British Hang Gliding and Paragliding Association

REPORT

Investigation of a paragliding incident which occurred at Gyrn Moelfre, Powys, on 14th June 2017 in which a pilot under training was fatally injured.

Introduction.

On 14th June 2017 the British Hang Gliding and Paragliding Association (BHPA) received reports of an air incident at Gyrn Moelfre, Powys (Mid Wales), which resulted in the death of a pilot. The BHPA tasked Mark Shaw, BHPA Technical Officer, to investigate the incident and submit a report to the Flying and Safety Committee (FSC) of the BHPA for ratification.

The objective of this investigation is to prevent future accidents and incidents. It does not seek to ascertain blame or apportion legal liability for claims that may arise.

BHPA investigation serial number: GBR-2017-5189

Summary.

On 14th June 2017 at approximately 11:50am, a BHPA member flying a paraglider made a training flight, under instruction by a BHPA Senior Instructor. Shortly before the impact, the pilot was seen at approximately 200 feet above ground level. He was instructed by radio to set up a landing approach and was seen to initiate a turn to fly the aircraft in the direction of the landing field. After this point, the flight was unobserved. The pilot was next seen after having impacted the ground in the neighbouring field to the landing field.

The Investigation determined from the available evidence that the pilot struck the ground following a departure of his aircraft from normal flight during landing approach. As there were no witnesses to the impact or what immediately led up to it, no conclusion can be reached as to what led the pilot to hit the ground with sufficient force to cause fatal injuries.

This document is confidential until ratified.

Date ratified by the BHPA Flying and Safety Committee: 6th February 2018.

THE STRUCTURE OF THE REPORT.

The structure of this report conforms to that recommended in the BHPA Technical Manual and is intended to follow the principles of Air Accident Investigation Branch reports. It is comprised of the following sections:

Section 1 - Factual information.

Section 2 - Analysis.

Section 3 - Conclusions.

Section 4 - Safety Recommendations.

SECTION 1 - FACTUAL INFORMATION.

1.1 History of the flight.

At approximately 10:15am on 14th June 2017, three trainee pilots (Pilots A, B and C) and a BHPA licensed Senior Instructor (Instructor G) arrived in the landing field at the foot of Gyrn Moelfre. The trainee pilots were there to undertake BHPA Club Pilot (Novice) course training, with Instructor G's BHPA registered school. The forecast was for light winds from the south-southeasterly direction.

Instructor G placed two windsocks in the landing field and gave a landing field briefing to the pilots. The wind in the landing field was noted at the time as very light, from a southeasterly direction.

Instructor G and the three students drove to the take-off area and the students performed daily inspections of their aircraft. Instructor G noted that the conditions on take-off were light, with a 6-9mph wind from the south-southeast. Pilots A, B and C performed their first flight of the day. They made soaring flights of about 10 minutes duration, with radio contact from Instructor G, and landed in the bottom landing field, using the field's northeastern boundary hedge as a landing approach reference.

Between 11:00 and 11:30am, the pilots and the instructor had arrived back at take-off and commenced preparations for a second flight. A number of club flyers on paragliders were soaring the bowls toward the northeastern end of the hill, at around 200 to 300 feet above the top of the hill. Instructor G noted that the wind was now predominantly from the south, and measured the wind strength, which he recorded as varying between 8 and 12mph.

Pilot A was briefed by Instructor G to undertake a soaring flight. He performed a reverse launch and was seen to fly beats of the hill, reaching a height above take-off (estimated by Instructor G) of around 70ft. It was noted that he appeared relaxed in the harness and comfortable in the air. After approximately 10 minutes' soaring, Pilot A was directed by Instructor G over the radio to fly out to the landing area and was told to "carry out the normal procedure" for landing. Pilot A flew away from the hill, gaining altitude in thermic lift and was seen by Instructor G to be making turns over the landing area, slowly losing height. Instructor G then briefed Pilot B, and supervised his launch.

Minutes later, Instructor G then noticed that Pilot A appeared to be approximately 200ft above the landing field, and over the trees at its southeastern corner. He instructed Pilot A on the radio to fly back to the landing field and set up his approach, and he saw Pilot A make a gentle left hand turn, heading on a north-northwesterly track, towards the landing field's northeasterly boundary hedge. At this point, Instructor G noted Pilot A was approximately 150 - 200ft above ground level. Instructor G turned his attention away from Pilot A, to Pilot B who was airborne, and to Pilot C on the launch area who was preparing to fly.

Instructor G then saw Pilot A's wing on the ground, next to the hedge between the landing field and its neighbouring field. He was unable to get a response from Pilot A on the radio, so instructed Pilot B to land, and Pilot C (who was still on the take-off area) to pack his equipment. Instructor G drove down the hillside and reached Pilot A seconds after Pilot B had landed and made his way over the hedge to Pilot A's position.

Pilot A was found seated in his harness, lying on the ground on his right hand side. His paraglider had overflown him and was on its bottom surface, with the leading edge in contact with the field's boundary hedge. The emergency services were called, and Instructor G performed CPR.

Pilot D (a club flyer) was airborne at the time of the incident and landed in the incident field some minutes after Pilot A's impact, in order to assist.

1.2 Injuries to persons.

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

1.3 Damage to the aircraft.

The paraglider sustained light damage from contact with a barbed wire fence. Pilot A's harness was visually inspected. No damage was evident.

1.4 Other damage.

Pilot A's helmet was visually inspected. No visual indications of forceful damage to the shell were evident.

1.5 Personnel information.

Pilot A was a 65 year-old male, with a body weight of approximately 70kg (recorded at the start of his training in June 2016). It was noted that Pilot A had subsequently lost weight, but his revised weight was not recorded on his Student Training Record Book, or stated on the post mortem report. Instructor G stated that Pilot A had told him he had lost about a stone in weight.

Pilot A was a current BHPA member, holding a Club Pilot (Hill) rating for hang gliding. He held no paragliding rating but had completed Elementary Pilot training with Instructor G, and was on his second day of flying Club Pilot training exercises.

1.6 Aircraft information.

The paraglider wing flown by Pilot A was a Gradient Bright 3, size 24. This size and model of paraglider holds a DHV 1 rating, and is an EN B class wing under the flight safety characteristics standard EN 926-2 when flown within the certified weight limits of 60 to 80kg (take-off weight). The incident paraglider (serial number G20242606214) was manufactured in June 2006.

The harness used by Pilot A was a Slider (medium) manufactured by Sol. The harness is supplied with an integral inflatable "Cygnus" impact pad, and a foam impact pad.

The helmet used by Pilot A was a Plusmax helmet, certified to EN 966.

All the above equipment is the property of the training school. The school's records note that the paraglider, harness and helmet all underwent an annual inspection on 2nd January 2017.

1.7 Meteorological information.

Aftercast information was obtained from the Met Office, which recorded for the incident day and location:

> "…between 1100 and 1300 UTC on the 14th June 2017, the location of interest was covered by a light to moderate SSE flow, with few or scattered amounts of stratocumulus, bases above 3500 FT. Temperatures were around 22 to 23C at Shawbury. The freezing level was above 10000 FT. Although mountain waves were not present moderate thermals were forecast to develop by 1000 UTC."

The conditions described by Pilots B, C, D, E and Instructor G were consistent with the aftercast data.

1.8 Communications.

The radios used for communication from Instructor G to Pilot A were WT96 Pro model PMR radios, manufactured by Doro. The school's records note that the radios were all inspected on 2nd January 2017.

1.9 The site.

Gyrn Moelfre is a hill in Powys, Mid Wales, which is popular with paraglider pilots. Its summit is at 523m above sea level, and the take off area is approximately 80m below the summit. It is a flying site operated by North Wales Hang Gliding and Paragliding Club. The club states in its site guide that the south-southeasterly face being used on the incident day takes wind directions from south to southeast.

The landing field is a field at the foot of the hill that slopes gently downwards in a south-southeasterly direction. It is bounded by a line of trees at its northwesterly and southeasterly ends, and established hedges to the fields on its southwesterly and northeasterly sides (the latter field being the incident field), shown in Figure 1, below.

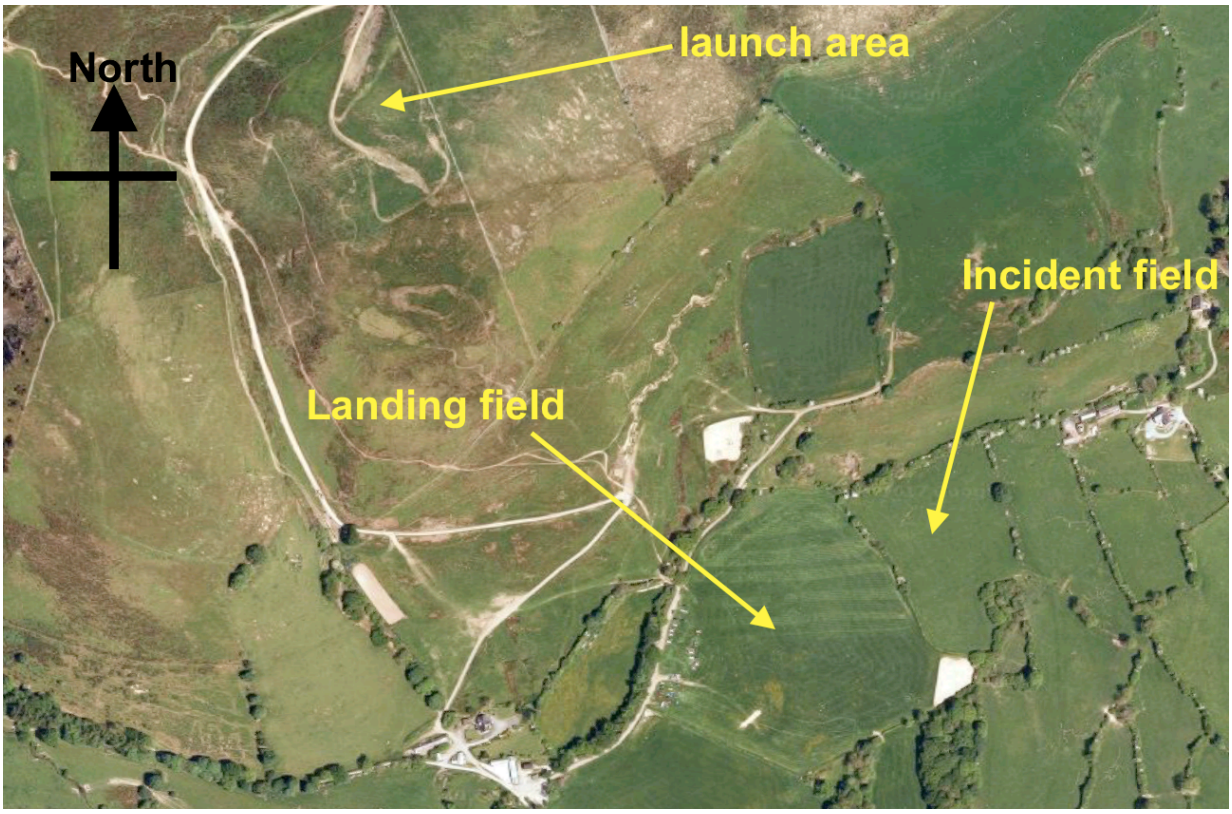

Fig. 1 (above) showing launching and landing areas, and the incident field.

1.10 Medical and pathological information.

Pilot A's cause of death was stated on the post mortem report as multiple traumatic injuries.

1.11 Survival aspects.

Instructor G stated that he and Pilot B reached the landing field approximately three minutes after he became aware of Pilot A's crash landing, Instructor G having descended the hill in his vehicle. Instructor G contacted the emergency services and performed CPR. The air ambulance arrived approximately 20 minutes after the 999 call was made.

1.12 Tests, research and evidence.

This report is based on statements from Pilots B, C, D and E; an interview and a site visit with Instructor G, a written statement and school records provided by Instructor G; the visual inspection of Pilot A's harness and helmet, and the inspection of the Gradient Bright paraglider wing by the Aerofix test centre. Supplementary evidence was supplied by Pilot F, the Met Office, and a recording from a "GoPro" camera carried by Pilot D.

SECTION 2 – ANALYSIS.

2.1 The incident aircraft and equipment.

The Investigation considered the flying equipment used by Pilot A**.**

2.1.1 The Gradient Bright paraglider.

The Bright is Gradient's entry-level wing. The Bright 3 is an older generation design, in production since 2006, and has been superseded by two further Bright models, to date.

The Bright 3 is described in its user manual as being:

> "…classified as a basic-intermediate paraglider (category DHV 1) and therefore is meant for the widest flying public"

As a paraglider with a DHV 1 rating, and as a B class wing under the flight safety characteristics test EN 926-2, it is considered suitable as a training wing.

The following calculation determines the suitable pilot weight based on the total weight of the flying equipment.

Gradient Bright	4.8kg
Harness (no emergency parachute fitted)	6.2kg
Approximate weight of helmet, clothing, etc.	5.0kg
Total equipment weight	16.0kg

Pilot A's weight could not be verified, as it was not taken during the post mortem. Reports of his weight loss would put him towards the top of the certified weight range of his paraglider.

The incident paraglider was examined by the Aerofix paraglider inspection and repair centre. The wing was found to be in good condition (apart from minor damage from the incident) and in a good state of trim.

Pilot A had made four flights on this paraglider on his previous day's training, two weeks before the incident.

2.1.2 The Sol Slider harness.

The Sol Slider harness is a model that is not now in production. It was manufactured for a wide range of paraglider pilots, including beginners. The Slider was fitted with both an inflatable impact pad and a foam impact pad.

2.1.3 The Plusmax helmet.

The BHPA Technical Manual states that helmets bearing suitable certification must be used in a training school. The Plusmax helmet carries EN 966 certification, and complies with the BHPA's requirements stated in the Technical Manual.

2.1.4 The Investigation found that the paraglider, harness and helmet issued to Pilot A were suitable for the activity, and were not contributory factors in the incident.

2.1.5 The radios.

The Investigation considered the radios used for communication between Instructor G and Pilot A. Instructor G stated that the radios were fitted to the shoulder strap of his students' harnesses, and he tested the radios for effective operation before each pilot took off. The pilots were not expected to transmit a response in flight. Pilot A was seen to respond to previous instructions earlier in the flight – he could evidently hear Instructor G's radio instructions. The Investigation found that the radios were of suitable type and fitted in an appropriate manner for the pilot to hear transmissions.

2.2 Pilot A's previous flying experience.

The Investigation considered Pilot A's hang gliding flying experience, based on information from Instructor G and a statement from Pilot F (a friend of Pilot A, a retired BHPA Club Coach, aerotow tug pilot and a hang glider pilot).

Pilot A held a BHPA Club Pilot rating for hang gliding in the hill environment. No logbook of his hang gliding activity was available, but it is apparent that he flew hang gliders for at least 20 years. Pilot A told Instructor G that he last flew his hang glider about nine years prior to beginning the paragliding training course.

Pilot F's statement illustrates that Pilot A was an experienced hang glider pilot, who flew a high performance hang glider. He was known to undertake cross-country flights launching from hills and by aerotow, and was cautious and competent.

Hang gliding and paragliding are different disciplines. The BHPA Technical Manual states that when transferring from one flight discipline to another, there is no short cut, and the pilot must train from the start[1]. Whilst the pilot position in flight and the control methods are

[1] BHPA Technical Manual Section 3, Chapter 4, Item 2: "Transferring between Disciplines".

different, there are practical skills and knowledge areas that are transferrable between the disciplines, specifically an awareness of airspeed, groundspeed and glide, and the requirement to land into wind. They are unlikely to be utilised when making initial short training flights, when students are learning familiarity with the controls, but would more likely be evident and demonstrable by students making higher or longer duration flights, once a degree of familiarity with the controls has been acquired.

Hang gliders are more complex aircraft than paragliders and require a higher degree of forward planning and precision in order to fly at the higher speed that hang gliders do, and perform controlled landings on the feet. Despite the nine-year break, it is clear from Pilot A's logged progress through the training course that he made the transition between the aircraft easily.

The Investigation considers Pilot A's hang gliding experience to have been a positive contributory factor to his progress through the paragliding training course. His awareness of airspeed, groundspeed and glide, and his familiarity with flying in proximity to a hillside would have contributed to his success in achieving flight objectives. This is evident from Instructor G's statement and demonstrated in Pilot A's Student Training Record Book, where he satisfied the exercise objective on every flight he undertook.

2.3 Pilot A's paraglider training with Instructor G, prior to the incident day.

Instructor G is a BHPA licensed Senior Instructor, and appropriately qualified to run a BHPA Registered Paragliding School.

Pilot A had trained with Instructor G on four days before the incident day. Pilot A's Student Training Record Book and the school Daily Flight Log were available to the Investigation.

2.3.1 Pilot A's BHPA Student Training Record Book records that he undertook the following training:

23rd June 2016	Exercises 1 to 9 (ground training and low hop flights). Trained by Instructor G. Site: Black Knoll.
1st September 2016	Exercise 9 (low hop flights). Trained by a Trainee Instructor under Instructor G's supervision. Site: Black Knoll.
10th May 2017	Exercises 10 to 15 (flight exercises) signed off as completed. Trained by Instructor G and a Trainee Instructor. Site: Gyrn Moelfre.
31st May 2017	Exercises 16 to 24 (pre-soaring and soaring exercises). Elementary Pilot theory and exam completed, and Pilot A was signed off at Elementary Pilot level. Trained by Instructor G. Site: Gyrn Moelfre.
14th June 2017	Trained by Instructor G Site: Gyrn Moelfre.

2.3.2 The school's Daily Flight Logs record the number of training flights made by Pilot A as follows:

10th May 2017	Four flights
31st May 2017	Four flights
14th June 2017	Two flights (including the incident flight).

2.3.3 Training analysis, based on school records and statements.

2.3.3.1 On 23rd June, flight numbers were not recorded. They were 'first hops' with less than 5m ground clearance (Exercise 9 in the Student Training Record Book).

2.3.3.2 The statement from Instructor G notes that on 1st September, Pilot A made eight low level flights, "maintaining course and airspeed with good take offs and landings at less than 50 ft.". These flights were recorded on the Daily Flight Log and in Pilot A's Student Training Record Book as Exercise 9 flights (first hops).

Taking into account information in Instructor G's statement, the Investigation considers that the flights made by Pilot A on this day satisfy the requirement for Exercise 13 – the flights being higher than first hops.

2.3.3.3 On 10th May, Instructor G noted in his statement that Pilot A was initially given refresher training, and made an unrecorded number of low level flights, satisfying Instructor G that he was ready to make higher flights. Pilot A then made four flights launching from the Gyrn Moelfre take-off, under the instruction of Instructor G, with a Trainee Instructor supervising Pilot A's landings, from the landing field. The wind was recorded as being from an east-southeasterly direction. From this direction, landings would most likely have been set up using an approach over the hedge on the southwesterly side of the landing field, although this is not recorded on school records.

The flight exercises in Exercise 14 and 15 each require a minimum of four successful flights to achieve the exercise objectives. In Pilot A's case, these two exercises were signed off as completed in four flights total.

2.3.3.4 On 31st May, Pilot A made four flights on the Club Pilot syllabus. There was no supervision from the landing field. Like the previous training day, the wind was recorded as being from an east-southeasterly direction, and landings would most likely have been set up using an approach over the hedge on the southwesterly side of the landing field.

In Pilot A's Student Training Record Book it was recorded that he had made two successful planned approaches into the landing field, within 10m of a designated target (Club Pilot exercise 23). The Investigation considers that Pilot A's hang gliding experience, particularly his awareness of glide and the requirement to land into wind would have played a significant part in achieving this objective.

2.3.4 Whilst the flight training of Pilot A was inaccurately and insufficiently recorded in his Student Training Record Book, it appears from the available evidence that Pilot A had demonstrated to Instructor G's satisfaction that he was capable of progressing from lower slope training to high flights; that he was capable of consistently setting up and achieving successful

landings; and that he could be progressed along the CP syllabus to flights in soaring conditions.

It is apparent from Instructor G's statement that Pilot A's previous hang gliding experience was evident in his flying ability, and contributed to his consistently achieving the exercise objectives.

Despite the incorrect recording of Pilot A's progression in his Student Training Record Book, the Investigation considers Instructor G's training of Pilot A was sufficient, and followed the spirit of training progression from Elementary Pilot to Club Pilot.

2.4 Meteorological conditions on the incident day.

The Investigation considered the meteorological conditions, based on the available evidence. The North Wales Hang Gliding and Paragliding Club site guide identifies the part of Gyrn Moelfre being used on the incident day as taking wind directions from the south to the southeast. The wind direction recorded by Instructor G falls within this range. The conditions described in the statements of Pilots D and E indicate light thermic activity over the course of the morning, and remaining suitable for paragliding even after the incident. The recorded wind strength and direction were within acceptable limits for paragliding training.

Pilot D landed in the same field as Pilot A, shortly after Pilot A's crash landing. From his helmet mounted GoPro camera in-flight film, there is no indication of strong thermic activity. The footage capturing his landing indicates benign conditions with very light wind and no discernible turbulence.

Although there was no evidence of thermic activity from Pilot D's GoPro footage when he flew into the landing field, Pilot C stated that thermic activity was noticeable when he landed - however his landing was not adversely affected.

The possibility of thermic activity and associated turbulence in the landing area cannot therefore be entirely ruled out as a contributory factor in the incident.

2.5 Suitability of the site for training, on the incident day.

The Investigation considered the flying site where the incident took place. Pilot A had flown into the landing field on eight previous flights before those on the incident day, and a degree of familiarity with the site may reasonably be expected.

The sloping nature of the landing field and the tree line on its downwind boundary requires an unconventional landing approach to lose height, flying an into-wind and then a downwind beat along the boundary hedge line, back towards the hill, in order to lose height and establish a position for a final into-wind glide.

It is evident that Pilot A performed satisfactory landings when monitored by a trainee instructor on 10th May, and on the subsequent training day (31st May) when there was no supervision in the landing field.

Based on the recorded conditions, the evident experience of Pilot A, his familiarity with the site and the previous training he had received, the Investigation considers the training site suitable for training that day.

2.6 Training on the incident day.

The Investigation considered the training received by Pilot A on the day of the incident.

2.6.1 Briefing in preparation for flight.

From the statements, the pilots received pre-flight briefings - in the landing field and on the take off area. On the basis of the available evidence, the briefings were appropriate to the site and conditions.

2.6.2 The first flight and the landing.

Pilot A was seen to make a controlled launch, and fly a soaring pattern for approximately ten minutes. Although it was not evident from the statements, the wind direction recorded on day would have required Pilot A to make a landing approach by losing height over the hedge on the northeasterly boundary of the field. He was familiar with making approaches from the opposite side hedge. It is evident, however, that the wind direction was constant. Pilot A would have therefore been able to monitor the windsocks from the air as he had been briefed, and establish which hedge to set up his landing approach over, whilst still quite high. Instructor G stated that Pilot A's first landing was a good into-wind landing.

2.6.3 The incident flight.

The wind speed and thermic activity had moderately increased in the period between the first and second flights, and other pilots in the air were able to gain height above take-off. The conditions were assessed by Instructor G, and considered as "ideal" for his students.

Instructor G briefed Pilot A before his second flight. It is apparent that Pilot A performed a good take off, and followed his soaring flight plan, under radio contact with Instructor G. There was no indication that Pilot A could not hear or was not responding to Instructor G's radioed instructions.

From Pilot A's position when last seen by Instructor G, it is apparent that Pilot A assessed the wind direction and had decided to make a landing approach from the same side as his previous flight. Instructor G estimated Pilot A to be flying over the trees on the upwind boundary of the landing field, and he prompted Pilot A over the radio to make his way back to the landing field and carry out his normal procedure. Instructor G observed Pilot A altering his track to make a left hand turn towards the landing field. Instructor G believed that his communication had been received, that the turn was in response to his radio instruction and that Pilot A was proceeding to a normal landing in the landing field. At this point, Instructor G looked away, to Pilot B who was airborne and to Pilot C who was getting ready for launch. It is extremely unlikely that he would have looked away had he seen the glider in turbulent air or in imminent danger.

There is no indication from the evidence of the amount of time Instructor G's attention was diverted from Pilot A. Based on the last seen height and position of Pilot A, and the location of the impact, the Investigation considers that his attention was diverted for a matter of seconds before becoming aware of Pilot A's wing on the ground.

Up to the point where Instructor G stopped observing the flight, there is no evidence to indicate that the instruction was insufficient or inappropriate for the conditions, and the ability and experience of Pilot A.

The injuries suggest that Pilot A impacted with significant force. Such force would only be possible in a fast descent following a departure from normal flight, with insufficient height for the paraglider to recover. With no witnesses to the final stages of the flight, no conclusion

can be reached into whether turbulent air, pilot action, or a combination of both caused a departure from normal flight that led Pilot A to impact the ground with sufficient force to sustain fatal injuries.

The causal factor(s) that led to the departure from flight of Pilot A's wing cannot be ascertained. It is therefore impossible to determine whether Instructor G would have been able to intervene, had he been observing at the moment the incident occurred.

2.6.4 With regard to the supervision of pilots under training, the Technical Manual states the following:

> Students should at all times be under qualified supervision; this will range from the Day 1 situation of 'very close supervision' through to near-CP award of 'watchful attention'. Very close supervision means that the instructor is in direct audio/visual contact with the student - they are close enough for there to be no misunderstanding as to what is intended and, in case of problems, the necessary corrective actions can be taken. Watchful attention means the instructor knows what the student intends, has assessed it as reasonable, and is observing the task so as to be able to debrief effectively and, where appropriate, sign off the task. [2]

From the point where his attention was diverted from Pilot A's landing approach, the Investigation determined that Instructor G did not maintain the appropriate level of attention as he did not observe and would therefore not have been able to debrief the entire approach and landing phases of the flight.

SECTION 3 – CONCLUSIONS.

The Investigation determined from the available evidence that Pilot A struck the ground following a departure of his aircraft from normal flight during landing approach. As there were no witnesses to the impact or what immediately led up to it, no conclusion can be reached as to what led Pilot A to hit the ground with sufficient force to cause fatal injuries.

SECTION 4 – SAFETY RECOMMENDATIONS.

The BHPA will remind its licensed instructors of the importance of appropriate attention through all stages of flight, for all levels of students, in accordance with the Technical Manual.

[2] BHPA Technical Manual Section 2, Chapter 1, Item 6: "Instruction in schools".