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ACCIDENT INVESTIGATION COORDINATING COMMITTEE

AIRCRAFT ACCIDENT REPORT P2020/03

PRELIMINARY REPORT

**ON INVESTIGATION OF THE ACCIDENT INVOLVING VIKING AIR
DHC-6-300, 8Q-TMF AIRCRAFT
AT VELANA INTERNATIONAL AIRPORT WATER AERODROME, MALDIVES
on 05 October 2020**

(This is a preliminary report and it contains facts which have been determined up to the time of publication. This report provides a brief overview of the investigation process, a summary of any important findings and overview of the remaining investigation process)

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 Maldives 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 as envisaged in Annex 13 to the Convention.

The AICC was assisted by Maldives Civil Aviation Authority (MCAA) and Trans Maldivian Airways (TMA) in the investigation of this accident.

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 2 November 2020.



Mr. Abdul Razzak Idris

Chairperson

Accident Investigation Coordinating Committee

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LIST OF ABBREVIATIONS

AICC	: Accident Investigation Coordinating Committee
ATPL	: Air Transport Pilot License
CG	: Centre of Gravity
CNS	: Communication, Navigation and Surveillance
COM	: Communication
CPL	: Commercial Pilot License
CVR	: Cockpit Voice Recorder
DHC-6-300	: Viking Air Twin Otter 300 Series
EASA	: European Union Aviation Safety Agency
ELT	: Emergency Locator Transmitter
EMMA	: Equalized Maintenance for Maximum Availability
FDR	: Flight Data Recorder
FO	: First Officer
lbs.	: Pounds
LH	: Left hand
LOPA	: Layout of Passenger Accommodation
LT	: Local time
MAC	: Mean Aerodynamic Chord
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
N/A	: Not applicable
NM	: Nautical Mile
OEM	: Original Equipment Manufacturer
PF	: Pilot flying
PIC	: Pilot-in-command

RBM	: Operator designated 3 letter code for Huruelhi water aerodrome (Unlicensed)
RH	: Right hand
TAC	: Total Air Cycles
TAT	: Total Air Time
TBA	: To be advised
TBD	: To be determined
TMA	: Trans Maldivian Airways Pvt. Ltd.
UTC	: Coordinated Universal Time
VEL	: Operator designated three letter code for Velavaru water aerodrome
VFR	: Visual Flight Rules
VHF	: Very High Frequency
MLE	: Velana International Airport
VMC	: Visual Meteorological Conditions
VOM	: Operator designated three letter code for Vommuli water aerodrome

SYNOPSIS

On 05 October 2020, DHC-6-300 aircraft (on floats), registration 8Q-TMF owned and operated by Trans Maldivian Airways Pvt. Ltd. (TMA), departed Vommuli water aerodrome to Velana International Airport. There were four passengers, two pilots and one cabin crew onboard the aircraft. The flight was conducted in accordance with the Visual Flight Rules (VFR). The whole flight was uneventful until after touch down at MLE.

At the time of the accident the water aerodrome was experiencing light rain and winds around 280 degrees / 20 knots, a left cross wind for the aircraft approaching from South to land on the North Right runway.

The aircraft landed on water runway designated "North Right". About two (2) seconds after the initial touch down the aircraft rapidly banked/rolled to about 60 degrees to the right, the right wing digging into water and the left wing rising high in the air; the aircraft veered to the right, making a "U" turn.

Immediately after the "U turn" the left wing dropped impacting the water heavily and eventually the aircraft came to a halt in an upright attitude on the floats.

The aircraft was taxied using RH engine power, and it was assisted by a dinghy pushing on the LH float to reach the passenger bay at TMA main base.

Once the aircraft was docked all passengers and crew were safely evacuated. The aircraft was then moved to the maintenance dock for carrying out assessment of damages sustained and investigation.

During the accident, one of the flight crew and the cabin crew suffered minor injuries. No injuries to the passengers were reported.

The accident occurred at 06:58 hours. MCAA reported the accident to the AICC at 08:20 hours and TMA reported the same to AICC at 08:21 hours.

One investigator from AICC and another representing MCAA, arrived at the accident scene, at approximately 10:15 hours and the investigation was initiated. A third investigator representing MCAA joined the team later during the same day.

During the accident the RH wing, LH wing and LH propeller blades of the aircraft sustained substantial damage. No obvious damages were observed on the fuselage, the RH engine, RH propeller, the floats or float attachments, though.

1.0 FACTUAL INFORMATION

Aircraft Owner:	Trans Maldivian Airways Pvt Ltd.
Registered owner:	Trans Maldivian Airways Pvt Ltd.
Operator:	Trans Maldivian Airways Pvt Ltd. (Air Operator Certificate No.005)
Aircraft Type:	Viking Air (De Havilland) DHC-6-300
Nationality:	Republic of Maldives
Registration:	8Q-TMF
Aircraft Manufacturer:	De Havilland Canada (Type Certificate now owned by Viking Air Ltd.)
Manufacturers Serial No.:	657
Place of Accident:	Velana International Airport Latitude: 04° 11' 50.76" N Longitude: 73° 32' 22.47" E
Date and Time:	05 October 2020 at 06:58 hours

1.1 History of Flight

1.1.1 Background

The aircraft was dispatched on 04 October 2020, on a multi-sector flight, (flight number FLT702955), MLE - Huruelhi (RBM) – Velavaru (VEL) – Vommuli (VOM) – MLE with 3 crew members (2 flight crew and 1 cabin crew) and a total of 11 passengers scheduled to have an overnight layover at VOM. The fourth sector (also the last sector) was the flight from VOM to MLE on 05th October 2020.

The aircraft was released for flight following completion of a daily inspection carried out on 03rd October 2020, evening. There was no record of any open deferred defects listed in the Aircraft Technical Log.

The airline's "flight release" document contains three parts - the 'Operational Flight Plan', 'Passenger & Cargo manifest' and the 'Flight release' – documenting weights for luggage and hand luggage. The operational flight plan is signed by both the Flight dispatcher and the PIC.

As per the flight release document, the aircraft departed MLE with 501 lbs of baggage, 1205 lbs of fuel, and a passenger weight of 1,884 lbs, totalling a take-off mass of 12,496 lbs.

The crew did not report any abnormalities in the aircraft throughout the flights operated on 4th October 2020.

After deplaning passengers at VOM, the PIC carried out an auto- feather test, as called for in the Aircraft Technical Log, and taxied to the mooring buoy, for overnight layover.

The crew had an early night after dinner at around 19:00 hrs on 4th October 2020, and waking up at 05:00 hrs, next morning to prepare the aircraft for departure. The crew after having breakfast and reported at the jetty at 05:31 hrs. A boat took the crew to the aircraft to the mooring buoy and the aircraft was taxied to the fixed platform. The pre-flight checks were carried out and departure was normal and uneventful.

On 5th October 2020, the aircraft departed VOM to MLE with 3 crew members (2 flight crew and 1 cabin crew) and 4 passengers. As per the flight release document, the aircraft departed VOM with 160 lbs of luggage, 805 lbs of fuel, and a passenger weight of 717 lbs, with a take-off mass of 10,588 lbs. The centre of gravity (CG) was recorded as 30% of MAC.

It is noted that at aerodromes other than the main base (MLE), Passenger and Cargo manifest is printed and issued to the crew by resort staff trained by TMA in the resort. This manifest does not account for Luggage weight and Hand luggage weight separately, unlike in the Flight release document issued in the main base, where both are separately reflected for each flight.

A Mass & Balance report for the flight was also issued before the flight departure. This Mass and Balance report is computed by the PIC, using a tablet in the cockpit and is prepared using the data stated in the flight release document.

There is no provision for PIC's signature for acceptance of the Mass & Balance report, and is available on a tablet. The Mass and Balance data is uploaded on company network in real time as the tablet is connected to Operator's network using Wi-Fi data network at main base, and at other stations it is connected to

company network using mobile data. If mobile data is not available at a point of departure, the mass and balance data does not get uploaded in the company network until mobile data becomes available.

The aircraft departed VOM at 06:14 hrs on the morning of 5th October 2020.

The PIC was PF for the sector VOM-MLE. Taxi-out, take-off, cruise, approach and until touch down at MLE all were normal and uneventful. Light rain was encountered during the approach to MLE and PIC stated that he used windshield wipers.

At the time of approach for landing the wind was 180 degrees/ 20 knots as given by the ATC.

The aircraft landed on water runway designated "North Right". About two (2) seconds after the initial touch down the aircraft rapidly banked/rolled to about 60 degrees to the right, the right wing digging into water and the left wing high in the air. The aircraft veered to the right, making a "U" turn.

Immediately after the "U turn" the left wing abruptly dropped which resulted in the left wing and LH engine propeller blades impact the water heavily causing damage to the wing and the propeller blades.



Figure1: RH Wing



Figure 2: LH Propeller

1.1.2 Aircraft

The aircraft (MSN: 657) was manufactured by De Havilland, Canada (Type Certificate now owned by Viking Air Ltd) in 1979. It was registered in the Maldives in 2000, under registration-8Q-TMF.

1.1.3 Flight crew

The PIC holds a valid ATPL while the FO holds a valid CPL. Details including hours accrued on type are specified in para 1.5 of this report.

1.2 Injury to persons

Injuries	Flight Crew	Cabin Crew	Passengers	Others
Fatal	0	0	0	0
Serious	0	0	0	0
Minor	1	1	0	0
Nil	1	0	4	0
Total	2	1	4	0

1.3 Damages to aircraft

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

1. Right Hand Wing:
 - a. Various damages in the area between ribs 25 to 28
 - b. The leading-edge bottom skin towards the wingtip buckled upwards
 - c. Wing tip severely crushed and material missing
 - d. Wing fin dislocated with the leading edge shifted outboard
 - e. The inboard trailing flap skin buckled upward
2. Left Hand Wing:
 - a. Leading edge bottom skin buckled upwards
3. Left Hand Propeller:
 - a. LH propeller blades (all three of them) bent aft
 - b. LH propeller assembly dislocated
4. Airframe:

No apparent damage observed.

1.3 Other damage

There were no damages to any other property or objects.

1.4 Personnel information

1.5.1 Pilot-In-Command

Age:	42 years
Nationality:	Maldives
Gender:	Male
Type of License:	ATPL
License issued on:	09 May 2010
License expires on:	08 May 2023
Type of medical:	Class One
Medical issued on:	22 August 2020
Medical expires on:	22 August 2021
Types flown:	DHC-6 (Floats)
Ratings:	DHC-8, DHC-6 (Float Plane)
Last Proficiency check:	13 July 2020
Last instrument rating renewal:	13 February 2020
Last line check:	12 March 2020
Total hours as PIC:	TBD
Total flight time:	12,329 hours
Flying experience:	
Total (all types)	12,329 hours
On type:	3417 hours
Last 90 days:	35.7 hours
Last 28 days:	16.8 hours
Last 24 hours:	4.9 hours
Previous rest period:	3 rd duty day after 4 days rest

1.5.2 Co-pilot

Age:	24 years
Nationality:	Maldives
Gender:	Male

Type of License:	CPL
License issued on:	12 April 2017
License expires on:	11 April 2024
Type of medical:	Class One
Medical issued on:	07 November 2019
Medical expires on:	07 November 2020
Types flown:	DHC-6
Ratings:	DHC-6, Float Plane
Last Proficiency check:	31 August 2020
Last instrument rating renewal:	13 August 2020
Last Line check:	07 September 2020
Total hours as PIC:	N/A
Total flight time:	2808 hours
Flying experience:	
Total (all types)	2808 hours
On type:	2543 hours
Last 90 days:	26.4 hours
Last 28 days:	23.3 hours
Last 24 hours:	4.9 hours
Previous rest period:	3 rd duty day after 3 days rest

1.5.3 Cabin Crew

Age:	40 years
Nationality:	Maldives
Gender:	Male
Type of License:	Cabin Crew License
License issued on:	20 January 2013
License expires on:	19 January 2013
Type of medical:	Class 3
Medical issued on:	16 December 2018
Medical expires on:	16 December 2020
Last recurrent training training)	03 August 2020 (DHC-6 type
Previous rest period:	3 rd day of duty after 3 days rest

1.5 Aircraft information

1.6.1 General information

Manufacturer:	Viking Air (De Havilland), Canada
Model:	DHC-6-300 Twin Otter
Registration:	8Q-TMF
Nationality	Maldives
Powerplants:	PT6A-27
Manufacturer's Serial Number (MSN):	657
Year of manufacture:	1979
Validity of C of R:	CR-163 (Issued on 29 June 2009) (Revised 03 September 2014)
Registered Owner:	Trans Maldivian Airways Pvt. Ltd.
Name of Legal Owner:	Seaplane Holding Cayman Ltd.
Certificate of Airworthiness:	MV-21H-0022 (Issued on 30 June 2009)
Airworthiness Review Certificate:	Expiry Date: 27 June 2021
Last periodic inspection carried out at TAT	36,878.40 hours
Total Air Time and Cycles at time of accident:	36,906.30 hours and 74,153 cycles
Last periodic inspection	EMMA No. 17 on 18-19 August 2020
Next inspection due at:	EMMA No. 18 at 37,003.40 hours or 18 October 2020 whichever occurs first

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.

1.6.2 Engines and Propellers

Right Engine (Gas Generator)	
Right engine manufacturer	Pratt & Whitney (Canada)
Year of manufacture	TBD
Model	PT6A-27

Serial number	PCE42493
Total Hours since new	26,949
Last overhaul date	TBD
Hours since overhaul	2,204.53 hrs
Last check carried out	EMMA #17
Hours since last check	TBD
Right Engine (Power Section)	
Right engine manufacturer	Pratt & Whitney (Canada)
Year of manufacture	1970
Model	PT6A-27
Serial number	PC-E50097
Last overhaul date	16 April 2018
Hours since overhaul:	2,204.53
Last check carried out:	EMMA #17
Hours since last check:	TBD
Left Engine (Gas Generator)	
Left engine manufacturer:	Pratt & Whitney (Canada)
Year of manufacture:	UNKNOWN
Model:	PT6A-27
Serial number:	PCE-42493
Total Hours since new:	26,965.32 hrs
Last overhaul date:	26-Jun-17
Hours since overhaul:	1,440.73
Last check carried out:	EMMA #17 on 18-19 August 2020
Hours since last check:	TBD
Left Engine (Power Section)	
Left engine manufacturer:	PWC
Year of manufacture:	UNKNOWN
Model:	PT6A-27
Serial number:	41655-100
Last overhaul date:	
Hours since overhaul:	TBD
Last check carried out:	EMMA#17 dated 29 January 2020
Hours since last check:	107.31
Right Propeller	
Manufacturer:	HARTZELL
Year of manufacture:	UNKNOWN

Model:	HC-B3TN-3DY
Serial number:	BUA31296
Last overhaul date:	TBD
Hours since last overhaul:	TBD
Last check carried out:	EMMA#17 dated 18-19 August 2020
Left Propeller	
Manufacturer:	HARTZELL
Year of manufacture:	UNKNOWN
Model:	HC-B3TN-3DY
Serial number:	TBD
Last overhaul date:	12 September 2019
Hours since last overhaul:	TBD
Last check carried out:	EMMA#17 dated 18-19 August 2020

1.6.3 Cabin Layout and Configuration

Cabin was configured under a LOPA approved by an EASA approved Design Organization to carry fifteen passengers plus one cabin crew in a standard floatplane configuration in which the seat normally installed in the sixth-row position is removed for carriage of passenger luggage in the cabin in lieu of carrying luggage in the dedicated cargo compartments. The reason is that the forward cargo compartment is not accessible for loading the luggage while the aft cargo compartment is not large enough to accommodate all the luggage normally carried by fifteen passengers. The aft baggage compartment is only used for loading smaller luggage.

The aircraft was in float configuration with Wipaire 13000 floats installed for float operation. The aircraft had four exits in the cabin and two exits in the cockpit. In this configuration the right passenger door is approved to be blocked.

Cabin crew confirmed the baggage was placed and secured with a baggage restraint.

1.6.4 Recent maintenance

The most recent maintenance inspections carried out include: Equalized Maintenance for Maximum Availability (EMMA) number 17 complied with, on 19 August 2020 at 36,878.40 hours TAT and 74,076 cycles.

1.6.5 Flight Controls

No abnormalities were reported on the flight controls, and there were no records of carrying out repairs on any of the flight controls in the last few days.

1.6.6 Powerplants

The maintenance records do not indicate any open deferred defects on either of the two engines or the propellers installed.

1.6.7 Fuel

Jet A-1 fuel was used on the aircraft. The aircraft had a total of 805 lbs. of fuel at departure from MLE, as per the Mass & Balance Report filed by the dispatchers.

1.6.8 Accessories

None

1.6.9 Defects

There was no record of any open deferred defects.

1.6.10 Aircraft load

The aircraft had a take-off mass of 10,587 pounds, when it was dispatched from VOM on the morning of 5 October 2020.

Passenger List (passenger list) - Flight Release document completed and printed by TMA Flight Dispatchers (available in TMA Dispatch at MLE) confirms that:

- Passenger weight (4 passengers) weighed a total of 717 lbs.;
- Luggage (4 pieces) weighed a total of 160 lbs.;
- Hand luggage was not separately accounted for

1.6.11 Load sheet

The load sheet also served as the passenger manifest. A copy of the load sheet was retained at VOM.

1.6 Meteorological information

ATC last communicated wind velocity to the aircraft was 280°/20 knots after which a revised wind of 300°/11 knots was blanket broadcasted to all aircraft just before 8Q-TMF landed.

1.8 Aids to navigation

The aircraft was operating under VFR, hence 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 to initial touchdown.

Immediately after the accident PIC headset was damaged which hindered inter-crew communications. Both crew members were found to have communicated without the use of a headset thereafter.

1.10 Aerodrome information

Destination Aerodrome:	Velana International Airport
Reference	4°12' 12.18" N, 73° 32' 14.54" E
Facilities:	5 water runways with fixed passenger platforms at different locations.

Location of the water aerodrome, including 5 water runways are available at MLE.

1.11 Flight Recorders

MCAR's do not require installation of a flight data recorder (FDR) or a cockpit voice recorder (CVR) for operation of DHC-6 aircraft in the Maldives. Therefore, the aircraft was not installed with FDR or CVR.

1.12 Wreckage and impact information

1.12.1 Accident site visit

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

1.12.2 Wreckage Condition

For impact information refer to 1.3.

1.12.3 Salvage operations

The floats did not sustain any damage and hence the crew was able to taxi the aircraft using the RH engine assisted with a dinghy pushing on the LH float. The aircraft initially docked at the passenger platform but later towed to the maintenance dock for carrying out further assessment and investigation.

1.13 Medical and pathological information

Both flight crew members plus the cabin crew were tested for drugs. Both the flight crew had negative results while the cabin crew member tested positive for both Methylenedioxypyrovalerone and Cannabinoids.

Medical records of the FO and the cabin crew member do not state any diagnosis with respect to the reported minor injuries.

1.14 Fire

At the time of impacting the water, crew reported that an engine fire alarm was heard, and the alarm continued for few seconds. The PIC could not establish the engine to which the alarm related, as neither T handles illuminated. The PIC did

not operate the fire shutoff handle as there was no visible sign of fire; and the indicator cartridge suggests the fire bottle was not discharged. Visual inspections do not indicate any signs of fire on the LH or the RH engine.

1.15 Survival Aspect

Having the aircraft stabilized the PIC and the FO communicated to the TMA dispatch to seek assistance. An MAFL Fire and Rescue dinghy assisted the aircraft to taxi to the dock and secure the aircraft. All passengers then safely disembarked the aircraft on to the passenger dock.

The cabin crew did attend to check on the welfare of the passengers. The cabin crew reported that none of the passengers reported any injuries.

There were no evidences of an activated ELT.

1.16 Tests and research

TBD

1.17 Organizational and Management Information

TMA is a MCAA approved Air Operator Certificate holder. TMA provides domestic air services with the aircraft fleet of DHC-6 on floats. The company is authorized to conduct day VFR Operations.

MCAA conducts regular inspections and audits on all aspects of the operation and maintenance to ensure compliance with applicable regulations and standards.

The company also holds Aircraft Maintenance Organization Approval (MCAO-145).

1.18 Additional Information

None

1.19 Useful or Effective Investigation Techniques

Video footage covering the landing was used in the assessment of accident sequence.

2.0 INITIAL FINDINGS

Based on the information gathered during the course of the investigation, the facts listed below have been determined:

- The aircraft had a valid certificate of airworthiness;
- The crew had valid licenses to conduct the flight;
- The crew had no or little flying since April due to the ongoing COVID-19 pandemic;
- The PIC was rated on float planes several years ago and returned to seaplane flying early this year, having served with another local operator flying the DHC-8 aircraft;
- Huruelhi Island (RBD) is not a licensed aerodrome, and no permit was issued for a flight on 4th October 2020; and
- The cabin crew was found positive for two classes of drugs.

3.0 SAFETY RECOMMENDATIONS

TBD