بسم الله الرحمن الرحيم

ACCIDENT INVESTIGATION COORDINATING COMMITTEE

AIRCRAFT ACCIDENT REPORT 2021/01

PRELIMINARY REPORT

ON INVESTIGATION OF THE
ACCIDENT INVOLVING VIKING AIR
DHC-6-300, 8QRAE AIRCRAFT
AT VELANA INTERNATIONAL AIRPORT,
MALDIVES

on 14th February 2021

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 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 the investigation of an accident or incident is prevention of accidents and serious incidents and it shall not be the purpose of this activity to apportion blame or liability.

The AICC was assisted by MCAA, MACL and Manta Air Pvt Ltd.

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

The report is released on 28 March 2021.

Mr. Abdul Razzak Idris
Chairperson
Accident Investigation Coordinating Committee

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LIST OF ABBREVIATIONS

AICC : Accident Investigation Coordinating Committee

ATIS : Automatic Terminal Information Service

ATL : Aircraft Technical Log

ATPL : Air Transport Pilots License

CC : Cabin Crew

CPL : Commercial Pilots License

CVR : Cockpit Voice Recorder

DHC-6-300 : Viking Air Twin Otter 300 Series

ELT : Emergency Locator Transmitter

EMMA : Equalized Maintenance for Maximum Availability

FDR : Flight Data Recorder

FO : First Officer

IR : Instrument Rating

lbs. : Pounds

LH : Left Hand

LOPA : Layout of Passenger Accommodation

LT : Local time

MA : Manta Air

MACL : Maldives Airports Company Limited

MCAA : Maldives Civil Aviation Authority

MCAR : Maldives Civil Aviation Regulations

MLE : IATA designated 3 letter code for Velana International Airport

MLF : Operator designated 3 letter code Maalifushi water aerodrome

MSN : Manufacturers Serial Number

Nm : Nautical Mile

PF : Pilot Flying

PIC : Pilot-in-Command

RH : Right Hand

STA : Fuselage Station location

TAC : Total Air Cycles

TAT : Total Air Time

TBD : To be determined

UTC : Universal Coordinated Time

VFR : Visual Flight Rules

VIA: : Velana International Airport

VIP: : Very Important People

ºC : Degrees Celsius

SYNOPSIS

On Sunday, 14 February 2021, the DHC-6-300 aircraft, registration 8Q-RAE operated by Manta Air, was on a charter flight from Maalifushi water aerodrome (MLF), in Thaa Atoll, to Velana International Airport (VIA) where th accident occurred. The flight was operated in accordance with the Visual Flight Rules (VFR).

The aircraft landed on the North-Right water runway. The accident occurred during landing.
As per the crew, on touch down, the aircraft bounced and banked to the right, dipping the right wing into the water. The aircraft did not recover from the right bank and veered to the right, making a U-turn finally coming to a stop upside down.

During the accident the aircraft was substantially damaged.

Six passengers, two pilots and one cabin crew were onboard the aircraft.
All passengers and crew were able to evacuate safely, but the cabin crew sustained minor injuries.

The accident occurred at 07:32 hours and the accident was reported to AICC at 07:56 hours. Investigators from MCAA and AICC arrived at the accident scene and commenced investigation.

1. FACTUAL INFORMATION

Aircraft Owner:	Kenn Borek Air Ltd.
Registered owner:	Manta Aviation Pvt Ltd.
Operator:	Manta Aviation Pvt Ltd. / Manta Air (MA) (Air Operator Certificate No.014)
Aircraft Type:	DHC-6-300
Aircraft Manufacturer:	de Havilland Canada (Type Certificate now owned by Viking Air Ltd.)
Manufacturer's Serial No.:	617
Nationality:	Republic of Maldives
Registration:	8Q-RAE
Place of Accident:	VIA - North-Right water runway
Reported location of accident:	04° 11' 39.99"N 73° 32' 16.01"E
Date and Time:	14 February 2021 at 07:32 hours

1.1 History of Flight:

1.1.1 Background

The accident flight was from Maalifushi (MLF) water aerodrome to VIA, the first flight of the day after an overnight shutdown at MLF. There were no repoted defects on the aircraft.

Both crew reported to duty on the previous day at VIA and departed on their first flight at 13:25 hours. The Operational Flight Plan issued on 13 February 2021 covers 5 flights for both 13th and 14th February with an overnight stop. A total of four legs were flown on the 13th before the aircraft shut down at MLF for the night. The last flight on this flight plan was scheduled to arrive at VIA at 0755 on 14 February.

A load sheet, along with a Pasenger and Cargo manifest was issued for the flight. The FO was PF for this sector. Taxi-out, take-off, cruise and approach into VIA were normal.

The PIC stated that the aircraft landing attitude was flat on this flight as was the case of all landings carried out by the FO on the previous day. PIC believed that this could have been a factor due to the differences in landing attitudes between the ATR aircraft and Twin Otter on floats.

The aircraft, while landing touched down and veered right, and the aircraft RH wing digged into the water and took a U turn and came to rest upside down.
The cabin crew assisted the passengers to evacuate the aircraft. Soon after the accident, the MACL rescue boats arrived and rescued all the passengers.

1.1.2 Aircraft:

The aircraft, MSN 617, was manufactured by de Havilland, Canada on 20 November 1979. It was registered in the Maldives on 03 December 2020, under 8Q-RAE. The aircraft was operated in float configuration with Wipaire 13000 floats installed.

The aircraft has an approved LOPA with 8 VIP seats installed in the cabin, in addition to a single normal sized seat for the cabin crew. It has two exits in the cockpit, on either side, two exits in the cabin. The approved LOPA shows two emergency exits on the right side of the cabin, and one emergency exit on the left.

1.1.3 Flight Crew:

The aircraft was operated by two crew members. All had valid licences granted by MCAA. Review of the records confirm that the medicals, seaplane ratings, and proficiency checks of the pilots were current, as of the date on which the accident occurred. Both pilots held Commercial Pilot Licences. Licence details, including hours accrued on type, are in para 1.5 of this report.

1.2 Injury 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	**1**	0	**1**	0
Nil	**2**	0	**6**	**8**	0
Total	**2**	**1**	**6**	**9**	0

1.3 Damages to aircraft:

Survey of the wreckage by the investigators identified the extent of the damages caused to the airframe, wing, engines and propellers. The damages include but not limited to:

1. LH Wing
   a. LH wing main attachment was broken and the rear spar was ripped off and fully detached, with the left engine and the wing strut, and was found at a distance from where the aircraft came to rest
   b. LH wing aft of main spa bent inward and crushed up to frame at STA 35.15
   c. Shroud skin and top skin dented and cracked from STA 60 outwards
   d. All the cables, including engine control cables and control surface cables, routed through the LH wing broken
   e. LH wing outboard of STA 297.00 crushed and wing cracked open from leading edge and top skin at STA 297.00
   f. All hinge arms bent and sheared
   a. All the wirings, including the generator feeder cable, routed through LH wing were broken
   b. LH wing vent line detached
   c. LH engine Bleed air line sheared
   d. Frame 218 attachment ripped off
   e. Wing attachment to Frame 239 ripped off from the wing
   f. Near the number six window on LH side, a hole was observed
   g. Fuselage damaged near the wing flap rod cutout, possibly damage from wing and from flap rod as wing swinged back
   h. Wing root panel and float panels completely destroyed and crushed into pieces

2. Floats
   a. LH float pylon to float attachment almost detached
   b. LH attworthy strut torn off from lower fitting
   c. All floats steps torn off
   d. Both spreader bars detached from the floats
   e. RH float has minimal damages

3. Empennage
   a. Minimal damage on empennage

b. Rudder trip top part found bent (This is believed to be a secondary damage as it was not damaged in the underwater videos)
b. RH wing found minimal damages including propeller and flight controls
c. LH hydraulic panel bent towards inside
d. Drag wires found bent
e. LH propeller blades found bent due to impact
f. LH wing leading edge and outboard from wing fence found crushed (and looks like first impact from the leading edge)
g. Flaps and aileron detached from hinge arms
h. Outermost wing hinge arm missing with shroud skin
i. LH wing root frame found damaged
j. LH wing flap push rod found bent with around 10 inches extended from the wing
k. LH wing inboard trailing flap detached – and recovered in salvage
l. LH inboard flap push rod found bent in the wing extended position
m. LH wing inboard trailing edge found extensively damaged
i. LH outboard fore flap pushrod found sheared off

4. Cabin and Cockpit
   a. RH emergency exit missing– door not recovered from the accident site
   b. RH side emergency exit was released and the door missing
   c. LH emergency exit door not released and the door intact
   d. LH side interior top panel was found damaged
   e. Nose cargo compartment door damaged and was open

5. Fuselage
   a. Airframe LH skin above window 5 between STA 219.85 and STA 239.88 found severely buckled inwards and craked open
   b. LH side above window six a one/two inches hole punctured on the skin
   c. LH airframe skin above window six between STA 239.88 and STA 272.00 found buckled inwards

1.4 Other damage

Nil

1.5 Personnel information

1.5.1 Pilot-In-Command

Age:	33 years
Nationality:	Maldives
Gender:	Male
Type of License:	ATPL
License issued on:	19.11.2014
License expires on:	05.10.2022
Type of medical:	Class 1
Medical issued on:	09.02.2021
Medical expires on:	08.02.2022
Types flown:	DHC-6, AT76
Hours on type:	7270 hours
Ratings:	DHC-6/IR; ATR 42/72
Last Proficiency check:	25.01.2021
Total hours as PIC:	4138 hours
Total flight time:	7939 hours
Last 90 days:	160:35 hours
Last 28 days:	35:47 hours
Last 24 hrs:	04:30 hours

1.5.2 Co-pilot

Age:	33 years
Nationality:	Maldives
Gender:	Male
Type of License:	CPL
License issued on:	08.01.2015
License expires on:	17.05.2023
Type of medical:	Class 1
Medical issued on:	17.01.2021
Medical expires on:	17.01.2022
Types flown:	DHC6, AT76
Hours on type:	2138 hours
Ratings:	DHC-6
Last Proficiency check:	03.03.2021
Total flight time:	3299 hours
Last 90 days:	21:35 hours

Last 28 days:	21:35 hours
Last 24 hrs:	04:30 hours

1.5.3 Cabin Crew

Age:	36 years
Nationality:	Maldivian
Gender:	Male
Type of License:	CCL
License issued on:	16.03.2008
License expires on:	15.03.2023
Type of medical:	Class 3
Medical issued on:	07.07.2020
Medical expires on:	06.07.2022

1.6 Aircraft information

1.6.1 General information

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

Manufacturer:	de Havilland Canada
Registration:	8Q-RAE
Powerplants:	PT6A-27
Manufacturer's Serial Number (MSN):	617
Year of construction:	1979
Total Air Time and Landing at time of accident:	43,932.14 hours and 78,854 landings
Certificate of Airworthiness:	Normal category, issued on 17 Dec. 2020
Airworthiness Review Certificate:	Issued on 17 December 2020 Expiry date: 16 December 2021
Last periodic inspection	EMMA No 13 on 6 February 2021
Last inspection carried out at TAT	43,907:31 hrs

1.6.2 Engines and Propellers

Right Engine (Gas Generator)	
Right engine manufacturer	PWC
Year of manufacture	UNKNOWN
Model	PT6A-27
Serial number	PCE-51958
Total Hours since new	6281:15
Last overhaul date	18 January 2002
Hours since overhaul	1899:32
Last check carried out	EMMA No 13 on 06 February 2021
Hours since last check	24:43 hours
Right Engine (Power Section)	
Right engine manufacturer	PWC
Year of manufacture	UNKNOWN
Model	PT6A-27
Serial number	51958-100
Last overhaul date	18 January 2002
Hours since overhaul:	1899:32
Last check carried out:	EMMA No 13 on 06 February 2021
Hours since last check:	24:43 hours
Left Engine (Gas Generator)	
Left engine manufacturer:	PWC
Year of manufacture:	UNKNOWN
Model:	PT6A-27
Serial number:	PCE 50155
Total Hours since new:	18055:21
Last overhaul date:	9 March 2014
Hours since overhaul:	1728:20
Last check carried out:	EMMA No 13 on 06 February 2021
Hours since last check:	24:43 hours
Left Engine (Power Section)	
Left engine manufacturer:	PWC
Year of manufacture:	October 1970
Model:	PT6A-27

Serial number:	50155-100
Last overhaul date:	9 March 2014
Hours since overhaul:	1728:20
Last check carried out:	EMMA No 13 on 6 February 2021
Hours since last check:	24:43 hours
Right Propeller	
Manufacturer:	HARTZELL
Year of manufacture:	UNKNOWN
Model:	HC-B3TN-3DY
Serial number:	BUA21602
Last overhaul date:	21 January 2020
Hours since last overhaul:	142:32 hours
Last check carried out:	EMMA No 13 on 6 February 2021
Left Propeller	
Manufacturer:	HARTZELL
Year of manufacture:	UNKNOWN
Model:	HC-B3TN-3DY
Serial number:	BUA21008
Last overhaul date:	31 July 2019
Hours since last overhaul:	142:32 hours
Last check carried out:	EMMA No 13 on 6 February 2021

1.6.3 Cabin Layout and Configuration

Cabin was configured to carry eight passengers plus one cabin crew in a VIP seating configuration

1.6.4 Recent maintenance

The most recent maintenance inspections carried out include Equalized Maintenance for Maximum Availability (EMMA) number 13 completed on 06 February 2021 at 43,907:31 TAT and 78,807 TAC.

1.6.5 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.

1.6.6 Powerplants

PT6A-27, described in 1.6.2

1.6.7 Fuel

Jet A-1 fuel was used on the aircraft. Latest refueling was done at the operator's main base at Dhaalu Airport where sealed barrels are stored and kept for refueling company operated DHC-6 float planes only. There is no certified fuel facility in the Airport.

1.6.8 Accessories

None

1.6.9 Defects

There were no recorded open defects.

1.6.10 Aircraft load

The aircraft has a take off weight of 11,429 pounds when it was dispatched from MLF for sector MLF-MLE. The calculated aircraft landing weight was 10,879 lbs., as per load sheet computed.

Passenger and cargo Manifest confirms that:

- Passenger weight (06 passengers) weighed a total of 1056 lbs.;
- Luggage (Cabin + Checked) (17 pieces) weighed a total of 461 lbs.

1.6.11 Load sheet

The load sheet was produced and delivered to the flight crew, but the the original signed load sheet was not recovered from the aircraft. The Station Representative is required to send the weight data to the Operator's Dispatch center at VIA where the Load sheet is prepared and is sent to the Station Representative, who will then print and submit the loadsheet for PIC acceptance and signature. Upon acceptance the the PIC was required to sign the original loadsheet with multiple copies.

1.7 Meteorological information

Weather report transmitted via ATIS at 0200Z at VIA is as follows:

METAR VRMM 140200Z 08010KT 9000 FEW018 28/24 Q1012 NOSIG=

Wind:	80^{o} 10 knots
Visibility:	9000 m
Sky condition:	Few clouds at 1800 ft
Temperature:	28.0 ^{o}C
Dew point:	24.0 ^{o}C
Pressure:	1012 hPa

No significant weather change noted

1.8 Aids to navigation

As the flight was conducted under VFR, and therefore no navigational aids were required.

1.9 Communications

There were no communication problems or system anomalies throughout the flight from taxi to take-off to cruise and upto intial touch down.

1.10 Aerodrome information

Destination Aerodrome:	VIA
Reference:	VIA water aerodrome Water Runway L/T (Northbound & Southbound Landing) SL: Latitude 04° 11' 50.76" N / Longitude 73° 32' 22.47”E NR: Latitude 04° 11' 26.82" N / Longitude 73° 32' 12.26”E
Facilities:	Multiple fixed platforms VIA water aerodrome base

Location of the water aerodrome, including 4 water runways available at VIA is shown on the aerodrome chart, published by VIA.

1.11 Flight Recorders

For DHC-6 aircraft, Flight Data Recorder (FDR) or Cockpit Voice Recorder (CVR) are not required under MCAR regulations.

1.12 Wreckage and impact information

1.12.1 Accident site visit

Accident site was visited by investigators from both MCAA and AICC.

1.12.2 Wreckage Condition

For aircraft damages refer to 1.3.

1.12.3 Salvage operations

The wreckage was loaded on to a flat top barge using a crane and was transported and offloaded at the Operator's main base at Dhaalu Airport at Dhaalu Kudahuvadhoo island. During salavage, secondary damage to the wreckage was observed.

1.13 Medical and pathological information

Drug tests results for all crew members were reported negative.

1.14 Fire

There were no signs or reports of a fire.

1.15 Survival Aspect

Due to the instantaneous nature of the accident the crew were unable to provide instruction or assist the passengers in donning life jackets. However the Cabin crew assisted some of the passengers evacuate the aircraft and later provided lafe jackets for the passengers.

There were no evidences of an activated ELT.

1.15.1 General

During post accident interviews, one passenger stated that the the pilot seated on the left hand seat (PIC) opened the pilot-side door, soon after the aircraft flipped. The PIC, FO, and three passengers (seated in 1A, 2A and 2D) evacuated the aircraft through the LH cockpit door. The other three passengers (seated 3A, 3D and 4A) and the cabin crew, evacuated the aircraft through the LH main cabin door.

1.15.2 Safety Briefing

Pre flight safety briefings were carried out according to Manta Air operations manual.

1.15.3 Personal Floatation Devices

The airplane was equipped with life jackets for each passenger seat and all crew members. Some passengers retrieved and used life jackets installed on the aircraft.

Passengers stated that they tried to hold on to the aircraft in the water and that the wreckage remained afloat through out - until they were rescued.

1.15.4 Search and Rescue

After receiving the notification, MACL Marine rescue boat arrived on scene in minutes and rescued all of the the passengers. More rescue vessels joined the effort later.

1.16 Tests and research

Pending

1.17 Organizational and Management Information

Manta Air (MA) is a MCAA approved Air Operator Certificate holder. MA provides domestic air services using ATR 42 / 72 and DHC-6 aircraft on floats. DHC-6 aircraft are authorized to conduct day VFR Operations only. The company also holds Aircraft Maintenance Organization Approval (MCAR-145) and MCAR-M Organisation Approval.

1.18 Additional Information

None

1.19 Useful or Effective Investigation Techniques

TBD

2. INITIAL FINDINGS

TBD

3. SAFETY RECOMMENDATIONS:

TBD