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AAIA

Air Accident Investigation Authority

# Loss of Lifting Conditions En-route (LOLI)

# Investigation Report

## PHI Fantasia 22 Paraglider

## Long Ke Wan, Sai Kung, Hong Kong

## 15 February 2023

**IVR-2025-05**

# AAIA Investigations

Pursuant to the Hong Kong Civil Aviation (Investigation of Accidents) Regulations (Cap. 448B), the sole objective of the investigation and the Investigation Report is the prevention of accidents and incidents. It is not the purpose of the investigation to apportion blame or liability.

The Chief Inspector instigated an inspector's investigation into the accident in accordance with the provisions in Cap. 448B.

This accident Investigation Report contains information of an occurrence involving a paragliding activity at Long Ke Wan in Hong Kong on 15 February 2023.

The Government Flying Service, Hong Kong Observatory, Hong Kong Police Force, Marine Department, Hong Kong China Paragliding Association, and the paraglider manufacturer, PHI-Air, provided assistance to the investigation team.

This Investigation Report supersedes all previous Preliminary Report and Interim Statements concerning this accident investigation.

All times in this Investigation Report are in Hong Kong Local Time unless otherwise stated.

Hong Kong Local Time is Coordinated Universal Time (UTC) + 8 hours.

Chief Accident and Safety Investigator

Air Accident Investigation Authority

Transport and Logistics Bureau

Hong Kong

May 2025

# Synopsis

At about 1345 hours (hrs) on 15 February 2023, a pilot using a PHI Fantasia 22 paraglider took off from the paragliding take-off area at Biu Tsim Kok in Long Ke, and planned to land at the beach.

At about 1350 hrs, the pilot was found landing short of the beach and became stranded in the sea about 60 meters from the beach shore.

The Pilot was rescued and airlifted to the hospital by a Government Flying Service helicopter for medical management. He was certified dead later on the same day.

Several video clips were taken by witnesses, documenting various stages of the pre-flight preparation, the take-off, a portion of the flight, and the unexpected water landing. These video clips had provided valuable insights into the sequence of events.

The Pilot flew with a PHI Fantasia 22 paraglider, an Advance Progress 3 harness, and an external flight deck. He did not wear a lifejacket or possess other buoyancy aid.

The investigation found that this fatal accident was probably caused by the paraglider landing short of the beach, resulting in a water landing and tragic drowning of the Pilot.

The investigation team has made three safety recommendations.

# Contents

# 1. Factual Information

## 1.1. History of the Flight

(1) A paraglider pilot (hereafter referred to as "the Pilot") arrived at the paragliding take-off area at Biu Tsim Kok in Long Ke at about 1330 hrs on 15 February 2023. He was accompanied by a fellow novice pilot (referred to as "P1"), an experienced pilot (referred to as "P2"), and a friend (referred to as "FD").

(2) At about 1345 hrs, he took off solo from the field with his PHI Fantasia 22 paraglider, and planned to land at the beach. He did not wear a lifejacket or possess other personal buoyancy aid.


(*Source: Based on photo on https://www.hkpa.net/longkewan*)

**Figure 1: Paragliding Take-off and Landing Areas at Long Ke Wan**

(3) The Pilot's take-off was smooth and he was flying with a generic soaring pattern trying to soar in the orographic lift[1] area along the coastline in front of the take-off area. About 4 minutes later, when the Pilot was flying towards the beach for landing, the headwind possibly slowed down the horizontal speed of the paraglider and it was descending steadily. P2 lost visual contact with the paraglider, and then ran down from the take-off area

[1] When a moving air mass meets a geographical feature such as a mountain, some of the air will have no option but to rise up over it. This process is known as orographic lift. If the rising air is moist, clouds will form.

to the hiking trail below it. At about 1350 hrs, P2 found that the paraglider landed short of the beach and was in the sea about 60 meters from the beach shore.

(4) P2 continued to run towards the beach along the trail and used his walkie-talkie to ask P1 to go to the beach as well. After arriving at the beach, P2 approached the paraglider by swimming to rescue the Pilot. When he reached the paraglider, he found that the Pilot was stranded by the lines of the paraglider. He unbuckled the paraglider and the harness from the Pilot and carried the Pilot towards the beach.

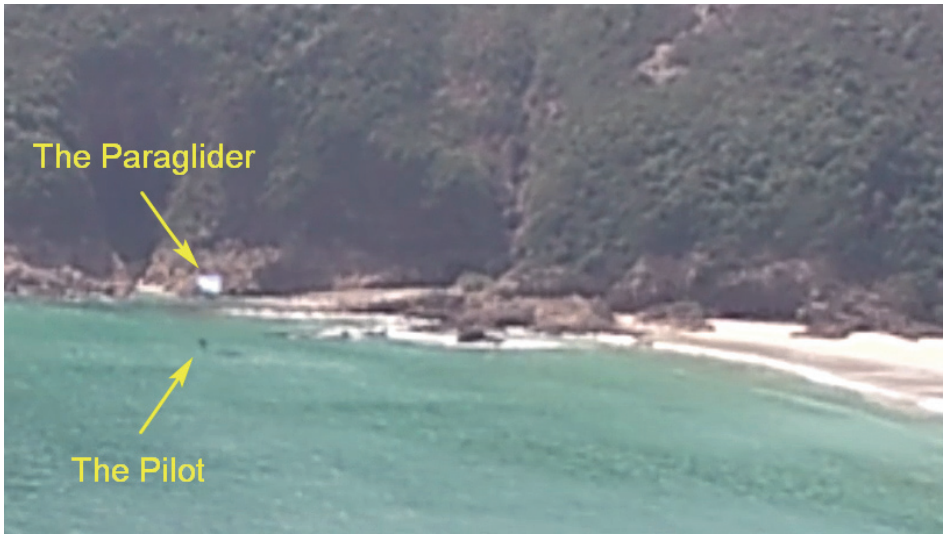


**Figure 2: The Moment Shortly before the Water Landing**

(5) With the help from P1 and a hiker at the beach, P2 removed the Pilot from the sea and carried him to the beach. They then carried out cardiopulmonary resuscitation (CPR) and artificial respiration to the Pilot in turn.

(6) About 30 minutes later, the Pilot was airlifted to the hospital by a Government Flying Service helicopter for medical management. He was certified dead later on the same day.

## 1.2. Injuries to Persons

The Pilot was drowned and perished.

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

**Table 1: Injuries to Persons**

## 1.3. Damage – Paraglider

There was no significant damage to the paraglider.

## 1.4. Other Damage

No other damage was caused.

## 1.5. Personnel Information

### 1.5.1. General

| | |
|---|---|
| Pilot | Male, aged 62 |
| Weight | 77 kg |
| Licence details: | Nil |
| Flying experience: | Five to six hours |

**Table 2: Pilot Information**

### 1.5.2. Experience, Training and Qualification

(1) The Pilot was a novice at paragliding. He performed at least 12 paragliding flights, including eight flights at Long Ke Wan.

(2) The Pilot accumulated about five to six flying hours in the 12 flights, and about two hours of ground preparation.

(3) There is no evidence that he held any paragliding licence or rating.

(4) The Pilot was a diving instructor.

## 1.6. Paraglider Information

(1) The Pilot flew with a PHI Fantasia 22 paragliding canopy. "22" stands for the size, and the paraglider has a projected area of 22.54 $m^2$. Its Certified Weight Range is 75 kg to 95 kg. It was certified to EN-A and was built in April 2021.

**Figure 3: The Pilot's PHI Fantasia 22 Paragliding Canopy**


**Figure 4: Data Labels of the Pilot's Paraglider**

(2) European Norm (EN) is a 4-level paraglider certification system, namely A, B, C & D. EN-A is the beginner glider while EN-D is for highly skilled pilots. According to the British Hang Gliding & Paragliding Association (BHPA), EN-A paragliders are "Designed for all pilots including pilots under all levels

of training. (For all pilots especially those in their first year of flying and …, for example those who fly less than 25 hours a year)"[2].

| Class | Description of flight characteristics | Description of pilot skills required *(BHPA expanded version)* |
|---|---|---|
| A | Paragliders with maximum passive safety and extremely forgiving flying characteristics. Gliders with good resistance to departures from normal flight. | Designed for all pilots including pilots under all levels of training.<br><br>*(For all pilots especially those in their first year of flying and for experienced pilots with limited currency, for example those who fly less than 25 hours a year.)* |
| B | Paragliders with good passive safety and forgiving flying characteristics. Gliders with some resistance to departures from normal flight. | Designed for all pilots and may be suitable for pilots under training if recommended by the manufacturer.<br><br>*(There are a wide range of gliders produced in this category. Some are closer to 'A' class gliders. Others are for pilots who have gained more than 30 hours mixed flying (at least ten in thermic conditions) and hold a 'Pilot' rating. B class gliders are also suitable for experienced pilots who fly less than 50 hours a year.)* |
| C | Paragliders with moderate passive safety and with potentially dynamic reactions to turbulence and pilot errors. Recovery to normal flight may require precise pilot input. | Designed for pilots familiar with recovery techniques, who fly "actively" and regularly, and understand the implications of flying a glider with reduced passive safety.<br><br>*(For pilots who are Advanced Pilot rated, have several hundred hours logged (many of these in thermic conditions), have completed SIV courses, are flying 10 or more hours a month, and enjoy dealing with large asymmetric collapses etc.)* |
| D | Paragliders with demanding flying characteristics and potentially violent reactions to turbulence and pilot errors. Recovery to normal flight requires precise pilot input. | Designed for pilots well practised in recovery techniques, who fly very actively, have significant experience of flying in turbulent conditions, and who accept the implications of flying such a wing.<br><br>*(For pilots who have been flying for many years, fly more than two hundred hours a year often in strong thermic conditions and are masters of the various SIV skills.)* |

**Figure 5: EN Classes of Paragliders Published by the BHPA**

(3) The Pilot also flew with an Advance Progress 3 harness of size M. It is certified to EN 1651 & LTF 91/09, 120 kg (maximum pilot weight up to 120 kg). A reserve parachute is stowed in the integrated compartment under the seat.


**Figure 6: Advance Progress 3 Harness**

[2] https://www.bhpa.co.uk/pdf/En_PG_Classes.pdf


**Figure 7: Data Label of the Pilot's Harness**

(4) The paragliding reserve parachute, Model "ALBA 105", was made by ICARO Paragliders. It was not used by the Pilot during the flight. It was removed from the harness compartment by the investigation team for examination after the accident.

**Figure 8: Reserve Parachute of the Pilot**

# 1.7. Meteorological Factors

## 1.7.1. Weather information from the Hong Kong Observatory

### 1.7.1.1. Weather Forecast for Local Aviation at 1230 hrs

(1) At 1230 hrs on 15 February 2023, the Hong Kong Observatory (HKO) issued a weather forecast for local aviation for the period from 1300 to 2300 hrs.

(2) According to the forecast, there were strong winds and severe turbulence within the 100-kilometre (km) radius of Hong Kong. The synopsis of the weather situation was "The northeast monsoon is affecting the South China coastal areas." The surface wind would be 10-15 knots (kt) (18-28 km/h) from the 010 (around north) wind direction.

### 1.7.1.2. Special Weather Tips

There were no Special Weather Tips issued on the date of the occurrence.

### 1.7.1.3. Thunderstorm Warning

There was no Thunderstorm Warning in force on the date of the occurrence.

### 1.7.1.4. Wind Data from Nearby Weather Stations

(1) According to the site guides website of the Hong Kong China Paragliding Association Limited (HKPA), the weather suitable for paragliding activity at Long Ke Wan is as follows:

(a) "*Flyable wind direction: East (NE-E-SE)*"

(b) "*Winds to look for on the HKO website are Tate's Cairn and Waglan with force 2-4 Easterly for ridge lift, or weaker conditions for sled runs. Never take off a paraglider in force 5 and above wind condition.*"

(2) The wind data collected by the HKO automatic weather stations at Tate's Cairn (TC) and Waglan Island (WGL) provided a good reference for the meteorological information of the Long Ke Wan paragliding area.

(3) The "10-minute mean wind" data between 1330 hrs and 1430 hrs of 15 February 2023 are presented in Table 3 below.

| Time (in HKT) | 10-minute mean wind direction (nearest 10 degree) | | 10-minute mean wind speed (km/h) | | 10-minute maximum gust (km/h) | |
|---|---|---|---|---|---|---|
| | TC | WGL | TC | WGL | TC | WGL |
| 1330 | 340 | 040 | 16 | 23 | 24 | 30 |
| 1340 | 340 | 040 | 18 | 21 | 24 | 27 |
| 1350 | 340 | 040 | 17 | 18 | 25 | 24 |
| 1400 | 340 | 030 | 17 | 18 | 23 | 23 |
| 1410 | 330 | 040 | 16 | 18 | 25 | 25 |
| 1420 | 340 | 040 | 17 | 18 | 25 | 26 |
| 1430 | 350 | 040 | 17 | 17 | 25 | 24 |

**Table 3: Wind Speed and Gust Data**

(4) The data from TC weather station indicated that the 10-minute mean wind speeds were 17 to 18 km/h (equivalent to wind force 3, moderate) between 1340 to 1350 hrs. The wind was blowing from the north-northwest (NNW, 340 degrees).

(5) The data from WGL weather station indicated that the 10-minute mean wind speeds were 18 to 21 km/h (equivalent to wind force 3 to 4, moderate) between 1340 to 1350 hrs. The wind was blowing from the northeast (NE, 40 degrees).

### 1.7.1.5. Rainfall Rate, Cloud Base, and Visibility

(1) According to the 3-km Constant Altitude Plan Position Indicator (CAPPI) radar images of (64-km range) at 1330 hrs and 1400 hrs on 15 February 2023, there was no rain echo detected over Hong Kong.

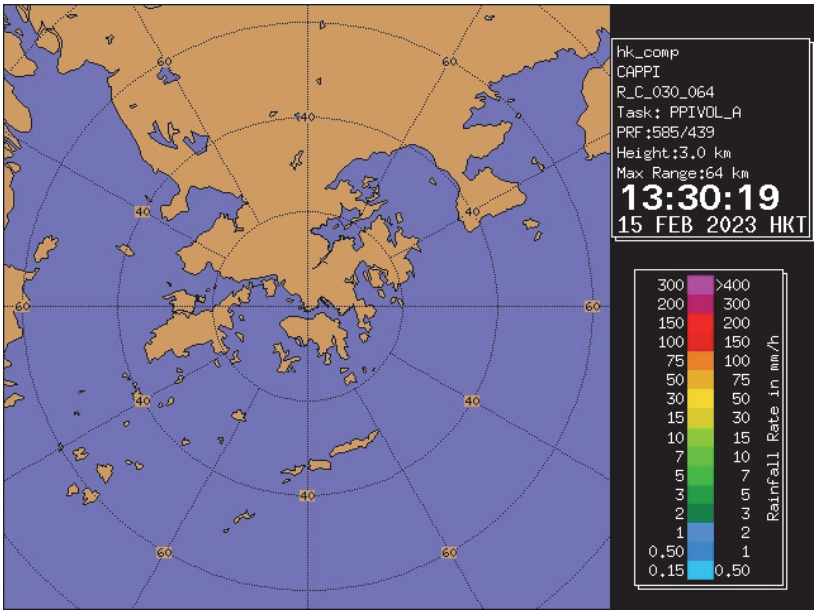


**Figure 9: Radar Image at 1330 Hrs on 15 February 2023**

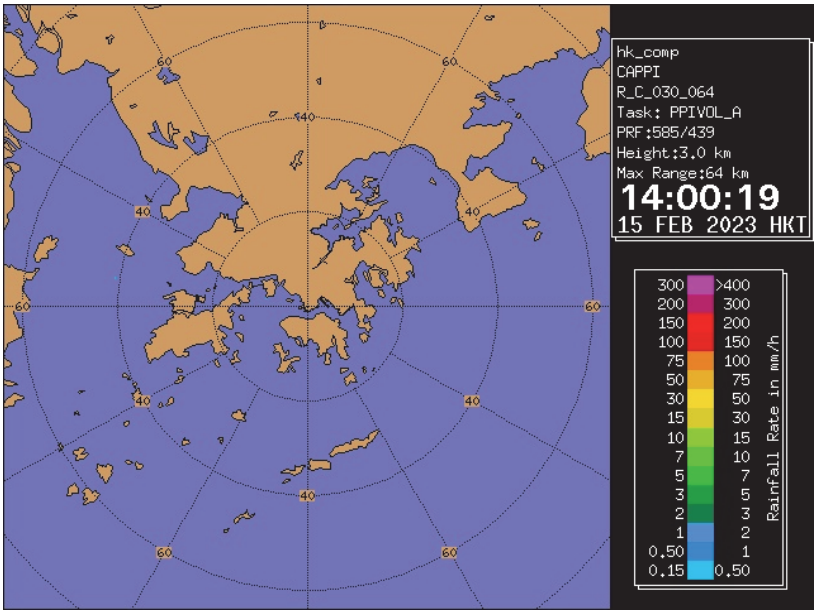


**Figure 10: Radar Image at 1400 Hrs on 15 February 2023**

Note: The Pilot's water landing was made at about 1350 hrs.

(2) The witness videos also indicated that the sky was sunny and there was no cloud at Long Ke. The visibility was very good.

### 1.7.2. Screen Capture of Windsock from Witness's Video

FD took videos at the take-off area before and during the flight. A screen capture in one of the videos showed the visibility in the area and the direction of the windsock[3] before the flight.

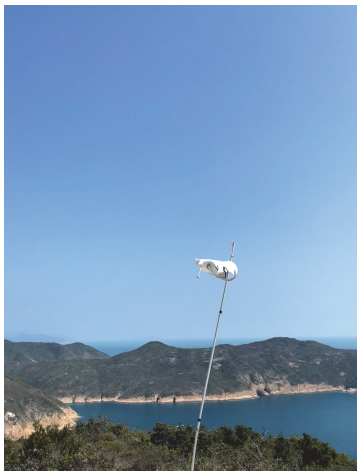

**Figure 11: Visibility and the Direction of the Windsock before Take-off**

[3] A windsock is a conical textile tube which is used as a simple device to indicate the direction and the relative speed of the wind at a particular location. The windsock's indications may be influenced by the local terrain, or other obstacles that can cause turbulence and affect the wind flow.

## 1.8. Navigation Aids

Not applicable.

## 1.9. Communications

(1) The Pilot carried two two-way radio transceivers, including one from P2. Both radio transceivers were damaged by seawater after the occurrence and could not be switched on. Their pre-set frequencies could not be identified.

**Figure 12: Two Two-Way Radio Transceivers Carried by the Pilot**

(2) According to P2, he tested the radio transceivers, which were set to 140 MHz, with the Pilot and they functioned normally. The Pilot maintained radio contact with P2 during the flight.

## 1.10. Paragliding Activity Area

(1) Long Ke Wan is located in the south-eastern part of Sai Kung Peninsula, north of the East Dam of High Island Reservoir, and within the Sai Kung East Country Park. It is one of the locations where paragliding activities are frequently carried out. Its boundary and operating altitude can be found in Section ENR 5.5 of the Aeronautical Information Publication Hong Kong (AIP HK) published by the Civil Aviation Department (CAD).

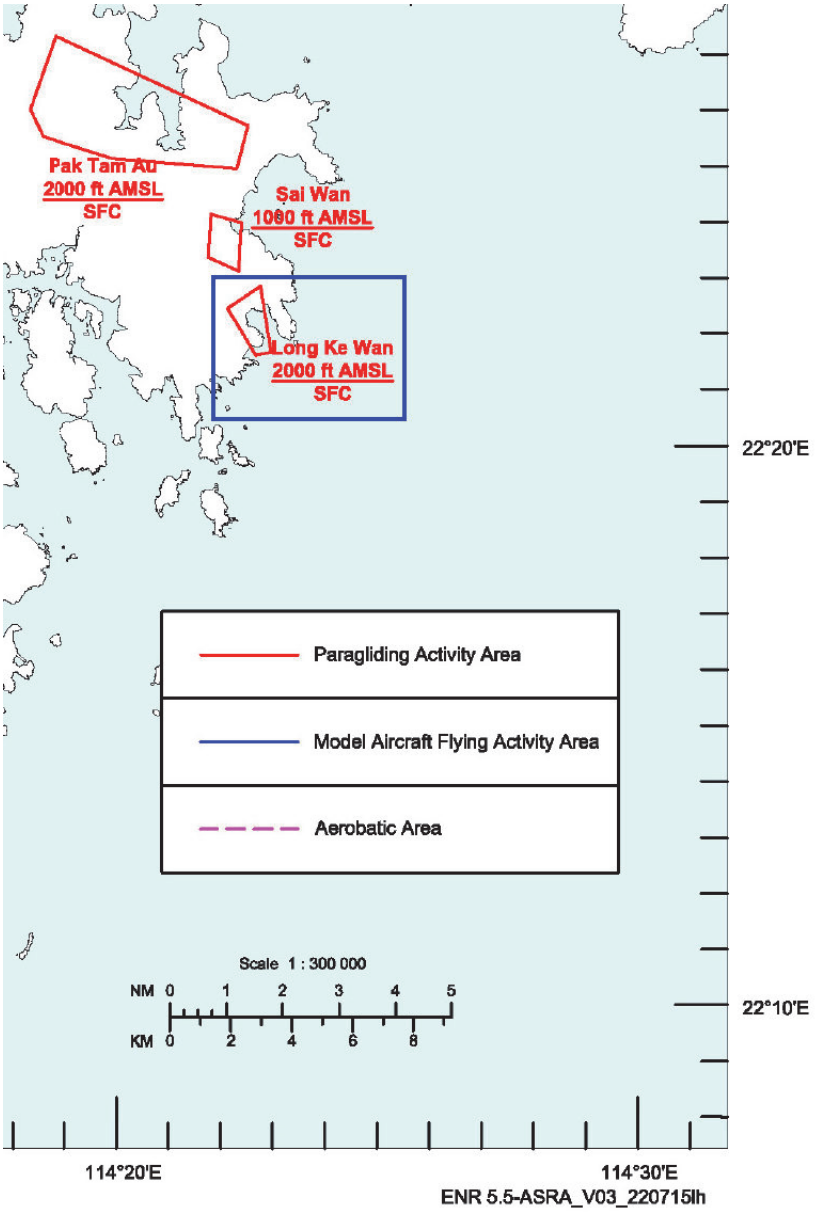


**Figure 13: Long Ke Wan Paragliding Area Published in AIP HK**

(2) The operating altitude of the area was from the ground surface (SFC) to 2,000 feet (609.6 m) Above Mean Sea Level (AMSL).

(3) The take-off area of the accident flight was at a height of about 460 ft (140.2 m) AMSL and within the boundaries of the Long Ke Wan paragliding area.

(4) There is a hiking trail right below the take-off area. It is at a height of about 100 m AMSL, and is commonly used as a height reference for paraglider pilots.

# 1.11. Flight Recorders

## 1.11.1. Variometer

(1) A variometer is an integrated device with altimeter, compass and Global Positioning System (GPS) functions. The variometer carried by the Pilot was a NavITer Hyper flight computer. It is a standalone instrument for hike and fly activities and automatically records all the details of flights in IGC files[4] up to 36 hours.

(2) The variometer can provide, but not limited to, the information of altitude, ground speed, the vertical height gain / loss (lift / sink rate), glide ratio, height above ground level (AGL), and wind direction to a pilot.


**Figure 14: Menu of NavITer Hyper Flight Computer**

## 1.11.2. Flight Track Data in the Pilot's Variometer

Due to seawater ingression, the circuit boards were damaged and no data could be downloaded for investigation.

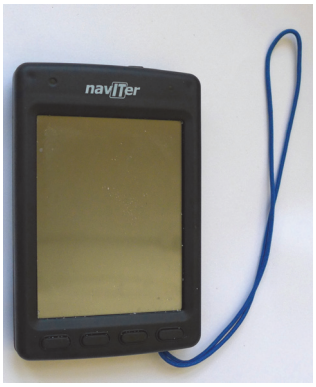


**Figure 15: NavITer Hyper Flight Computer of the Pilot**

[4] The IGC file type was primarily associated with the Global Positioning System by the Fédération Aéronautique Internationale (FAI). "IGC" comes from "the International Gliding Commission". IGC files provide a standard for exchanging data logs from GPS flight recorders.

### 1.11.3. Video Recording

The early part of the Pilot's flight was video-recorded by FD at the take-off area. The unexpected water landing was captured in a couple of videos taken by a hiker at a hilltop, between Long Ke Wan and Long Ke Tsai, opposite the take-off field. These video clips have provided valuable insights into the sequence of the flight.

## 1.12. Wreckage and Impact

### 1.12.1. General

The paraglider and the associated equipment were brought back to the beach when the Pilot was rescued. They were preserved by the Hong Kong Police Force (HKPF). A detailed examination of them was conducted by the investigation team with the assistance of the HKPA Safety Officer at Sai Kung Police Station on 22 February 2023.

### 1.12.2. Canopy and Harness

(1) The paragliding canopy, Model "PHI Fantasia 22 paraglider", and the harness, Model "Advance Progress 3", were examined and found in good shape.

(2) One of the lines connecting the canopy to the harness was found broken.

### 1.12.3. Paragliding Reserve Parachute

(1) The paragliding reserve parachute was intact and stored inside the reserve compartment of the harness.

(2) The investigation team removed the reserve parachute from the reserve compartment for inspection and did not identify any abnormal findings.

### 1.12.4. Helmet

(1) The helmet of the Pilot, Model "PlusAir" of size XL, was made by Plusmax GmbH.

(2) The helmet was certified to EN 966 standard.

(3) The helmet was manufactured in June 2015.


**Figure 16: The Helmet of the Pilot and Its Label**

(4) The helmet was examined and no significant damage was noted.

## 1.12.5. Other Equipment

(1) The Pilot carried an external flight deck which accommodated his NavITer Hyper Flight Computer, a compass, and a Spinlock safety line cutter (hook knife). The hook knife was still kept inside its container in a pocket of the external flight deck.

**Figure 17: External Flight Deck and Accessories of the Pilot**

**Figure 18: Hook Knife Carried by the Pilot**

(2) The Pilot also carried two handheld radio transceivers, including one borrowed from P2 as mentioned in paragraph 1.9 (1).

## 1.13. Medical/Pathological Information

The cause of death as shown by the autopsy appeared to be drowning and the autopsy findings were consistent with it. There was no significant trauma that could account for the death.

## 1.14. Smoke, Fire, and Fumes

Not applicable.

## 1.15. Survival Aspects

### 1.15.1. Safety Standards of the Helmet

(1) According to the CAD's Safety Guidance on Paragliding Activities [5], paraglider pilots are advised to wear a helmet which is certified to either EN966 (air sports), EN1077 A & B, ASTM2040 or SNELL rs98 (snow sports) to strengthen protection.

[5] https://www.cad.gov.hk/english/paragliding.html

(2) According to the HKPA Operations Manual (Version 1 Feb 2022), Section 8.1 Mandatory Safety Equipment states that “All pilots and passengers must fly with a helmet certified to either EN966 (air sports), EN1077 A & B, ASTM2040 or SNELL rs98 (snow sports)”.

### 1.15.2. Lifespan of the Helmet

(1) The helmet of the Pilot was manufactured in June 2015.

(2) According to the guidance of the HKPA, the helmet lifespans vary but typically range between 3 years for heavy use, to 5 years for regular use, or potentially slightly longer if the helmet remains mostly unused.

(3) It is apparent that the manufacturer of the helmet, Plusmax GmbH, was out of business and therefore could not be reached for their recommended helmet life span.

## 1.16. Tests and Research

### 1.16.1. Aging Check of Paraglider Lines

(1) An aging check of paraglider lines was carried out to determine their conditions with the assistance of the HKPA Safety Officer. The difference between the manufacturer’s line lengths and the calibrated measurement should not be greater than 10 mm.

(2) The results showed that the C lines shrunk by 20 mm.

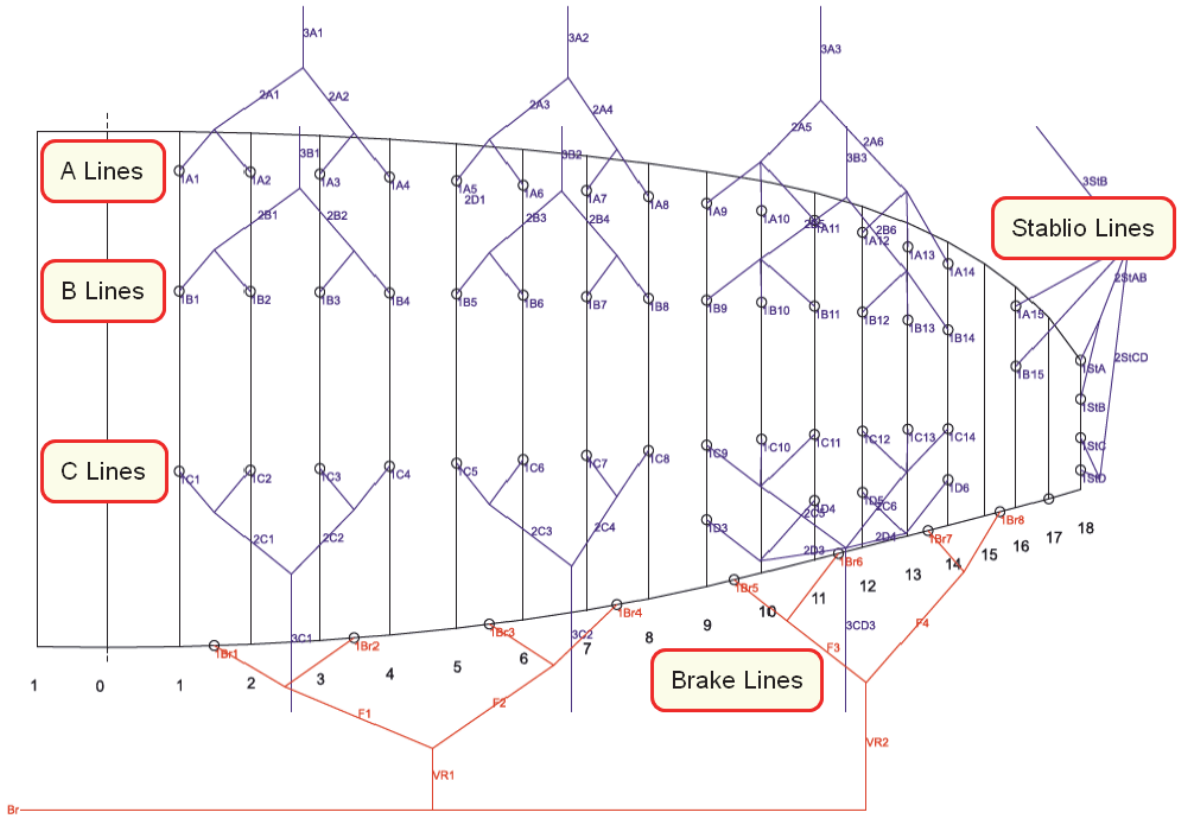


**Figure 19: Lines Aging Check at the Upper "A Gallery"**

## 1.17. Organisation, Management, System Safety

### 1.17.1. Civil Aviation Department

The CAD regulates civil aviation activities in Hong Kong. In view of the increasing popularity of paragliding activities in Hong Kong, the CAD has taken initiatives to enhance the safe operation of paragliding activities.

### 1.17.2. Hong Kong China Paragliding Association Limited

(1) The HKPA, formerly the Hong Kong Paragliding Association Limited, was established in 1990 to promote and encourage paragliding activities. It was renamed as Hong Kong China Paragliding Association Limited in May 2023.

(2) The HKPA was recognised by the Sports Federation & Olympic Committee of Hong Kong, China (SF&OC) as the National Sports Association for paragliding activities in Hong Kong. Operating under the provisions of the Societies Ordinance, the HKPA represents the interest of paraglider pilots and ensures the safe conduct of paragliding activities in Hong Kong.

### 1.17.3. International Paragliding Association (IPA)

The International Paragliding Association (IPA) was established as a non-profit organisation under Societies Ordinance in 2023. The Association promotes the sport of paragliding in Hong Kong and enhances members' knowledge in the use of paragliding equipment.

## 1.18. Additional Information

### 1.18.1. FAI Notes on Water Landing (Ditching) for Paragliding Pilots

(1) The Fédération Aéronautique Internationale, FAI - The World Air Sports Federation, is a non-governmental and non-profit making international organisation. It establishes rules for air sporting events and generally oversees air sports activities.

(2) The FAI publishes "Notes on the Risk of a Water Landing for Paragliding Pilots"[6] on their website. The conclusion of the Notes states that "*Water landings pose significant risks for paragliders, necessitating careful preparation and adherence to safety measures. By being aware of equipment dangers, understanding the types of landings, considering water factors, and implementing necessary mitigation measures, pilots can enhance their safety during water landings.*"

(3) The Notes highlight categories of the following risks:

(a) Equipment Dangers (Tangled Lines, Harness Design, and Helmet);

(b) Types of Water Landings (Controlled Ditch, Uncontrolled Ditch, and Almost Made it to Shore); and

(c) Types of Water (Landing in Still Water, Landing in a River, and Beach Landings with Waves).

(4) The Notes also provide guidance on the mitigation measures:

(a) Carrying a Hook Knife

"*Paragliders should always carry a hook knife, which can be used to cut away the glider if entangled, particularly when landing near moving*

[6] https://www.fai.org/page/notes-risk-water-landing-pg

*water. This tool enables the pilot to quickly free themselves from potential entrapment.*"

(b) Using a Suitable Lifejacket

"*When flying near bodies of water, it is recommended to wear a life jacket. However, it is essential to choose a self-inflating type with a buoyancy rating of 275n*[7]*. This higher rating is necessary to counteract the buoyancy of the harness and ensure the pilot remains afloat effectively.*"

### 1.18.2. Lifejacket – Test and Standard

(1) The German Paragliding and Hang Gliding Association (DHV[8]) is the national organisation that represents the free flying community in Germany. They conducted tests on automatically operating lifejackets for paragliding activities after a fatal accident happened in the autumn of 2008, in which a pilot landed in the water, the automatic lifejacket failed to function and the pilot was drowned before the rescue boat reached the scene.

(2) The results indicated that one of the tested 275 N lifejackets fulfilled the test requirements of keeping an unconscious pilot's head over water. 275 N means the performance level of personal flotation devices (PFDs) for adults and children for offshore use under extreme conditions.

(3) The current international standard for 275 N PFDs is ISO 12402-2:2020 which replaces EN 399 standard.

### 1.18.3. Hook Knife

A hook knife is an important safety tool in case of emergency such as entanglement. It can be used to cut the lines or risers of a paraglider if a pilot gets entangled. It is normally stored in a pocket on the harness.

## 1.19. Useful or Effective Investigation Techniques

Not applicable.

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[7] The 'N' on a life jacket stands for Newtons, which is a measure of force. For example, 10 Newtons is equivalent to 1 kilogram of buoyancy. There are currently four primary European standards for buoyancy, 50 N, 100 N, 150 N and 275 N. (Source: https://www.mrtsos.com/commercial/faqs/lifejackets/what-are-the-different-levels-of-buoyancy)

[8] The German Paragliding and Hang Gliding Association (DHV) has a technical department whose role is to certify paragliding and hang gliding equipment to the airworthiness requirements published by the Luftfahrt-Bundesamt (LBA, the civil aviation authority in Germany). Their certification procedure has for a long time been known as the 'DHV tests' which have gained acceptance around the world.

# 2. Safety Analysis

*The Safety Analysis provides a detailed discussion of the safety factors identified during the investigation, providing the evidence required to establish the findings, causes, contributing factors and the safety recommendations.*

## 2.1. Pilot Experience

(1) The Pilot accumulated about five to six flying hours in 12 flights, and about two hours of ground preparation. He was a novice at paragliding and did not hold any paragliding qualifications. According to P2, the Pilot performed at least 12 paragliding flights successfully, including eight flights at Long Ke Wan.

(2) According to the HKPA webpage, the Long Ke Wan paragliding site is suitable for HKPA 0[9] holders under instruction.

(3) The Pilot's paraglider is of EN-A designed for all pilots including pilots under all levels of training.

(4) Based on the above information, the investigation team considers that the paraglider was suitable for his experience level.

## 2.2. Canopy of the Paraglider

During the aging check of paraglider lines, it was found that the C lines shrunk by 20 mm. The wing is an EN-A glider, the amount of C lines shrinking would not highly affect the overall performance and flying characteristic of the paraglider. The paraglider is considered airworthy for the flight.

## 2.3. Mass and Balance

(1) The weight of the paraglider, the harness with equipment, and the Pilot were 4.58 kg, 6.5 kg (estimated), and 77 kg respectively.

(2) The total inflight weight was 88.08 kg which was within the standard weight range (75-95 kg) for a PHI Fantasia 22 paraglider as specified in the Fantasia Manual.

[9] HKPA 0 is a rating for novice, such as pilot under instruction or passenger of tandem flight.

## 2.4. Weather

(1) The physical setup of wind sensors at TC automatic weather station and WGL automatic weather station are 587.4 m AMSL and 82.7 m AMSL respectively. Therefore, TC and WGL measure the wind data at different levels.

(2) Since the height of the take-off area is 140.2 m AMSL, the wind data of WGL provided a more appropriate reference of wind conditions at the take-off area.

(3) The videos taken by the witnesses showed that the sky was sunny at Long Ke area and the visibility was very good. According to the observation of the witnesses in the take-off area, as shown in the windsock photo, the wind force was about 2 to 3 and the wind direction was north-easterly at the field during the take-off of the paraglider. This aligned with the wind speed and direction guidance in the HKPA website.

(4) Due to Coandă effect[10], air has tendency to stay attached to a convex surface. It was likely that the air at sea level of Long Ke beach was flowing offshore from the beach to the sea and sinking, and the air went up and changed its direction again along the Biu Tsim Kok terrain as shown in the following figure.


**Figure 20: Illustration of 040 Degrees Airflow of Long Ke Wan Paragliding Site**

[10] The Coandă effect is the tendency of a stream of fluid (air or liquid) coming from an opening to follow an adjacent flat or curved surface and to entrain fluid from the surroundings so that a region of lower pressure develops. It can also be described as the tendency of a fluid to adhere to the walls of a convex surface.

(5) By making use of the variometer and observing the breeze in trees and ripples on water, a pilot should be able to gather sufficient information about the wind direction to prepare his landing into wind.

(6) It is considered that the weather at the Long Ke Wan paragliding area was not a factor in this accident.

## 2.5. Flight Analysis

(1) The data in the Pilot's variometer could not be retrieved, but the videos taken by FD at the take-off area and the hiker at the hiking trail opposite to the take-off area almost captured most of the flight made by the Pilot. It could be observed that the paraglider was flown under control by the Pilot and the manoeuvres were gentle.

(2) After take-off, the Pilot made a slight left turn and then turned right to fly in the orographic lift area along the landscape towards the sea with a heading of approximately 130 degrees. The video shows the horizontal speed was high and the Pilot was flying with trim speed[11]. It was likely that the Pilot was flying with tailwind[12]. The paraglider maintained the altitude at the take-off.

(3) After flying tailwind for around 19 seconds and reaching some point, the Pilot initiated a left turn and then maintained a heading of approximately 330 degrees towards the beach. When he was about to pass the take-off field, he was approximately 30 m below it. The video showed the horizontal speed was lower than before and he was flying with trim speed. It was likely that he was flying with headwind and the paraglider kept descending.

(4) After flying headwind for around 30 seconds and reaching some point, he initiated a right turn, maintained a heading of approximately 130 degrees, and was flying tailwind again. The horizontal speed of the paraglider increased again and the paraglider kept descending.

(5) After flying tailwind for around 17 seconds and reaching some point, P2 reminded the Pilot to turn back to the beach through radio. The Pilot then initiated a left turn and maintained a heading of approximately 330 degrees again. The paraglider kept descending.

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[11] If a pilot does not touch the brakes or speed bar of a paraglider, it has a built-in flying speed with respect to the air flowing around it. This is known as the trim speed. The typical trim speed is about 35-38 km/h for most paragliders.

[12] A paraglider flies with a certain speed with respect to the surrounding air, which is called the airspeed. A paraglider also has a certain speed with respect to the ground, which is called the groundspeed. If there is no wind, the airspeed is equal to the groundspeed. With a headwind the airspeed of a paraglider is still the same, but the groundspeed decreases (airspeed minus wind speed). With a downwind (tailwind) the airspeed is still the same but the groundspeed is higher (airspeed plus wind speed).

(6) It is apparent that the Pilot did not expect the offshore wind and sinking air at sea level and his flight path would have made the landing at the beach impossible. At the end, the paraglider made a water landing some 60 meters from the beach shore.

(7) According to the videos taken by the hiker at the hiking trail opposite the take-off field, the paraglider's canopy covered the Pilot after he landed on the water. It became a critical situation as the lines and canopy could have entangled the Pilot, and he might not have been able to escape from the paraglider.

(8) Before a paraglider takes off, it is important for a pilot to do an assessment of take-off and landing conditions, including an analysis of path, weather, site, equipment, and himself, and formulate a flight plan accordingly. He should then adapt his flight plan to changing conditions, such as developing weather, and change of wind conditions and its subsequent effects on the groundspeed. This will allow him to manage risks, optimise flights for safety from launch to landing, and stay within his safety limits.

## 2.6. Water Landing (Ditching)

### 2.6.1. Flight Planning for Emergency Landing

(1) In the pre-flight planning, paraglider pilots, either flying alone or with a passenger (tandem paragliding), should review their intended flight paths, the associated risks, and the contingency plans for emergency situations, such as an unexpected water landing.

(2) When pilots fly at areas over or near water, they should take into account of the risks of a water landing in their flight plan. While they should do their best to avoid an unexpected water landing, they should also be proficient in the relevant emergency procedures.

### 2.6.2. Unexpected Landing in Moving Water for Pilot and Passenger

(1) Unexpected landing in moving water is one of the most perilous situations which can occur during paragliding flight. It poses significant dangers for paraglider pilots. The paraglider canopy will fill with water and will drag the pilot out to sea or underwater very quickly. This has the potential to be a critical emergency and the pilot must act immediately to save his life.

(2) In tandem paragliding flights over water, due consideration should be taken by the pilots for their passengers who have no or very limited knowledge in paragliding and how to deal with emergency situations such an unexpected water landing.

### 2.6.3. Emergency Actions for Water Landing

(1) Long before the occurrence of this accident, the HKPA published safety tips on emergency landing. Regarding water landing, the tips stated that:

"*It is extremely dangerous ditching with a paraglider. Pilots are almost always better served by landing in trees, before choosing to land in moving water. The pilot can easily become entangled in the paraglider or lines and drown. If a water landing is inevitable, do landing WITH the wind which gives more chances for the paraglider and lines stay away from the pilot. Remove all the buckles or cut away the webbing immediately. Swim and stay away from the paraglider.*"

(2) A literature[13] research was conducted by the investigation team on actions to be taken if a water landing is inevitable. In principle, a paraglider pilot will have to take the following actions:

(a) choose landing in an area as close to the land as possible;

(b) fully consider the process of escaping from the paraglider and harness and not getting drowned before making the landing;

(c) when approaching the water surface, the pilot should try to follow the wind direction as much as possible so that the canopy lands in front of the pilot;

(d) loosen his straps and put the hands on the buckles of the harness;

(e) have a hook knife ready;

(f) unbuckle quickly after, perhaps even before, landing;

(g) separate from the paraglider and the harness as soon as possible;

(h) If getting tangled in the paraglider and his equipment, cut himself free of lines and straps; and

(i) call for help and the emergency services.

[13] Paragliding: The Beginner's Guide, written by Bastienne Wentzel and Ed Ewing, published by Cross Country International

Touching Cloudbase : A Complete Guide to Paragliding, written by Ian Currer, published by Air Supplies Publishing

# 2.7. Survivability

## 2.7.1. Analysis of Fatal Injuries

Based on the autopsy report, the cause of death appears to be drowning.

## 2.7.2. Survival Aspects

### 2.7.2.1. Life jacket

(1) The results of the DHV lifejacket test indicated that one of the tested 275 N automatically operating lifejackets fulfilled the test requirements of keeping an unconscious pilot's head over water. The FAI "Notes on the Risk of a Water Landing for Paragliding Pilots" also points out that paraglider pilots are recommended to wear a lifejacket when flying at areas over or near water, and it is essential to choose a self-inflating type with a buoyancy rating of 275 N.

(2) After an unexpected water landing, paraglider pilots' clothing may trap air and it adversely affects the self-righting capacity of the lifejacket. In addition, the paragliding equipment they carry has significant weight. Therefore, paraglider pilots operating over water should carefully evaluate the use of a suitable automatically operating lifejacket which can provide a high level of buoyancy and is capable of turning an unconscious user into a position with the mouth and nose clear of the water. This would enhance their chances of survival in the event of an unexpected water landing, especially when they become unconscious.

### 2.7.2.2. Hook Knife

(1) The hook knife was still kept inside its container which was placed in a pocket of the external flight deck when the Pilot's equipment was examined after the accident. This indicates that he might not have attempted or was unable to pull the hook knife out for use.

(2) A hook knife should be easily accessible by a pilot. If a water landing is inevitable, a pilot should get his hook knife in hand before the landing.

## 2.7.3. Helmet

The helmet of the Pilot was certified to EN 966 standard which was acceptable to be used for paragliding. However, its lifespan was beyond the periods recommended by the HKPA.

# 3. Conclusions

## 3.1. Findings

*From the evidence available, the following findings are made with respect to this occurrence. These findings should not be read as apportioning blame or liability to any particular organisation or individual.*

(1) The Pilot did not wear a lifejacket or possess other personal buoyancy aid for the flight. [1.1 (2)]

(2) At about 1350 hrs, the Pilot was found landing short of the beach and was in the sea about 60 meters from the beach shore. [1.1 (3)]

(3) The Pilot was stranded by the lines of the paraglider. [1.1 (4)]

(4) The Pilot was a novice at paragliding and accumulated five to six hours of flying. He performed eight flights at Long Ke Wan before. (1.5)

(5) The data from TC weather station indicated that the 10-minute mean wind speeds were 17 to 18 km/h (equivalent to wind force 3, moderate) between 1340 to 1350 hrs. The wind was blowing from the north-northwest (NNW, 340 degrees). [1.7.1.4 (4)]

(6) The data from WGL weather station indicated that the 10-minute mean wind speeds were 18 to 21 km/h (equivalent to wind force 3 to 4, moderate) between 1340 to 1350 hrs. The wind was blowing from the northeast (NE, 40 degrees). [1.7.1.4 (5)]

(7) The take-off area was within the boundaries of the Long Ke Wan paragliding area as stipulated in the AIP HK published by CAD. (1.10)

(8) No flight data could be downloaded from the Pilot's variometer due to seawater ingression. (1.11.2)

(9) The cause of death as shown by the autopsy appeared to be drowning and the autopsy findings were consistent with it. There was no significant trauma that could account for the death. (1.13)

(10) The FAI provides guidance on carrying a hook knife and using a 275 N lifejacket as mitigating measures for the risks of unexpected water landing. [1.18.1 (4)]

(11) The German Paragliding and Hang Gliding Association (DHV) lifejacket test results in 2008 indicated that one of the tested 275 N lifejackets fulfilled the test requirements of keeping an unconscious pilot's head over water. [1.18.2 (2)]

(12) The subject EN-A paraglider was suitable for the Pilot's experience level. [2.1 (4)]

(13) The C lines shrunk by 20 mm but this would not highly affect the overall performance and flying characteristic of the paraglider. The paraglider is considered to be airworthy to the flight. (2.2)

(14) The total inflight weight was within the standard weight range for a PHI Fantasia 22 paraglider as specified in the Fantasia Manual. [2.3 (2)]

(15) It is considered that the weather at the Long Ke Wan paragliding area was not a factor in this accident. [2.4 (6)]

(16) It is apparent that the Pilot did not expect the offshore wind and sinking air at sea level and his flight path would have made the landing at the beach impossible. At the end, the paraglider made a water landing some 60 meters from the beach shore. [2.5 (6)]

(17) According to the videos taken by the witness at the hiking trail opposite the take-off field, the paraglider's canopy covered the Pilot after he landed on the water. It became a critical situation as the lines and canopy could have entangled the Pilot, and he might not have been able to escape from the paraglider. [2.5 (7)]

(18) It is important for a pilot to formulate a flight plan, adapt his flight plan to changing conditions, so as to manage risks, optimise flights for safety from launch to landing, and stay within his safety limits. [2.5 (8)]

(19) In tandem paragliding flights over water, due consideration should be taken by the pilots for their passengers who have no or very limited knowledge in paragliding and how to deal with emergency situations such an unexpected water landing. [2.6.2 (2)]

(20) Paraglider pilots operating over water should carefully evaluate the use of a suitable automatically operating lifejacket which can provide a high level of buoyancy and is capable of turning an unconscious user into a position with the mouth and nose clear of the water. This would enhance their chances of survival in the event of an unexpected water landing, especially when they become unconscious. [2.7.2.1 (2)]

(21) The hook knife was still kept inside its container which was placed in a pocket of the external flight deck. This indicates that the Pilot might not have attempted or was unable to pull the hook knife out for use. [2.7.2.2 (1)]

(22) The helmet of the Pilot was certified to EN 966 standard which was acceptable to be used for paragliding. However, its lifespan was beyond the periods recommended by the HKPA. (2.7.3)

## 3.2. Cause

This fatal accident was probably caused by the paraglider landing short of the beach, resulting in a water landing and tragic drowning of the Pilot. [3.1 (2) and 3.1 (9)]

# 4. AAIA Safety Recommendation Report

(1) When a safety issue is identified at any stage of the investigation, AAIA issues Safety Recommendation Report to the relevant organisation(s) to recommend preventative action that has to be taken promptly to enhance aviation safety.

(2) During the investigation, AAIA identified safety issues regarding unexpected water landing of paragliders that should be addressed in a timely manner. On 22 May 2024, AAIA issued Safety Recommendation Report SRR-2024-03, which contained Safety Recommendations SR-2024-03 and SR-2024-04, to the HKPA and the IPA.

## 4.1. Safety Recommendation SR-2024-03

It is recommended that the Hong Kong China Paragliding Association and the International Paragliding Association remind all participants of paragliding in Hong Kong, who operate over water, the importance of being proficient in the emergency procedures of unexpected water landing, including making the hook knife easily accessible so that they can promptly cut lines or risers if they get entangled.

**Safety Recommendation Owner: The Hong Kong China Paragliding Association and the International Paragliding Association**

## 4.2. Safety Recommendation SR-2024-04

It is recommended that the Hong Kong China Paragliding Association and the International Paragliding Association advise all participants of paragliding in Hong Kong, who operate flights over water, to wear an automatically operating lifejacket which provides a high level of buoyancy and is capable of turning an unconscious user into a position with the mouth and nose clear of the water in case of a water landing.

**Safety Recommendation Owner: The Hong Kong China Paragliding Association and the International Paragliding Association**

# 5. Implementation of AAIA Safety Recommendations

## 5.1. Safety Actions on Safety Recommendations SR-2024-03 and SR-2024-04

### 5.1.1. Safety Actions Taken by the HKPA

(1) The HKPA added the following statement in their Site Guides webpages for each paragliding sites:

"*Pilots should be proficient in the emergency procedures of ditching (landing in the water) before take-off. Please refer to the emergency landing webpage for further information.*"

(2) On their "Paragliding Minimum Equipment" webpage, an easily accessible hook knife is in the list of equipment which should be considered for flying.

(3) The HKPA added the following information in their Site Guides webpage for Long Ke Wan as follows:

(a) Additional safety information, such as a flight contour alert line and "action box" lines for student pilot under HKPA 1 level training, have been added in the Long Ke Wan paragliding site photo.

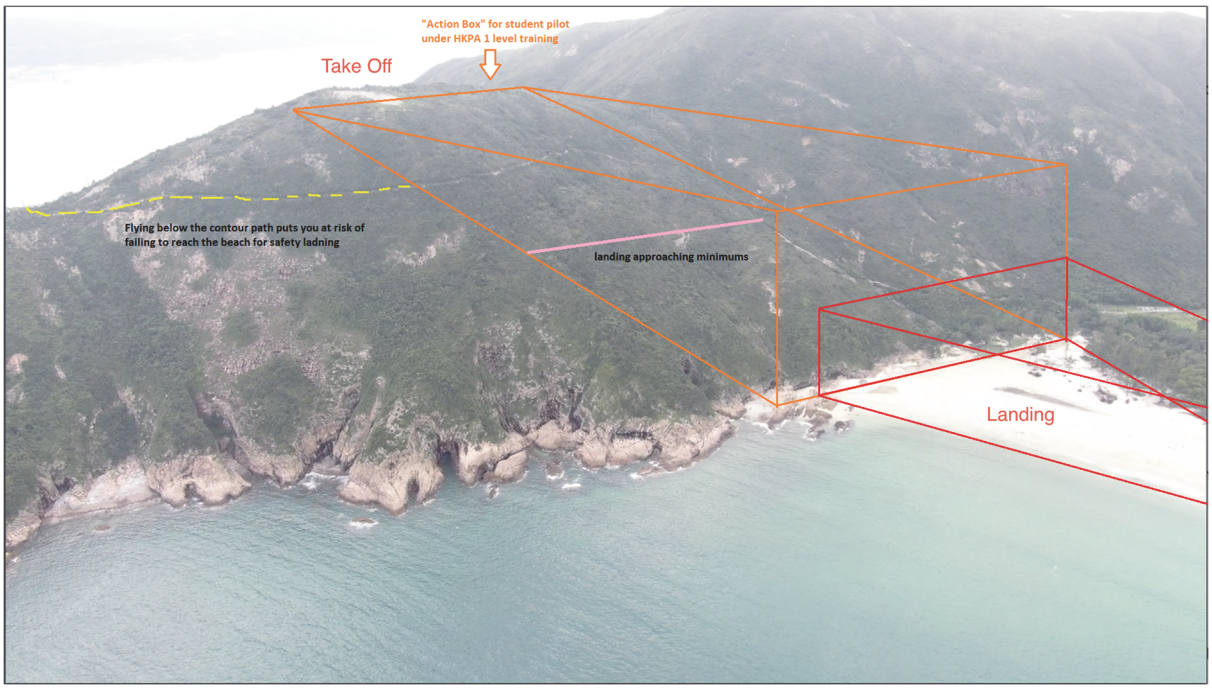


**Figure 21: Additional Safety Information on Long Ke Wan Paragliding Site**

(b) Under the “Hazards” heading of this webpage, the following statement has been added:

“*Pilots should consider wearing a personal flotation device meeting the EN 399 standard when flying over water.*”

### 5.1.2. Reply from the IPA

At the time when this report was finalized, no reply had been received from the IPA.

# 6. Additional Safety Recommendations

## 6.1. Safety Recommendation SR-2024-10

It is recommended that the Hong Kong China Paragliding Association and the International Paragliding Association re-emphasize the crucial importance for a pilot to formulate a flight plan, adapt his flight plan to changing conditions, so as to manage risks, optimise flights for safety from launch to landing, and stay within his safety limits. [3.1 (18)]

**Safety Recommendation Owner: The Hong Kong China Paragliding Association and the International Paragliding Association**

# 7. General Details

## 7.1. Occurrence Details

| | |
|---|---|
| Date and time: | 15 February 2023 at 1345 hrs |
| Occurrence category: | Accident |
| Primary occurrence type: | Loss of Lifting Conditions En-route (LOLI) |
| Location: | Long Ke Wan, Sai Kung, Hong Kong |
| Position: | 22° 22' 19.9" N,  114° 22' 32.5" E |

## 7.2. Pilot Details

| | |
|---|---|
| Licence details: | Nil |
| Flying experience: | Five to six hours |

## 7.3. Aircraft Details

| | | |
|---|---|---|
| Manufacturer and model: | PHI Fantasia 22 Paraglider | |
| Serial number: | 004-147-G | |
| Year of Manufacture: | 2021 | |
| Type of Operation: | Private | |
| Departure: | Biu Tsim Kok, Sai Kung, Hong Kong | |
| Destination: | Long Ke Wan Beach, Sai Kung, Hong Kong | |
| Persons on board: | Crew – 1 | Passengers – 0 |
| Fatalities: | 1 | |
| Injuries: | 0 | |
| Aircraft damage: | Nil | |

# 8. Abbreviations

| | |
|---|---|
| AAIA | Air Accident Investigation Authority |
| AGL | Above ground level |
| AIP HK | Aeronautical Information Publication Hong Kong |
| AMSL | Above Mean Sea Level |
| ASTM | American Society for Testing and Materials |
| BHPA | British Hang Gliding & Paragliding Association |
| CAD | Civil Aviation Department |
| Cap. 448B | Hong Kong Civil Aviation (Investigation of Accidents) Regulations |
| CAPPI | Constant Altitude Plan Position Indicator |
| DHV | German Paragliding and Hang Gliding Association |
| EN | European Norm |
| FAI | Fédération Aéronautique Internationale |
| GPS | Global Positioning System |
| HKO | Hong Kong Observatory |
| HKPA | Hong Kong China Paragliding Association Limited |
| HKPF | Hong Kong Police Force |
| hrs | Hours |
| km | Kilometre |
| kt | Knot |
| m | Metre |
| MHz | Mega Hertz |
| min | Minute |
| PFD | Personal flotation device |
| SF&OC | Sports Federation & Olympic Committee of Hong Kong, China |
| UTC | Coordinated Universal Time |

# 9. Table of Figures, Photos, Tables