British Hang Gliding and Paragliding Association

REPORT

Investigation of a paragliding accident
which occurred at
Black Knowe Head, near Ettrick
on 17th July 2011
in which the pilot suffered serious injury.

Introduction

On 17th July 2011 the British Hang Gliding and Paragliding Association (BHPA) received reports of an air accident at Black Knowe Head, near Ettrick, that had resulted in serious injuries to one of the pilots involved. The BHPA tasked Mr Mark Dale, BHPA Technical Manager, to investigate the accident and submit a report to the Flying and Safety Committee (FSC) of the BHPA for ratification.

BHPA investigation serial number: IR 11/042

Summary

On Friday17th July 2011 the second round of the 2011 British Paragliding Cup competition was taking place at Black Knowe Head near Ettrick in the Scottish borders area.

The weather was unsuitable for most of the day but was forecast to improve later. The competitors were told to reassemble for a briefing at 16:00hrs at the campsite. The pilots then went to Black Knowe where a task was briefed at approximately 17:00hrs. The launch window opened at 17:20 with race start at 17:40. Pilots launched between these times. At about 17:50 conditions began to deteriorate with showers visible to the East. The wind switched to ESE from S and light rain started. As pilots descended to land, heavy rain started to fall and the wind strength increased.

The pilot was descending to land near to where the cars were parked at the bottom of the hill. The pilot had flown down with Big Ears applied. At around 40 feet agl the wing entered a horseshoe configuration with the tips forward. The wing then entered a stable tail-slide all the way to the ground without recovering. The pilot impacted heavily.

First Aid was provided immediately and the Emergency Services summoned. The pilot was airlifted to the Borders General Hospital where a fracture of the C2 vertebrae was diagnosed.

This document is confidential until ratified.

Date ratified by the BHPA Flying and Safety Committee: 29th March 2012

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 pertaining to AAIB reports. It is divided into four 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

On Friday17th July 2011 the second round of the 2011 British Paragliding Cup competition was taking place at Black Knowe Head near Ettrick in the Scottish borders area.

The British Paragliding Cup is a competition open to all pilots with a Pilot rating or higher. There are generally 5 to 6 rounds per year held around the country. These vary from 2 to 4 days in length giving an average of around 16 possible competition-flying days.

The round in Scotland was the second of the 2011 series as there had already been one 4-day event in the Yorkshire Dales in May. The weather forecast was not the most favourable and something in the region of 30 pilots out of a possible 50 turned up. Thursday was windy with the chance of the wind dropping later in the day so a re-brief was called; however the weather window did not materialize and there was no flying. Friday looked the same with a promise of lowering winds after showers throughout the day and a re-brief was called for mid/late afternoon.

A group of nine pilots decided to spend the intervening time going for a walk to St Mary's Loch and then having lunch at a local inn (the 'Tibbie Shiels'). These pilots all had a drink on arrival at the inn and further drinks with their meals. The pilot who later had the accident was seen to consume at least two pints of beer. The group were then transported back to the competition by minibus, as pre-arranged.

By the time of the re-brief arrived the showers had ceased and the wind was dropping off with it promising less wind into the early evening. The Meet Director liaised with the local contact and a flying site just down the valley from the campsite was chosen for its open aspect and friendly nature in stronger wind conditions. On arrival it seemed that the wind was indeed dying off and with the weather conditions clear the pilots started up the hill to a launch site.
The Meet Director stopped around half way up the hill and assessed the conditions. The wind was very manageable and a pilot offered to be a wind dummy to test conditions. The Meet Director also spoke with the local liaison pilot about a possible task, deciding upon a short race to goal around 20km downwind from the site following a road. By this time the wind dummy pilot had taken off and was flying up to the top of the hill. The air seemed buoyant and at the top of the hill reasonably strong but he was able to penetrate well and gave the conditions a 2 on the radio.
The task was written up and a briefing called at approximately 17:00hrs. The task was explained and the details of timings, contact numbers and frequencies gone over, all usual procedures being followed. The Meet Director pointed out that the conditions had been given a 2 and that again people did not have to fly if they didn't feel like it. In accordance with normal procedures the Meet Director appointed three experienced pilots to be his condition reporters in the air; this meant that when he asked for a conditions report they were to give a 1 to 3 rating. If he got a 3 from any one of them then the task would be stopped.

The launch window opened at 17:20 with race start at 17:40. Pilots launched between these times.

Most pilots took off shortly after the window was opened as the wind conditions on the hill were getting lighter and the Meet Director was passed conditions reports of 1's after an initial couple of 2's. There were a few very localized showers out in front and three or four miles off to the East but these were either dying out before they reached the hill – or passing by. Conditions upwind still seemed fine with good visibility.

Shortly after the race start time had been passed a 'cloud street' set up above the hill, and at the front of this street it was possible to see showers. The Meet Director took the decision to see how it developed and called in over the radio that there was a possibility of showers heading towards the hill so that the pilots were forewarned. To get a better view of what was happening in the air the Meet Director walked to the top of the hill. From here he observed that there was a significant rain shower approaching. He therefore took the decision to stop the task. He blew the horn twice, an indication that the task was stopped and started to repeat over the emergency channel that the task was stopped and that all pilots should land as soon as possible where it was safe to do so. Immediately a small group of pilots (who had climbed to near cloudbase at 3000feet) chose to go over the back of the hill and landed in the next valley downwind without incident. The rest put in 'Big Ears' to assist their descent (this was also signals to other pilots that the task is over and landing should take place as soon as possible). It was at this point the wind started to pick up again as the gust front started to come through and it swung to ESE from S, although all pilots were still able to penetrate into wind. The Meet Director started down the hill repeating over the radio that all pilots should land as soon as possible where it was safe to do so. By the time he had reached the original launch position it had started to spit with rain, and most pilots were close to landing. The majority had chosen to land further to the west, whilst two pilots (the accident pilot and one other) were coming into land near where the cars had parked at the foot of the hill, by a stand of large pine trees.

The rain became heavy and the wind was gusty and strong as the pilot neared the ground, still in Big Ears. At around 40feet agl the wing was seen to 'horseshoe' with the tips forward. The wing entered a stable tail-slide (going backwards over the ground) all the way to the ground without recovering. The pilot impacted heavily on his back, bounced once and ended up lying on his back and right side with his feet towards the wing and head into wind. His helmet either came off in the impact or was removed by the pilot before help arrived (less than one minute).

The other pilot (Pilot B) who had landed (going backwards) a short distance further up the slope from the accident pilot was a trained First Aider and immediately went to assist the accident pilot. Other pilots soon arrived to assist. The pilot was conscious but initially incoherent.

The rain shower passed by after some fifteen minutes or so.

As there was no mobile phone signal in the valley the Meet Director was given a lift to a nearby house which had a land line and an ambulance was summoned. The ambulance arrived on site at approximately 19:00hrs along with the local constabulary. Shortly afterwards the ambulance crew summoned an Air Ambulance. This arrived at approximately 19:40. The pilot was then airlifted to the Borders General Hospital where a fractured vertebrae in the neck was diagnosed

Whilst hospitalised for treatment to this injury the pilot suffered a stroke.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	-	-	-

Serious	1	-	-
Minor / None	-	-	-

1.3 Damage to the aircraft

The paraglider was undamaged in the accident. It was independently examined and found to be in Good to Very Good condition. There was some slight line shrinkage on the outer portion of both the left and right wing, but this was still within specification. This shrinkage was even front to back and symmetrical, so the angle of attack remained more or less the same as manufactured. The only effect of this shrinkage was a slight increase in the arc at the tips.

The paraglider was also test flown by the Ozone Chief Test Pilot to explore the Big Ears/stall area. These flight tests were videoed. No unusual behaviour was observed.

1.4 Other damage

None

1.5 Personnel information

Pilot was aged 55 at the time of the accident. He holds a BHPA 'Pilot' rating.
The pilot's total weight in flight at the time of the accident was 95kg.

He had flown hang gliders from 1973 to approximately 2005, amassing a total of approximately 550hrs. After a gap he started flying paragliders in 2007 having undertaken no formal training. He flew a Sport 3 for about 25 hours and then purchased an Ozone Delta in September 2010. He flew without qualification until 2010 when he applied for the BHPA Pilot rating. At this point he obtained a BHPA qualification through the 'Alternative Entry Scheme'. At the time of the accident he had 77 hours PG experience.

The pilot had taken part in one round of the same competition series the year before.

1.6 Aircraft information

Glider: Ozone Delta EN C certification
Harness: Woody Valley Peak2 with Airbag
Helmet: Make and model unknown, open face EN966 design.

1.7 Meteorological information

The wind was initially square onto the hill (Southerly), 8 – 12 mph, smooth and providing easy take off conditions. As the rain shower arrived it became E.S.E. 22 to 25mph and turbulent

1.8 Aids to navigation

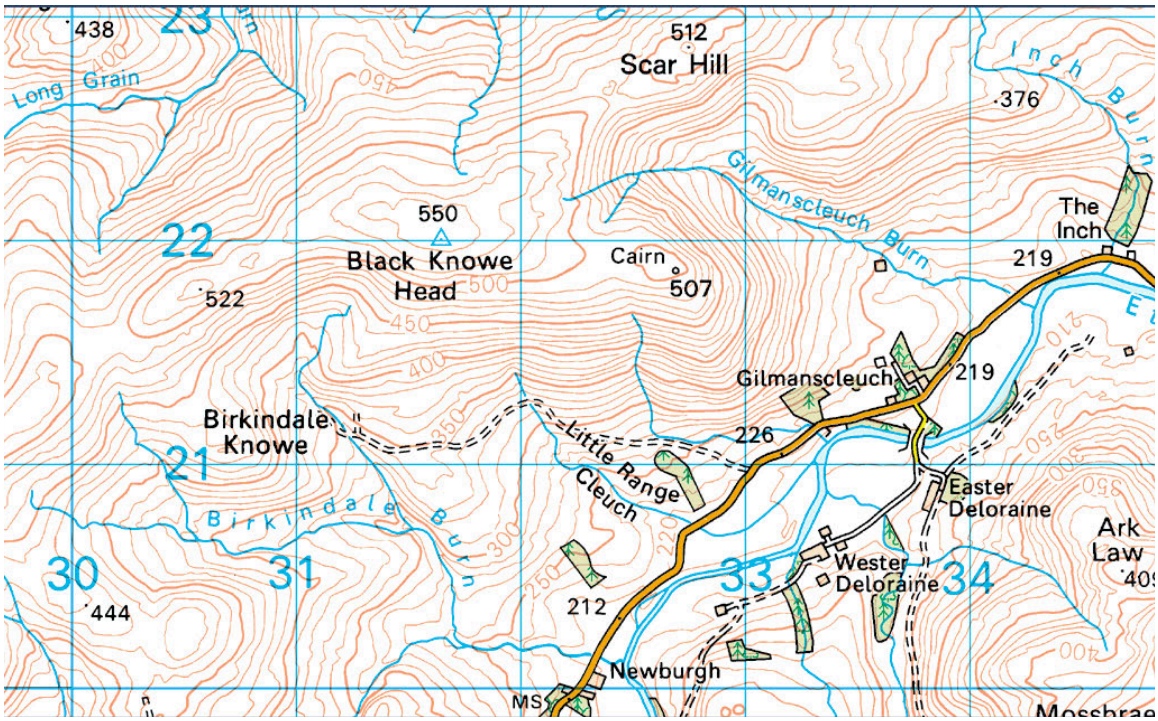
Not applicable.

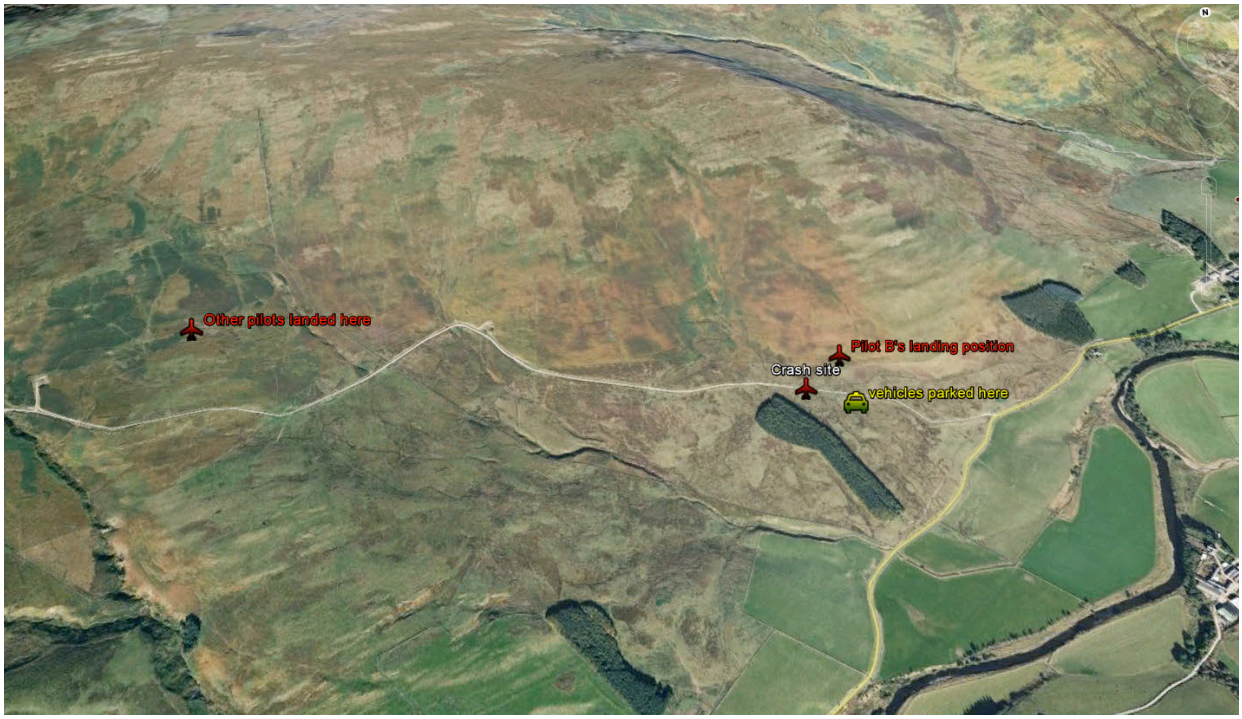
1.9 Communications

Not relevant

1.10 Aerodrome and approved facilities

Black Knowe Head is situated approximately 10 kilometres North East of Ettrick. It is a very gentle, smooth, grass and bracken covered slope; quite long and with excellent landing areas. It is best flown in a Southerly wind.





1.11 Flight recorders

The pilot was flying with a Brauniger Competino+ which recorded the flight. (The GPS clock was set one hour ahead of GMT hence the times recorded below are one hour out.)

Tracklog

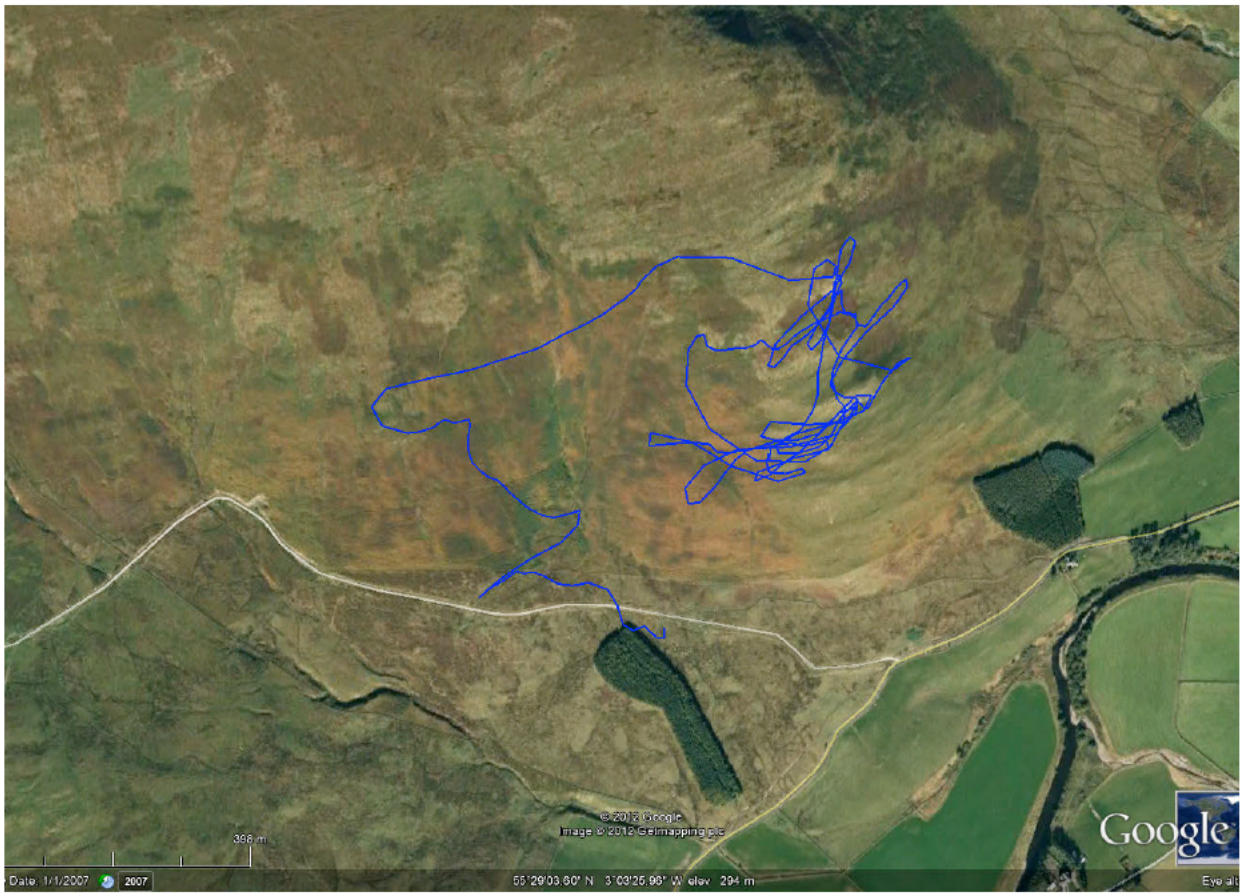
The tracklog was recorded at 5 second intervals so is a good representation of the flight but lacks details in the final few seconds prior to the pilot impacting.

This instrument records both GPS and barometric altitude. The pilot did not calibrate the pressure altitude of the GPS prior to the flight so this was adjusted manually to match takeoff location and recorded GPS altitude.

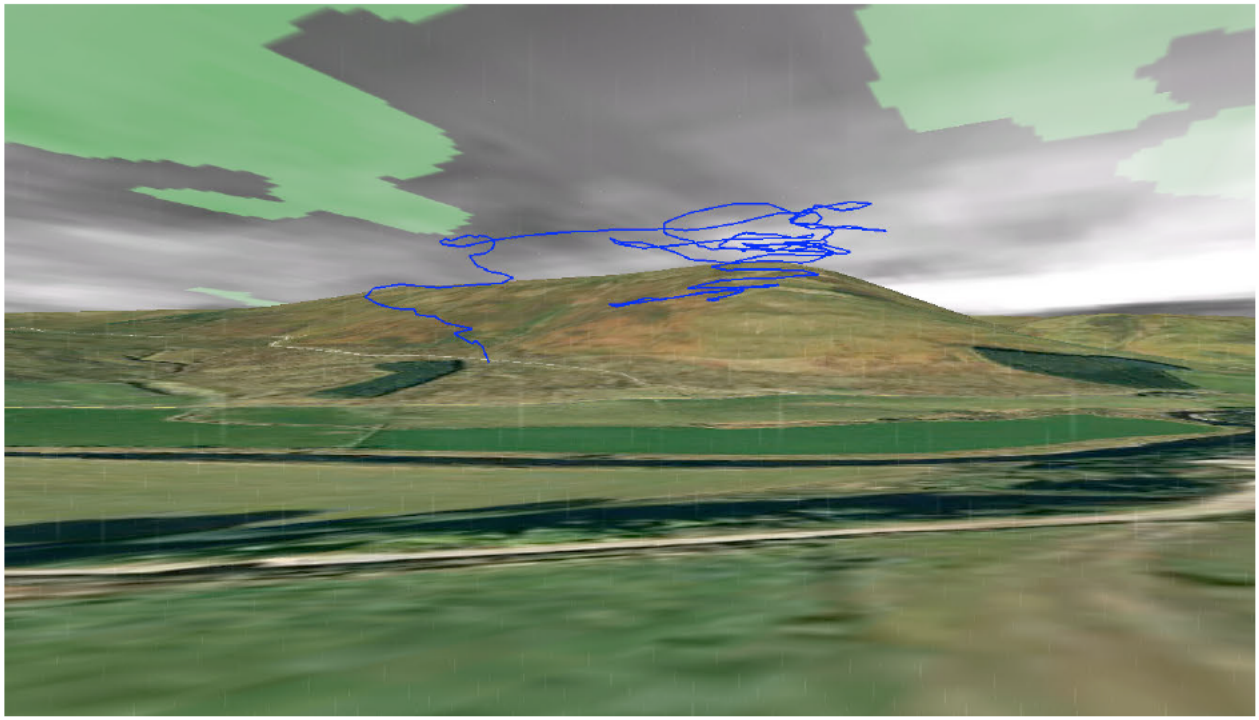
The GPS stopped recording GPS position and Altitude as the pilot landed.

Facts from the Tracklog

Time		**Vario**	**GPS Alt**	**Baro Alt**
16:39:53	Soaring Start		1165’	1143’
16:54:17	Max altitude		1663’	1697’
16:54:22	Soars west along ridge		1677’	1697’
16:56:27	Turns out from hill & descends	~ -200fpm	1667’	1612’
16:59:48	Descent rate increases	~ -500fpm	1073’	930’
16:59:58	Pilot landed		-	841’



Track log viewed from above.



Track log viewed from the SE.

1.12 Wreckage and impact information

None.

1.13 Medical and pathological information

The pilot suffered a fractured vertebra in his neck during the accident. Whilst in hospital he suffered a stroke.

1.14 Fire

None.

1.15 Survival aspects

It has not been possible to clarify whether the pilot removed his helmet after impact or whether it detached itself during the impact.

There was a considerable delay in evacuating the pilot. The accident happened at 18:00hrs. The ambulance arrived on site at approximately 19:00hrs. The Air Ambulance arrived at approximately 19:40. The pilot was then airlifted to the hospital.

1.16 Tests and research

Not applicable.

1.17 Organisational and management information

The British Paragliding Cup competitions are a level below the British Paragliding Championship. The BHPA Paragliding Competitions Panel has no direct involvement in the British Paragliding Cup competition series. The British Paragliding Cup rounds are organised by a small team of volunteer organisers, with an appointed meet director and two to three safety marshals/drivers. Usually the organisers fly in the competition while the meet director and safety marshals stay on the ground. There is also a local liaison pilot chosen for their experience and knowledge of the local area; they supply local knowledge of sites, conditions, possible tasks and any information of possible issues with regards to safety of a particular site, task or local weather phenomenon.

The British Paragliding Cup competition organisers try, as far as possible, to run the comp in the same fashion as the British Championship in order to prepare the pilots for bigger competitions, which includes using the scoring system, briefings, 'sign to fly' sheets, etc.

The Meet Director generally puts a task together assisted by the local liaison pilot with input from one of the other organisers, experienced pilot or both. There is a task briefing held by the meet director with all relevant information regarding the task set out on a task board, the local liaison will then give any pertinent details of problems that may be encountered, dangers or ‘house thermal’ information. Pilots are then asked if they have any questions, these are answered and it is reiterated that they do not have to fly if they are uncomfortable with any aspect of the task and flying and that ultimately the decision to take off and therefore take part is theirs alone. There is a designated emergency channel that is assigned and the channel is put on the task board, all pilots have to carry a radio and be tuned into the emergency frequency while flying, this is so there can be communication between the meet director and pilots in case of the suspension of a window, cancelling of a task etc. An air horn is used to signal the start of the task and also

should it be required the stopping of a task. There is a 'sign to fly' sheet that is passed around for all pilots who intend to take off to sign; this is so there is a record of the people who are present. Whether they take off or not the pilots have to report in by a designated time so that a check can be made that all pilots are accounted for, this is then double checked by another marshal to ensure accuracy.

No on-site medical cover is provided.

1.18 Additional information
N/a

1.19 Useful or effective investigation techniques
N/a

SECTION 2 – ANALYSIS
The paraglider stalled when close to the ground, either due to being in Big Ears in wind shear/turbulence or due to being pumped out of Big Ears when in wind shear/turbulence.
This accident involved several factors:

1. Weather
2. Big Ears
3. EN 'C' class glider
4. Choice of landing area
5. Flying and Alcohol
6. Competition

Weather
Paragliders are not designed or tested to be flown in rain. It is known that a paraglider's stability and recovery characteristics are degraded when wet. Because of this, warnings about flying in rain have been published in Skywings April 2006, March 2008 and March 2010. It is possible that the loss of the control of the glider was triggered by the pilot attempting to get out of Big Ears with a wet canopy.

The pilot who landed nearby (further up the slope) a few seconds after the accident was going backwards on final approach and at touchdown. This clearly indicates that the wind at that moment was strong. That pilot described the conditions at landing as 'gusty strong wind'. In gusty, strong conditions turbulence and shear is always to be expected close to the ground.

Big Ears
Exercise 35 of the BHPA Training Programme for PG pilots covers Big Ears. It requires that students are taught how to use Big Ears, when to use Big Ears, the limitations/dangers of Big Ears and the safe way to get out of Big Ears. The accident pilot had not undertaken any formal PG training so there is no record that he had ever been warned of the dangers and limitations etc..

The BHPA Pilot Handbook Chapter 12 covers 'Big Ears'. It states that 'While in 'big ears' (snip)
The glider adopts a steeper flight-path with no change of attitude, so the wing is operating at a higher angle of attack. This makes the glider less susceptible to tucks, but more susceptible to stalling. Using the speed-bar to lower the angle of attack a little (once safely established in 'big ears') can provide an increased safety margin above the stall…. It also states: 'Getting out of 'big ears'
As already mentioned, in 'big ears' the glider is operating at an increased angle of attack, and this means that care must be taken not to provoke a stall. Unfortunately, several serious accidents have occurred

when pilots have used the old 'pumping out' technique to recover both 'ears' simultaneously, and have inadvertently stalled the wing. This risk is greater when descending through wind shears ….

Ozone Delta Handbook

To reopen your big ears, release both A lines at the same time. To help reinflation, brake gently one side at a time until tips regain pressure. Avoid deep symmetric applications of the brake as this could induce parachutal or full stalls.

IMPORTANT: You can land with the ears (you should release the ears before final flare). Ozone do not advise you to do this when it's turbulent or windy due to the risk of a possible stall and lack of precision in steering.

It has not been possible to ascertain what method of recovery from Big Ears the pilot was in the habit of using. Using Big Ears close to the ground is not a recommended technique.

EN C Paraglider

The Ozone Delta paraglider involved in the accident was certified in the EN 'C' category. This means that it has been tested and found to be a paraglider *'with moderate passive safety and with potentially dynamic reactions to turbulence and pilot errors. Recovery to normal flight may require precise pilot input.'*

The most recent BHPA advice on 'Choosing Wings within the EN classes' was published in Skywings Feb 2010 Pg 8.

On gliders rated EN 'C' the published BHPA advice was: *For pilots who are Advanced Pilot rated, have several hundred hours logged (many of these in thermic conditions), have completed SIV courses, are flying ten or more hours a month, and enjoy dealing with large asymmetric collapses etc.*

The accident pilot was not Advanced Pilot rated, did not have several hundred hours logged (on paragliders), had not completed any SIV courses, and was not flying ten or more hours a month. (He had averaged about nineteen hours a year in the four years he had been flying paragliders.)

He had chosen to buy and fly a glider *'with moderate passive safety and with potentially dynamic reactions to turbulence and pilot errors'* despite BHPA advice to the contrary.

It is possible that the pilot believed that his previous experience on hang gliders could be taken into account. It is the case that an experienced hang glider pilot can convert to paraglider flying with virtually no tuition, and the soaring skills and airmanship are transferable. This means that very rapidly the pilot appears to have mastered the new craft type. Unfortunately the recovery skills are not transferable, nor are knowledge and understanding of the dangers and limitations of various facets of paragliding (Eg Big Ears, B line, Speed Bar etc.). To an experienced hang glider pilot a paraglider may appear to be a simple machine – but paragliders must be treated with at least as much respect as any other flying machine as they are very unforgiving of any carelessness or mistake.

Choice of landing area

The pilot chose to land near the cars, close to a stand of tall pine trees. Only one other pilot landed in that general area, but he landed further up the slope away from the trees. The majority of the rest of the competitors landed on the large unobstructed open area in front of the hill. It is possible that the loss of control of the glider was caused by mechanical turbulence triggered by the stand of trees, or by the parked vehicles.

Flying and Alcohol

The pilot was seen to consume at least two pints of beer less than two hours before flying.

The Air Navigation Order states:
PART 19 PROHIBITED BEHAVIOUR
Drunkenness in aircraft
139 *(2) A person must not, when acting as a member of the crew of any aircraft or being carried in any aircraft for the purpose of acting as a member of the crew, be under the influence of drink or a drug to such an extent as to impair their capacity so to act.*

The phrase 'such an extent as to impair their capacity to act' is effectively defined in the 'Railways and Transport Safety Act 2003' which states:

PART 5 AVIATION: ALCOHOL AND DRUGS
Offences
93 Prescribed limit

(1) A person commits an offence if—

(a) he performs an aviation function at a time when the proportion of alcohol in his breath, blood or urine exceeds the prescribed limit, or

(b) he carries out an activity which is ancillary to an aviation function at a time when the proportion of alcohol in his breath, blood or urine exceeds the prescribed limit.

(2)The prescribed limit of alcohol is (subject to subsection (3))—

(a) in the case of breath, 9 microgrammes of alcohol in 100 millilitres,

(b) in the case of blood, 20 milligrammes of alcohol in 100 millilitres, and

(c) in the case of urine, 27 milligrammes of alcohol in 100 millilitres.

94 Aviation functions

(1) For the purposes of this Part the following (and only the following) are aviation functions—

(a) acting as a pilot of an aircraft during flight,

CAA SAFETY SENSE LEAFLET 24 states:
Since it takes an extended period of time to remove even low levels of alcohol from the blood, pilots should not fly for at least eight hours after consuming modest amounts of alcohol and up to 24 hours (or longer) following a major celebration!

It is not possible to ascertain to what extent alcohol affected the pilot's decision making and reactions.

Competition

This was a competition for pilots holding a Pilot rating; that is experienced pilots more than able to make their own decisions. Notwithstanding this fact, the competition had in place a system of pre-launch condition checking and a system of monitoring conditions during the competition, and these systems were used effectively. The pilots were reminded at the Task Briefing that the decision to fly was theirs. When the heavy rain shower approached the hill, its presence would have been at least as obvious to the airborne pilots as it was to the Meet Director. Whilst the Meet Director took a timely decision to cancel the task, the decision to land should have been taken at least as quickly (if not before) individually by the pilots airborne. That is their duty as Aircraft Commanders. This type of decision making is the primary skill of hang gliding and paragliding.

SECTION 3 – CONCLUSIONS

The investigation concluded that the cause of the accident was the pilot continuing to fly with inclement weather approaching and then choosing to use Big Ears on a wet EN 'C' paraglider during a landing approach to an area that was likely to be affected by turbulence in the prevailing gusty conditions.

SECTION 4 - SAFETY RECOMMENDATIONS

It is understood that the British Paragliding Cup organisers have amended their rules to require that pilots undertake to comply with the law and not to fly when under the influence of alcohol or other substances, so no recommendation is made in that respect.

1. It is recommended that that BHPA Competition Panel review procedures for ensuring that the emergency services can be summoned in a timely manner, and ensure that Meet Directors etc. are familiar with ways of ensuring that an Air Ambulance is despatched without delay when necessary.