

بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ



## ACCIDENT INVESTIGATION COORDINATING COMMITTEE

Republic of Maldives

SAFETY INVESTIGATION REPORT 2023/02

# FINAL REPORT

**AIRCRAFT IMPACTED A SWELL DURING TAKE-OFF**

**ISLAND AVIATION SERVICES LIMITED**

**VIKING AIR DHC-6-300 TWIN OTTER, 8Q-ISI**

**BERENNIA KOTTEFARU WATER AERODROME**

**KOTTEFARU ISLAND, RAA ATOLL, MALDIVES**

**05 June 2023**

## INTRODUCTION

Maldives is a signatory to the Convention on International Civil Aviation (Chicago, 1944) which established the principles and arrangements for the safe and orderly development of international air transport. Article 26 of the Convention obligates Signatories to investigate accidents and serious incidents to civil aircraft occurring in their State.

This report is based upon the investigation carried out by the Accident Investigation Coordinating Committee (AICC) in accordance with Annex 13 to the Convention, the Civil Aviation Act 2/2001 and the Civil Aviation Regulations. The sole objective of this investigation is to prevent accidents and serious incidents. It is not the purpose of this investigation to apportion blame or liability.

In investigating this serious incident, AICC was assisted by Island Aviation Services Limited (IASL).

All timings in this report are local time unless otherwise stated. Time difference between local and UTC is +5 hrs.

The report is released on 30 October 2024.

Mr. Abdul Razzak Idris

**Chairperson**

**Accident Investigation Coordinating Committee**



## TABLE OF CONTENTS

1.	FACTUAL INFORMATION .....	8
1.1	History of Flight.....	8
1.1.1	Background .....	8
1.2	Injuries to Persons.....	10
1.3	Damage to aircraft.....	10
1.5	Personnel Information .....	12
1.5.1	Pilot-In-Command.....	12
1.5.2	Co-pilot.....	12
1.5.3	Cabin Crew .....	13
1.6	Aircraft Information.....	13
1.6.1	General Information.....	14
1.6.2	General Information.....	14
1.6.3	Recent maintenance.....	16
1.6.4	Flight Controls .....	16
1.6.5	Fuel.....	16
1.6.6	Defects .....	17
1.6.7	Aircraft Load.....	17
1.7	Meteorological information .....	17
1.8	Aids to Navigation.....	18
1.9	Communications.....	18
1.10	Aerodrome information.....	18
1.11	Flight Recorders .....	19
1.12	Wreckage and impact information.....	19
1.12.1	Wreckage Condition .....	19
1.12.2	Salvage operations .....	20
1.13	Medical and pathological information.....	20
1.14	Fire.....	20
1.15	Survival Aspect.....	20
1.16	Tests and research.....	20
1.17	Organizational and Management Information .....	20
1.18	Additional Information .....	20

---

2.	ANALYSIS .....	21
2.1	Prevailing Weather Conditions at KTH .....	21
2.2	Aircraft Handling during take-off attempt .....	21
2.3	Crew Qualifications and Experience .....	22
3.	CONCLUSIONS .....	23
3.1	Findings.....	23
3.2	Causes / Contributing Factors .....	23
3.3	Safety Recommendations .....	24
3.3.1	To the Operator .....	24
4.	APPENDICES .....	25
4.1	Mass and Balance report .....	25
4.2	Aircraft Technical log .....	26
1.3	Passenger and cargo Manifest .....	27
1.4	Loadsheet .....	28
4.4	Photos of aircraft damages.....	29

## LIST OF ABBREVIATIONS

AICC	Accident Investigation Coordinating Committee
AMO	Aircraft Maintenance Organisation
ASC	Air Safety Circular
ATPL-A	Air Transport Pilot License - Aeroplane
ATL	Aircraft Technical Log
CAMO	Continuous Airworthiness Management Organisation
CCL	Cabin Crew License
CPL-A	Commercial Pilot License - Aeroplane
CVR	Cockpit Voice Recorder
DHC-6-300	Viking Air DHC-6, series 300 aircraft
EMMA	Equalized Maintenance for Maximum Availability
FDR	Flight Data Recorder
FO	First Officer
FTL	Flight Time Limitations
IASL	Island Aviation Services Limited
lbs.	Pounds
KTH	Operator designated three letter code for Brennia Kottefaru water aerodrome
LT	Local Time
LH	Left Hand
MCAA	Maldives Civil Aviation Authority
MCAR	Maldives Civil Aviation Regulations
MLE	IATA designated three letter code for Velana International Airport
MMS	Maldives Meteorological Service
MSN	Manufacturer Serial Number

MTOM	Maximum Take-Off Mass
OPC	Operator Proficiency Check
PF	Pilot Flying
PIC	Pilot-in-Command
PM	Pilot Monitoring
p/n	Part Number
PWC	Pratt & Whitney Canada
TAC	Total Air Cycles
TAT	Total Air Time
VFR	Visual Flight Rules
VHF	Very High Frequency
UTC	Coordinated Universal Time

## **SYNOPSIS**

On 5 June 2023, at about 15:20 hrs (10:20 UTC), a Viking Air DHC-6-300 floatplane (Registration Markings 8Q-ISI), while taking-off from Brennia Kottefaru water aerodrome (KTH) (Kottefaru, Raa Atoll), impacted a swell and was hurled into the air. The aircraft went into a left bank and dropped outside the reef landing on the LH float and settled upright. The LH float and the LH wingtip were found damaged.

There were no reports of any injuries to any of the passengers or crew members.

The serious incident was reported to the AICC at 17:06 hours, and an investigation was initiated on the same day.

## 1. FACTUAL INFORMATION

Aircraft Legal Owner:	Island Aviation Services Ltd.
Registered Owner:	Island Aviation Services Ltd.
Aircraft Type:	DHC-6-300 (Floatplane)
Operator:	Island Aviation Services Ltd. (Air Operator Certificate No.007)
Registration:	8Q-ISI
Location of Occurrence:	Brennia Kottefaru water aerodrome 5° 30' 31.66"N; 73° 2' 6.43"E
Date and Time:	5 June 2023 at 15:20 hours
Number of Persons on board:	16

### 1.1 History of Flight

#### 1.1.1 Background

On 05 June 2023, flight Q2-2401 departed MLE to Brennia Kottefaru water aerodrome (KTH) and landed at KTH at 11:40 hrs. After the passengers disembarked and baggage was offloaded, the aircraft was taxied and tied to the buoy, in the lagoon. The crew then disembarked to the resort and was provided with crew rest facilities.

The return flight to MLE was scheduled to depart in the afternoon at 15:30 hrs, and a Flight Dispatch Release was issued. There were 3 crew and 13 passengers. In preparation for the flight, the crew boarded the aircraft on the buoy and taxied the aircraft to the platform, located within the lagoon, where baggage was loaded, and passengers boarded. The FO was Pilot Flying (PF) and the PIC was Pilot Monitoring (PM).

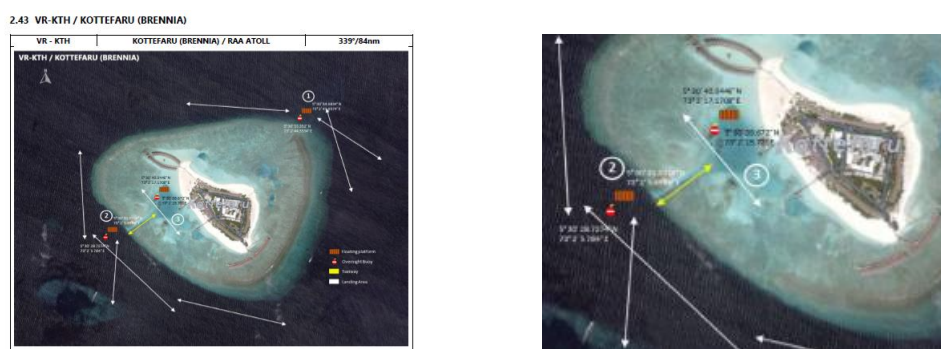


Fig. 1(a) and 1(b): Kottefaru aerodrome chart captured from IAS Ops Manual Part C, Chapter 2, Page 2-45, Rev 25 Dec 2023





Fig. 2: Approximate take-off- line, flight path and landing location

The PF attempted to take-off in a westerly direction (See Fig 2 above) from within the house reef, while a left cross wind was present. The water condition was found to be rough with heavy winds and high swells. The crew initially planned to take-off parallel to the swells but was unable to do so due to the rough water conditions, and due to swells approaching from multiple directions. Both crew members discussed regarding the best take-off line, and the selected take-off line was confirmed by the PIC, which was a line regularly used for take-off, which required initiating the take-off run near the northern side of the service jetty, and taking -off towards north west, past the arrival jetty. The PF stated that the take-off was conducted as they do for any rough water conditions by holding the controls to prevent from hitting the swells. PIC stated that the attempted take-off from within the house reef was to avoid the rough waters outside the lagoon area.

During the take-off run, just past the fairway (boat entrance) of the reef, a high swell hit the aircraft and the aircraft was hurled around 10 feet into the air.

When the aircraft hit the swell, the aircraft speed was below take-off speed and the aircraft started to bank left and drop. Subsequently the PF lost control of the aircraft. The PIC stated that he took over the controls at that moment, and in order to correct the situation, the right rudder was pushed, ailerons were engaged, and the right engine power was reduced to idle - without shutting off the fuel. Despite the corrective actions by the PIC, the aircraft banked to the left and came down outside the lagoon, about 100 meters away from the line of take-off, where extremely rough waters existed. The aircraft came down on the left float first and then came to a stop.

After the recovery from the initial attempt to take-off, a second take-off attempt was planned with the PIC as PF. However, due to the high swells and considering the weight of the aircraft, the take-off was discontinued.

After the take-off was rejected, crew noticed the illuminated 'Doors Unlocked' caution light and instructed the cabin crew to check the doors. The cabin crew then exited the aircraft cabin onto the left float and re-adjusted the aft baggage compartment door handle, which resulted in the caution door light to turn off.

While standing on the left float the cabin crew noticed several damages including detachment of the passenger stairs from the (aft) float attachment point and damages on the front of the left float. Cabin crew reported these observations to the crew members, and the FO then stepped outside onto the left float to confirm the damage reported, and the crew then decided to return to the platform. Further, the cabin crew reported observing damage to the left wing tip. On returning to the platform, the passengers disembarked normally, and the crew declared the aircraft as AOG and reported the serious incident.

## 1.2 Injuries to Persons

Injuries	Flight Crew	Cabin Crew	Passengers	Total on board	Others
Fatal	0	0	0	0	0
Serious	0	0	0	0	0
Minor	0	0	0	0	0
Nil	2	1	13	16	0
Total	2	1	13	16	0

## 1.3 Damage to aircraft

Damages were found on the LH floats as detailed below:

1. The LH inboard AFT stiffener (p/n: 13A01427-022) of number 6 bulkhead found cracked.
2. The LH inboard AFT stiffener (p/n: 13A01427-010) of number 6 bulkhead found cracked.
3. The channel (PANEL FT. Spreader bar Support RH, p/n: 13A01160-003) that houses the left float FWD attachment fitting found cracked.
4. The channel (PANEL AFT. Spreader bar Support LH, p/n: 13A01160-004) that houses the left float AFT attachment fitting found cracked.

5. Left wing tip fairing (p/n: C6W1004-1) found damaged.
6. Left wing outboard trailing edge skin found dented.
7. Left float number 6 bulkhead body panel (p/n: 13A01150-052) found torn.
8. Leading edge skin of the left wing outboard fore flap dented beyond allowable limits.
9. Left float right side panel (p/n: 1011235) of number 8 bulkhead found torn.
10. Left float top skin found dented and damaged at number 6 bulkhead.

## 1.4 Other Damage

No other damage was reported.

## 1.5 Personnel Information

### 1.5.1 Pilot-In-Command

Age:	39 years
Nationality:	Maldives
Gender:	Male
Type of License:	ATPL-A
License issued on:	12 October 2022
License expires on:	11 October 2027
Type of medical:	Class I (One) medical certificate
Medical issued on:	27 August 2022
Medical expires on:	26 August 2023
Types flown:	DHC6
Hrs. on type:	5156:00 Hrs
Ratings:	DHC6/IR
Last Proficiency check:	5 February 2023 (OPC-2)
Total hours as PIC:	2549:00 Hrs
Total flight time:	5464:00 Hrs
Last 90 days:	122:30 Hrs
Last 28 days:	110:20 Hrs
Last 24 hours:	01:05 Hrs + 3:20 hrs
Previous rest period:	2 - 3 June 2023

### 1.5.2 Co-pilot

Age:	30 Years
Nationality:	Maldivian
Gender:	Male
Type of License:	CPL-A
License issued on:	13 December 2022
License expires on:	12 December 2027

Type of medical:	Class I (One) medical certificate
Medical issued on:	17 July 2022
Medical expires on:	16 July 2023
Types flown:	DHC6
Hrs. on type:	359:00 Hrs
Ratings:	DHC6
Last Proficiency check:	27 April 2023 (OPC-2)
Total flight time:	559:00 Hrs
Last 90 days:	161:20 hrs
Last 28 days:	60:05 Hrs
Last 24 hours:	01:05 Hrs + 1:40 hrs
Previous rest period:	1 - 2 June 2023

### 1.5.3 Cabin Crew

Age:	23 Years
Nationality:	Maldives
Gender:	Male
Type of License:	CCL
License issued on:	3 February 2019
License expires on:	2 February 2024
Type of medical:	Class III
Medical issued on:	12 December 2022
Medical expires on:	11 December 2024
Previous rest period:	2 - 3 June 2023

## 1.6 Aircraft Information

DHC-6-300 aircraft bearing MSN 411 was built in 1974 by de Havilland Inc. The aircraft was registered in the Maldives for the first time on 16 December 2017 and ever since it has been in operation with IASL.

### 1.6.1 General Information - Airframe

The DHC-6-300 “Twin Otter” is an unpressurised, all-metal, high wing aircraft powered by two Pratt & Whitney PT6A-27 engines driving three bladed, reversible-pitch, full feathering Hartzell propellers. The aircraft is designed for seating two pilots, side by side with dual controls, standard and optional flight instrumentation.

Manufacturer	Viking Air (De Havilland Inc.)
Model	DHC-6-300 series
Manufacturer’s serial number	411
Year of Manufacture	1974
Nationality	8Q (Republic of Maldives)
Registration Markings	8Q-ISI
Certificate of Registration	Valid – since initial issue on 16 Dec 2021
Owner	IASL
Operator	IASL
Validity of Certificate of Airworthiness	Valid since initial issue on 18 December 2017 (Normal category)
Airworthiness Review Certificate	Issued by MCAA on 24 December 2020. (Second extension issued by the Operator: 22 December 2022)  Valid until 23 December 2023
Total Flying Hours since manufacture	40,403:55 Hrs (40,402:30+1:25)
Total Landings since manufacture	69,970 landings (69,967+3)
Total Flying Hours since overhaul	40,403:53 Hrs
Last periodic inspection	Routine A&E Inspection
Last inspection carried out at TAT/TAC	TAT 40,391:41 / TAC: 69,947
Total Flying Hours since last periodic inspection	12:12 Hrs

### 1.6.2 General Information – Engine and Propellers

<b>Right Engine (Gas Generator)</b>	
Right engine manufacturer	PWC
Year of manufacture	2007
Model	PT6A-27
Serial number	PCE-51241

Total Hrs. since new	16036:27
Last overhaul date	18 Jan 2022
Hrs. since overhaul	1529:24 hrs
Last check carried out	Overhaul
Hrs. since last check	1529:24
<b>Right Engine (Power section)</b>	
Right engine manufacturer	PWC
Year of manufacture	2007
Model	PT6A-27
Serial number	PCE-51241-100
Last overhaul date	18 Jan 2022
Hrs. since overhaul	1529:24
Last check carried out	Overhaul
Hrs. since last check	1529:24
<b>Left Engine (Gas Generator)</b>	
Left engine manufacturer	PWC
Year of manufacture	1977
Model	PT6A-27
Serial number	PCE-50503
Total hrs. since new	14032:12
Last overhaul date	08 Oct 2019
Hrs. since overhaul	2984:07
Last check carried out	Overhaul
Hrs. since last check	2984:07
<b>Left Engine (Power section)</b>	
Left engine manufacturer	PWC
Year of manufacture	1977
Model	PT6A-27
Serial number	PCE-50503
Last overhaul date	08 Oct 2019
Hrs. since overhaul	2984:07
Last check carried out	Overhaul
Hrs. since last check	2984:07

Right Propeller	
Manufacturer	Hartzell
Year of manufacture	UNK
Model	HC-B3TN-3DY
Serial number	BUA 34792
Last overhaul date	20-Oct-2021
Hrs. since last overhaul	1601:36
Last check carried out	Overhaul
Left Propeller	
Manufacturer	Hartzell
Year of manufacture	UNK
Model	HC-B3TN-3DY
Serial number	BUA 34522
Last overhaul date	24-Jun-2020
Hrs. since last overhaul	1465:52
Last check carried out	Overhaul

\*Engine / Propellor details including hours are stated as provided by the Operator and have not been independently verified.

### 1.6.3 Recent maintenance

Daily inspection on the aircraft was carried out at 09:30 hrs (04:30 hrs UTC) at Operator's main base at MLE on the day of the serious incident.

### 1.6.4 Flight Controls

The flight controls consist of conventional, manually actuated primary flight controls operated through cables, pulleys, and mechanical linkages. Rudder and elevator trim are manually controlled and mechanically actuated; aileron trim is electrically actuated. Secondary flight controls consist of hydraulically actuated wing flaps.

### 1.6.5 Fuel

Jet A-1 fuel was used on the aircraft engines. Prior to departure of flight number Q2-2401 the aircraft was refueled at the main base at MLE. The mass of fuel uplift, along with other fuel masses recorded on the ATL sheet are detailed below:



Departure from MLE:	1300 lbs.
At T/O from MLE:	1250 lbs.
Arrival at KTH:	870 lbs.
Uplift from KTH:	Nil
Departure from KTH:	870 lbs.
At T/O from KTH:	820 lbs.

### 1.6.6 Defects

No defects were reported by the crew during preflight checks carried out or during operation of the flight from MLE to the resort. Aircraft had no open Deferred Defects either.

### 1.6.7 Aircraft Load

The aircraft departed KTH with a take-off mass of 12,240 lbs. The estimated landing mass at arrival in MLE is 11,860 lbs.

## 1.7 Meteorological information

There was no recorded weather data available at KTH water aerodrome. The nearest recorded data was available from Baa Dharavandhoo automatic weather station (AWS), which is approximately 40.4 km (22 nm) south of KTH water aerodrome, and weather data from a second location was also available, from Raa Alifushi, located 27.9 nm (51.7 km) north of KTH. Available data for both the locations are tabulated below:

Wind	Wind	Gust wind	Gust wind	
Date/Time	direction	Speed (knots)	direction	Speed (mph)

Baa Dharavandhoo:

5 Jun 23 / 15:20	262°	10.6 knots	260°	14.4 knots
------------------	------	------------	------	------------

Raa Alifushi:

5 Jun 23 / 15:20	283°	10.7 knots	280°	13.0 knots
------------------	------	------------	------	------------

There was no weather information available from Ifuru Airport which is located 11.9nm (22km) north of the KTH.

In the dispatch flight release document, the high tide was noted at 0.98m at 14:21 hrs.

## 1.8 Aids to Navigation

There were no navigation aids available at the water aerodrome. The aircraft was operating under VFR.

## 1.9 Communications

There were no communication issues or defects recorded. Both VHF communication systems were operating normally.

## 1.10 Aerodrome information

As per the water aerodrome license, KTH is equipped with one floating platform. KTH is an uncontrolled aerodrome.

Departure Aerodrome: Brennia Kottefaru (VR-KTH)

Reference Floating – 5° 30' 39.0" N / 73°02'15.0" E

Facilities: Floating platforms: 01

The Aerodrome License for Brennia Kottefaru (VR-KTH) bearing license number AP/O/160, was issued to Island Aviation Services Ltd. on 30 March 2021.

The Water Aerodrome Chart in the Operators OM Part C, Initial issue, revision 5, dated 31 October 2021 under the Route Manual for VFR Floatplane shows 1 floating platform, 1 overnight buoy and 3 marker buoys. No landing areas inside the lagoon were marked, although it is stated that other areas can be used. Under caution it is stated that "Landings and take-offs shall be done by the PIC if the FO is below 1500 hrs on type".



VR-KTH / KOTTEFARU (BRENNIA)			
VR-KTH	KOTTEFARU (BRENNIA) – RAA ATOLL	339°/84NM	
REFERENCE	N 5°30'65.0" E 73°02'24.0"		
DESCRIPTION	NORMAL OPS ONLY WITHIN THE DESIGNATED LANDING/TAKE-OFF AREA MARKED IN THIS CHART.		
FACILITIES	1 FLOATING PLATFORM 1 MOORING BUOY	MAX A/C DAY S/D MAX A/C NIGHT S/D DINGHY	02 01 YES
FUEL	NO		
CATEGORY	C	TIDE	-20 MIN
OP MINIMA	VFR		
MSA	500 FT AGL – ALL QUADRANTS WITHIN 5NM		
COMM/NAV	ADVISORY 128.8 / MLE VOR 114.7 – 12NM LISTEN & WATCH DRV TWR ON 118.25 MHZ		
ALTERNATES	KUDAFUSHI (VR-KUF) 270°/3.59 NM – FUEL: NO MEEDHUPPARU (VR-MEP) 228°/4.8 NM – FUEL: YES		
CAUTION	<ul style="list-style-type: none"> <li>Expect large swells and rough water condition / Do not flyover the resort island</li> <li>Exercise extra caution during take-off and landings. Landings and take-offs shall be done by PIC if the FO is below 1500hrs on type.</li> </ul>		
REMARKS	TAKE-OFF AND LANDING AREA ILLUSTRATED ARE FOR FAVORABLE CONDITIONS, OTHER AREAS CAN BE USED. PILOTS ARE ADVISED TO USE GOOD JUDGEMENT.		
RESORT INFORMATION	Phone: 6580022		

## 1.11 Flight Recorders

No flight data recorder (FDR) or Cockpit Voice Recorder (CVR) was installed on the aircraft, and they are not required under MCARs.

## 1.12 Wreckage and impact information

### 1.12.1 Wreckage Condition

Not applicable

### **1.12.2 Salvage operations**

There was no salvage required.

### **1.13 Medical and pathological information**

There were no records of any crew member having any pre-existing medical conditions that may have affected their performance. Further, all three crew members were subjected to drug tests and the results were reported negative.

### **1.14 Fire**

There were no fires or fire alarms reported.

### **1.15 Survival Aspect**

Life jackets were on board. However, it was not necessary to use any, as the aircraft was able to taxi back to the dock on its own. The passengers disembarked normally.

### **1.16 Tests and research**

None carried out.

### **1.17 Organizational and Management Information**

Island Aviation Services is a MCAA approved Air Operator Certificate holder. The company is permitted to provide both domestic and international passenger transport services. At the time of the serious incident, the IAS fleet consisted of Airbus A320, ATR 72-212A, ATR 42-500, DeHavilland DHC-8 and Viking Air DHC-6 aircraft. IAS holds AOC 007 approval, CAMO approval no. MV. CAMO.001 and AMO Approval no. MV.145.031 issued by the MCAA.

### **1.18 Additional Information**

None

## 2. ANALYSIS

The investigation looked into the following:

- a. Prevailing weather conditions at the departing water aerodrome.
- b. Aircraft handling during take-off attempt.
- c. Crew qualifications and experience.
- d. Operator's OM and organizational management.

The objective of the analysis is to identify the root cause of the occurrence and make recommendations, which, when implemented, will minimize recurrence of similar serious incidents in the future.

### 2.1 Prevailing Weather Conditions at KTH

At the time of the serious incident strong westerly winds were present at the aerodrome. The sea was rough with high waves generated in multi directions.

The demonstrated maximum cross wind speed for take-off published by the aircraft manufacturer is 17 knots. Relatively strong westerly winds and rough sea conditions prevailed in the take-off area - both inside the lagoon, and elsewhere on the western side of the island. The highest tide for the day was noted at 14:21 hrs, just an hour prior to the serious incident. Despite strong winds and high waves, the visibility in the area was good and no rain was reported.

### 2.2 Aircraft Handling during take-off attempt

The crew attempted to take off inside the lagoon. This decision was made considering the water conditions which appeared to be rougher outside the reef.

The first take-off attempt was in a north-westerly direction, ensuring minimal crosswind and initiated near the service jetty, which is the normal take-off line taken at KTH.

Crew members stated that they noticed the swells approaching in all directions to the aircraft take-off path but considered the waves not significant enough to jeopardise the take-off. Based on the judgement the crew continued the take-off run and before reaching the take-off speed, the aircraft hit a swell and the aircraft was hurled into the air. The PF lost control of the aircraft and the aircraft went into a left bank and

started to drop. At this point the PIC took over the controls and tried to correct the situation. Despite the actions of the PIC, the aircraft banked to the left and dropped on to the water outside the lagoon.

Not being aware of damages that the aircraft sustained during the impact, a second take-off attempt was made outside the lagoon with the PIC as PF. This is an unsheltered area, and high swells are always present during westerly winds. Soon after this second attempt to take-off, the crew decided to discontinue the take-off considering the high swells and the weight of the aircraft.

After the take-off was rejected, crew noticed the illuminated 'Doors Unlocked' caution light and instructed the cabin crew to check the doors and while checking the aft baggage door the cabin crew observed some of the damages and reported to the cockpit crew.

### **2.3 Crew Qualifications and Experience**

Both crew members were appropriately qualified and held valid licenses for the operation of the flight. The PIC had over 5000 hrs on type and holds an ATPL. The Pilot Flying was the FO, who possess a CPL-A with about 359 flight hours on type and had limited experience.

Under the airline operators existing procedures specified in OM-C, FO's with less than 1500 hrs on type are not permitted to land or take-off from category C aerodromes.

### **2.4 Operator's OM and organizational management**

The Operator's OM Part B, Chapter 2, Normal Procedures 2.1.7 Ocean / Saltwater Operations Considerations, item 8 states that "The primary objective during rough water conditions is safe operation of the aircraft and the prevention of cumulative wear and fatigue to the airframe. Landing in an area of smoother or more protected water that requires a longer taxi to the platform takes absolute precedence over landing as close to the platform as possible in unacceptably rough water conditions."

Based on the crew interview it was noted that the crew were aware that sheltered waters were available on the eastern side of the island that is more safer for a take-off but opted to take-off from inside the lagoon to avoid 15 or more minutes of taxiing in the choppy waters.

### **3. CONCLUSIONS**

#### **3.1 Findings**

AICC identifies the following as the findings.

1. Both flight crew members held valid licenses and were appropriately qualified.
2. Medical fitness, FTL or fatigue of the crew were not factors in this serious incident.
3. There were no evidence of airframe or system failures prior to the serious incident.
4. FO was the PF who initiated the take-off on the serious incident sector.
5. The FO had limited experience operating in and out of Category C aerodromes, and do not possess the required 1500 hrs on type for conducting take-offs or landings at Category C aerodromes.
6. High swells and rough water conditions existed at the take-off area.
7. The selected take-off line appears to be the most suitable take-off line, although it was not marked in the route manual.
8. The aircraft hit a wave and got hurled about 10 feet up into the air and went into a left bank and dropped on to the water outside the lagoon.
9. PIC took over the controls when the aircraft started dropping.
10. After the recovery from the first take-off attempt the crew attempted for a second take-off.
11. The crew did not carry out any inspection of the aircraft after the heavy impact, before attempting the second take-off.
12. The attempted second take-off was discontinued due to the high swells and considering the weight of the aircraft.
13. The requirement to fix a wind direction indicator as per ASC 14-2 was not met and no wind direction indicator or wind cone was available in the aerodrome.

#### **3.2 Causes / Contributing Factors**

The AICC determines that the probable causes of the serious incident were:

1. The PIC delegated the duties of the PF to the FO to perform take-off, although the FO did not meet the company requirements for taking-off from a category C water aerodrome.
2. High swells and rough water conditions prevailed in the take-off area.
3. The aircraft hit a wave and was hurled into the air unexpectedly before reaching take-off speed.

### **3.3 Safety Recommendations**

#### **3.3.1 To the Operator**

Considering the safety actions taken by the airline Operator, following safety recommendations are proposed:

1. Review, and if necessary, revise the flight crew training policy on account of the serious incident.
2. Emphasize use of alternate landing and take-off areas during times when unfavourable water conditions.
3. Ensure all crew landing in and taking-off from Category C water aerodromes meet the minimum experience requirements as stipulated in the company Manuals.
4. Ensure compliance with requirements stipulated in ASC 14-2.

#### **3.3.2 To MCAA**

1. Review, and if necessary, revise the requirements stipulated in ASC 14-2.



### 4. APPENDICES

#### 4.1 Mass and Balance report

Release Ref:		Dispatch Flight Release		Aircraft	DOW	DOI	MTOW
BQ-ISI001662		05 June 2023		BQ-ISI	8830	12.1	12500
FLT NUMBER		2400	2401				
ROUTE		MLE-KTH	KTH-MLE				
SCHED TIME		1030-1115	1515-1600				
DIST		084	084				
WAG.BRG		343	163				
ETE		38	38				
OFF BLOCK		0546	1112				
TAKE OFF		0556	11				
LAND		0840					
ON BLOCK		0648					
FLIGHT TIME		0048					
BLOCK TIME		0102					
BOARDING		10	13				
TOTAL ON BOARD		10	13				
DISEMBARKING		10	13				
DELAY CODE							
PAX (LBS)		1695	0				
BAGGAGE (LBS)		373	0				
EIC		30	30				
MAN ADG		0	0				
TOTAL PAY LOAD		2098	30				
TRIP FUEL		380	380				
TAXI +T/O FUEL		50	50				
+/- OPS FUEL							
+CREW FUEL							
MIN FUEL REQ		1210	780				
FUEL @ DEP		1300	870				
FUEL @ T/O		1250	820				
SECTOR BURN		380	380				
TOTAL BURN		430	860				
FUEL @ ARRI		870	440				
DOW		8830	8870				
T/O WEIGHT		12178	9680				
LDN WEIGHT		11798	9300				
MTOW		12500	12500				
UNDER LOAD		322	2820				
C OF G INDEX		9.5/9.7	10.6/10.8				
INT-DEPARTURE							

CONFIG		OPS TYPE	
NML	SCHEDULE	CREW	TAKE OFF
		2/1	2
		LANDING	SSR CODE
		2	3413

Flight Crew		Phone No.
CPT		
SIC		
C/A		
AST C/A		
DISP		

Sunrise / Sunset / Grounding		
TWIL From		5:44
Sunrise		5:54
Sunset		18:14
Grounding		18:24
TWIL to		18:33

Tides	Time	Meter
High Tide	1:08	0.68
Low Tide	7:21	-0.02
High Tide	14:21	0.96
Low Tide	20:30	0.29

Alternate Airport	
PRIMARY	SECONDARY
MEP	KUF
BYD	REE

Security Checks  
 Security Search

IMPORTANT CONTACTS	
COAST GUARD NORTH	9921805
COAST GUARD SOUTH	3325981
POLICE	3322111
AIRPORT FIRE & RESCUE	3337122
AMBULANCE	102

NEAREST DOMESTIC AIRPORT	
IFU	118.35

MANIFEST  LOAD SHEET  TOW / LDW / PRE-DEPARTURE  
 FUEL CHECK  FAX MANIFEST  WEATHER / NOTAMS/PRE-FLIGHT  
 MEDIC FORM  SL  AIR FORECAST REPORT

Received and checked by: \_\_\_\_\_

PIC REPORT (WEATHER DIVERSION, AIR RETURN, AOG, DELAYS)

WE TAKE OFF FROM KTH INSIDE LAGOON. IT WAS VERY ROUGH AND WINDY BIG SWELLS. AS SOON AS WE TOOK OFF WE HIT A SWELL AND THE AIRCRAFT GOT AIRBORNE AND WE LOST CONTROL AND BANK TO THE LEFT AND HIT THE WING.

CABIN DEFECT

-NIL-

Direct to		
DFO	<input type="checkbox"/>	CHEF CABIN CREW
CABIN SERVICE	<input type="checkbox"/>	ENGINEERING
SAFETY PILOT	<input type="checkbox"/>	SCHEDULING
		GROUND OPS
		FACILITIES
		MANAGER SEAPLANE OPS





### 1.3 Passenger and cargo Manifest

Passenger Manifest				Time	Aircraft	Dep.	Arr.	Flight No				
Monday, June 5, 2023				15:15	BQ-ISI	KTH	MLE	Q2-240				
SI No	Client	Category	Ticket No	Passenger Name	VIP	Gender	Conn. Flt	Chk Pcs	Hnd Pcs	Luggage Wt	Pax Wt	Check in Time
1	KTH	GUEST	237784	[REDACTED]		F	UL101	1	1	59	150	14:30
2	KTH	GUEST	237801	[REDACTED]		M	MALE	2	1	74	189	14:30
3	KTH	GUEST	237802	[REDACTED]		F	MALE	0	0	0	150	14:35
4	KTH	GUEST	237803	[REDACTED]		M	MU236	2	1	55	189	14:30
5	KTH	GUEST	237804	[REDACTED]		F	MU236	0	0	0	150	14:40
6	KTH	GUEST	237805	[REDACTED]		M	MU236	1	1	51	189	14:40
7	KTH	GUEST	237806	[REDACTED]		M	MU236	0	0	0	189	14:40
8	KTH	GUEST	237807	[REDACTED]		F	MU236	0	0	0	150	14:40
9	KTH	GUEST	237808	[REDACTED]		F	MU236	0	0	0	150	14:40
10	KTH	GUEST	237811	[REDACTED]		M	MU236	2	1	77	189	14:40
11	KTH	GUEST	237812	[REDACTED]		F	MU236	0	0	0	150	14:40
12	KTH	GUEST	238578	[REDACTED]		F	MALE	2	1	96	150	14:35
13	KTH	GUEST	238579	[REDACTED]		F	MALE	0	0	0	150	14:35

**Connected Bumped Bags**

Total Pax: 13

Weight of checked in pax only		
Checked in Count	Lug Wt	Pax Wt
16	412	2145

SI No	Cargo Type	Description	Cargo Wt
1	co mail	Co Mail-1	8
<b>Total Cargo Weight</b>			<b>8</b>

**Last Minute Changes**

Name	VIP	Type	Conn Flt	pcs.	Lug Wgt.	Pax Wgt.
[REDACTED]						

NAME / SIGN: [REDACTED]


I certify that this Aircraft is loaded in accordance with the approved weight and balance schedule. LMC limit is 2500kg and LMC correction is mandatory for Take-off weight. Landing weight and % MAC@TOW.

	Before LMC	After LMC
Pax Weight =	2145.00 Lbs	
Luggage + Cargo Weight + EIC =	450.00 Lbs	
Total Payload =	2595.00 Lbs	
DOW +	Lbs	
Zero Fuel Weight =	Lbs	
Take of Fuel +	Lbs	
TOW =	Lbs	
Correction +	Lbs	
Actual TOW =	Lbs	
Burn off Fuel -	Lbs	
Landing WGT =	Lbs	
<b>INDEX T.O.W</b>	Lbs	
<b>INDEX LW</b>	Lbs	

TRIM CALCULATOR USED

© 2023 - Island Aviation services Ltd.

### 1.4 Loadsheet



**LOADSHEET - DHC 6 - 300**

ALL WEIGHTS IN POUNDS (LBS)

FLIGHT INFORMATION				
FLT NO:	802401	ORIGIN:	KTH	PIE:
A/C REG:	80707	DEST:	MLE	
DATE:	25/01/23	CREW:	2/1	

WEIGHT DISTRIBUTION				
	WEIGHT	LMC		
DRY OPERATING WEIGHT	8820			
ADJUSTMENTS +/-				
<b>ADJ. DRY OPERATING WEIGHT</b>				
OA	A B C			
1	M M F	528		
2	F M F	450		
3	M F F	480		
4	M P F	450		
5	F	639		
<b>PASSENGER WEIGHT</b>				
130 MAX OF Arms	420			
130 MAX AFT CPT	20			
130 MAX SHELF	0			
<b>Total Bag Weight</b>	450			
<b>ZERO FUEL WEIGHT</b>	11425			
BLOCK FUEL	870			
TAXI	-50			
FWD FUEL	410			
AFT FUEL	410			
<b>TAKE-OFF FUEL</b>	820			
<b>TAKE OFF WEIGHT (12500 Max)</b>	12240			
TRIP FUEL	280			
<b>LANDING WEIGHT (12500 Max)</b>	11965			

LAST MINUTE CHANGE			
DEST	SPECIFICATION	OL/CPT +/-	WEIGHT
LMC TOTAL +/-			

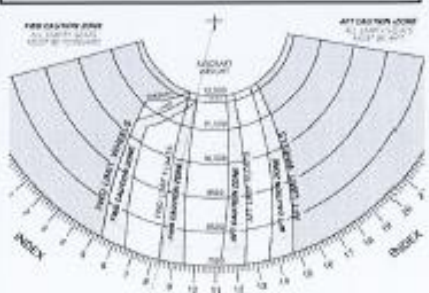
PAX WEIGHTS	
M	185
F	155
C	77
MM	378
MF	308
FF	300
MMM	547
MMF	506
MFF	485
FFF	450

TRIM INDEX	
TOW	106
LW	108

TOTAL PAX	CREW
13	3

CG LIMITS 25% - 32%  
Trim Calculator Used

Notes: 1. 10 SOLBS



1. Verify that this Aircraft is loaded in accordance with the approved MBB Airplane and as indicated above. LMC limit is 25% and LMC exception is mandatory for the Take-off weight. Landing weight also to MAC@TOW.

**PIG**

Signature and Lic no: \_\_\_\_\_

Page 28 of 30

30 October 2024

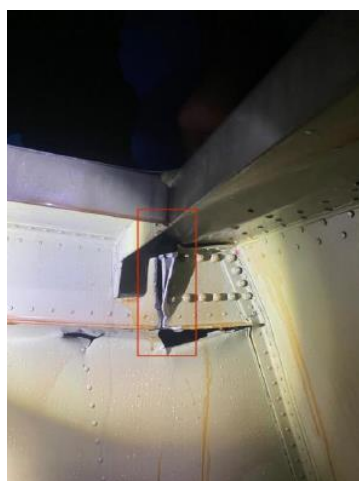
## 4.4 Photos of aircraft damages



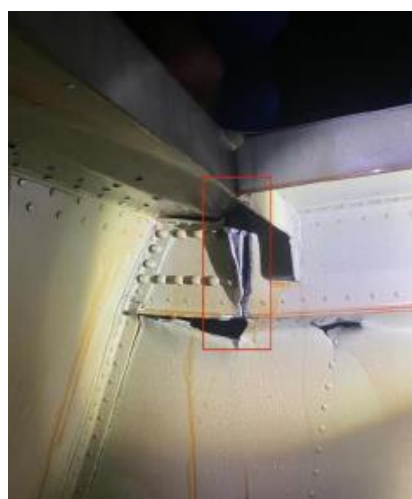
**Figure 1:** The left hand inboard AFT stiffener (ARM-PANEL-#6 BULKHEAD, PN: 13A01427-022) of the number 6 bulkhead has been cracked



**Figure 2:** The left hand inboard AFT stiffener (ARM, PANEL, RH, #6 BULKHEAD, PN: 13A01427-010) of the number 6 bulkhead has been cracked



**Figure 3:** The channel (PANEL FT. SPREADER BAR SUPPORT, RH, PN: 13A01160-003) that houses the left float FWD attachment fitting cracked



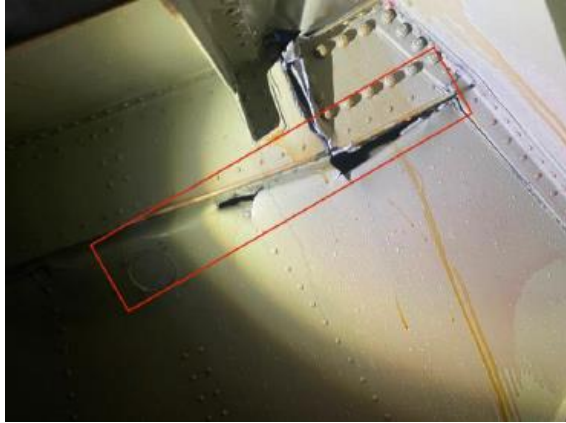
**Figure 4:** The channel (PANEL FT. SPREADER BAR SUPPORT, LH, PN: 13A01160-004) that houses the left float AFT attachment fitting cracked



**Figure 5:** Left wing tip fairing (PN: C6W1004-1) damaged



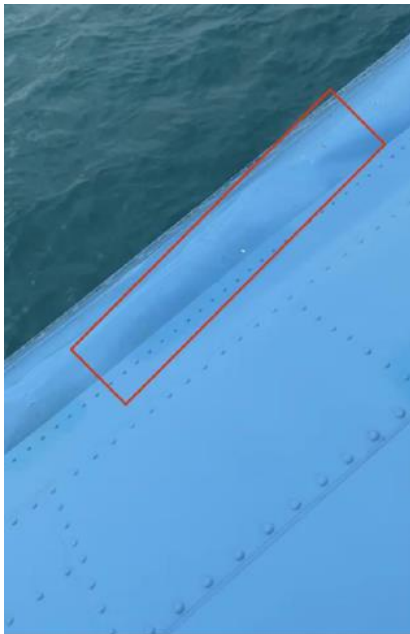
**Figure 6:** Left wing outboard training edge skin dented



**Figure 7:** Left float number 6 bulkhead body panel (PN: 13A01150-052) torn



**Figure 8:** Right hand side panel (PN: 1011235) of number 8 bulkhead torn



**Figure 9:** Leading edge skin of the left wing outboard fore flap dented beyond the allowable limits



**Figure 10:** Left float top skin has been dented and damaged at number 6 bulkhead