بسم الله الرحمن الرحيم

ACCIDENT INVESTIGATION COORDINATING COMMITTEE

AIRCRAFT ACCIDENT REPORT P2020/04

PRELIMINARY REPORT

ON INVESTIGATION OF THE ACCIDENT INVOLVING VIKING AIR DHC-6-300, 8Q-TMR AIRCRAFT AT SUN SIYAM IRU FUSHI RESORT WATER AERODROME, MALDIVES

on 22 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 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.

In investigating this accident, AICC was assisted by Maldives Civil Aviation Authority (MCAA), and Trans Maldivian Airways.

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

The report is released on 19 November 2020.

ACCIDENT INVESTIGATION COORDINATING COMMITTEE
MALDIVES

Mr. Abdul Razzak Idris
Chairperson
Accident Investigation Coordinating Committee

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LIST OF ABBREVIATIONS

AICC : Accident Investigation Coordinating Committee
CVR : Cockpit Voice Recorder
DHC-6-300 : Viking Air Twin Otter 300 Series aircraft
EASA : European Union Aviation Safety Agency
ELT : Emergency Locator Transmitter
EMMA : Equalized Maintenance for Maximum Availability
FDR : Flight Data Recorder
FO : First Officer
IRU : Sun Siyam Iru Fushi Resort Water Aerodrome
lbs. : Pounds
LH : Left Hand
LOPA : Layout of Passenger Accommodation
LPC : License Proficiency Check
MCAA : Maldives Civil Aviation Authority
MCAR : Maldives Civil Aviation Regulations
MLE : IATA designated three letter code for Velana International Airport
MTOM : Maximum Take-Off Mass
OPC : Operator Proficiency Check
PF : Pilot Flying
PIC : Pilot-in-command
RH : Right Hand
STC : Supplemental Type Certificate
TAC : Total Air Cycles
TAT : Total Air Time
TBD : To be determined
TMA : Trans Maldivian Airways Pvt. Ltd.
UTC : Coordinated Universal Time
VFR : Visual Flight Rules

SYNOPSIS

On 22 October 2020, DHC6-300 aircraft, registration 8Q-TMR operated by Trans Maldivian Airways Pvt. Ltd., was on a scheduled flight, from Velana International Airport outbound to Sun Siyam Iru Fushi Resort (Medhafushi Island at Noonu Atoll). There were 14 (fourteen) passengers, two pilots and one cabin crew onboard the aircraft.

The aircraft landed inside the Island lagoon. After a normal touch down and upon selection of engine reverse, the pilots noticed that the engine reverse were producing asymmetric reverse power and that the aircraft was veering to the left - towards anchored vessels. The PIC took control of the aircraft and attempted to control the situation but was unsuccessful and as a consequence the aircraft collided with one of the anchored vessels - Sun Cruise 09.

As a result of the collision the aircraft sustained damages to its LH wing and LH propeller blades, and the vessel Sun Cruise 09 suffered damages; scratch marks were on the aft LH corner and hole cut in the aft RH corner of the vessel's accommodation. At the time of the collision no person was onboard the vessel.

After the collision, the PIC reversed the aircraft and taxied to the fixed platform, using engine power.

All passengers and crew disembarked safely. No injuries to crew or passengers were reported.

At the time of the accident the weather at the water aerodrome was reportedly calm and sunny, with westerly wind of around 07 knots, and good visibility.

The accident occurred at 11:08 hrs. and the MCAA reported the accident to the Accident Investigation Coordinating Committee (AICC) at 12:34 hrs. on the same day. AICC began its investigation on the same day by interviewing the crew members. One investigator from MCAA and two investigators from AICC traveled to the accident site on 24 October 2020, and continued the investigations.

1.0 FACTUAL INFORMATION

Legal Owner:	Seaplane Holding Cayman 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:	8Q (Republic of Maldives)
Registration:	8Q-TMR
Aircraft Manufacturer:	De Havilland Canada (Type Certificate now owned by Viking Air Ltd.)
Manufacturers Serial No.:	270
Place of Accident:	Sun Siyam Iru Fushi Resort (Medhafushi Water Aerodrome) Latitude: 05° 44.488' N Longitude: 73° 19.305' E
Date and Time:	22 October 2020 at 11:08 hrs.

1.1 History of Flight

1.1.1 Background

The aircraft was dispatched on 22 October 2020, on a multi-sector flight, (flight number FLT703694), MLE – Sun Siyam Iru Fushi (IRU) – Kuredhoo (KRD) – MedhuFaru Lagoon (SJR) – MLE with 3 crew members (2 flight crew and 1 cabin crew) and a total of 14 passengers, all destined to Sun Siyam Irufushi resort. The aircraft was then scheduled to pick up passengers from the rest of destinations to return to MLE.

The aircraft was released for flight at 19:05 hrs on 21 October 2020, following completion of a daily inspection. 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 574 lbs of baggage, 1415 lbs of fuel, and a passenger weight of 1,926 lbs, totalling a take-off mass of 12,490 lbs.

A Mass & Balance report computed for the flight was also issued before the flight departure. It is computed by the PIC, on a tablet in the cockpit using the data stated in the flight release document. The centre of gravity (CG) at departure was recorded as 29% of MAC.

The aircraft departed MLE on its first flight of the day, at 10:24 hrs on 22 October 2020 and landed at IRU at 11:08 hrs.

The FO was the PF for the sector MLE - IRU. According to the flight crew, no abnormalities were observed throughout the flight from taxi-out, take-off, cruise to approach: all were normal and uneventful until touch down at IRU, and reverse was selected.

The crew reported not receiving any weather update for Sun Siyam Iru Fushi. According to the crew the wind was blowing from a westerly direction at about 7 knots. The nearest automatic weather station was available at Shaviyani Atoll Funadhoo. The following was recorded at 11:10 hrs. on 22 October 2020.

Wind direction:	250°
Average wind:	3 knots
Max wind direction:	200°
Max wind speed:	5 knots
Accumulated rain:	Nil

As per the crew, the aircraft landed inside the Island lagoon. After a normal touch down and upon selection of reverse, the pilots noticed that the engine were producing asymmetric reverse power and the aircraft was veering to the left - towards the anchored vessels. The PIC attempted to take control of the situation but was unsuccessful and the aircraft moved forward and collided with one of the anchored vessels - Sun Cruise 09. As a result of the collision, both the aircraft and the vessel sustained damages. The LH engine, propeller, and the LH wing were found damaged,

while the vessel sustained scratch marks on the aft LH corner and a hole cut in the aft RH corner of the vessel's accommodation. At the time of the collision no person was onboard the vessel.

PIC took control of the aircraft, applied reversed power and taxied to the fixed platform, using engine power without outside assistance.

Once the aircraft was secured at the platform both engines were shut down, all passengers and crew disembarked safely followed by offloading the baggage. No injuries to crew or passengers were reported.

On the day of the accident the PIC reported to duty at 0530 hrs in the morning at TMA base. The PIC was reporting for the second day of duty after a three-day rest period.

The FO reported to work at 0900 hrs and was reporting for the third day of his duty, after a four-day rest period, with the first day of the duty being on standby. Both crew members were paired to fly together in the past.

The crew carried out the pre-flight and walk-around checks prior to the first flight of the day. No abnormalities were reported by the crew.

1.1.2 Aircraft

The aircraft (MSN: 270) was manufactured in January 1969 by de Havilland Canada. The aircraft was first registered in the Maldives on 30 May 2006 and is currently operated by Trans Maldivian Airways Pvt Ltd.

1.1.2 Flight crew

The flight was operated by three crew members. Detailed information on crew qualification, are included in section 1.5 of this report.

1.2 Injury to Persons

Injuries	Flight Crew	Cabin Crew	Passengers	Others
Fatal	0	0	0	Nil
Serious	0	0	0	Nil
Minor	0	0	0	Nil
Nil	2	1	14	Nil
Total	2	1	14	Nil

1.3 Damages to aircraft

Survey of the aircraft revealed the extent of the damages caused to the wing and propellers. The damages include but not limited to:

1. Left Hand Wing:
    a. Leading edge dented and skin torn at approximately 63 inches from outboard of STA 60
    b. Wing fence damaged
    c. On lower wing skin 3 stringers bent inwards along with bottom skin
    d. Top skin and 4 ribs damaged

2. Left Hand propeller:
    a. Approximately 12 inches missing from the 4 propeller blade tips missing
    b. Erosion strips de-bonded
    c. Blades cracked

1.4 Other damage

As a result of the collision, scratch marks were made on the aft left-hand corner of the of the vessel's housing by the aircraft wing, and the left propeller cut the aft right corner of housing of the vessel. At the time of the impact no person was aboard the vessel.

1.5 Personnel information

1.5.1 Pilot-In-Command

Age:	37 years
Nationality:	Maldives
Gender:	Male
Type of License:	Air Transport Pilot License
License issued on:	08.12.2019
License expires on:	07.12.2023
Type of medical:	Class one
Medical issued on:	15.03.2020
Medical expires on:	14.03.2020
Types flown:	DHC-6 (on Maldivian license)
Hrs. on type:	10,129.1 hrs.
Ratings:	DHC-6, Float Plane
Last Proficiency check:	08.07.2020 (OPC), 12.03.2020 (LPC)
Total hrs. as PIC:	7,848.5 hrs.
Total flight time:	13,019.2 hrs.
Last 90 days:	82 hrs.
Last 28 days:	31.7 hrs.
Last 24 hrs.:	4.6 hrs.
Previous rest period:	2nd duty day after 3 days rest

1.5.2 Co-pilot

Age:	22 years
Nationality:	Maldivian
Gender:	Male
Type of License:	Commercial Pilot License
License issued on:	27.11.2019
License expires on:	26.11.2024
Type of medical:	Class one
Medical issued on:	12.08.2020
Medical expires on:	11.08.2021
Types flown:	DHC-6, Float Plane
Hrs. on type:	376 hrs.
Ratings:	DHC-6, Float Plane

Last Proficiency check:	05.08.2020 (OPC), 05.08.2020 (LPC)
Total flight time:	626.7 hrs.
Last 90 days:	56.8 hrs.
Last 28 days:	27.5 hrs.
Last 24 hrs.:	2.1 hrs.
Previous rest period:	3rd duty day after 3 days rest (1st duty day on call)

1.5.3 Cabin Crew

Age:	32 years
Nationality:	Maldivian
Gender:	Male
Type of License:	Cabin Crew License
License issued on:	04.08.2016
License expires on:	03.08.2021
Type of medical:	Cabin crew
Medical issued on:	11.07.2019
Medical expires on:	11.07.2021
Previous rest period:	2nd duty day after 3 days rest and 1-day emergency leave

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 four-bladed, reversible-pitch, full feathering propellers manufactured by MT Propeller, Germany. This type of MT propeller is installed under an STC approved by MCAA. The aircraft is designed for seating two pilots, side by side with dual controls and standard flight instrumentation.

Manufacturer:	de Havilland Canada
Registration:	8Q-TMR
Powerplants:	PT6A-27
Manufacturer's Serial Number (MSN):	270
Year of construction:	1969
Total Air Time and Landing at time of accident:	44,386.75 hrs. and 92,582 landings

Certificate of Airworthiness:	Normal category, issued on 11 July 2009
Airworthiness Review Certificate:	Issued on -3 April 2019 - extended until 2 April 2021
Last periodic inspection	EMMA No 4 on 20 October 2020
Last inspection carried out at TAT	44,384.27 hrs.

1.6.2 Engines and Propellers

Right Engine (Gas Generator)	
Right engine manufacturer	Pratt & Whitney Canada
Year of manufacture	1999
Model	PT6A-27
Serial number	PCE PG0122
Total Hrs. since new	15,311.71
Last overhaul date	23 January 2014
Hrs. since overhaul	4,943.01 hrs.
Last check carried out	EMMA #4
Hrs. since last check	2.48 hrs.
Right Engine (Power Section)	
Right engine manufacturer	Pratt & Whitney Canada
Year of manufacture	Unknown
Model	PT6A-27
Serial number	PS-52118-100
Last overhaul date	26 May 2014
Hrs. since overhaul:	4633.81
Last check carried out:	EMMA #4
Hrs. since last check:	2.48 hrs.
Left Engine (Gas Generator)	
Left engine manufacturer:	Pratt & Whitney Canada
Year of manufacture:	1978
Model:	PT6A-27
Serial number:	PCE-51671
Total hrs. since new:	20,229.81 hrs.

Last overhaul date:	19 Dec 2019
Hrs. since overhaul:	275.03
Last check carried out:	EMMA#4 dated 20 October 2020
Hrs. since last check:	2.48
Left Engine (Power Section)	
Left engine manufacturer:	Pratt & Whitney Canada
Year of manufacture:	Unknown
Model:	PT6A-27
Serial number:	42006-100
Last overhaul date:	19 Dec 2019
Hrs. since overhaul:	275.03 hrs.
Last check carried out:	EMMA#4 dated 20 October 2020
Hrs. since last check:	2.48 hrs.
Right Propeller	
Manufacturer:	MT Propeller
Year of manufacture:	2019
Model:	MTV-16-1ECFR(P)CFR240-55A
Serial number:	190125
Last overhaul date:	N/A
Hrs. since last overhaul:	N/A
Last check carried out:	EMMA#4 dated 20 October 2020
Left Propeller	
Manufacturer:	MT Propeller
Year of manufacture:	2019
Model:	MTV-16-1ECFR(P)CFR240-55A
Serial number:	190124
Last overhaul date:	N/A
Hrs. since last overhaul:	N/A
Last check carried out:	EMMA#4 dated 20 October 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 rather than carrying them in the dedicated cargo compartments. The reason being 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. The aircraft had four exits in the cabin and two in the cockpit. In this configuration the right passenger door is approved to be blocked.

1.6.4 Recent maintenance

The most recent maintenance inspections carried out include: Equalized Maintenance for Maximum Availability (EMMA) check number 04 complied with on 20 October 2020, at 44,384.27 TAT and 92,576 TAC.

During this EMMA inspection, inspection cards 4E LH engine and 5E RH engine was called for and completed. The EMMA card 58 and 68 (Mechanical) included engine / propeller maintenance tasks including:

1. Auto feather system
2. Overspeed governor
3. Constant speed governor
4. Propeller assembly

Additionally, engine ground runs were carried out before and after the EMMA check – with several engine parameters recorded – including:

1. Propeller overspeed governor check
2. Acceleration check
3. Acceleration in reverse and asymmetry check
4. Max reverse check

1.6.5 Flight Controls

Only those inspections called for in the EMMA inspections were carried out on the flight controls. Neither maintenance nor operating crew reported any abnormalities on the flight controls during the flight.

1.6.6 Powerplants

Aircraft was fitted with two Pratt & Whitney PT6A-27 engines. These engines were supplied by Pacific Turbine Brisbane (maintenance contractor) under a PBH program executed between the two companies.

1.6.7 Fuel

Jet A-1 fuel was used on the aircraft. The aircraft was loaded with a total of 1415 lbs. of fuel at departure from MLE, as per the Mass & Balance Report filed with TMA by the dispatchers.

1.6.8 Accessories

None

1.6.9 Defects

The aircraft had no open defects recorded.

1.6.10 Aircraft load

The aircraft has a Maximum Take-off Mass (MTOM) of 12,500 pounds. When it was dispatched from MLE for sector MLE-IRU, the aircraft had a total MTOM of 12,490 lbs., as per load sheet computed and available at the base.

Pax List (passenger list) - Flight Release document completed and printed at 09:48 hrs. on 22 October 2020 by TMA Flight Dispatchers (available in MLE) confirms that:

- Passenger weight (14 passengers) weighed a total of 1,926 lbs.;
- Luggage (18 pieces) weighed a total of 491 lbs.;

- Hand luggage (18 pieces) weighed 67 lbs.

This translates to a total payload of 2,484 lbs. carried onboard the aircraft, at departure from MLE.

1.6.11 Load sheet

The load sheet also served as the passenger manifest. A copy of the load sheet was retained with dispatch prior to taking-off, as required per the company Operations Manual. The records do not reflect any excessive loading of the aircraft.

1.7 Meteorological information

No weather data was available at Sun Siyam Iru Fushi Resort water aerodrome.

CAA Air Safety Circular ASC14-2 Amendment 1, Procedure and requirements for licensing water aerodromes and floating platforms, dated 04 February 2009, requires one wind direction indicator to be mounted on the movement area. No such visual aid was available at Sun Siyam Iru Fushi Resort water aerodrome at the time of the accident.

Meteorological information available from the automatic weather station at Shaviyani Atoll Funadhoo at 11:10 hrs. on 22 October 2020, was recorded as follows:

Wind direction:	250^{o}
Average wind:	3 knots
Max wind direction:	200^{o}
Max wind speed:	5 knots
Accumulated rain:	Nil

1.8 Aids to navigation

The aircraft was operating under VFR where 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 landing.

1.10 Aerodrome information

Destination Aerodrome:	Sun Siyam Iru Fushi Resort water aerodrome	
Reference	Floating –	N05°44.46012', E73°19.945'
	Attached –	N 05°44.488', E 73°19.067
		N 05°44.537', E 73°19.305
Facilities:	1 fixed platform, 2 floating platforms and 3 mooring buoys	

Location of the water aerodrome, including 4 water runways available at Sun Siyam Iru Fushi Resort is shown on the aerodrome chart, published by TMA

Figure 1: Sun Siyam Iru Fushi Resort Water Aerodrome Chart

Aerodrome License for Sun Siyam Iru Fushi Resort (Medhafushi Island), bearing license number AP/O/92, was issued to Trans Maldivian Airways Pvt Ltd., on 28 November 2010.

1.11 Flight Recorders

No flight data recorder (FDR) or cockpit voice recorder (CVR) was installed on the aircraft, as MCARs permit operation of the DHC6, series 100/200/300 aircraft without them.

1.12 Wreckage and impact information

1.12.1 Accident site visit

Accident site was visited by investigators from both MCAA and AICC. During this visit the aircraft was visually checked for damages.

1.12.2 Wreckage Condition

For damage information refer to 1.3.

1.12.3 Salvage operations

LH Propeller was replaced and a temporary repair on the damaged wing was carried out before the aircraft was ferried back to TMA base, under a ferry permit issued by the MCAA.

1.13 Medical and pathological information

Both flight crew members and the cabin crew were subjected to drug tests and the results were reported negative for all crew members.

1.14 Fire

There was no fire or fire alarms.

1.15 Survival Aspect

The aircraft taxied on its own power and reached the fixed platform and secured the aircraft without any assistance. The LH engine in which the blades were damaged were not shut down until the aircraft was docked in the fixed platform. There were no evidences of an activated ELT.

1.16 Tests and research

The related engine components need to be subjected to in depth laboratory testing to ensure performance.

1. The damage propeller including hub and assembly
2. The propeller governor and the over speed governor

1.17 Organizational and Management Information

TMA is a MCAA approved Air Operator Certificate holder. TMA provides domestic air services with a fleet of over 50 DHC-6 aircraft on floats. The company is authorized to conduct day VFR Operations.

The company holds Aircraft Maintenance Organization Approval reference MV.145.025 issued by the MCAA.

1.18 Additional Information

None

1.19 Useful or Effective Investigation Techniques

None

2.0 INITIAL FINDINGS

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

1. The Engine Performance check (Task Card number 202457-363) requiring engine performance check and operation of engine instruments prior to and post EMMA check, was carried out on 19 October 2020 at 11:05 hrs and 20 October 2020 at 17:00 hrs, respectively. The recorded engine ground run readings show some parameters were out of the limits, but the 'EGR Troubleshooting and Analysis Form' has no entries made suggesting there were no corrective actions taken to rectify the variations, prior to releasing the aircraft back to service.
2. The Crew from previous day reported a rejected take off at MLE due to weak reverse power observed, and also reported 'very weak' forward power as well
3. There was no wind direction indicator at the water aerodrome.

3.0 SAFETY RECOMMENDATIONS

TBD