بسم الله الرحمن الرحيم

ACCIDENT INVESTIGATION COORDINATING COMMITTEE

Republic of Maldives

SAFETY INVESTIGATION REPORT 2023/01

FINAL REPORT

WING IMPACTED WATER DURING LANDING

TRANS MALDIVIAN AIRWAYS

VIKING AIR DHC-6-300 TWIN OTTER, 8Q-TAQ

VOMMULI WATER AERODROME

VOMMULI ISLAND, FAAFU ATOLL, MALDIVES

16 MAY 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 accident, AICC was assisted by Trans Maldivian Airways (TMA).

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 24 April 2024.

ACCIDENT INVESTIGATION COORDINATING COMMITTEE
MALDIVES

Mr. Abdul Razzak Idris
Chairperson
Accident Investigation Coordinating Committee

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LIST OF ABBREVIATIONS

AOC	Air Operator Certificate
AICC	Accident Investigation Coordinating Committee
ATL	Aircraft Technical Log
ATPL	Air Transport Pilot License
CAMO	Continuous Airworthiness Management Organisation
CEN	Operator designated three letter code for Centara water aerodrome
CG	Centre of Gravity
CPL	Commercial Pilot License
CVR	Cockpit Voice Recorder
DHC-6-300	Viking Air DHC-6, series 300 aircraft
EMMA	Equalized Maintenance for Maximum availability
FDR	Flight Data Recorder
FTL	Fight Time Limitations
FO	First Officer
FWD	Forward
IR	Instrument Rating
IVL	Operator designated 3 letter code for Sun Siyam Iru Veli Maldives water aerodrome
IVL	Operator designated three letter code for SunSiyam Iruveli Maldives water aerodrome
lbs.	Pounds
LH	Left Hand
LIL	Operator designated three letter code for LilyBeach water aerodrome
LT	Local Time
MAC	Mean Aerodynamic Chord
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
O/B	Out board
PF	Pilot Flying

PIC	Pilot-in-Command
PM	Pilot Monitoring
PWC	Pratt & Whitney, Canada
SRM	Structural Repair Manual
TAC	Total Air Cycles
TAT	Total Air Time
TMA	Trans Maldivian Airways
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VOM	Operator designated 3 letter code for Vommuli water aerodrome
WAIG	(TMA) Water Aerodrome Inspection Group
WNW	West to North westerly direction

SYNOPSIS

On 16 May 2023, a Viking Air DHC-6-300 floatplane (registration markings 8Q-TAQ), operated by TMA landed at Vommuli water aerodrome (VOM) with 5 passengers and 3 crew onboard. The FO was the Pilot Flying (PF), and the PIC was the Pilot Monitoring (PM) seated on the left seat.

According to the flight crew, no abnormalities were observed throughout the flight. During landing, the aircraft hit a swell and bounced, hitting the left wing on the water and then landed. The impact with water caused extensive damage to the left wing of the aircraft. After landing the crew taxied the aircraft and docked at the fixed platform and both engines were shutdown. The passengers then disembarked through the main airstair door.

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

The occurrence was reported to the AICC at 15:55 hours LT, and an investigation was initiated on the same day.

1. FACTUAL INFORMATION

Aircraft Legal Owner:	Trans Maldivian Airways Pvt Ltd
Registered owner:	Trans Maldivian Airways Pvt Ltd
Aircraft Type:	DHC-6-300 (Float plane)
Operator:	Trans Maldivian Airways Pvt Ltd (Air Operator Certificate No.005)
Registration:	8Q-TAQ
Location of Occurrence:	VOM (approximately 0.75 km east of Vommuli Island)
Date and Time:	16 May 2023 at 15:20 hours LT
Persons on board:	8

1.1 History of Flight

1.1.1 Background

On 16 May 2023, Viking Air DHC-6-300 floatplane (registration markings 8Q-TAQ), operated by TMA, departed Sun Siyam Iru Veli Maldives water aerodrome (IVL) (Aluvifushi, Dhaalu atoll) on a charter service to Vommuli water aerodrome (VOM). There were 5 passengers (including 1 infant), 2 flight crew and 1 cabin crew onboard. The FO was the Pilot Flying (PF), and the PIC was the Pilot Monitoring (PM).

The aircraft was released for flight from the Operator's main base at Velana International Airport (MLE). The Daily Inspection was carried out on the previous day. On the day of the accident, the first trip of the day for the aircraft was operated on sectors MLE-CEN (Centara) – LIL (LilyBeach) – MLE.

On the second trip, the aircraft departed for a series of flights from MLE to IVL (Sun Siyam Iru Veli Maldives), then to VOM (Vommuli) and back to MLE. According to the flight crew, no abnormalities were observed, and the flight was uneventful until the initial contact with water at VOM.

The approach was considered a 'normal approach' and the crew performed descent checks and the FO briefed the PIC for landing.

The aircraft made a right orbit around the Vommuli island and the crew confirmed the landing line towards the edge of the reef, considering the water conditions and wind which, according to the PIC, was moderate from the west.

The FO briefed the PIC on the landing direction as well as flap settings, and the PIC advised the FO to adjust the landing direction. The PIC stated that the FO was briefed to turn slightly right, quartering the wind from the right paralleling the swells, as it was the best option based on his experience. The PIC stated that due to the large gaps between the swells, it was best to avoid landing head-on (perpendicular direction) to the swells.

Both crew members considered the approach as a 'normal approach'. During landing, with reduced power, the aircraft hit a swell and bounced. The PIC stated that the FO was instructed to increase the power, but accidentally retarded the power levers instead of moving them forward, thus reducing power. However, the FO stated that the power levers were in fact moved FWD to add power, as instructed by the PIC. The FO stated that the power was insufficient as the aircraft speed was low and with the lag in engine spooling up.

According to the crew, immediately after the bounce the aircraft experienced a left bank with the left wing impacting the water. Immediately after the bounce, the PIC took control of the aircraft. Once the aircraft was brought under control, the aircraft was taxied and docked on the fixed platform. Both engines were shutdown and the passengers then disembarked through the passenger door.

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	4+1	7+1	0
Total	2	1	4+1	7+1	0

1.3 Damage to aircraft

Damages were found only on the LH wing (which is part of Area 4, as per the DHC-6 manual PSM 1-6-7), as detailed below:

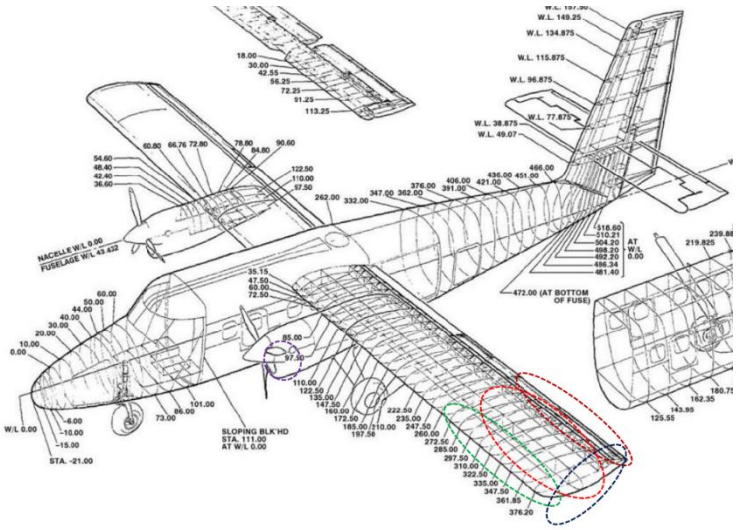
a. LH Wing Leading Edge (STA 247.50 – 376.20) – Damaged skin - Repairable Damage within SRM
   Upper skin, damaged ribs and hinge arm require replacement
   Several Stringers deformed

b. LH Wing Upper and Lower Surface (STA 247.50 – 376.20) – Damaged skin - Repairable Damage within SRM

c. LH Aileron - Dent / Deformation

d. LH O/B Fore Flap – Dent / Deformation

e. LH Wing tip – Deformed - Repairable Damage within SRM



1.4 Other Damage

None

1.5 Personnel Information

1.5.1 Pilot-In-Command

Age:	44 years
Nationality:	Maldives
Gender:	Male
Type of License:	A (ATPL-A)
License issued on:	17 Jan 2007 (First issued date)
License expires on:	14 Sep 2027
Type of medical:	Class One (1) medical certificate
Medical issued on:	03 Sep 2022
Medical expires on:	02 Sep 2023
Types flown:	DHC6/IR
Hrs. on type:	15,586.9 hours
Ratings:	DHC6 / IR
Last Proficiency check:	09 Aug 2022
Total hours as PIC:	14,966.5 hours
Total flight time:	15,586.9
Last 90 days:	245.31 hours
Last 28 days:	75.06 hours
Last 24 hours:	2.4 hours
Previous rest period:	11, 12 and 13 May 2023

1.5.2 Co-pilot

Age:	29 years
Nationality:	Sri Lanka
Gender:	Female
Type of License:	CPL-A
License issued on:	29 Dec 2022
License expires on:	28 Dec 2027
Type of medical:	Class One (1) medical certificate
Medical issued on:	04 Oct 2022

Medical expires on:	04 Oct 2023
Types flown:	DHC6 series
Hrs. on type:	352.5 hours
Ratings:	DHC6
Last Proficiency check:	06 Dec 2022
Total flight time:	352.5
Last 90 days:	228.31 hours
Last 28 days:	68.29 hours
Last 24 hours:	2.5 hours
Previous rest period:	13, 14 and 15 May 2023

1.5.3 Cabin Crew

Age:	31 years
Nationality:	Maldives
Gender:	Male
Type of License:	Cabin Crew License
License issued on:	02 May 2011 (First issued date)
License expires on:	06 Feb 2027
Type of medical:	Class Three (3) Medical Certificate
Medical issued on:	01 Sep 2022
Medical expires on:	31 Aug 2024
Previous rest period:	10, 11 and 12 May 2023

1.6 Aircraft Information

DHC-6-300 aircraft bearing MSN 381 was built in January 1973 by de Havilland Inc. The aircraft was registered in the Maldives for the first time on 25 October 2021and ever since it has been in operation with TMA.

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, constant speed, full feathering, and reversible-pitch 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:	381
Year of Manufacture:	1973
Nationality:	8Q (Republic of Maldives)
Registration Markings:	8Q-TAQ
Certificate of Registration:	Valid – since initial issue on 25 Oct 2021
Owner:	TMA
Operator:	TMA
Validity of Certificate of Airworthiness:	Valid since initial issue on 4 Nov 2021 (Normal category)
Airworthiness Review Certificate:	Issued by MCAA on 04 Nov 2021 Valid until 03 Nov 2022 1st Extension issued by the Operator's MCAR-M Organization – Valid until 03 Nov 2023
Total Flying Hours since manufacture:	27,151:74 hours
Total Landings since manufacture:	43,349 landings
Last periodic inspection:	EMMA 20
Last inspection carried out at TAT/TAC:	27,079:13 hours/ 43,181 cycles
Total Flying Hours since last periodic inspection:	74 hours

1.6.2 General Information (Engines and Propellers)

Right Engine (Gas Generator)	
Right engine manufacturer	PWC
Year of manufacture	Unknown
Model	PT6A-27
Serial number	PC-E 51467
Total Hrs. since new	11,660.94 hours
Last overhaul date	02 Feb 2023
Hrs. since overhaul	3106.14 hours
Last check carried out	EMMA No 20 on 29 April 2023
Hrs. since last check	74.44 hours

Right Engine (Power section)	
Right engine manufacturer	PWC
Year of manufacture	Unknown
Model	PT6A-27
Serial number	PG0085-100
Last overhaul date`	16 Feb 2021
Hrs. since overhaul:	2281.60
Last check carried out:	EMMA No 20 on 29 April 2023
Hrs. since last check:	74.44 hours
Left Engine (Gas Generator)	
Left engine manufacturer:	PWC
Year of manufacture:	Unknown
Model:	PT6A-27
Serial number:	PCE-41105
Total hrs. since new:	30,409.55 hrs
Last overhaul date:	17 May 2010
Hrs. since overhaul:	4224.75
Last check carried out:	EMMA No 20 on 29 April 2023
Hrs. since last check:	74.44 hours
Left Engine (Power section)	
Left engine manufacturer:	PWC
Year of manufacture:	Unknown
Model:	PT6A-27
Serial number:	P41105
Last overhaul date:	17 May 2010
Hrs. since overhaul:	4224.75
Last check carried out:	EMMA No 20 on 29 April 2023
Hrs. since last check:	74.44 hours
Right Propeller	
Manufacturer:	Hartzell
Year of manufacture:	Unknown
Model:	HC-B3TN-3DY

Serial number:	BUA22039
Last overhaul date:	24 Jul 2020
Hrs. since last overhaul:	2372.75 hours
Last check carried out:	EMMA No 20 on 29 April 2023
Left Propeller	
Manufacturer:	Hartzell
Year of manufacture:	Unknown
Model:	HC-B3TN-3DY
Serial number:	BUA20897
Last overhaul date:	16 April 2021
Hrs. since last overhaul:	2372.75 hours
Last check carried out:	EMMA No 20 on 29 April 2023

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

1.6.3 Recent maintenance

The most recent maintenance inspections carried out include Equalized Maintenance for Maximum Availability (EMMA) check number 20, complied with on 29 April 2023, at 27,079.13 TAT and 43,181 TAC. The next maintenance inspection would fall due at 27,204.13 hours TAT.

As per Aircraft Technical Log (ATL) sheet number 164969, the latest daily inspection was carried out at 18:30 hrs on 15 May 2023.

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 FLT888909, 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: 865 lbs.

Arrival at IVL:	445 lbs.
Uplift from IVL:	none
Departure from IVL:	445 lbs.
Arrival at VOM:	365 lbs.

1.6.6 Defects

The crew did not report any defects, and aircraft had no recorded open defects.

1.6.7 Aircraft Load

The aircraft departed Sun Siyam Iru Veli Maldives water aerodrome (IVL) with a take-off mass of 9,954.27 lbs. The estimated landing mass at arrival in VOM was 9,904.27 lbs.

The crew were provided with a printed loadsheet which was accepted and signed by the PIC. The loadsheet was prepared by Operator's Resort Agent (an employee of the resort trained by the Operator to assist the crew in dispatch duties).

Based on the loadsheet, both takeoff and landing masses were well within the limitations set by the Operator.

The Mass & Balance Report prepared for the flight by the PIC using the aircraft Tablet, recorded the Take-Off CG at 31% MAC, and the landing CG also at 31% MAC.

1.7 Meteorological information

There was no recorded weather data available at the Vommuli water aerodrome. The nearest recorded data was available from Faafu Nilandhoo climate data (automatic weather station), which is approximately 16.36 km (8.9 nm) north of Vommuli water aerodrome.

1.8 Aids to Navigation

N/A

1.9 Communications

N/A

1.10 Aerodrome information

As per the MCAA issued aerodrome license VOM is equipped with two fixed platforms, two floating platforms and two mooring buoys. On the southern side of the island, one attached platform and a floating platform (platform no. 1) was available, and on the north-eastern side an attached platform and a floating platform (platform no. 2) was available. For each of the floating platforms, a mooring buoy is located nearby. VOM is an uncontrolled aerodrome.

Platform co-ordinates:

Attached Platform 1:	N 02° 54′ 40.58″, E 72°52′ 05.89″
Floating Platform 1:	N 02° 54′ 48.57″, E 72°52′ 03.50″
Attached Platform 2:	N 02° 54′ 33.72″, E 72°52′ 01.79″
Floating Platform 2:	N 02° 54′ 32.57″, E 72°52′ 10.67″

Aerodrome License for Vommuli water aerodrome (Vommuli island, Dhaalu Atoll) bearing license number AP/O/125, was issued to Trans Maldivian Airways Pvt Ltd., on 13 December 2016. The latest platform inspection conducted by the MCAA was carried out on 02 November 2016. An inspection checklist was completed on 19 March 2023 by TMA Water Aerodrome Inspection Group (WAIG). The checklist was signed by the individual who completed the inspection form.

The surface conditions at both the landing areas at VOM have high swell patterns with long swell distances and these conditions exist throughout the year. About 4km to the northwest of the VOM, a 2km wide open channel exists, in between two lagoons, facing the ocean, on the western periphery / coastline of the atoll. Through this opening, high roller waves from the Arabian sea moves into the atoll with little or no restriction and passes through the VOM landing areas. These swells exist in both the designated landing areas. The waves are unpredictable and flows in multiple directions.

The VFR Route Manual issued by the Operator, in its Issue 4, Revision 0, dated 10 June 2018, shows another floating platform inside the lagoon, about 1.3 nm north of Vommuli. The MCAA has no record of any approval issued for the installation of a platform inside this lagoon.

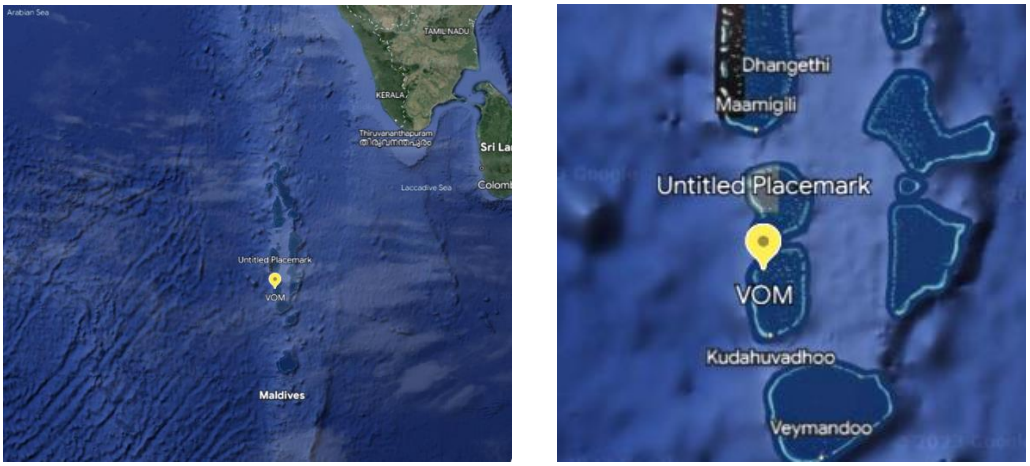


Fig 1(a) and 1 (b) – showing geographical location of Vommuli water aerodrome

Fig 2: Vommuli water aerodrome

TMA categorizes VOM as a Category C aerodrome and TMA Operations Manual Part A, General, Issue 2, Rev 9, dated 20 Oct 2022, under 8.1.2.3 covers Aerodrome categories – Water. Under sub-section C, Category C Aerodrome conditions are defined, which includes, those aerodromes deemed challenging in all weather conditions.

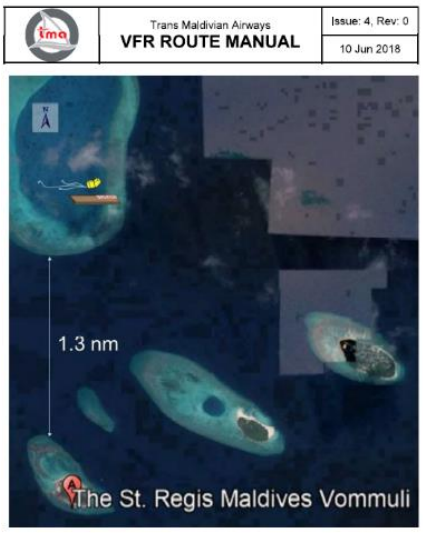


Fig 3(a) and 3(b): Vommuli water aerodrome chart from TMA VFR route manual

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

N/A

1.13 Medical and pathological information

There was no record 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

N/A

1.16 Tests and research

No tests or research were carried out as there were no technical defects identified during the investigation.

1.17 Organizational and Management Information

TMA provides domestic air services with a fleet of over 60 DHC-6 aircraft on floats. The company is authorized to conduct day VFR operations.

TMA holds AOC number 005, CAMO approval MV. CAMO.003 and MCAR 145 Maintenance Organisation Approval number MV.145.025 issued by the MCAA.

1.18 Additional Information

In November 2017 a similar accident involving a Viking Air DHC-6-200 floatplane aircraft occurred in Dhoores Water aerodrome – about 2.3 km north-east of VOM, where similar water surface conditions exist. (The AICC safety investigation report 2017/03 “Final Report on the Accident to Viking Air DHC-6-200, 8Q-IAG, Dhoores Floating Platform, Maldives. 16 November 2017’ is available on the MCAA website at https://www.caa.gov.mv/accidents-incidents).

2. ANALYSIS

This analysis is focused on the prevailing weather conditions at the water aerodrome, crew co-ordination, aircraft handling during landing and crew qualifications including their training and experiences. The Operator's operating standards, and organizational management are also looked at.

The objective of the analysis is to identify the root cause of the occurrence and put forward recommendations, which, when implemented by the stakeholders, will minimize recurrence of similar occurrences in future.

2.1 Operational Aspects

2.1.2 Weather Conditions at VOM

In general, wind direction and strength may be difficult to gauge in the absence of an appropriately located windsock, especially where local geography may affect the winds in the landing area. At the time of the landing at Vommuli, the wind was westerly with an estimated speed of 10-15 knots with high swells. During westerly winds, landing areas surrounding Vommuli island experiences wave heights of two to three feet with roller waves, typical for the time of the year. The waves move into the atoll from the north-west and passes through the atoll in a south easterly direction. While these waves flow between the two islands - Dhoores and Vommuli, the waves create unpredictable, multi–directional swell patterns. Another peculiar feature of these waves is that they have unusually long swell distances.

The PIC was familiar with the VOM landing areas and stated that the water conditions at VOM was 'nice' and way better than the previous two days, and this is one reason why the PIC decided to let the FO land.

2.1.3 Crew Co-ordination during Landing & Aircraft Handling

The accident sector was flown by a qualified FO, but having limited experience in landing under the prevailing water conditions. The PIC (a Line Training Instructor) stated that both crews discussed and selected the most suitable landing line which was towards the edge of the Vommuli island reef. As required by the procedures in the TMA Operations Manual, Part A, the aircraft performed a flyover inspection (Fig. 4) to assess the aerodrome surface conditions prior to landing.

Fig 4: Aircraft flyover path captured from FlightRadar24.com (Image used with permission)

The crew interviews confirm that the required landing checks were carried out including the selection of the flaps. It was noted that the aircraft was relatively lightweight and as per checklist the ref speed (Vref) was less than 70 knots. Both crew members confirmed that the FO briefed the PIC on the landing and that the PIC advised the FO to amend the landing direction and the way to approach for landing. Hence, the FO was briefed to go to the west on quartering the wind (from the right) paralleling the swells. The PIC stated that this instruction was given to avoid landing head-on (perpendicular direction) due to the large gaps between the swells, as it was the best option under the given water conditions.

The direction of landing was westbound, aiming towards the tip of the lagoon on Vommuli island, and not directly towards Vommuli island. This was to ensure that the go-around path was maintained clear, and Vommuli island will be on the right, in the event a go-around becomes necessary.

The PIC advised FO to land parallel to the waves and continued a normal approach. During landing, with reduced power, the aircraft hit a swell and bounced. After the bounce, the aircraft experienced a left bank with the left wing impacting the water. Immediately after the bounce the PIC instructed FO to add power. Following up, the FO stated that the power levers were moved FWD to add power. However, the FO felt

the power was insufficient due to the delay in engine spooling up and the aircraft continued to yaw to the left. The PIC took control, recovered and landed the aircraft.

It is noted that the PIC and FO statements contradict each other regarding power management. While the FO stated that the power levers were moved forward to add power as advised by the PIC, the PIC stated that the power levers were retarded instead of moving forward, thus reducing the power. The PIC further stated that he added power after taking over the controls, but the aircraft did not respond fast enough due to the lag in engine spooling.

When asked, the PIC stated that the PF was competent to land under the circumstances and would let the PF land again, under similar circumstances if the opportunity arises. The PIC added that the lesson learnt was to be more vigilant and prepared to take over from the PF, when needed.

2.1.4 Crew Qualifications, Training and Experience

The PIC and FO held valid licenses, fulfilled qualification and experience requirements of the Operator, and had operated themselves within the FTL limits prior to operation of the flight.

The PIC is an approved Line Training Captain with over 15,000 hours on type and was familiar with the landing areas and has operated to VOM regularly.
The FO was released to line about a month ago, having completed the line indoctrination training and had more than 350 hours on type. The FO had never landed at VOM but had landed at two other category C water aerodromes.
Both crew members stated that they had adequate rest prior to beginning the duty on the day of the accident. There was no evidence of any adverse medical conditions that affected any of the crew members. Drug tests done after the accident were found to be negative for both the PIC and the FO.

2.1.5 Conditions for Operating in and out of Category C Water Aerodromes

According to the airline Operations Manual Part A this water aerodrome is a Category C aerodrome and defines who can operate in and out of Category C Water Aerodromes.

TMA Operations Manual, Part A - General Issue 2, Revision 9, 8.1.2.3 defines the Water Aerodrome categories and characteristics of all different categories. TMA water aerodrome chart indicated that the Vommuli water aerodrome as Category C.

Category C aerodrome characteristics are stated as follows:

1. Large number of coral heads in the area.
2. Shallow operating area with restrictions during low tide.
3. Constrained operating area with limited approach and take-off orientations or distance due to the geography of the vicinity or layout of the resort. For aerodromes with more than one operating area, if any one of the areas pose such challenges, the aerodrome shall be classified as Category C.
4. Any water aerodrome deemed challenging in all weather conditions.

It is also stated that prior to landing at a category C water aerodrome a flyover inspection is mandatory. Additionally, it calls for increased situational awareness as water conditions are deemed to be erratic. If the conditions prevailing at Vommuli were unsuitable, the crew could have used an alternate landing site that was available nearby. However, at the time of landing the crew considered water conditions at VOM suitable for landing.

TMA Memo no. FO/2019-M025A dated 29 July 2019 was issued on the subject, “First officer restrictions for Take Off and Landing”. As per the Memo, Junior Co-Pilots can perform take-off and landings at Category C water aerodromes, provided the PIC is an approved Line Training Captain. In the Memo it is also stated that regardless of category and experience of a co-pilot, the captain must use his / her discretion to allow any co-pilot to take-off and land at any aerodrome. Extra caution must be taken into consideration during situations involving rough water, strong winds, bad weather, and operating in confined areas.

The PIC’s guidance to the PF was to land parallel to the waves, however the FO had limited experience in landing parallel to waves.

3. CONCLUSIONS

3.1 Findings

AICC identifies the following as the findings.

1. Medical fitness and FTL of the crew were not factors in this accident.
2. FO was the PF on the accident sector.
3. Moderate sea sate conditions existed at the landing area.
4. The FO had limited experience on the aircraft type with about 350 hrs.
5. The FO had limited experience operating in and out of Category C aerodromes and had never landed at VOM before.
6. The left wing of the aircraft impacted water on the roll to the left.

3.2 Causes / Contributing Factors

The AICC determines that the probable causes of the accident were:

1. The aircraft inadvertently hit a swell during landing.
2. Limited experience of the PF to operate to Category C water aerodromes.
3. Complacency and lack of vigilance on the part of PM to closely monitor the situation and take over when necessary.
4. Non-conducive power management for the aircraft behaviour during a bounce.

3.3 Safety Recommendations

3.3.1 Recommendations for the Operator

1. Review and revise company training policy on permitting junior crew members to take off and land at category C water aerodromes, as appropriate.
2. Provide Line-training for both crew members on the outcome of the review undertaken.

4. APPENDICES

4.1 Mass and Balance report

Mass & Balance Report

Tuesday, 16 May 2023 - 8Q-TAQ - 15:05:54 - IVL to VOM

Trip Information

AIRCRAFT	
Registration No	8Q-TAQ
APS Index	11.92
APS Weight	8,575.27 lbs
CREW	
Pilot-in-Command	[redacted]
ROUTE	
Departure	IVL Sun Aqua Iru Veli
Arrival	VOM Vommuli
Distance	6 nm
Bearing	255° WSW
TOTALS	
Total Pax Weight	678.00 lbs
Total Fuel	445.00 lbs
Total Baggage	271.00 lbs
Take-Off Weight	9,954.27 lbs
Sector Burn	50.00 lbs
Landing Weight	9,904.27 lbs

Details

FUEL TANKS	
FWD Tank	222.00 lbs
AFT Tank	223.00 lbs
MOMENTS	
APS Moment	1,820,006.70
Take Off Moment	2,112,882.33
Landing Moment	2,102,857.33
SECTIONS	
Section A	0.00 lbs
Section B	678.00 lbs
Section C	0.00 lbs
Section D	271.00 lbs
Section Tail	0.00 lbs

Take Off CG

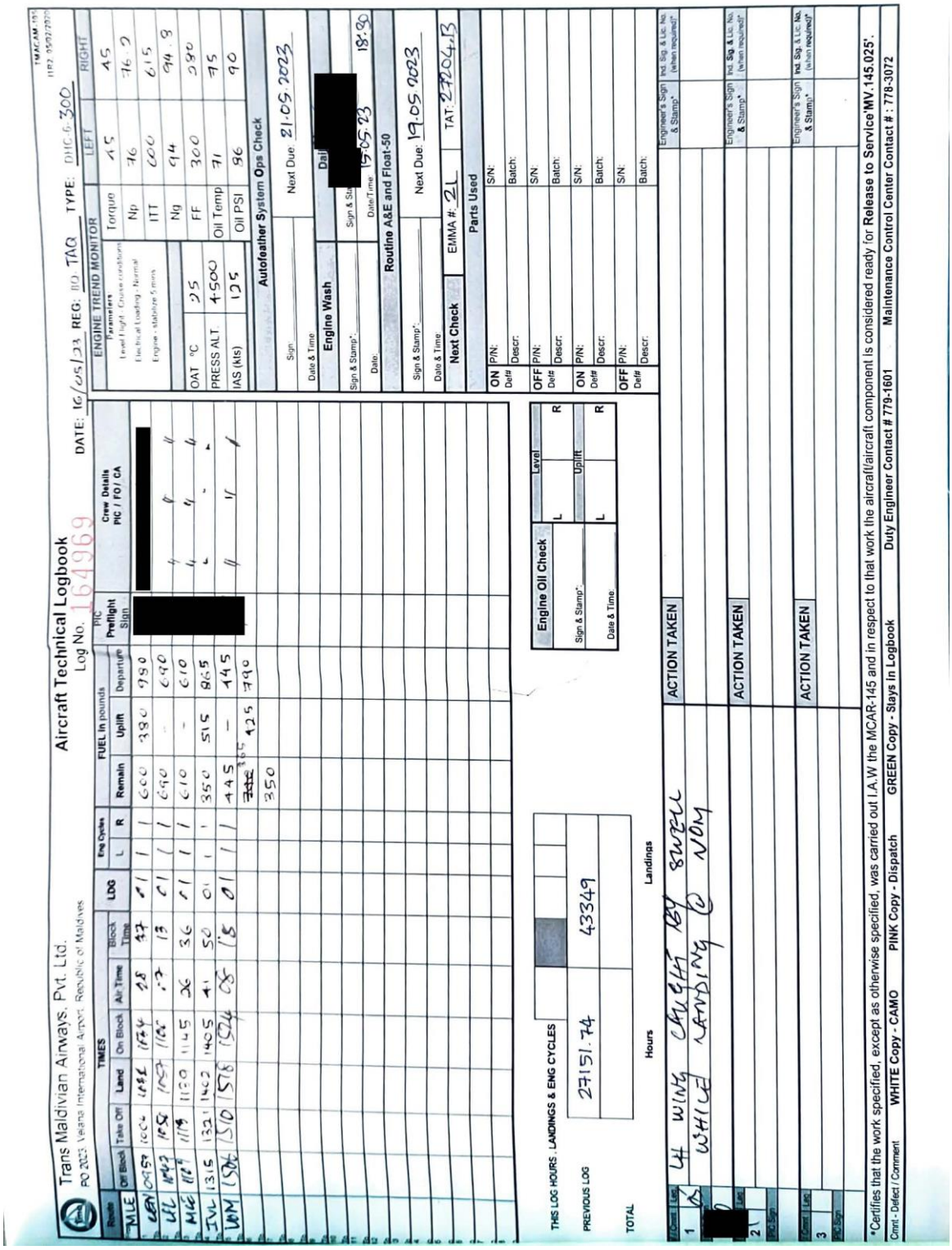
31% MAC

Landing CG

31% MAC

TMAPP WB Report ID: 884907, Generated on: 17-May-2023 12:03:23

4.2 Aircraft Technical log (ATL Log 164969)



Trans Maldivian Airways. Pvt. Ltd.
PO 2023 Velana International Airport, Republic of Maldives

Aircraft Technical Logbook
Log No. 164969

DATE: 16/05/23 REG: 8Q-TAQ TYPE: DHC 6-300

TIMES: Route, Off Block, Take Off, Land, On Block, Air Time, Block Time
FUEL in pounds: Remain, Uplift, Departure
Eng Cycles: L, R
LDG
PIC Preflight Sign
Crew Details PIC / FO / CA

Route	Off Block	Take Off	Land	On Block	Air Time	Block Time	LDG	Eng Cycles L	Eng Cycles R	Remain	Uplift	Departure	PIC Preflight Sign	Crew Details PIC / FO / CA
MLE														
HAN	1057	1106	1252	1254	2.8	4.7	01	1	1	600	330	930	[redacted]	[redacted]
UL	1453	1458	1557	1557	1.3	1.3	01	1	1	690	-	690		
MLE	1119	1119	1220	1145	2.6	3.6	01	1	1	610	-	610	4	4
TVL	1315	1321	1402	1405	4.1	5.0	01	1	1	350	515	865	4	4
HAN	1526	1530	1538	1544	1.8	1.8	01	1	1	445	-	445	2	2
										~~730~~ 785	125	790	//	//
										350				

THIS LOG HOURS: LANDINGS & ENG CYCLES
PREVIOUS LOG 27151.74 43349
TOTAL
Hours Landings

Engine Oil Check: Level L R; Uplift L R; Sign & Stamp*; Date & Time

ACTION TAKEN
1 LH WING CAUGHT BY SQUALL WHILE LANDING @ HDM
2
3

Engineer's Sign & Stamp* | Ind. Sig. & Lic. No. (when required)*

ENGINE TREND MONITOR

Parameters		LEFT	RIGHT
Level Flight, Cruise conditions	Torque	45	45
Takeoff, Loading, Normal	Np	96	96.2
Engine stabilize 5 mins	ITT	600	615
	Ng	94	94.3
OAT °C	25	FF	300	290
PRESS ALT	4500	Oil Temp	71	75
IAS (kts)	125	Oil PSI	96	90

Autofeather System Ops Check
Sign: Next Due: 21.05.2023
Date & Time

Engine Wash
Sign & Stamp*: Dat[redacted]
Date/Time: 19.05.23 18:30

Routine A&E and Float-50
Sign & Stamp*: Next Due: 19.05.2023
Date & Time

Next Check | EMMA #: 2L | TAT: 27204.3

Parts Used

ON	P/N:	S/N:	
	Def#:	Descr:	Batch:
OFF	P/N:	S/N:	
	Def#:	Descr:	Batch:
ON	P/N:	S/N:	
	Def#:	Descr:	Batch:
OFF	P/N:	S/N:	
	Def#:	Descr:	Batch:

*Certifies that the work specified, except as otherwise specified, was carried out I.A.W the MCAR-145 and in respect to that work the aircraft/aircraft component is considered ready for **Release to Service'MV.145.025'.**

Cmnt - Defect / Comment | WHITE Copy - CAMO | PINK Copy - Dispatch | GREEN Copy - Stays in Logbook | Duty Engineer Contact # 779-1601 | Maintenance Control Center Contact # : 778-3072

4.3 Passenger and cargo Manifest

5/16/23, 2:38 PM TRANS MALDIVIAN AIRWAYS

TRANS MALDIVIAN AIRWAYS
PASSENGER & CARGO MANIFEST

PRINT - Please print 2 copies for the captain

A/C Reg.: TAQ	**Date:** Tuesday, May 16, 2023	**Checkin Close Time:** 14:42:00
Dep. Station: IVL	**Flt. No.:** FLT888909	**Sequence of Close:** 1 of 1
Arr. Flight No.:	**Arr. Station:**	**Resort Name:** IVLR
	Dep. Flight No.:	**Login ID:** [redacted]

Passengers:

Resort	Passenger No.	Name	VIP	Type	Conn. Flt.	Tour Opr.	Pcs.	Lug. Wgt.	Pax Wgt.	Checked In
IVLR	[redacted]			MALE	[redacted]	IVL	4	128	189	✓
IVLR	[redacted]			FEMALE	[redacted]	IVL	0	0	150	✓
IVLR	[redacted]			MALE	[redacted]	IVL	4	143	189	✓
IVLR	[redacted]			FEMALE	[redacted]	IVL	0	0	150	✓
IVLR	[redacted]			INFANT	[redacted]	IVL	0	0	0	✓

Weight of checked in pax only

Checked in Count	Lug. Weight	Pax Weight
5	271.00	678.00

Cargo :

Last Minute Changes(manual input):

Name	VIP	Type	Conn. Flt.	Tour Opr.	Pcs.	Lug. Wgt.	Pax Wgt.

Aircraft weight and balance is within limits for take-off, enrute and landing of the above flight

[redacted]

Captains Signature [redacted]

Prepared by: (Resort Agent's Na[redacted]

Pax. Wgt		678
Cgo Wgt.		
Lug. Wgt.		271
TOTAL PAYLOAD		949
APS WGT.		95[illegible]
Fuel		130
T.O.W.		995[illegible]
Corr		995[illegible]
ACT. T.O.W.		
Burn off		00
Landing WGT		970[illegible]

* All Weights in lbs.

Close Window

https://flightinfo.transmaldivian.com/WebForms/Manifest.aspx?FlightNo=FLT888909&CurrentLeg=2&Resort_str=IVL 1/1

4.4 Photos of aircraft damages

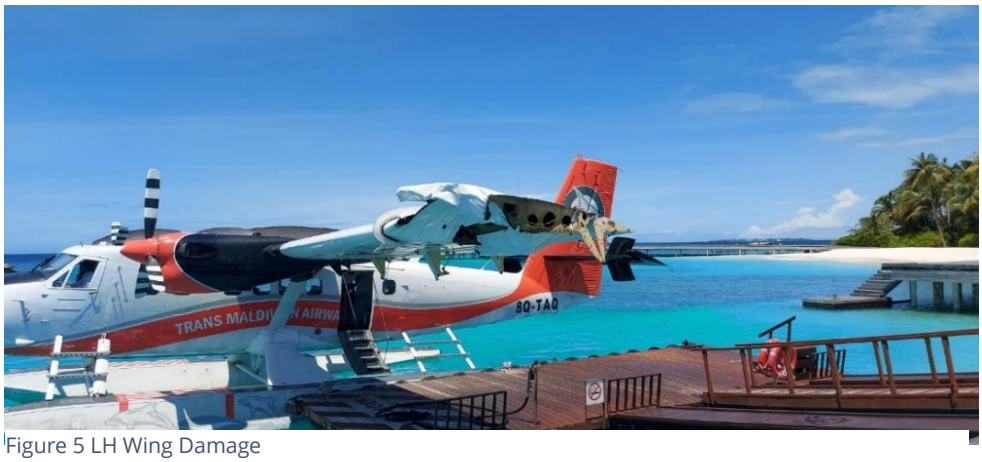


Figure 5 LH Wing Damage

Figure 6 LH Wing (RIB NO. 28) Damage

Figure 7 LH Wing Damage

Figure 8 LH Wing Damage

Figure 9 LH Aileron Damage

Figure 10 LH Wing Leading Edge Damage

Figure 11 LH Wing Top Damage

Figure 12 LH Wing Leading Edge Damage