m.

1.9 Wreckage and Impact Information

The microlight collided with a wooden pole, one of a pair of poles supporting three 38 kV power lines. The microlight was observed by witnesses to collide with the pole just below the suspended cables, approximately 12 m above the ground. Following the collision, the microlight fell to the base of the pole with the wing separating structurally from the trike due to fracture of the vertical support post. The vertical post supporting the wing structure had evidence of contact with the pole. Impact marks on the structure of the trike show that the pole came in contact with the tubular components attached to the wing and the pilot's control bar.

The wing and trike were initially located together. The first responders to the accident lifted the wing and placed it aside in order to gain access to the Pilot who was lying on the ground beside the trike. The Investigation found the wing a few metres away from the trike unit, in an upright position but with fracture of control-frame components (**Photo No. 3**).

Photo No. 3: Under-side of wing, showing fracture of control-frame components

There was some tearing damage found in areas of the sail covering and impact damage was evident to the leading edge. The control bar and associated tubing showed significant distortion through compression and fracture. The main fore-aft tubular component was compressed and fractured. The entire wing structure exhibited distortion.

The vertical support post was distorted in compression and had fractured, separating the entire wing structure and control bar from the trike. Following the fracture, the engine and fuel tank, which were attached to the support post, rotated downwards about the remaining lower pivot point of the post (**Photo No. 4**).

Photo No. 4: Vertical support post with evidence of buckling and fracture

The propeller, still attached to the engine, was found with the blades flat on the ground. One propeller blade was found almost detached and the remaining two exhibited cracks. The grass surface around the wreckage showed no evidence of propeller rotation.

The fuel tank, situated under the engine, had been distorted during impact with the ground. The plastic fuel filler cap was dislodged resulting in the majority of the fuel tank's contents spilling onto the ground. A small amount of fuel remained in the tank, which was recovered by the Investigation for subsequent testing. The spilled fuel stained a significant area of the grass to the rear of the tank. The fuel shut-off tap, **(Photo. No. 5)**, located on the right-hand side of the engine, was noted to be in an intermediate position (between 'FUEL-ON' and 'FUEL-OFF').

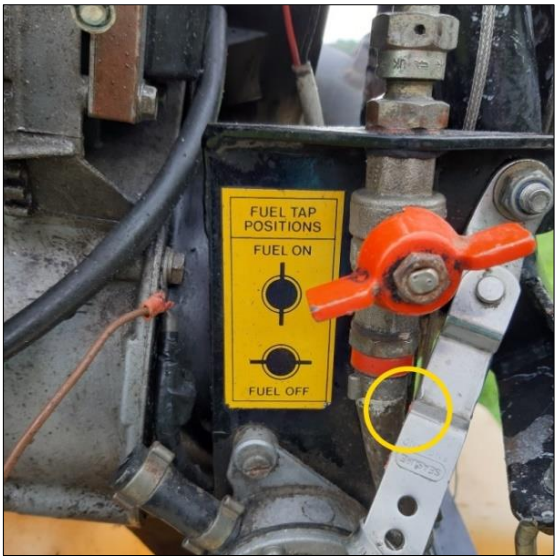

Photo No. 5: Fuel tap as found in intermediate position (red paint transfer indicated)

The trike nose-nacelle showed evidence of crushing with damage to the instrument panel and instruments. Apart from two small items, the wreckage was located within a small area. A navigation compass (which detached from the coaming in front of the Pilot) was recovered 27 m from the main wreckage, in the direction of flight. A plastic retaining ring (part of the compass assembly) was recovered 10 m from the wreckage also in the direction of flight.

1.10 Medical and Pathological Information

The Post-mortem Report for the Pilot was made available to the Investigation by the Coroner for Kilkenny. The Report concludes that the Pilot '*was involved in an air craft crash*', and that '*at Post mortem there was no evidence of any underlying diseases which could have contributed to the crash*.' The Pilot '*died instantly from massive trauma to the head, spine and chest.'*

The toxicology test Report stated that carbon monoxide was '*less than 10% saturation*', ethanol was '*not detected*' and that drugs were '*not detected*' on preliminary screen.

1.11 Survival Aspects

The Pilot was located on the ground lying face down by the first persons at the scene. He was not wearing a helmet – according to family members he normally did so. The microlight was equipped with a two-point lap-belt in the forward seating position and a four-point harness in the rear. The Pilot occupied the forward position, the position from which solo flight must be conducted. The rear seat had a soft, tape-wrapped package installed for the purposes of a backrest and the rear harness was latched and secured. The front lap-belt, which was used by the Pilot, was found in the open (unlatched) position and there was no evidence that the belt was opened by any person at the accident site prior to its inspection by the AAIU. When examined on site, the lap-belt was found to close and latch. Subsequent examination showed that the mechanism could open with force applied against the rear of the latching mechanism. Both the front and rear seat latching mechanisms exhibited significant corrosion and wear (**Photo No. 6**).

Photo No. 6: Front seat lap-belt ends (indicated) exhibited significant corrosion of the latching mechanism

1.12 Tests and Research

1.12.1 Fuel Sample

A small quantity of fuel remained in the fuel tank at the accident site and was recovered. The sample was brought to a testing laboratory and subjected to a Vapour Pressure Test to check the volatility of the sample. The fuel test Report stated:

> *'Fuel exhibits very low vapour pressure and a very high density. The odour of the fuel confirms it is motor spirit. These results* [in the opinion of the testing laboratory] *confirm the fuel is very old and has lost a lot of the light ends. This would decrease the vapour pressure and result in an increase in density. The added 2-stroke oil would also account for a small increase in the overall density of the fuel.'*

The small quantity of fuel that remained in the tank was open to atmosphere following the accident and spillage of the tank contents. The Vapour Pressure Test revealed a value below the normal range for automotive Petrol and a density of 827.9 kg/m^3 (outside and above the normal range (720 to 775 kg/m^3 measured at 15 °C).

A further simulated distillation test was carried out to determine the fuel/oil mix ratio. This test revealed the heavier constituents were between 95% and Full Boiling Point (FBP). According to the Report, and allowing for the presence of heavier sludge (typically about 2%), the oil present in the sample was approximately 2-3% of the sample tested and was consistent with a correct mix ratio of fuel/oil.

2. AAIU Comment

The Pilot was initially observed to operate the microlight at low altitude to the north of the airstrip, before continuing at low altitude in the vicinity of the hangar. The Investigation is satisfied that the microlight was manoeuvring under full control when observed by witnesses and was not experiencing any difficulty. It is probable that the Pilot was simply manoeuvring the aircraft in pitch and roll to familiarise himself, as, prior to the earlier flight he had not flown for several months.

The adjacent power lines should not have posed a significant hazard to flying operations during take-off and landing, as the power lines run obliquely to the landing strip with sufficient lateral separation. However, the risk of collision increased once the microlight began to operate at low level.

The Investigation is satisfied that the position of the fuel tap on the right-hand side of the engine, which was found in an intermediate position, was not causal to the accident. Paint transfer on the bracket indicates that the fuel tap was most likely moved from its normal 'ON' position by contact from the adjacent steel bracket due to distortion of the microlight structure under impact forces.

The engine note was heard to decrease just before the microlight was observed impacting the pole, such a reduction was probably due to pressure on the throttle pedal being reduced by the Pilot prior to impact. Following failure of the vertical support post during the impact, the engine and propeller, which were supported from the lower section of the post, rotated. This resulted in the propeller contacting the ground. The damage to the three blades, and significant damage to one of the blades, was likely due to impact with the ground. Tests established that the fuel/oil mix ratio for use in this engine was correct. Due to the length of time the fuel had remained in the tank it had lost much of its volatility. However, the engine started and ran without any apparent problems during the flight.

The most recent Permit to Fly was issued by the CAA on 25 February 1997 and the most recent Certificate of Validity expired on 21 June 2009. The Investigation was not presented with any logbooks in relation to the microlight, nor were any maintenance records available for the period June 2009 to the time of the accident. Any maintenance that was carried out was conducted by the Owner or the Pilot but no records were kept of this work. The microlight was not operated or maintained in an airworthy condition as required by regulation.

Although the Pilot was the holder of a NPPL (A) issued by the UK CAA with a Microlight Aeroplanes (Landplanes) Class Rating, this rating expired on 28 October 2008 without renewal. The Pilot's experience was estimated solely from the amount of flying the Owner stated that he thought the Pilot had completed. Prior to the day of the accident, the Pilot had last flown sometime late the previous year, possibly around September. The Pilot did not keep a record of his flight hours, nor did he undertake any flights with an Instructor, nor any skill test to renew his licence to operate Microlight aircraft. At the time of the accident, the Pilot was not properly licenced nor was he current regarding any recent flying.

Although the microlight had not been maintained in accordance with recommended procedures and the volatility of the fuel used had deteriorated, the Investigation is of the opinion that no defects on the part of the microlight, its engine or fuel supply contributed directly to the accident.

The microlight's front seat, occupied by the Pilot, was equipped with a two-point lap-belt. This was found open at the accident site and the lap-belt latching mechanism was found to be significantly corroded. Lap-belt designs provide limited protection in the event of a collision as there is no upper-body restraint. The forces experienced in the collision were significant and it is likely that the latching mechanism opened under these loads at impact thus failing to secure the Pilot. The fact that the latching mechanism exhibited significant corrosion may have contributed to the opening of the lap-belt.

On the evening of the accident flight, the Pilot chose to operate at very low level. While operating at a low altitude with the distraction of being observed by persons on the ground, it is probable that the Pilot did not realise the close proximity of the power lines and the supporting poles. Although it appears that he reduced power in an attempt to avoid a collision, it was not possible to manoeuvre the microlight in the time available. The Pilot was fatally injured on impact.

- END -

Appendix A

Location of the accident

Graphic No. 1: Location of witnesses, power lines and airstrip *(Google Maps)*

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

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An Roinn Iompair
Turasóireachta agus Spóirt
Department of Transport,
Tourism and Sport

Air Accident Investigation Unit,
Department of Transport Tourism and Sport,
2nd Floor, Leeson Lane,
Dublin 2, D02TR60, Ireland.
Telephone: +353 1 604 1293 (24x7): or
+353 1 241 1777 (24x7):
Fax: +353 1 604 1514
Email: info@aaiu.ie
Web: www.aaiu.ie