ACCIDENT INVESTIGATION COMMISSION

FINAL REPORT

AIC 25-1001

22 August 2025

OPERATOR	:	Tropicair Limited
REGISTRATION	:	P2-AXL
MANUFACTURER	:	De Havilland Aircraft of Canada
MODEL	:	DHC-6-400
CLASS/CATEGORY	:	Runway Excursion
LOCATION	:	Kerema Airport, Gulf Province, Papua New Guinea
OCCURRENCE DATE	:	6 February 2025

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DEFINITIONS AND INTERPRETATION

Accident	An occurrence associated with the operation of an aircraft resulting in fatal or serious injury to a person/s, or substantial damage to the aircraft.
Accredited representative	A person designated by a State, on the basis of his or her qualifications, for the purpose of participating in an investigation conducted by another State. The accredited representative would normally be from the State's accident investigation authority.
Contributing Factor	An action, omission, or condition that increased the likelihood or severity of the accident
Safety Recommendation	A proposal of an accident investigation authority based on information derived from an investigation, made with the intention of preventing accidents or incidents and which in no case has the purpose of creating a presumption of blame or liability for an accident or incident.
State of Design	The State having jurisdiction over the organization responsible for the aircraft type design
State of Manufacture	The State having jurisdiction over the organization responsible for the final assembly of the aircraft, engine or propeller
State of Occurrence	The State in the territory of which an accident or incident occurs

ACRONYMS

AGL	Above Ground Level
AIC	Accident Investigation Commission (PNG)
AMSL	Above Mean Sea Level
AOC	Air Operator Certificate
ATC	Air Traffic Control
ATS	Air Traffic Service
CASA PNG	Civil Aviation Safety Authority of Papua New Guinea
CAR	Civil Aviation Rules
CPL	Commercial Pilot License
COM	Company Operation Manual
CSN	Cycles Since New
CVR	Cockpit Voice Recorder
Deg	degrees
FDR	Flight Data Recorder
Ft	feet
GNSS	Global Navigation Satellite System
Hrs	hours
HJ	Sunrise to Sunset
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IIC	Investigator in Charge
IMC	Instrument Meteorological Conditions
kg	Kilogram(s)
km	Kilometre(s)
Kts	knots (nautical mile(s)/hours)
Ltd	Limited
min	minutes
MOC	Maintenance Organisation Certificate
MTOW	Maximum Take-off Weight
NDB	Non-Directional Beacon
NTSB	National Transportation Safety Board
NM	Nautical Mile(s)
PCN	Pavement Classification Number
PIC	Pilot in Command
RNAV	Area Navigation
Sec	Second(s)
S/N	Serial Number
TSB	Transport Safety Board
TSN	Time Since New
TTIS	Total Time in Service
UTC	Coordinated Universal Time

INTRODUCTION

Investigation AIC 25-1001

At 11:09 (01:09 UTC) on 6 February 2025, Tropicair Limited (Ltd) notified the Accident Investigation Commission (AIC) via email about an occurrence that had occurred on the same day at 10:28. The occurrence involved a DHC-6-400 Twin Otter aircraft, owned by Lagavulin Asset Management Ltd and operated by Tropicair Ltd. The AIC immediately began gathering information pertinent to the occurrence and commenced an investigation pursuant to *Section 247 of the PNG Civil Aviation Act 2000.*

The AIC classified the occurrence as an accident and categorized it as a runway excursion. In accordance with *ICAO Annex 13, Chapter 4, paragraph 4.1,* the AIC promptly notified relevant foreign authorities of the State of:

- Airframe Manufacture/Design: Canada (TSB)
- Engine Manufacture/Design: Canada (TSB)

This investigation was conducted, and other States participation was permitted in line with the AIC's Investigation Policy and Procedures Manual, which is fully aligned with *ICAO Annex 13, Chapter 5, paragraph 5.18.*

This Final Report was prepared by the AIC, P.O. Box 1709, Boroko 121, NCD, Papua New Guinea. It has been authorised for public release by the Commission in accordance with *Paragraph 6.5* of the *ICAO Annex 13*. The report is available on the AIC website at www.aic.gov.pg .

The report is based on the investigation carried out by the AIC under *the Civil Aviation Act 2000*, and *Annex 13* to the *Convention on International Civil Aviation*. It contains factual information, analysis of that information, findings and contributing (causal) factors, other factors, safety actions, and safety recommendations. All times in this report are in local time (UTC+10 hours) unless otherwise stated.

AIC investigations explore the areas surrounding an occurrence, and the facts relevant to understanding how and why the accident occurred are included in the report. The report may also contain other non-contributing factors which have been identified as safety deficiencies for the purpose of improving safety.

In accordance with *ICAO Annex 13*, it is not the purpose of aircraft accident investigation to apportion blame or liability. The sole objective of the investigation and the Final Report is the prevention of accidents and incidents.

Synopsis

On 6 February 2025, at 10:28[1] local time (00:28 UTC[2]), a De Havilland Aircraft of Canada DHC-6-400 Twin Otter aircraft, registered P2-AXL, owned by Lagavulin Asset Management Limited (Ltd) and operated by Tropicair Ltd conducted an IFR[3] charter flight from Purari Airstrip to Kerema Airport, Gulf Province. During the landing roll at Kerema, the aircraft experienced a loss of directional control, veered off the runway and impacted a drainage ditch that runs along the left side of the runway. There were no reported injuries to the 2 crew members and 8 passengers onboard. The aircraft sustained substantial damage to the nose section and nose landing gear assembly on impact.

Recorded data showed that after the first application of Beta the aircraft continued to maintain centerline tracking. There were no abnormalities in directional control during touchdown and initial landing roll.

The Pilot-In-Command (PIC) applied Beta for the second time to further decelerate the aircraft. Subsequently, the aircraft began to drift towards the right edge of RWY 14. The PIC then advanced the power levers forward, applying asymmetric power. Simultaneously, the co-pilot applied full left rudder momentarily, before releasing pressure on the left rudder pedal. Both actions indicated intensions to steer the aircraft back to the left.

The PIC stated during interview that he attempted to apply brakes to further reduce the aircraft’s speed. However, he encountered difficulty in accessing the brakes when the sole of his footwear became lodged in the gap between the rudder pedals and brakes. Despite continued attempts, he was unable to gain proper access to the brakes and instructed the co-pilot to apply brakes. Following the PIC’s instructions the co-pilot stated that he lightly tapped the brakes as directed.

Recorded data showed that the PIC continued to apply asymmetric power while the aircraft continued to drift further right of the runway on the grass surface of the runway edge due to the grass surface being damp from rain fall earlier that morning, which reduced traction, impacting the aircraft's ability to respond to steering inputs. The PIC’s corrective actions, the aircraft's momentum on the damp grass surface and the asymmetric thrust-induced left yaw moment that led to an abrupt left skid back onto the paved surface, resulted in the aircraft overshooting the runway and continuing leftward onto the grass surface of the left side of RWY 14. The aircraft eventually impacted the side of the drainage ditch. The combined use of REVERSE application and braking by the crew was insufficient to arrest the aircraft’s movement due to its momentum and reduced traction.

The accident resulted from a combination of environmental and human factors, as well as procedural non-compliance. The uncoordinated actions by the crew and the excessive corrective control inputs applied, in an attempt to recover directional control of the aircraft, inadvertently worsened the situation. The poor crew communication and coordination during a critical phase of flight degraded situational awareness and control.

Further details and factors, including analysis and findings are contained in the main report. The report also includes safety recommendations derived from safety deficiencies observed by the AIC during the investigation addressed to the operator.

According to *ICAO Annex 13 Standards*, identified safety deficiencies and concerns must be raised with the persons or organisations best placed to take safety action. Unless safety action is taken to address the identified safety deficiencies, death or injury may result in a future accident.

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[1] Departure time from Purari Airstrip according to the recorded data

[2] The 24-hour clock, in Coordinated Universal Time (UTC), is used in this report to describe the local time as specific events occurred. Local time in the area of the accident, Papua New Guinea Time (Pacific/Port Moresby Time) is UTC + 10 hours.

[3] Instrument Flight Rules: Rules and regulations established to govern flight under conditions in which flight by outside visual reference is not safe. IFR flight depends upon flying by reference to instruments in the flight deck, and navigation is accomplished by reference to electronic signals. It is also a term used by pilots and controllers to indicate the type of flight plan an aircraft is flying, such as an IFR or VFR flight plan

1. FACTUAL INFORMATION

1.1 History of the Flight

Aircraft Registration	:	P2-AXL
Owner	:	Lagavulin Asset Management Limited
Operator	:	Tropicair Limited
Type of Operation	:	IFR Charter Flight
Persons on Board	:	Ten (10) – 2 Crew and 8 Passengers
Accident Site	:	Latitude 7° 57’49.7”S, Longitude 145°46’18.7”E
Elevation	:	8 feet (ft) above sea level
Time of occurrence	:	10:28 local time (00:28 UTC)

Table 1: Accident Summary.

On 6 February 2025, a De Havilland Canada DHC-6-400 Twin Otter aircraft, registered P2-AXL (AXL), on an IFR charter flight from Purari Airstrip to Kerema Airport, Gulf Province, experienced a runway excursion during the landing roll at Kerema. The aircraft lost directional control during the landing roll, veered off the runway and impacted the runway edge drainage ditch that runs along the left side of the runway.

Figure 1: Overview of P2-AXL flight path and accident site.

The Pilot in Command (PIC) was the pilot flying (PF) and occupied the left seat. The co-pilot was the pilot monitoring (PM) and occupied the right seat.

Recorded data[4] showed that AXL departed Purari Airstrip at 10:00 local time, climbed to and maintained an altitude of 5,000 ft Above Mean Sea Level (AMSL), and tracked Southeast to Kerema with an estimated arrival time of 10:25 (Refer Figure 2).

[4] Recorded data comprises information from the Solid-State Flight Data Recorder, Solid-State Cockpit Voice Recorder, and the Appareo AIRS-400, all of which have been synchronised. For additional details, refer to Section 1.11

During an interview with the AIC, the crew reported that due to adverse weather conditions encountered while approaching Kerema Airport, they continued the flight at the published Minimum Safe Altitude (MSA) of 4,400 ft to ensure adequate terrain clearance.

They further stated that they became visual less than 10 Nautical Miles (NM) Northwest of Kerema and commenced their descent for a visual approach into Kerema for landing.

Recorded data showed that at 10:16, approximately 25 NM Northwest of Kerema Airport, the aircraft commenced a descent from 5,000 ft AMSL.

At 10:19, approximately 16 NM Northwest of Kerema, the aircraft stopped descending at 3,200 ft AMSL, then initiated a climb and levelled off at approximately 4,500 ft AMSL as it continued towards Kerema.

At approximately 9 NM Northwest of Kerema Airport, the crew initiated a descent. At 10:24, passing 3,000 ft AMSL the crew cancelled SARWATCH and proceeded with the approach to the circuit area.

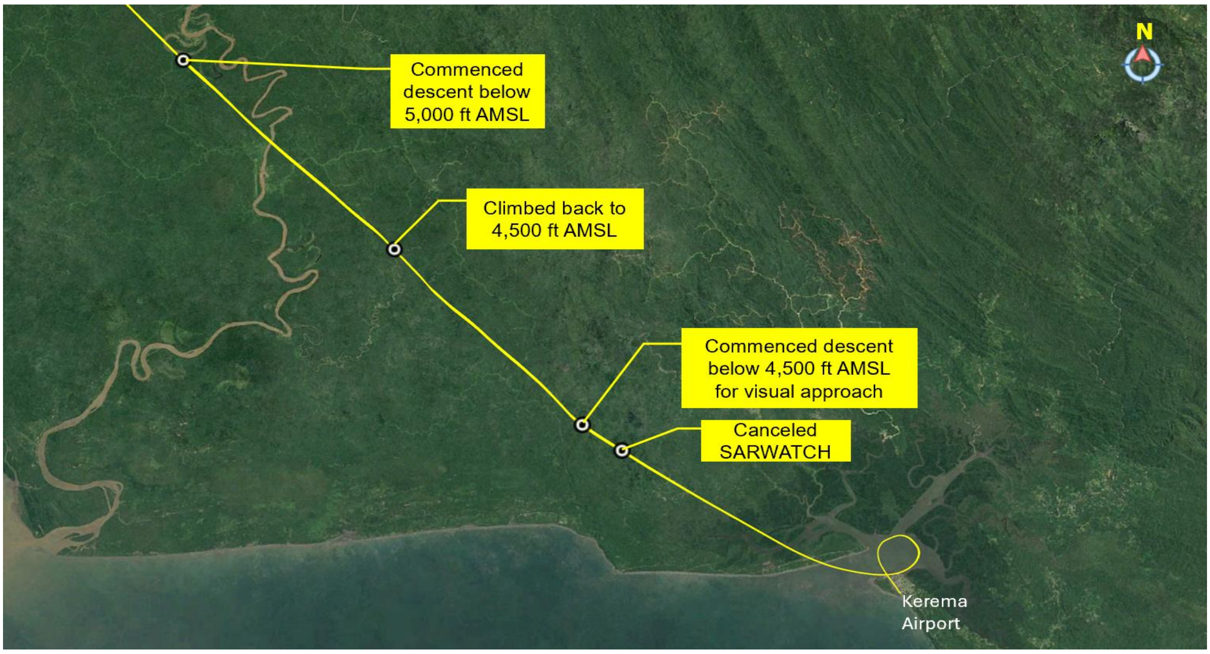


Figure 2: P2-AXL Flight path after descending below 5,000ft.

The crew stated during interview that upon arrival in the Kerema circuit area they observed patches of clouds over the aerodrome and convective weather activity developing southeast of the aerodrome.

After arriving overhead the field, the crew assessed the windsock which indicated wind conditions favouring a landing on Runway (RWY) 32. However, taking into consideration the weather activity observed southeast of the aerodrome, along the extended centreline of RWY 32, combined with the elevated terrain in the approach sector to RWY 32, the crew opted to proceed with the approach and land with a tailwind on RWY 14.

Recorded data showed that at 10:26, the aircraft was positioned overhead the field while passing through 1,200 ft Above Ground Level (AGL).

The aircraft then tracked east of the field, before turning left and joining left downwind for RWY 14. The aircraft then continued left onto the base leg while passing through 700 ft AGL. At 10:27, the aircraft was established on final, passing through 150 ft AGL.

According to the crew, while turning onto final, they confirmed the effects of the tailwind combined with a crosswind from the right. They continued with the approach while closely monitoring the right cross-tailwind. The PIC added that as the aircraft descended closer to RWY 14 threshold, the effect of the right cross-tailwind began to reduce. The co-pilot stated that at 300 ft AMSL, on short final, he advised the PIC that the tailwind component was 10 kts. The PIC elected to proceed with the landing, with recorded data indicating that the aircraft touched down at 10:28.

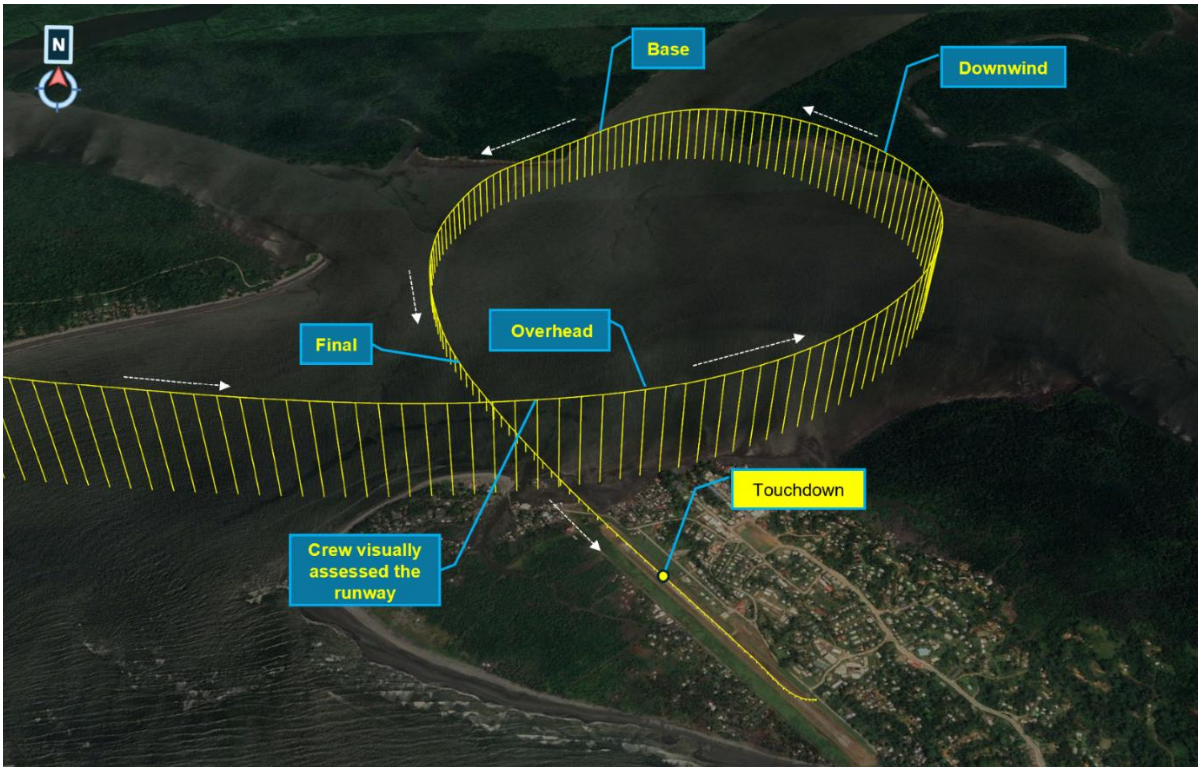


Figure 3: Kerema Airport Circuit Area.

Following touchdown, the PIC selected Beta mode in accordance with the operator's Standard Operating Procedures (SOPs) to assist with decelerating the aircraft. Recorded data showed that; after the first application of Beta the aircraft continued to maintain centerline tracking. There were no abnormalities in directional control during touchdown and initial landing roll.

Recorded data showed that the PIC applied Beta for the second time. Subsequently, the aircraft began to drift towards the right edge of RWY 14. The PIC then advanced the power levers forward. The left power lever remained in the IDLE position while the right power lever was advanced further forward, which indicated that the PIC was applying asymmetric power. Simultaneously, the co-pilot applied full left rudder momentarily. Following this action, recorded data showed the aircraft yawed briefly to the left, before the co-pilot abruptly released pressure on the left rudder pedal. The aircraft then yawed to the right and continued to drift to the right.

The PIC stated during interview that he attempted to apply brakes to further reduce the aircraft's speed. During this action, he encountered difficulty in accessing the brakes when the sole of his footwear became lodged in the gap between the rudder pedal and brakes. Despite continued attempts, he was unable to gain proper access to the brakes.

Recognising the situation, the PIC instructed the co-pilot to assist in applying brakes. During AIC's interview with the co-pilot, he stated that he was not aware of the situation of the PIC's inability to access the brakes. However, following the PIC's instructions he stated that he lightly tapped the brakes as directed.

According to the PIC, he continued with the application of asymmetric power combined with rudder input, to steer the aircraft back onto the paved runway surface. However, the aircraft continued to travel forward on the grass surface of the runway edge on the right side, before it skidded left toward the paved runway surface. The crew stated that once back on the paved runway surface, the aircraft overshot the centreline and continued further left of RWY 14. They added that they were unable to maintain directional control. The PIC stated that he applied Reverse when the aircraft had skidded onto the grass surface of the left runway edge in an attempt to stop the aircraft.

Recorded data showed that the PIC continued to apply asymmetric power while the aircraft continued to drift further right of the runway on the grass surface of the runway edge, before making a sharp left turn. This was in response to the induced asymmetric thrust effect, with an increase of power in the right engine that generated a left yaw moment. The aircraft then re-entered the runway and overshot the centreline before continuing further left onto the grass surface of the runway edge. The PIC applied Reverse, however, the aircraft continued to skid further left and eventually impacted the side of the drainage ditch.

Figure 4: Illustration of P2-AXL tracking along the runway from touchdown to impact.

Tyre markings identified by the onsite investigation, showed that the right main wheel had rolled onto the grass surface of the runway edge on the right side of the runway, approximately 300 metres from the touchdown point of RWY 14.

The tyre markings also showed that the aircraft travelled approximately 170 m further forward with all three wheels on the grass surface. The tyre marks then indicated a change of direction to the left, back towards the runway. The deep imprinted tyre marks on the grass surface and then onto the sealed bitumen surface indicated that the aircraft had begun to skid.

The tyre marks continued over the paved runway surface, onto the grass surface of the left edge and into the drainage ditch, the final resting position of the aircraft.

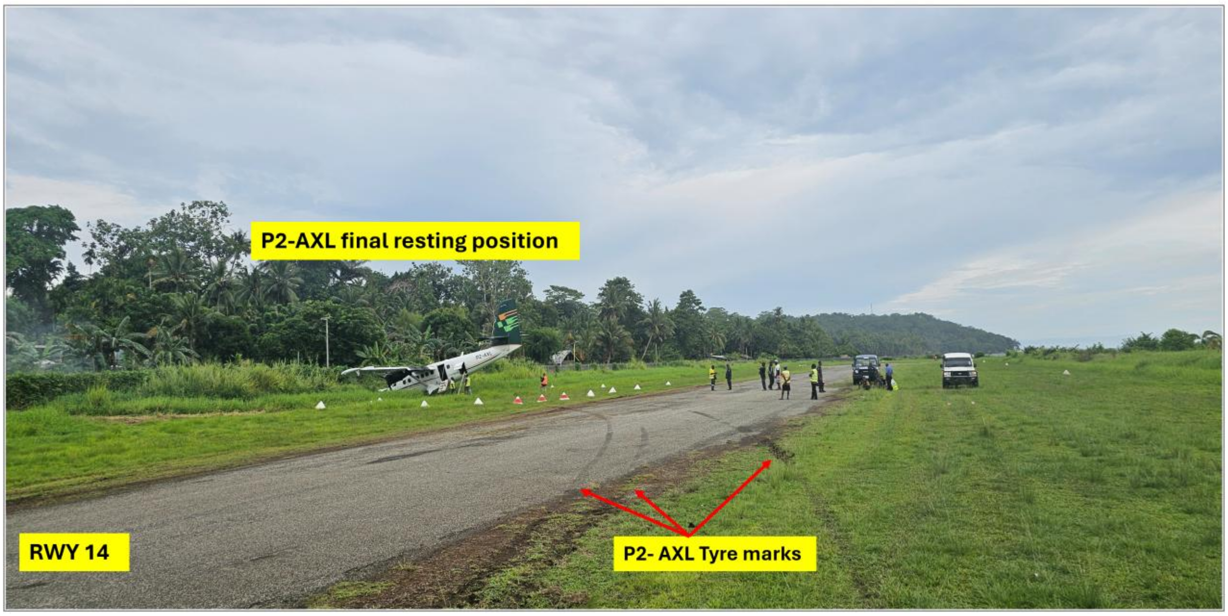


Figure 5: Tyre marks depicting P2-AXL track on the grass surface, right side of RWY 14 before turning left and re-entering RWY 14.

The crew subsequently shut down the engines and proceeded with the evacuation of passengers. The crew and the passengers egressed the aircraft through the left rear exit door.

1.2 Injuries to Persons

INJURIES	*Crew*	*Passengers*	*Total in aircraft*	*Others*
Fatal	0	0	0	0
Serious	0	0	-	-
Minor	0	0	-	Not applicable
None	2	8	-	
TOTAL	2	8	10	-

Table 2: Injuries to persons.

1.3 Damage to Aircraft

The aircraft sustained substantial damage to its nose section and nose landing gear assembly. Refer to Section 1.12 for a detailed description of damage to the aircraft.

1.4 Other damage

There was no other damage to property and/or the environment.

1.5 Personnel Information

1.5.1 Pilot in Command

Age	:	*43 years*
Date of Birth	:	*15 June 1981*
Gender	:	*Male*
Nationality	:	*Fijian*
Position	:	*Pilot*
Type of licenses	:	*PNG CPL (Aeroplane)*
Route	:	*Endorsed*
Type ratings	:	*BN-2, DHC-6*
Instrument rating, multi-engine two pilot	:	*19 January 2025*
Total flying time	:	*6,286.6 hours*
Total on this type	:	*5,800 hours*
Total hours last 30 days	:	*11.1 hours*
Total hours last 7 days	:	*8.1 hours*
Last Competency Check (DHC-6)	:	*19 January 2025*
Medical class	:	*One*
Issued	:	*25 April 2024*
Valid to	:	*25 April 2025*
Medical limitation	:	*Multi Crew*

Table 3: PIC Personnel Information.

An assessment of the Pilot-in-Command's (PIC) training records as provided by the Operator was conducted to evaluate crew competency and currency at the time of the accident. The records confirmed that the PIC was current in both proficiency and currency checks in compliance with *Civil Aviation Rules (CAR) Part 61.807 – Currency Requirements for the Holder of an Instrument Rating*, and *CAR Part 125.605 – Flight Crew Competency Checks*.

Operational documentation indicated that within the three months preceding the accident, the PIC had conducted multiple flights using the accident aircraft, including 22 flights paired with the same co-pilot. The most recent flight conducted as pilot-in-command occurred two days prior to the accident flight. His flight and duty time limitations were within regulatory requirements.

Additionally, records confirm that the PIC had completed six flights into Kerema Airport during the same three-month period, indicating familiarity with the airport and its operational environment.

Based on the available evidence, the investigation determined that the PIC possessed operational familiarity with the aircraft type, the assigned co-pilot, and the destination aerodrome.

1.5.2 Co-pilot

Age	:	*43 years*
Date of Birth	:	*30 March 1981*
Gender	:	*Male*
Nationality	:	*Fijian*
Position	:	*Pilot*
Type of licenses	:	*PNG CPL (Aeroplane)*
Route	:	*Endorsed*
Type ratings	:	*C152, C172, C206, Y12, BN-2A, DHC-6*
Instrument rating, multi-engine two pilot	:	*22 June 2024*
Total flying time	:	*6,303 hours*
Total on this type	:	*2,100 hours*
Total hours last 30 days	:	*77.2 hours*
Total hours last 7 days	:	*15.6 hours*
Last Competency Check (DHC-6)	:	*22 June 2024*
Medical class	:	*One*
Issued	:	*12 September 2024*
Valid to	:	*12 September 2025*
Medical limitation	:	*Multi Crew*

Table 4: Co-pilot Personnel Information.

An assessment of the co-pilot's training records, as provided by the operator, was conducted to evaluate crew competency and currency at the time of the accident. The records confirmed that the co-pilot was current in both proficiency and currency checks in accordance with *Civil Aviation Rules (CAR) Part 61.807 – Currency Requirements for the Holder of an Instrument Rating*, and *CAR Part 125.605 – Flight Crew Competency Checks*.

Operational records indicated that the co-pilot had conducted all recent flights using the accident aircraft, serving in both pilot-in-command and co-pilot capacities. Documentation also confirmed that the co-pilot had operated several flights into and out of Kerema Airport in the period preceding the accident, demonstrating operational familiarity with the aerodrome and its surrounding environment.

Based on the available evidence, the investigation determined that the co-pilot possessed adequate familiarity with the aircraft type and the operational context of the accident flight.

1.6 Aircraft Information

The De Havilland Aircraft of Canada Ltd, DHC-6 Series 400 Twin Otter is an all-metal, high-wing monoplane. It is equipped with a fixed tricycle landing gear configuration, featuring a steerable nosewheel. The flight control system consists of a conventional three-control setup, consisting of dual side-by side rudder pedals and control column combination.

The aircraft is powered by two wing-mounted Pratt and Whitney, PT6A-34 turboprop engines, each driving a three-bladed, reversible pitch, fully feathering propeller.

The aircraft is certified to accommodate up to 19 passengers, depending on the specific seating configurations.

1.6.1 Aircraft

Aircraft manufacturer	:	*De Havilland Aircraft of Canada*
Model	:	*DHC-6-400*
Serial number	:	*895*
Year of manufacture	:	*2014*
Nationality of State of Manufacture	:	*Canada*
Nationality of State of Registration	:	*PNG*
Registration	:	*P2-AXL*
Name of the owner	:	*Lagavulin Asset Management Limited*
Name of the operator		*Tropicair Limited*
Certificate of Airworthiness number	:	*485*
Certificate of Airworthiness issued		*8 May 2023*
Valid to	:	*non-terminating*
Certificate of Registration number	:	*485*
Certificate of Registration issued	:	*17 April 2023*
Valid to	:	*non-terminating*
Total airframe hours	:	*3,581.47*
Total airframe landings	:	*3,703*

Table 5: Aircraft Information

1.6.2 Engines

Manufacturer	:	*Pratt & Whitney Canada Inc.*
Type	:	*PT6A-34*
Engine Type	:	*Turboprop*
Time to next overhaul	:	*4,000 hours*
Position	:	*Left*
Serial No.	:	*PCE-RB0770*
Total Hours Since Overhaul	:	*0.0 hours*

Total Time Since New	:	*3,581.47*
Position	:	*Right*
Serial No.	:	*PCE-RB0771*
Total Hours Since Overhaul	:	*0.0 hours*
Total Time Since New	:	*3,581.47 hours*

Table 6: Engine Information.

1.6.3 Propellers

Manufacturer	:	*Hartzell Propeller Inc.*
Type	:	*HC-B3TN-3D/T10282NB*
Propeller Type	:	*Hydraulically controlled, three blade, constant speed, fully reversing and fully feathering*
Position	:	*Left*
Serial No.	:	*BUA-32697*
Total Hours Since Overhaul	:	*808.11 hours*
Position	:	*Right*
Serial No.	:	*BUA-32880*
Total Hours Since Overhaul	:	*1,880.56 hours*

Table 7: Propeller Information.

1.6.4 Airworthiness and Maintenance

At the time of the accident, P2-AXL had a valid Certificate of Airworthiness (CoA) and Certificate of Annual Airworthiness Review (AAR).

The maintenance records of the aircraft were reviewed and identified that there were no outstanding scheduled maintenance, defects and Minimum Equipment List (MEL) prior to the accident flight.

Therefore, the investigation found that the aircraft was serviceable and airworthy at the time of the accident.

1.6.5 Aircraft Weight and Balance

The investigation determined that the aircraft was within the approved weight and centre of gravity (balance) limitations for the intended flight and therefore, weight and balance was not a contributing factor to the accident.

1.6.6 Aircraft Systems

1.6.6.1 Rudder Pedals

According to the *Viking DHC-6, Series 400, Pilot Operating Handbook, Volume 2, Revision 1 30 May 2014; Section 7 Aircraft and Systems Description,* Rudder Pedals are installed at the pilot and co-pilot positions. Each set of rudder pedals is adjustable fore and aft for comfortable reach by means of a knob below each instrument panel.

When the knob is pulled, leg reach can be adjusted by allowing a spring-loaded adjuster to move the pedals aft, or by exerting pressure on the pedals to move the pedals forward. Re-engagement of the knob locks the pedals in the desired position.

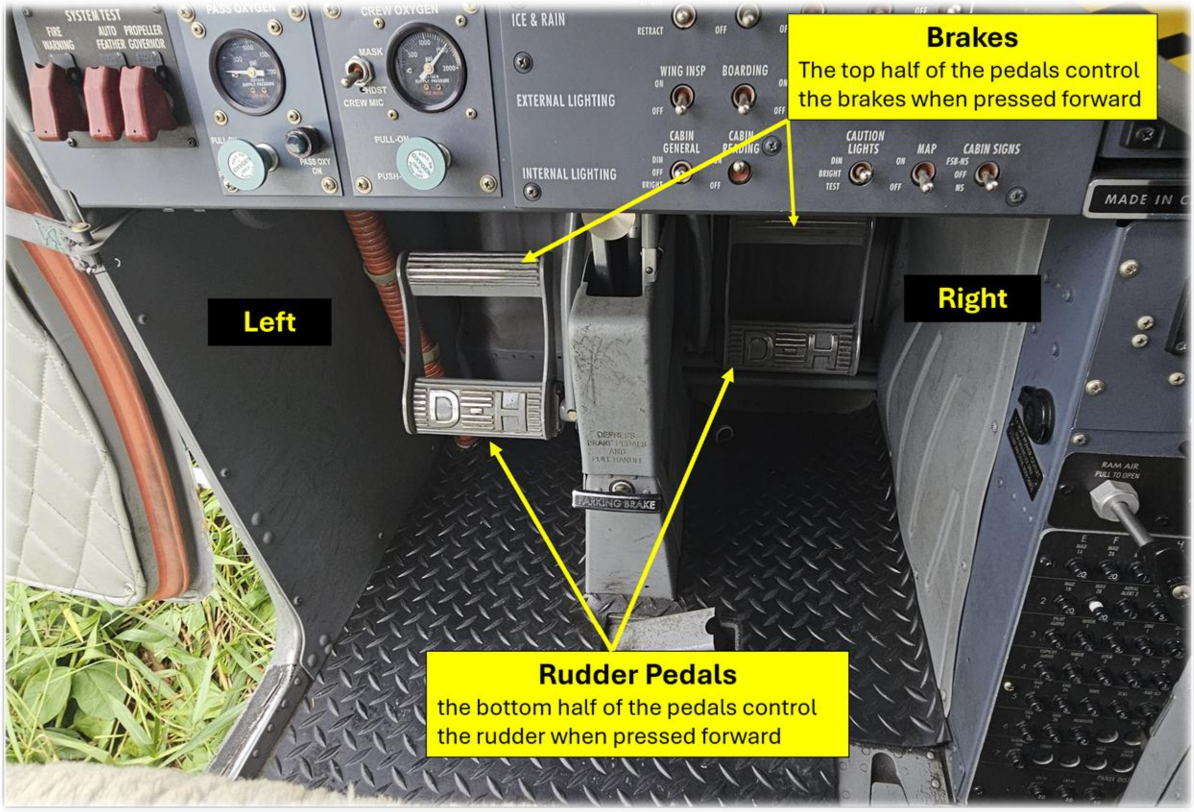


Figure 6 P2-AXL Rudder and Brake Pedals.

The rudder pedals control the aircraft's rudder, which adjusts yaw – the side-to-side movement of the aircraft's nose. They also function as independent left and right brake pedals when the top of each pedal is pressed forward.

Directional control during landing should be maintained by use of rudder, according to the *Viking DHC-6 Series 400 Pilot Operating Handbook Volume 2, Revision 1, 30 May 2014, Section 10 Safety and Operational Tips*. As the aircraft slows down, asymmetric thrust may be used to control any tendency to weathercock (for more information refer to section *1.18 Additional Information*) in crosswinds.

The investigation established that, while directional control is expected to be maintained through the coordinated use of rudder and braking, as outlined in the *Viking DHC-6 Series 400 POH*, the PIC's ability to apply braking was compromised. The sole of his footwear became lodged between the rudder pedal and brake mechanism, preventing effective engagement of the brakes.

Section 5.1 Appendix A1 and Appendix A2 provide a systematic description of the Engine/Propeller Control and Flight Control systems, respectively.

1.6.6.2 Assessment of Pilot Feet Placement During landing and Brake Application

The PIC stated during interviews that he encountered difficulties in accessing the brakes during the landing roll. He stated that the sole of his footwear became lodged in the gap between the rudder and brake pedal assembly, preventing effective brake engagement. He further stated that despite multiple attempts, he was unable to obtain adequate brake control.

As part of the investigation, a subject was instructed to demonstrate a series of foot positions on the rudder pedal assembly, that could lead to the reported interference when attempting to access the brakes. The assessment was performed using footwear similar in size and type, as that worn by the PIC at the time of the occurrence.

In one of the demonstrations, the sole of the footwear got lodged in the gap between the rudder and brakes. Video review of the landing roll was inadequate due to the PIC's feet position on the rudder pedals not being visible. However, demonstration results support the PIC's account. Refer to Figure 7 below, showing images of the demonstrations conducted.

Figure 7:Demonstration of Foot/Feet position on Rudder Pedals and Brakes.

1.7 Meteorological Information

1.7.1 National Weather Service Terminal Aerodrome Forecast (TAF)

TERMINAL AERODROME FORECAST (TAF)		
Issued by	:	*PNG National Weather Service (NWS)*
Minor Port	:	*AYKM*
Issued	:	*6 February 2025* *03:00 (17:00 UTC)*
Validity Period	:	*05:00 – 19:00 (19:00 – 09:00 UTC)*
Wind	:	*010 degrees at 5 Kts*
Cloudy	:	*Scattered at 1600 ft Broken at 3000 ft*
Visibility	:	*Greater than 10 km in rain and drizzle*
QNH	:	*1004 1006 1005 1003*

Table 8: Weather Information on the day of the accident provided by National Weather Services (NWS).

1.7.2 Reported Weather and Pilot Observation of weather at Kerema

According to the crew, on the first flight to Kerema earlier in the morning at 9:05, on the day of the accident, it had been raining. They described the intensity of the rain as light and stated that the visibility was good. On this occasion they had also landed on RWY 14.

During an interview with the AIC, the crew stated that prior to their departure from Purari Airstrip, they received a brief weather update via phone from the local agent at Kerema Airport. According to the crew, the local agent advised that both the weather conditions and visibility were good. The crew then elected to proceed with the flight to Kerema.

On descent and approaching Kerema, they encountered adverse weather, therefore, the crew stopped their descent and initiated a climb to the published Minimum Safe Altitude (MSA) of 4,400 ft AMSL where they levelled off and maintained MSA, until approximately 9 NM Northwest of Kerema Airport. The cloud cover, according to the crew, appeared to be layers of scattered and broken clouds, however, they were able to see the coastline. When they had visual of the field, they proceeded with a visual approach to the Kerema circuit area.

Figure 8: P2-AXL Cockpit view overhead the aerodrome.

According to the crew, when overhead the field they noted the windsock indicating gusts and favouring a landing on RWY 32. However, taking into consideration the weather activity observed southeast of the aerodrome, along the extended centreline of RWY 32, combined with the elevated terrain in the approach sector to RWY 32, the crew opted to proceed with the approach and land with a tailwind on RWY 14.

Figure 9: The cloud cover southeast of the aerodrome towards RWY 32, shortly after the accident: (Picture capture provided by a passenger after the evacuation from P2-AXL).

1.8 Aids to Navigation

Ground-based navigation aids, on-board navigation aids, and aerodrome visual ground aids and their serviceability were not a factor in this accident.

1.9 Communication

All communications between air traffic services (ATS) and the pilot were normal and did not contribute to this accident.

1.10 Aerodrome Information

1.10.1 General Information

Kerema Airport is located in Gulf Province, Papua New Guinea, at an elevation of 8 ft and about 120 NM northwest of Jacksons International Airport, National Capital District, Papua New Guinea.

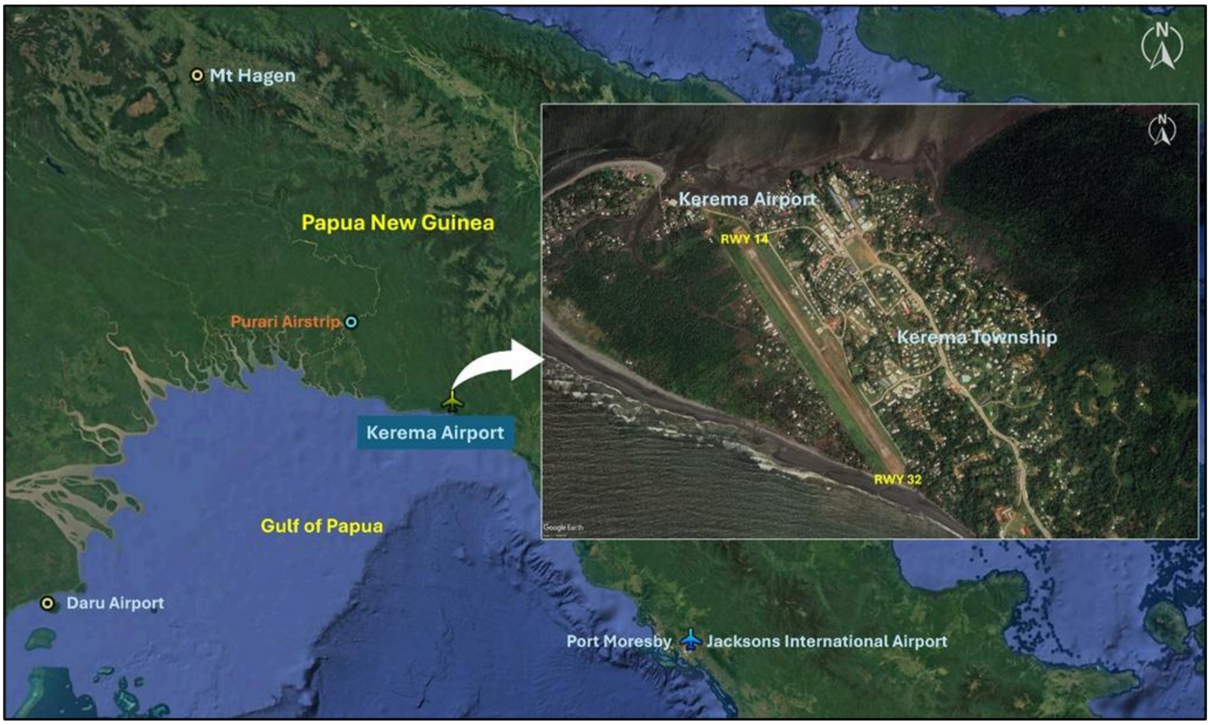


Figure 10: Location of Kerema Airport.

According to the Aeronautical Information Publication Papua New Guinea, (AIP PNG) the Kerema Airport is a small aerodrome, offering limited services and infrastructure and primarily intended for light aircraft operations. The airport supports daytime (HJ) operations only, with no nighttime or instrument flight capabilities due to the absence of runway or approach lighting systems. The airport lacks cargo handling facilities and fuel services, meaning no refuelling or storage capacities are available on-site. A basic passenger terminal is present with sanitation facilities for travellers. Rescue and firefighting capabilities are absent, with no equipment or resources for aircraft recovery in case of emergencies. The apron, surfaced with bitumen and rated at PCN 14, supports limited aircraft operations, while taxiways are narrower at 7.5 meters (m) wide, unsealed, and rated at PCN 12.

The runway slope is level and basic runway markings are provided; however, no centerline, touchdown zone, or threshold lighting is installed. There are no navigation aids installed at the airport, with arrivals and departures reliant on GNSS -based procedures, including published RNAV (GNSS) approach charts.

Meteorological services at Kerema Airport are supported by the Port Moresby Meteorological Watch Office (MWO), offering 24-hour weather monitoring and Terminal Aerodrome Forecast (TAF) preparation. However, specific landing forecasts are not available. Consultations and briefings for weather-related planning can be accessed via telephone or NAIPS . These limitations highlight the airport's basic operational nature and dependence on external support for advanced services and emergency response.

The AIP PNG classifies Kerema Airport as an uncertified aerodrome.

With the limitation of Kerema Airport as established in the AIP PNG, the operator stores its own Jet A1 fuel drums and refuelling equipment at the airport.

Aerodrome name: Kerema Airport		
Coordinates:	**Latitude:** 07°57'49.7" S	**Longitude:** 145°46'18.7" E
Elevation:	8 ft	
Dimension:	Length: 944m	Width: 45m
Airstrip Type:	Two-way landing and take off	
Surface characteristics:	Bitumen sealed	
Slope:	Level	
Hours of operations:	Day light	
ATS Communication:	Moresby Flight Information Service (FIS)	
	VHF: 120.9 **HF:** 6622	

Table 9: Kerema (AYKM) Aerodrome Information.

According to the operator's DHC-6 Route Guide dated 1 December 2017, the operator attests that the airport infrastructure presents notable operational challenges. As stated within the DHC-6 Route Guide, the small parking area, unsealed and prone to bogging in heavy rain, demands careful ground handling. While navigation aids such as NDB and DME have been decommissioned, the operator's crews may use a DME Arrival plate referencing AYKM for guidance. Safety risks include potential wind shear on Runway 14 during strong south-easterly winds and unauthorized movements of pedestrians and animals on the field. Despite these constraints, there are no performance limitations for DHC-6 aircraft operating at Kerema, allowing the operator to conduct its flights effectively while maintaining safety and operational standards.

1.10.2 Onsite Observation of Kerema Airport

During the onsite investigation, investigators observed the operational surfaces and the overall condition of the aerodrome.

The main runway at Kerema Airport which composed of a bitumen surface, exhibited overall signs of deterioration. The surface appeared uneven in certain areas, with visible erosion and potholes along the runway. Vegetation encroachment was observed along the edges of the runway, where overgrown grass was seen extending inward toward the bitumen surface making the narrow runway width.

Adjacent to the bitumen surface, the grass edge is relatively short in height compared to the taller and denser grass located beyond the runway cones and extending up to the perimeter fencing. These grass areas that slope into drainage ditches along the edges of the runway, were observed to contain thick, overgrown vegetation as well as standing water and mud.

The aerodrome is surrounded by a perimeter fence that provides a degree of security and helps restrict unauthorized public access to the airside area.

The taxiway connecting the runway to the aircraft parking bay is situated on the northern side of the runway, approximately midway along the runway's length. The taxiway and parking bay surface composes of grass that had recently been cut and a bitumen strip that has also been encroached by the grass.

There are two windsocks installed at the aerodrome. One is positioned at the aircraft parking bay, while the second windsock is located further from the parking bay closer to the Southeast end of the runway. Both windsocks are serviceable and assessed to be effective in providing visual indicators of wind direction and strength.

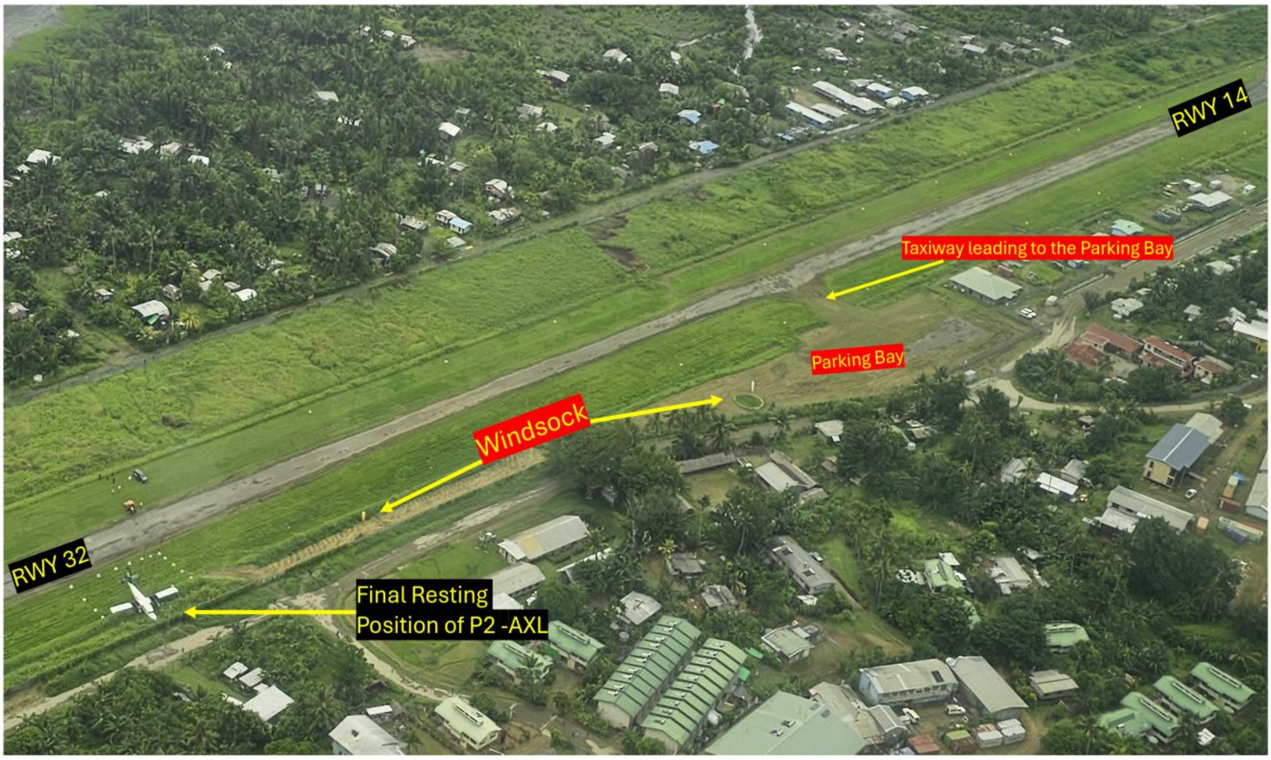


Figure 11: Aerial view of Kerema (AYKM) aerodrome.

1.11 Flight Recorders

The aircraft was fitted with a Solid-State Cockpit Voice Recorder (SSCVR) and a separate Solid-State Flight Data Recorder (SSFDR). The table below provides more information about the recorders.

Both recorders were taken to the AIC Flight Recorder Laboratory to undergo data download, readout, playback, and analysis. The data was successfully retrieved and utilised to complement the investigation.

Solid-State CVR		Solid-State FDR	
Manufacturer	Honeywell International Inc.	Manufacturer	Honeywell International Inc.
Model	AR-120	Model	AR-256
Part Number	980-6023-002	Part Number	980-4710-003
Serial Number	11445	Serial Number	02536
Recording Capability	3 Channels 30 min 2 Channels 2 hours	Recording Capability	More than 25 hours 256 words per second

Table 10: SSFDR and SSCVR information.

Figure 12: Download of the recorders at the AIC Flight Recorder Laboratory.

The FDR captured key parameters from the accident flight, which were plotted and analysed by the AIC to understand the sequence of events. The data spans from approximately 1,200 ft AMSL to the point of impact. Refer to Figure 13 below.

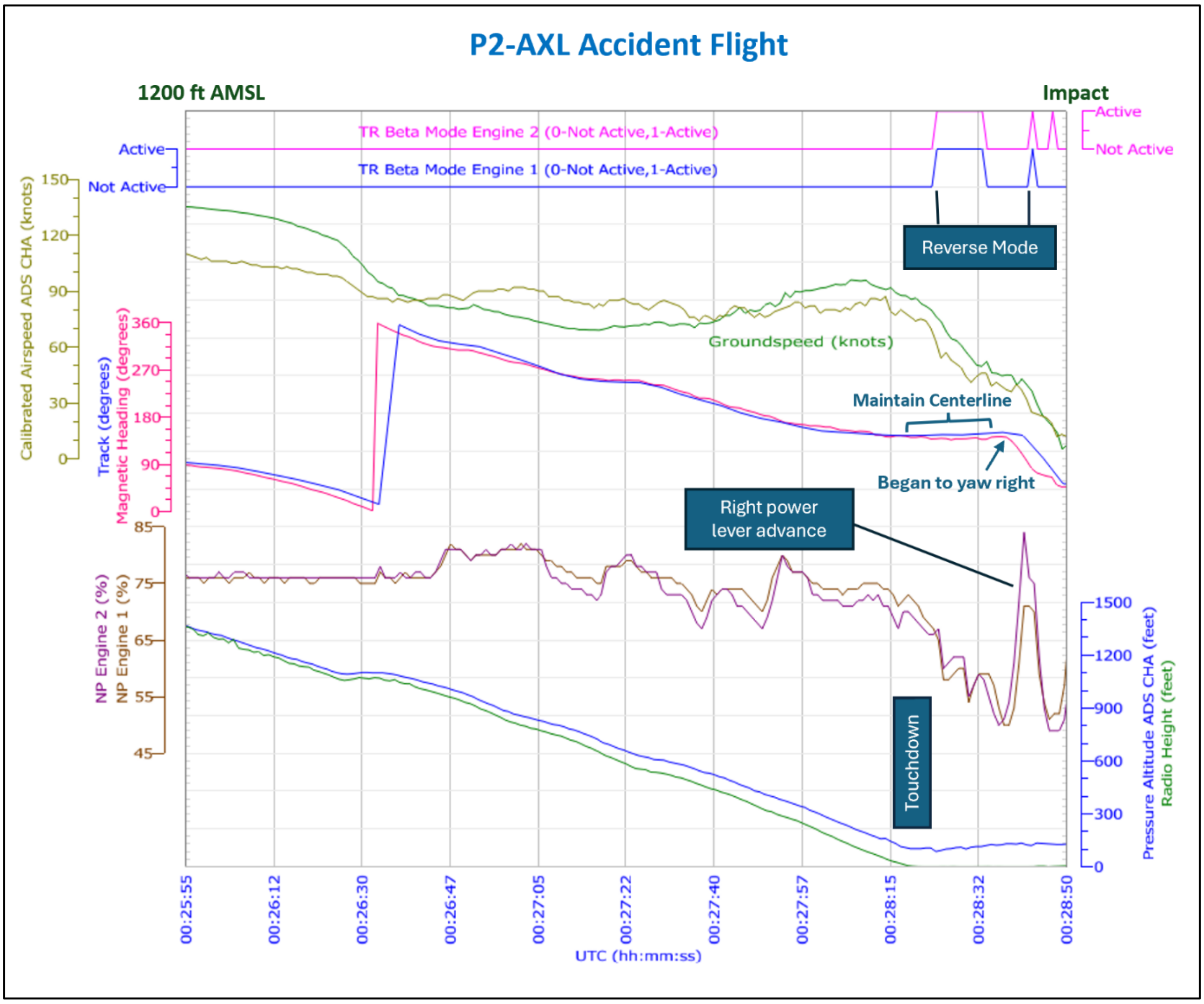


Figure 13: P2-AXL from 1,000 ft AMSL to impact.

1.11.1 Other Electronic Data Recording Device

The aircraft was fitted with an Appareo AIRS 400 recorder for flight data monitoring purposes. The unit captured the following information: cockpit image recording, intercom system audio for crew, air traffic control (ATC) communications and WAAS GPS (latitude, longitude, groundspeed, vertical speed, GPS altitude, etc), Attitude data (G forces) and rates of rotation. The unit has an SD card for storing recorded information.

Data from the SD Card was successfully extracted and included recordings from the accident flight, as well as from earlier flights conducted prior to the accident. Relevant parameters and video imagery from the accident flight were retrieved and synchronised with the SSCVR and SSFDR data, and analysed to complement the investigation.

1.12 Wreckage and Impact Information

1.12.1 General Description of the Wreckage

According to the onsite investigation, tyre marks imprinted by AXL showed that the aircraft's tracking from touchdown to the initial landing roll along RWY 14, were less distinct due to the sealed bitumen surface.

However, the tyre markings of the initial drift to the right, identified by onsite investigation, showed that at approximately 300 metres (m) from touchdown, the aircraft exited the runway and tracked along the grass strip with more distinct tyre markings on the soft surface.

Observations also showed that the aircraft had travelled a further 170 m forward with all three wheels on the grass surface. The tyre marks then indicated a change of direction to the left, back towards the runway. The deep imprinted tyre marks on the grass surface tracking back onto the sealed bitumen surface indicated that the aircraft had begun to skid. The tyre marks showed that the aircraft continued over the runway surface and further onto the grass surface of the runway edge on the left side and into the drainage ditch.

Figure 14: Ground track during the landing roll leading to the accident.

Despite the crew's efforts to recover from the loss of directional control, the asymmetric power inputs caused the aircraft to accelerate past the runway edge and into the drainage ditch. Recorded data showed that the aircraft impacted the drainage ditch at a considerable speed and momentum.

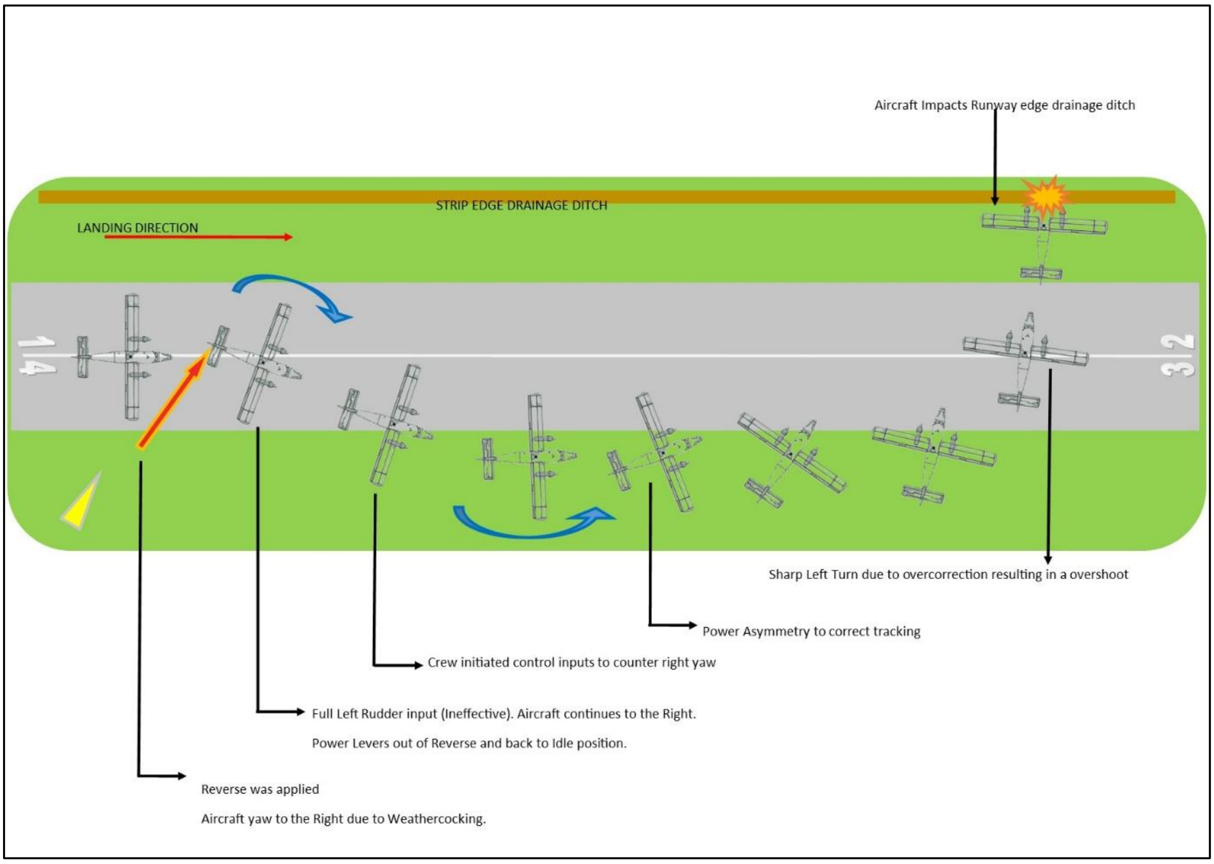


Figure 15: Illustration showing initial yaw to the right, leading to right drift and overcorrection.

1.12.2 Aircraft Damage

The onsite damage assessment by the AIC team identified extensive damage primarily localised to the aircraft's nose section (Refer to Figure 15) This area contains internal mounting shelves and equipment enclosures. The extent of the damage suggests a potential compromise to both the airframe structure and the integrity of multiple onboard systems located within the nose cone area.

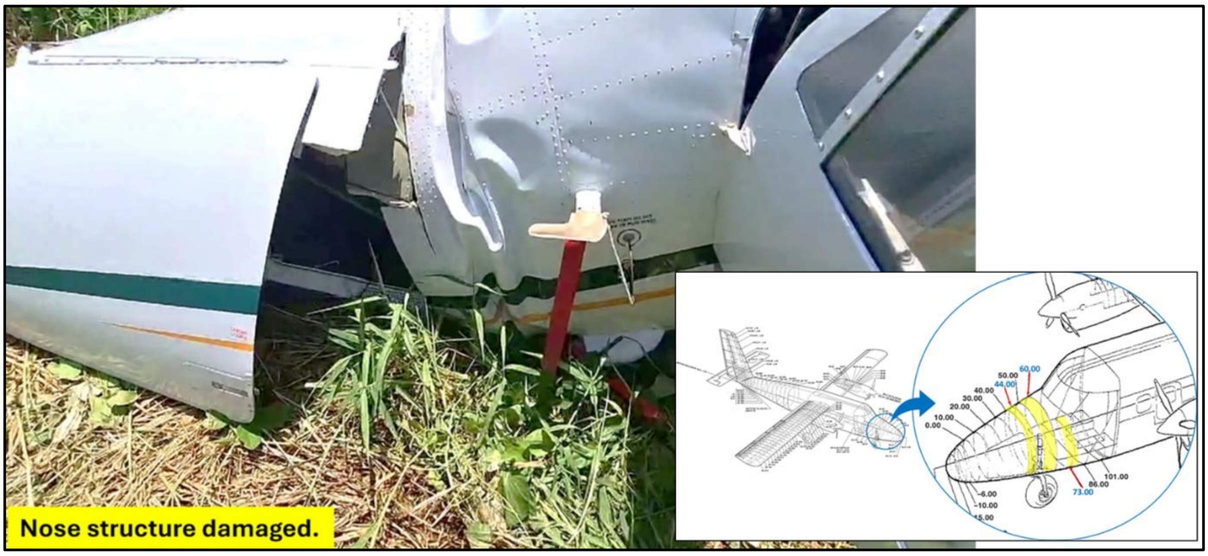


Figure 16: Structural damage to the nose section (FS 40.00-FS 60.00), showing deformation and deterioration.

The Nose Landing Gear had collapsed as a result of the runway excursion. Due to the collapse, the Nose Landing Gear was removed to prevent further damage to the airframe structure.

Figure 17: Nose landing gear bogged in the drainage ditch.

1.12.3 Post Maintenance Assessment

According to Tropicair Limited's Damage Assessment and Apron Recovery report, the aircraft sustained significant damage as a result of the runway excursion. The following sections of the aircraft were identified as damaged;

1. The Weather Radar Equipment, installed inside the nose cone, was physically compromised. The deformation of the nose cone structure resulted in damage to the radar assembly.
2. Hydraulic Equipment located in the forward lower section of the nose cone sustained impact damage, affecting the operational reliability of the system.
3. The Crew Oxygen System and associated Cylinder, positioned within the bottom section of the nose cone, was found to be compromised as a result of the structural deformation.
4. Avionic Components situated between fuselage stations FS 40.00 and FS 60.00 were subjected to mechanical shock and displacement. The mounting shelves securing these components were impacted.
5. The Hoses, Wiring Looms, Connectors, and Mounting Brackets installed within the affected Nose Section exhibited signs of stress and possible damage, requiring thorough functional and inspections.
6. External Panels and the composite nose cone section exhibited visible cracks and deformations consistent with impact forces during the runway excursion.

Section 5.2 Appendix B of this report contains the operator's damage assessment.

1.13 Medical and Pathological Information

No medical or pathological investigations were conducted as a result of the this accident nor were they required.

1.14 Fire

There was no evidence of pre- or post-impact fire.

1.15 Survival Aspects

Operator's *Standard Operating Procedures (SOP) Manual, version 0, section 5.10.5 'EVACUATION AFTER EMERGENCY LANDING'* states:

The Captain has the prime responsibility for initiating a passenger evacuation. Should another crew member consider that an evacuation is necessary, he is to advise the Captain of the situation and await the Captain's decision. In cases where it is obvious that an evacuation is imperative and no contact with the Captain has been possible, only then will the other crew member assume full responsibility for initiating the evacuation. It is therefore necessary for the Captain to keep any other crew members and passengers fully informed of his intentions, when any situation develops which may require an emergency evacuation or precautionary disembarkation of crew and passengers.

According to the crew, once the aircraft came to a complete stop and the engines were shut down by the PIC, the co-pilot made his way to the back of the aircraft and evacuated the passengers through the airstair door/forward left cabin door. Onsite investigation identified that the passengers were evacuated through the airstair door/forward left cabin door.

The co-pilot then offloaded all baggage from the rear baggage compartment door of the aircraft and relocated the passengers to a safe area away from the aircraft.

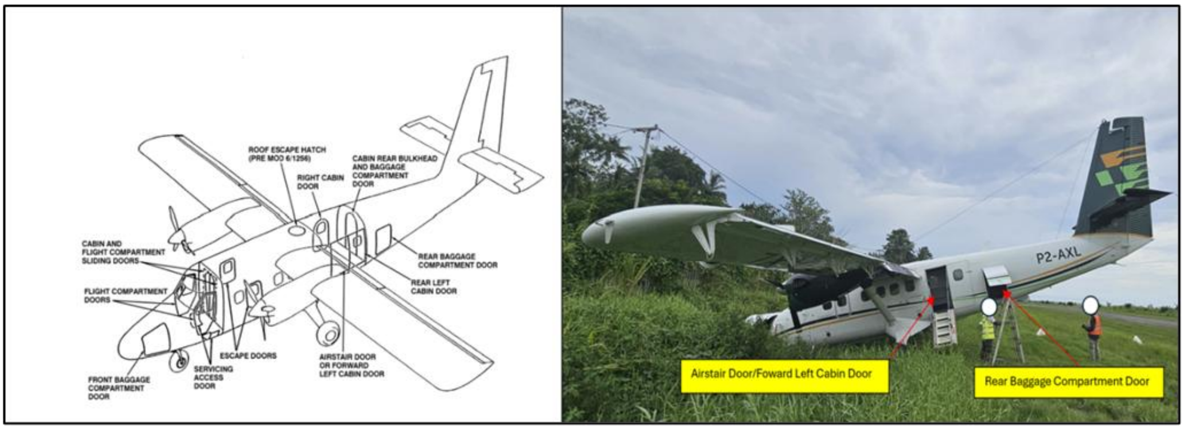


Figure 18: Aircraft schematic and P2-AXL post occurrence indicating door used for evacuating passengers and baggage compartment used to retrieve passenger baggage.

The PIC gathered all documentation in the flight compartment and made his way into the passenger cabin and assisted the co-pilot remove other items like the fire extinguishers, first aid kit and life jackets from the aircraft, then disembarked the aircraft.

Both pilots and all passengers were rescued on the same day and flown back to Port Moresby.

1.16 Tests and Research

No tests and research were conducted as a result of this occurrence.

1.17 Organisational and Management Information

1.17.1 The Operator: Tropicair Limited

The Tropicair Limited (PNG) Head Office and Maintenance Facility is located in the National Capital District, Port Moresby, Papua New Guinea. Tropicair operates domestically and internationally where CASA PNG has granted approval.

At the time of the accident, the operator had an Air Operator Certificate (AOC) # 119/015 issued on 24 November 2023 and effective from 30 November 2023 to the end of 30 November 2028.

The AOC is issued pursuant to *Section 47 (3)* and *49 of the Civil Aviation Act 2000* and *Civil Aviation Rule Part 119* and authorises Tropicair Limited to perform commercial air operations in accordance with the approved operations specifications and company exposition.

The operator has a Maintenance Organisation Certificate (MOC) # 145/015 issued on 01 June 2024 and effective from 01 June 2024 until 31 May 2027. The company also contracts out its aircraft Maintenance to authorised maintenance organisations.

1.17.2 Crew Rostering

1.17.2.1 Roster Construction and Changes

The operators *Operations Manual, Volume 2, Part A, Section 1.2 'Crew Rostering'* states,

Pilot rosters shall be prepared and authorised by the Chief Pilot.

Rosters shall be constructed in compliance with the flight and duty limitations [...] for a 14-day period where possible. The Chief Pilot shall roster only pilots holding a current licence and rating, current medical and meeting recency and operational competency requirements specified either in this Operations Manual or the Training & Competency Manual.

Rosters shall be made available to crew members at least 7 days prior to commencement of the roster where practical [...]

Rosters shall include duty periods, rest periods, standby duty, flight and ground training, competency assessments, deadhead transportation and recreational leave.

Each roster (where practical) shall be constructed to show details of the sectors involved, dates and times, crew assigned, the pilot in command, aircraft assigned, and any training involved or scheduled.

Where two pilots of equal qualifications are rostered to crew together, the Chief Pilot shall designate one pilot as the pilot in command, having regard to the recency in duties of the non-flying pilot.

Roster change requests shall be submitted to the Chief Pilot.

Section 1.3 of the Operations Manual 'Flight Authorisation' states that to ensure that flight operations are conducted by crews with appropriate qualifications and experience and in compliance with flight and duty requirements, the Chief Pilot (or the Training & Competency Manager acting on his behalf) shall authorise all scheduled and non-scheduled flights according to this procedure […]

The investigation found that the crew had changed assigned flying roles without notifying the Chief Pilot of the change prior to the flight. The investigation found that the PM was initially assigned the PIC role, and the PF was assigned PM role. However, both had changed roles before the flight.

Both crew had stated that they changed flying roles for the day so that the PM who was initially assigned PIC role could be PM/co-pilot and sit in the right seat so he could prepare for his Base check that was scheduled for the same day after the flight.

1.17.2.2 Training and Competency Considerations

The operators *Training and Competency Manual, Section 1.2* states that the Training & Competency Manager shall liaise with the Chief Pilot for the inclusion of all training and competency requirements in each roster period. Where practical, requirements shall be confirmed to the Chief Pilot not less than 3 days prior to the commencement date of the roster concerned […]

However, there is no specific guidance or consideration in the operator's relevant manual(s) for pilots who are scheduled for their training or competency checks.

The investigation found from the roster for the day that the PM/Co-pilot was rostered for operational flying for a 0800 departure to fly the sectors Port Moresby-Kerema-Purari-Kerema-Port Moresby as well as a 1330 departure for his base/line check or proficiency check on the day of the accident.

1.17.3 Crew Resource Management (CRM)

The operator's DHC-6-400 Standard Operating Procedures Manual, Version 0, Part B, Volume 9 states:

The operation of an aircraft, like any other machinery, involves the physical skills required to manipulate the aircraft and the knowledge to enable it to be operated safely and efficiently. Where the combination of more than one crew member exists, a pool of resources is provided to operate the aircraft at this high level of safety and efficiency during all phases of operation. The effectiveness of the crew is dependent upon the efficiency of their thought processes and the coordination of their physical activities [….].

Good flight crew resource management should be practiced in any aircraft, regardless of the level of technical sophistication.

The term 'CRM' refers to using all available resources to achieve a safe and efficient flight operation.

Close to the heart of CRM is the assertion that - *any pilot, however junior, will become increasingly assertive and will be heard, if a colleague begins to deviate from the Company's Standard Operating Procedures without due cause* […]

The investigation revealed from recorded data and interviews with the AIC that the flight crew did not communicate effectively during the landing roll. Critical information, such as the PIC's difficulty in accessing the brakes due to the sole of his footwear being lodged in the gap between the rudder and brakes, was not promptly or clearly conveyed to the co-pilot. Additionally, there was no clear verbal coordination regarding the use of asymmetric thrust and rudder inputs.

1.17.3.1 CRM Training

According to the Training Module for Crew Resource Management-Aeronautical Decision Making (CRM-ADM) in the operator's Training and Competency Manual, Volume 1, Part D, the training is covered in the initial and, transition and recurrent training phases. The recurrent training is delivered every 12 months through CTS online and a file certificate is issued.

The following are covered in the CRM-ADM module:

Crew Resource Management:

- Authority of PIC

Aeronautical Decision Making:

- CRM skills
- Communication processes
- Building and maintaining a flight team
- Workload and time management
- Situational awareness
- Fatigue: effects and reduction strategies
- What is ADM
- Risk Management
- Operational pitfalls

The investigation found from the operators Training module for CRM-ADM Training in the *Training and Competency Manual, Part D, Volume 1*, that the recurrent training is competed every 12 months online and a certificate issued upon completion.

Tropicair Crew Resource Management (CRM) training is delivered through Computer Based Training (CBT) and consists of an online module followed by an exam online.

Both pilots received the initial CRM training. The CRM training is delivered through CBT by a certified aviation training organization. It requires between 5 to 7 hours to complete before a certificate is granted.

The PIC and Co-pilot had attended the one-day CRM-ADM training and were current at the time of the accident. The PIC completed the 1-day course on 20 March 2024, and the Co-pilot completed it on 30 November 2024.

1.17.3.2 ICAO-Recommended Delivery Methods for Crew Resource Management (CRM) and Aeronautical Decision Making (ADM) Training

A review of relevant ICAO manuals such as Doc 9863 (Human Factors Training Manual) and Doc 9995 (Evidence Based Training Manual) showed that there is no fixed/standard percentage for CBT (Computer-Based Training) vs. classroom delivery in CRM (Crew Resource Management) and ADM (Aeronautical Decision-Making) training. However, industry best practices and ICAO standards support a blended approach.

According to ICAO Doc 9683, section 2.4.22 training delivery is also an important training requisite. CRM should at all times remain operationally focused. This means the avoidance of training activities that have nothing to do with the operational environment. Classroom "games" must be absolutely avoided. Delivery techniques that should be used in CRM training revolve around an adult-learning context. This means that there must be a balance between "telling" and "facilitating" the learning. In general, delivery techniques such as small group discussions, use of incident/accident videos, and presentations that centre on real line-experiences offer the best learning opportunities for trainees.

CRM training delivery method is just as important as what is taught. Classroom activities or games should be connected to aviation tasks and simulate/reflect flight operations. CRM should be taught using methods suitable for adult learners, meaning the trainer should not just lecture (tell) but also engage learners in discussion and reflection (facilitate). Use realistic, engaging methods like case studies, cockpit videos, group problem-solving, and actual aviation events to make CRM meaningful and practical. CRM is not abstract theory, it's about developing real-world decision-making, teamwork, and communication skills that pilots need during operations.

ICAO Doc 9995 provides a training model that fully integrates CRM principles into pilot training through the use of competency frameworks, scenario-based delivery, and behavioural assessments.

CRM is not taught separately in EBT (Evidence Based Training) but is embedded and assessed throughout the program as part of core pilot competencies. Chapter 4 and 5 of Doc 9995 refer to non-technical skills and behavioural indicators, where CRM elements are evaluated during simulator training, briefings, and LOFT (Line-Oriented Flight Training).

CRM concepts are to be integrated into:

- Scenario design
- Instructor feedback and debriefings
- Competency-based assessment

1.17.4 Safety Management System (SMS)

There is an initial, transition and recurrent training.

The following are covered in the SMS Training module:

- The relationship between Quality Systems and Safety Management Systems
- Role of the Flight Safety Officer
- Assessment of safety data and risk analysis
- Safety information and promotion
- Safety meetings

The operator's Training module for SMS Training in the *Training and Competency Manual, Part D, Volume 1* states that the recurrent training is completed every 24 months.

The PIC and co-pilot had attended the SMS training and were current at the time of the accident. The PIC had completed the 1-day SMS course on 5 September 2023 with an expiry date of 5 September 2025 and the Co-pilot had completed it on 23 March 2024 with an expiry date 23 March 2026.

The Quality & Safety Manager conducts the SMS training, which is a face-to-face session and takes approximately 60 minutes. The PIC completed the Initial training, while the co-pilot completed the recurrent training.

1.18 Additional Information

According to the *FAA Airplane Flying Handbook (FAA-H-8083-3C) 2021, Chapter 9: Approaches and Landings;* "Characteristically, an airplane has a greater profile or side area behind the main landing gears than forward of the gears. With wheels acting as a pivot point, the airplane tends to turn or weathervane into the wind". Maintaining control on the ground is a critical part of the after-landing roll because of the weathervane effect of the wind on the airplane".

Weathercocking, or weathervane is a phenomenon where an aircraft on the ground turns into the wind due to aerodynamic forces. This occurs when the aircraft's fuselage and vertical stabiliser create a yawing moment that causes the nose to align with the wind direction. On the ground, the main landing gear acts as a pivot point, and any crosswind can induce this effect, making it challenging to maintain directional control during landing rolls.

Encountering a right cross-tailwind during the landing roll, introduces complex asymmetric forces that challenge both directional control and deceleration. It combines the destabilising effects of a tailwind with the yaw-inducing tendencies of a right crosswind, which together can cause significant weathervane or drift if not managed properly.

1.19 Useful or Effective Investigation Techniques

Not Applicable

2. ANALYSIS

2.1 Flight Operations

The flight was conducted under Instrument Flight Rules (IFR) and remained uneventful from departure at Purari Airstrip until touchdown at Kerema Airport. Approximately 9 nautical miles from the aerodrome, the flight crew initiated a visual approach and tracked directly to establish overhead the field. Based on prevailing wind conditions and weather activity developing to the southeast of the aerodrome, the crew elected to land on Runway 14 with a tailwind component.

The investigation determined that prior to joining the circuit, the crew were aware of the prevailing wind, which presented a right cross-tailwind component on final approach to RWY 14. This was evident in the actions of the Pilot-in-Command (PIC) during the turn onto final, where appropriate control inputs were applied to mitigate the effects of the cross-tailwind. The co-pilot closely monitored airspeed and issued timely advisories regarding the tailwind during final approach. The PIC maintained control with continuous adjustments to counter the right cross tailwind throughout the approach and touchdown.

Following touchdown and initial landing roll, there were no abnormalities in directional control. In accordance with the Operator's Standard Operating Procedures (SOPs), the PIC selected Beta mode to assist in deceleration. As the landing roll progressed, a second application of Beta was initiated. During this phase, the aircraft drifted slightly to the right of the runway centreline. The investigation found that the PIC applied asymmetric power, where the left power lever remained at IDLE position, while the right power lever was advanced slightly forward, intended to steer the aircraft back toward the centre of the runway. Simultaneously, the co-pilot momentarily applied full left rudder, indicating his intent to also correct the rightward drift.

The investigation found that that these uncoordinated control inputs resulted in the aircraft momentarily yawing left before yawing back to the right and continuing to drift right. The PIC then attempted to apply braking but encountered difficulty when the sole of his footwear became lodged in the gap between the rudder pedal and the brakes. The PIC requested assistance from the co-pilot in applying brakes.

While attempting to regain directional control, the PIC applied asymmetric power and rudder input to steer the aircraft back to the paved surface. However, the aircraft continued forward onto the grass surface adjacent to the right side of the runway. The application of additional power to the right engine induced a left yaw moment, causing the aircraft to make a sharp turn left and skid back toward the paved surface of the runway. Once on the runway, the aircraft overshot the centreline and drifted onto the grass surface on the left side of RWY 14. The PIC then selected REVERSE in an attempt to stop the aircraft, but it continued to skid further left, into the drainage ditch and impacted the side of the drainage ditch.

The investigation determined that during the second application of Beta mode, the aircraft's speed had decreased sufficiently to allow for braking as per SOPs. However, as the PIC repositioned his feet from the rudder to the brakes, directional control was compromised due to the removal of rudder input, which had been countering the weathercocking effect caused by the right crosswind. The PIC responded by applying asymmetric thrust to correct the rightward yaw. At the same time, the co-pilot noticed the aircraft's drift to the right and reacted with a sudden full left rudder input. It is likely that this abrupt rudder movement interfered with the PIC's foot position or due to the PICs rushed attempt to engage the brakes, the sole of his footwear may have lodged in the gap between the rudder pedals and brakes, contributing to his difficulty in accessing the brakes.

This combination of uncoordinated inputs likely resulted in a temporary loss of situational awareness and uncertainty over control authority. As the co-pilot released the rudder pressure as abruptly as it had been applied, the PIC continued with asymmetric thrust and rudder inputs to regain directional control. However, the aircraft drifted further right, with all three wheels on the damp grass surface adjacent to the runway. The grass surface, damp from light rain fall earlier that morning, offered significantly reduced traction compared to the paved runway, impacting the aircraft's ability to respond to steering inputs.

Despite the PIC's corrective actions, the aircraft's momentum on the damp grass surface and the asymmetric thrust-induced yaw led to an abrupt left skid back onto the paved surface, overshooting the runway and continuing leftward onto the opposite grass surface of the left side of RWY 14. The aircraft eventually impacted the side of the drainage ditch. The combined use of REVERSE and braking by the crew was insufficient to arrest the aircraft's movement due to its momentum and reduced traction.

Post-incident examination of the wreckage indicated that the aircraft had accelerated prior to impacting the embankment. This increase in ground speed was attributed to thrust inputs applied by the crew in an attempt to correct the aircraft's deviation toward the right side of the runway.

It is likely that the right cross-tailwind encountered during the approach phase contributed to a persistent weathercocking tendency after touchdown. Although the tailwind component subsided during the landing roll, the prevailing crosswind from the right remained a factor, adversely affecting the aircraft's directional control during deceleration.

The AIC found that, although the PIC applied appropriate control inputs to counteract the prevailing right cross-tailwind during the approach, touchdown, and early stages of the landing roll, directional control was not adequately maintained as the roll progressed. The crew's response to the developing rightward drift was marked by uncoordinated and excessive control inputs, including the use of asymmetric thrust and abrupt rudder applications. These actions, compounded by a lack of effective crew communication and coordination, resulted in degraded directional control. The resulting instability during the ground roll contributed directly to the runway excursion and the aircraft's eventual impact with the drainage ditch.

2.2 Human Factors

2.2.1 Dual Rostering for training and checking and Operational Flights

The investigation found that the PM (Pilot Monitoring) was scheduled for his Proficiency check (Base Check) as well as operational flying on the day of the accident. The investigation found that although there is no specific guidance or consideration in the operator's relevant expositions for pilots who are rostered for training and competency checks, a Base Check demands full focus.

A Base check (also known as a line check or proficiency check) is a formal evaluation of a pilot's performance, procedures, and safety adherence. It requires full mental alertness and preparation, often inducing higher stress levels. Flying both a check and a duty flight in one day can lead to fatigue, increasing the risk of errors especially if the check is lengthy or stressful.

Dual rostering for training/checking and operational flights on the same day should be prohibited unless explicitly approved under controlled conditions. The pilot should be rostered only for the check on that day. However, if operational flying is required, it should only occur if the check is completed early and successfully, with prior planning and approval and within duty time limits

2.2.2 Last minute Change to flying Duties

The investigation found that the flight crew had changed flying duties just before the flight without notifying the relevant persons of the change. It is Standard Operating Procedure (SOP) that Flight crews are assigned roles (Pilot Flying and Pilot Monitoring) by the Chief pilot and duties discussed during the pre-flight briefing. Changing roles at the last minute can cause confusion or miscommunication during critical flight phases.

Pilots also mentally prepare for their roles before the flight. Sudden changes can disrupt this focus, potentially affecting performance.

A last-minute switch can lead to imbalanced workload if one pilot is less familiar with the aircraft, route, or current conditions.

The change to the assigned flying duties could have been properly communicated, documented and discussed during a revised pre-flight briefing.

2.2.3 Crew Resource Management (CRM)

The Pilot Flying handles directional control unless incapacitated. The Pilot Monitoring/ Pilot Not Flying should not intervene unless necessary and communicated.

The investigation identified simultaneous and uncoordinated inputs by both crew members. The PM (Pilot Not Flying) applied full rudder input while the PIC applied engine power asymmetrically, likely in response to directional deviation. The combined but unsynchronised control inputs produced conflicting aerodynamic and thrust forces, disrupting directional stability and control.

Effective cockpit coordination demands clear role delineation: one pilot must have unambiguous control, while the other provides support and monitors. In this case both pilots assumed active control without communicating intentions to receiving confirmation, violating basic CRM principles such as task delegation, verbal coordination and mutual situational awareness. Furthermore, their inadequate enforcement may have contributed to the confusion. The absence of CRM can exacerbate the situation and lead to errors that would otherwise be preventable.

It is therefore the view of the AIC that the PIC’s foot becoming momentarily trapped or jammed between the rudder pedal and brake mechanism, during a landing roll and the directional control issue may have been caused by the simultaneous and uncoordinated application of control inputs by both crew.

This is why clear delineation of roles is critical. Only one pilot should be actively controlling rudder and brakes. The non-flying pilot should guard controls only if needed, not input simultaneously. Any control conflict must be resolved immediately with verbal communication: “I have control." / "You have control."

2.2.4 CRM Training

The CRM is highly interactive. It is about leadership/command, decision making, situation awareness, team building, workload management and vigilance. These skills require discussion, role-play, scenario-based exercises, and group feedback, not just passive learning. A purely online format misses out on crew interaction and behavioural practice.

The investigation identified that the crew had completed the CRM-ADM recurrent training which was done online in one day and were current at the time of the accident.

Completing the online CRM modules can cause fatigue and reduced engagement. Sitting through hours of online training in one day can cause mental fatigue, reducing retention of what is covered in the modules. Crew may tune out or disengage, especially without an instructor to facilitate. CRM effectiveness depends on attention and active participation.

CRM is typically taught in a classroom environment, involving multiple crew members, to encourage discussion and interaction. It is recommended to be delivered through a combination of classroom, facilitated discussion, and practical application.

Online modules may be acceptable for refresher training or theory components, but not for full CRM courses. Computer-based training (CBT) may be used to supplement but not replace interactive components.

3. CONCLUSIONS

3.1. Findings

3.1.1. Aircraft

a) The aircraft was certified, equipped and maintained in accordance with existing regulations and approved procedures.

b) The aircraft had a valid Certificate of Airworthiness, Certificate of Registration and had been maintained in compliance with the regulations.

c) The aircraft was certified as being airworthy when dispatched for the flight.

d) The mass and the centre of gravity of the aircraft were within the prescribed limits.

e) There was no evidence of any defect or malfunction in the aircraft that could have contributed to the accident.

f) The aircraft was structurally intact prior to impact.

g) The aircraft sustained substantial damage to the nose section and nose landing gear assembly on impact.

h) All controls surfaces were accounted for and all damage to the aircraft was attributable to the impact of the forces.

3.1.2. Pilot

a) The flight crew was licensed and qualified for the flight in accordance with existing PNG Civil Aviation Rules.

b) The flight crew were in compliance with the flight and duty time limitations in accordance with the existing PNG Civil Aviation Rules.

c) The flight crew were properly licensed, certified as medically fit and were adequately rested to operate the flight.

d) The flight crew's actions and statements indicated that their knowledge and understanding of the aircraft systems were adequate.

e) The flight crew had operated multiple flights into and out of Kerema Airport prior to the accident, demonstrating knowledge of the destination aerodrome and surrounding environment.

f) Within 3 months preceding the accident flight, the PIC had operated multiple flights with P2-AXL, including twenty-two flights with the same co-pilot, which demonstrates operational familiarity as a crew.

g) The most recent flight operated by the crew into and out of Kerema Airport was two (2) days prior to the accident flight.

h) The co-pilot was scheduled for his Proficiency check (Base Check) as well as operational flying on the day of the accident.

i) CRM-ADM training for flight crew initial, transition and recurrent is an online training instead of classroom-based training with discussion and interaction, including discussion of CRM and case studies.

3.1.3. Flight Operations

a) The flight was conducted under Instrument Flight Rules (IFR) and remained uneventful up until the landing phase at Kerema Airport.

b) The flight crew had changed flying duties just before the flight without notifying the relevant persons of the change,

c) Approximately 9 NM from Kerema, the crew became visual with the aerodrome and initiated a visual approach to Runway 14, considering wind conditions and developing weather activity in the vicinity of Kerema, particularly affecting the approach to RWY 32.

d) The crew were aware of prevailing wind conditions, which presented a right cross-tailwind component on final approach.

e) The PIC demonstrated appropriate crosswind handling techniques during approach and touchdown. The approach was stabilised and the co-pilot issued timely airspeed and tailwind advisories.

f) On touchdown, the PIC selected Beta mode for deceleration in accordance with the Operator's Standard Operating Procedures (SOPs).

g) There were no abnormalities in directional control during touchdown and initial landing roll.

h) During the second application of Beta mode, the aircraft began to drift to the right of the runway centreline.

i) The PIC applied asymmetric power, with the right power lever advanced slightly forward, likely to counteract the rightward drift and steer the aircraft back toward the runway centreline.

j) Simultaneously, the co-pilot applied full left rudder momentarily, indicating his independent attempt to correct the drift, resulting in uncoordinated directional inputs.

k) The aircraft momentarily yawed left, then continued drifting right as the effect of the crosswind persisted.

l) The PIC experienced difficulty accessing the brakes due to the sole of his footwear becoming lodged between the rudder pedal and the brakes. The PIC requested the co-pilot to assist in applying brakes.

m) The aircraft exited the paved runway surface on the right 300 m from the touchdown point, with all wheels entering the adjacent grass area, which was damp and had reduced traction due to rain fall earlier that morning.

n) The aircraft departed the paved runway surface onto the grass area on the right edge due to inadequate directional control 300 m from the touchdown point.

o) The PIC continued application of asymmetric power and rudder inputs to steer the aircraft back to the left onto the paved runway.

p) During the tracking correction, the increased right engine thrust induced a left yaw moment that caused the aircraft to make a sharp left turn and skid back to the paved runway surface and then continue to the left side of RWY 14.

q) The aircraft overshot the runway centreline, entered the grass area on the left side of RWY 14, and eventually impacted the side of the drainage ditch.

r) The aircraft had accelerated prior to the impact with the side of the drainage ditch, due to increased thrust inputs by the PIC in an attempt to correct tracking.

s) The crosswind component remained during the landing roll and adversely affected directional control as the aircraft decelerated.

t) The crew's responses during the landing roll were marked by uncoordinated control inputs, including abrupt rudder use and asymmetric thrust, which were not effectively coordinated between the PIC and the co-pilot.

u) The lack of effective crew communication and coordination during the landing roll contributed to the degradation of directional control.

v) Although appropriate crosswind landing techniques were applied during approach and touchdown, directional control was not sufficiently maintained during the latter stages of the landing roll.

3.1.4. Operator

a) The operator provided its pilots with route guidance material for routinely flown routes.

3.1.5. Air Traffic Services and Airport Facilities

a) Communications between the crew and Air Traffic Services were standard during the flight.

3.1.6. Flight Recorders

a) The aircraft was equipped with a flight data recorder (FDR) and a cockpit voice recorder (CVR).

b) The aircraft was fitted with an Appareo AIRS 400 unit, a lightweight recorder.

3.1.7. Medical

a) There was no evidence that the crew suffered any sudden illness or incapacity which might have affected their ability to control the aircraft.

3.1.8. Survivability

a) The accident was survivable.

b) There were no reported injuries.

3.1.9. Safety Oversight

a) The Civil Aviation Safety Authority's safety oversight of the operator's procedures and operations was adequate.

3.2 Causes [Contributing factors]

The investigation identified certain factors that influenced or contributed to the runway excursion and subsequent impact with the drainage ditch.

The accident resulted from a combination of environmental and human factors, as well as procedural non-compliance.

The investigation determined that the decision to land on Runway 14 with a prevailing right cross-tailwind component, although within limits, increased landing complexity. While the tailwind component reduced during rollout, the persistent crosswind from the right introduced a weathercocking effect that adversely affected the aircraft's directional control during the landing roll and continued to impose destabilising lateral forces, challenging the crew's ability to maintain runway alignment.

Compounding the environmental factors was a breakdown in crew coordination and control input management. During the deceleration phase, the Pilot-in-Command (PIC) applied asymmetric thrust, while the co-pilot simultaneously initiated an abrupt full left rudder input. These conflicting actions resulted in uncoordinated control forces and yaw oscillations, ultimately contributing to the aircraft's drift off the runway centerline. The situation was further exacerbated by inadequate Crew Resource Management (CRM), evidenced by ineffective communication and a lack of clear control authority, which impaired situational awareness at a critical phase of the landing roll.

As the aircraft departed the paved surface, it encountered damp grass conditions, significantly reducing traction and braking effectiveness. The reduced friction on the damp grass surface, coupled with the aircraft's existing yaw and momentum, rendered recovery attempts ineffective. This loss of control trajectory led to the aircraft skidding laterally until it impacted a drainage ditch. In an attempt to regain control and reposition the aircraft back onto the runway, the PIC applied additional thrust while on the unpaved surface. However, this action unintentionally increased the aircraft's ground speed and reduced its ability to decelerate, thereby contributing to the severity of the runway excursion and the subsequent impact.

The combined effect of adverse environmental conditions, uncoordinated control inputs, inadequate CRM, and inappropriate recovery actions collectively led to the runway excursion and substantial damage to the aircraft.

3.3 Other factors

Not applicable.

4. RECOMMENDATIONS AND SAFETY ACTIONS

4.1 Recommendations AIC 25-R11/25-1001 to Tropicair Limited

Recommendation

The PNG Accident Investigation Commission (AIC) recommends that Tropicair Limited establish and implement a structured Crew Resource Management (CRM) and Aeronautical Decision Making (ADM) training program incorporating a blended learning approach, including both computer-based and instructor-led classroom training.

Action requested

The AIC requests that Tropicair Limited note recommendation AIC 25-R11/25-1001 and provide a response to the AIC within 90 days of the issue date, but no later than 06 October 2025 and explain, including with evidence, how Tropicair Limited has addressed the safety deficiency identified in the safety recommendation.

4.2 Recommendation AIC 25-R12/25-1001 to Tropicair Limited

Recommendation

Recommendation number AIC 25-R12/25-1001 to Tropicair Limited

The PNG Accident Investigation Commission (AIC) recommends that Tropicair Limited implement targeted Crew Resource Management (CRM) reinforcement initiatives aimed at improving cockpit coordination during critical phases of flight. The effectiveness of these measures should be evaluated through routine flight checks and crew performance monitoring.

Action requested

The AIC requests that Tropicair Limited note recommendation AIC 25-R12/25-1001 and provide a response to the AIC within 90 days of the issue date, but no later than 06 October 2025 and explain, including with evidence, how Tropicair Limited has addressed the safety deficiency identified in the safety recommendation.

4.3 Recommendation AIC 25-R13/25-1001 to Tropicair Limited

The PNG Accident Investigation Commission (AIC) recommends that Tropicair Limited establish clear and specific guidelines for the assignment of crew on check and training flights. These should include:

- clearly communicating assignments to all crew members involved in such flights; and
- ensuring that any changes to assigned duties are documented and effectively communicated to all responsible personnel.

Action requested

The AIC requests that Tropicair Limited note recommendation AIC 25-R13/25-1001 and provide a response to the AIC within 90 days of the issue date, but no later than 06 October 2025 and explain, including with evidence, how Tropicair Limited has addressed the safety deficiency identified in the safety recommendation.

This Final Report is released by;

Accident Investigation Commission

Ministry of Civil Aviation

Papua New Guinea

22 August 2025

ACCIDENT INVESTIGATION COMMISSION
The Common Seal of
PAPUA NEW GUINEA

MARYANNE J. WAL
CHIEF COMMISSIONER / CHAIRMAN

CAPTAIN ARIA BOURAGA
COMMISSIONER / DEPUTY CHAIRMAN

5. APPENDICES

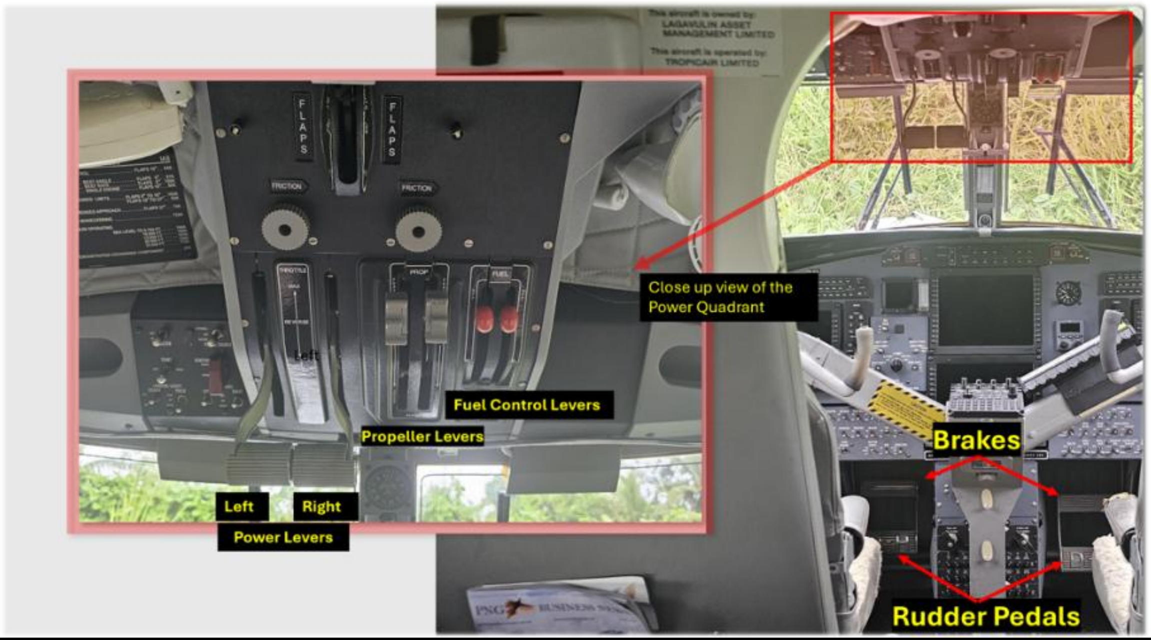
5.1 Appendix A: Aircraft Systems

5.1.1 Appendix A1: Engine / Propeller Control Systems

Engine/Propeller Controls

According to the *Viking DHC-6, Series 400, Pilot Operating Handbook, Volume 2, Revision 1 30 May 2014*; the engine and propeller controls are mounted in the overhead console in the flight compartment, and consist of power levers, propeller levers, and engine fuel levers. Friction control knobs for the power and propeller levers are also installed.

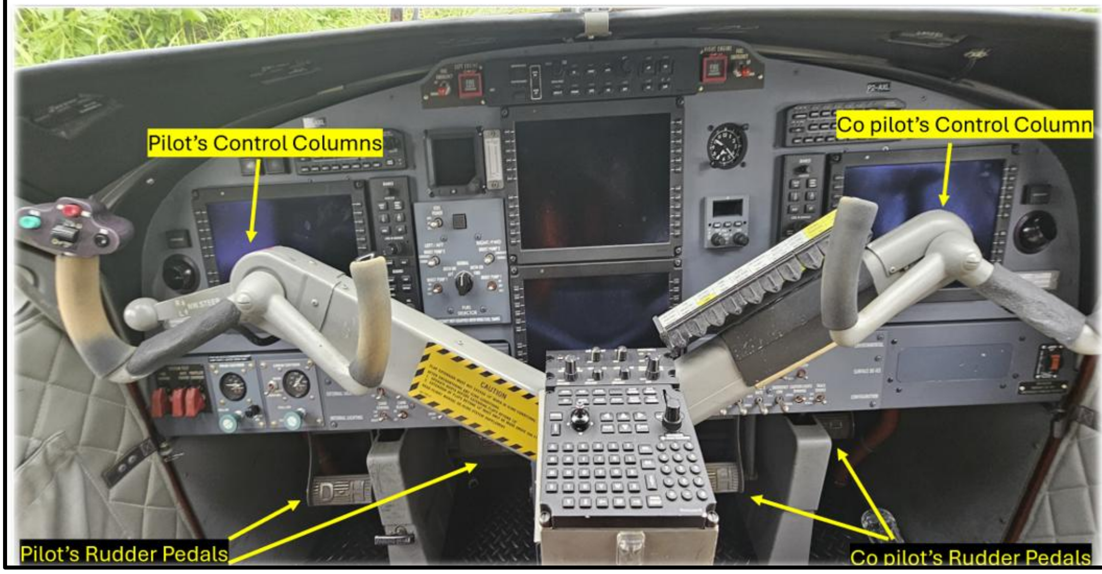
The power levers move in slots in a quadrant labelled THROTTLE, with position markings, MAX, IDLE and MAX to denote the limits in the engine forward and reverse power ranges and the idle speed position. The reverse range is labelled REVERSE. Each power lever controls engine gas generator speed in the forward and reverse power ranges and propeller blade angle in the BETA range.



5.1.2 Appendix A2: Flight Controls

Flight Controls

According to the *Viking DHC-6, Series 400, Pilot Operating Handbook, Volume 2, Revision 1 30 May 2014; Section 7 Aircraft and Systems Description,* the flight controls are conventionally operated through pulley and cable systems and mechanical linkage by a control column, control wheel and rudder pedals. The control column is of a dual Y configuration located on the aircraft centreline with a control wheel pivoted at the upper end of each arm. The ailerons lower with the wing flaps and their degree of movement, including degree of differential movement, increases proportionately with flap deflection. The ailerons move differentially at any flap position. The left elevator, rudder and left aileron are equipped with flight adjustable trim tabs, and the right elevator with trim tab that is interconnected with the flaps. A general tab (servo tab) is installed on each aileron and on the rudder.



5.2 Appendix B: Tropicair Limited – Accident Report – P2-AXL (Damage Assessment and Apron Recovery)

TROPICAIR – MAINTENANCE P145/015

Accident Report – P2-AXL (Damage Assessment and Apron Recovery)

Appendix 1

Initial Damage Assessment

6

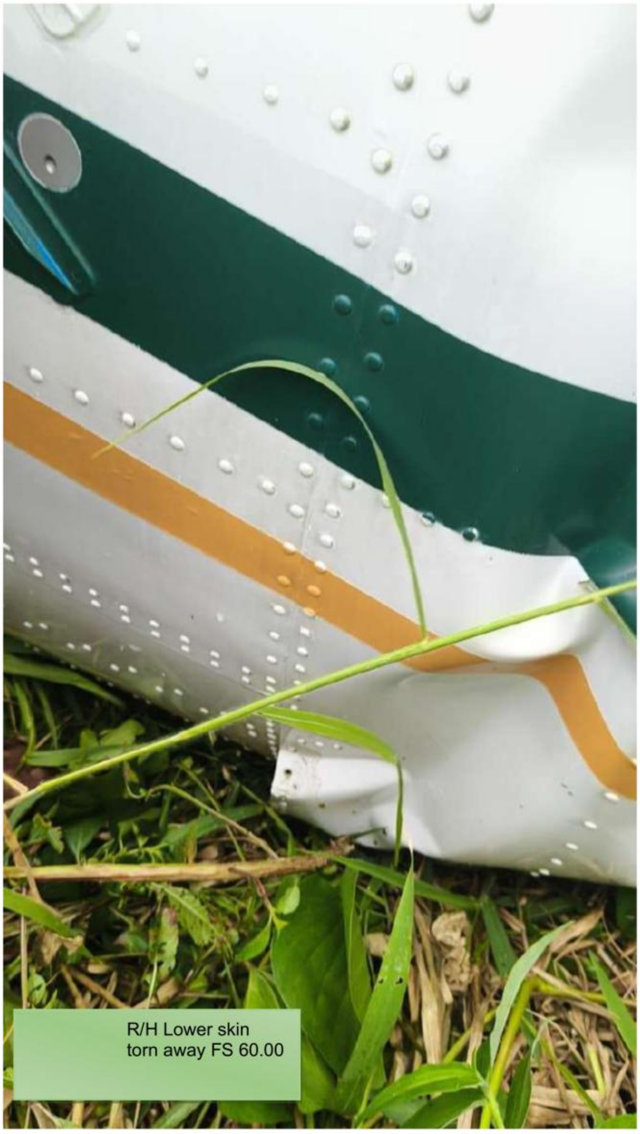

Torn Nose Structure - Severe crumbling between FS 40.00 & FS 60.00
Johnny076


Severe crumbling between
FS 40.00 & FS 60.00

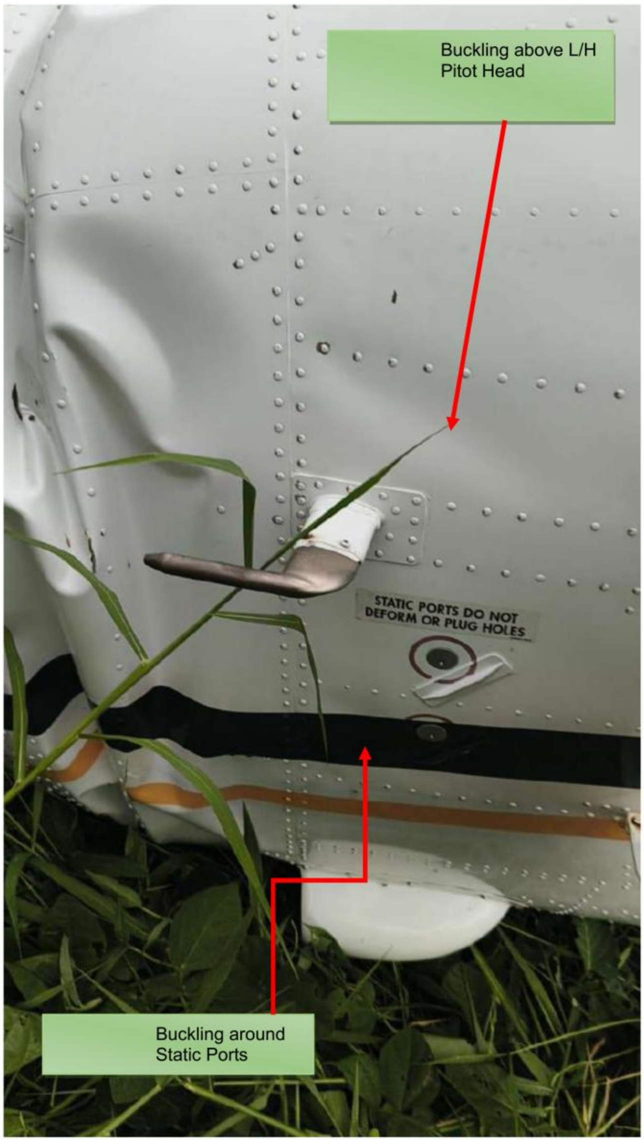

CUT HERE IN EMERGENCY
Johnny076

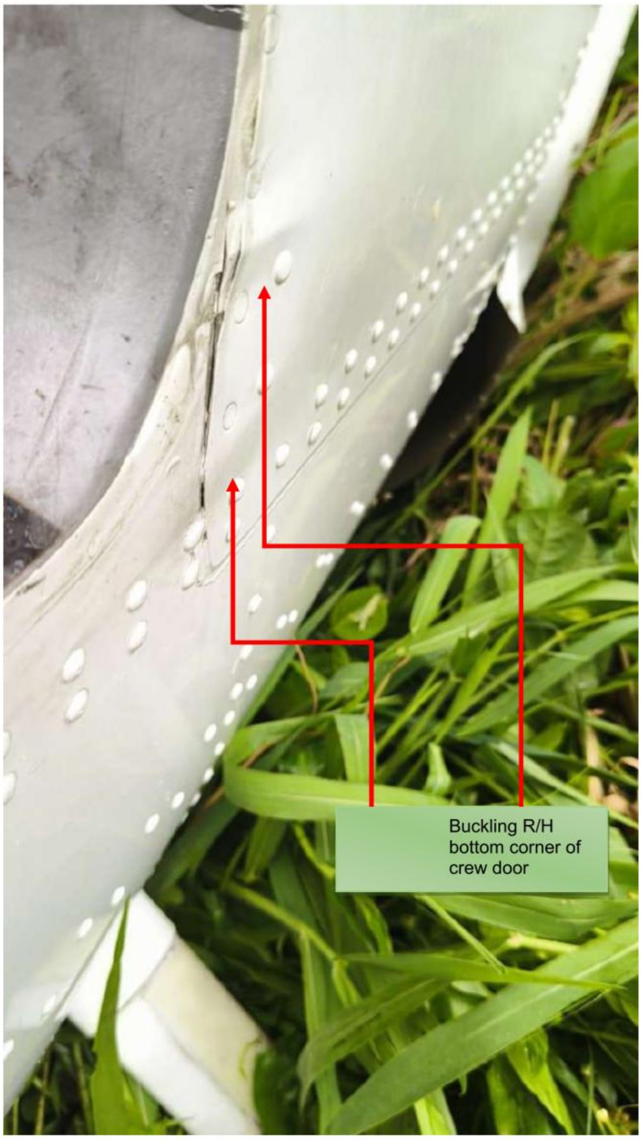

CUT HERE IN EMERGENCY


Severe crumbling
between FS 40.00
& FS 60.00

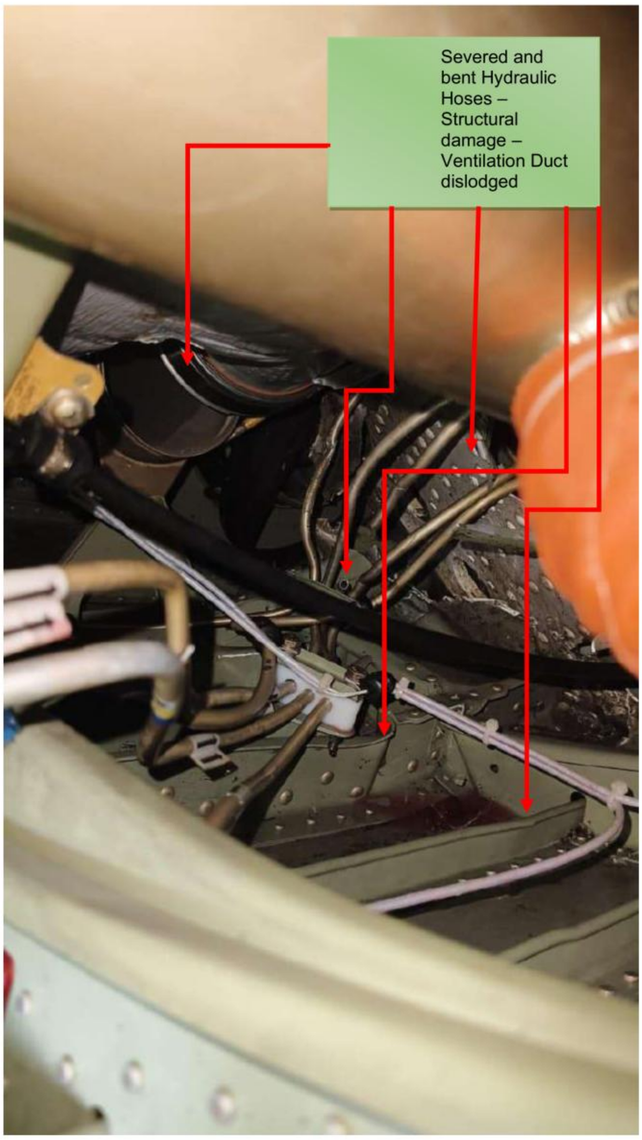

R/H Lower skin
torn away FS 60.00

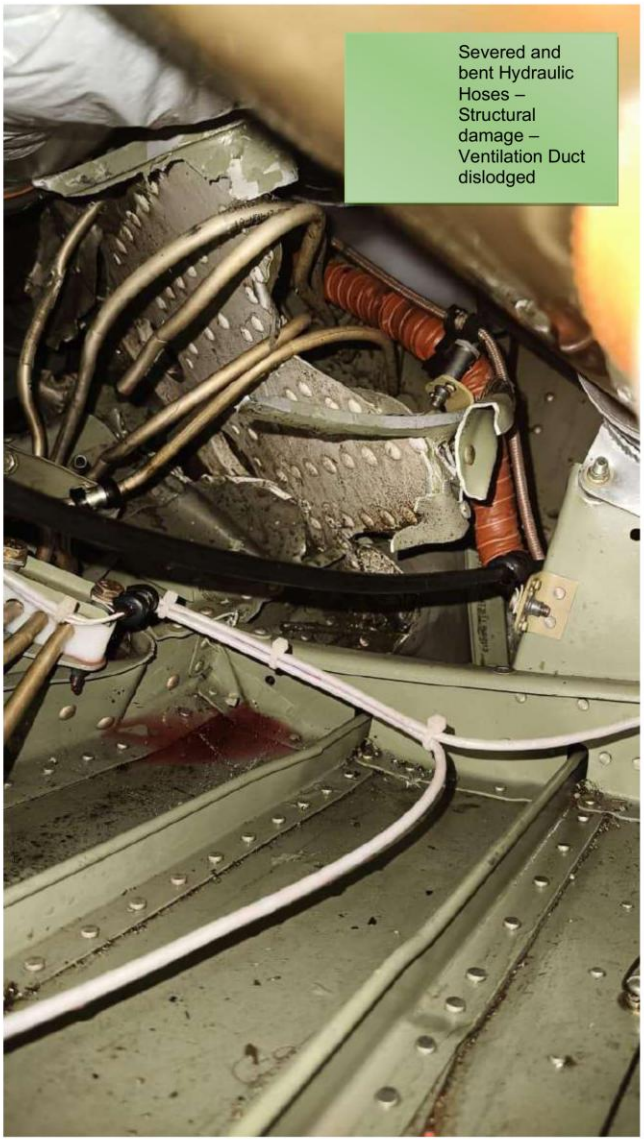

R/H Lower skin
torn away FS 60.00

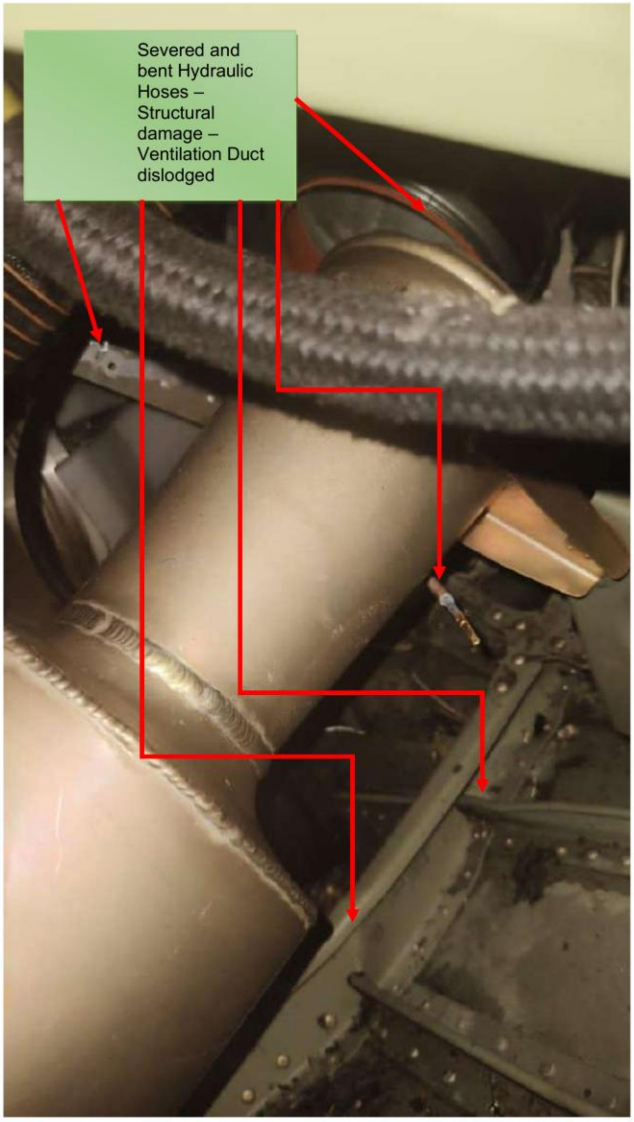

Buckling above L/H Pitot Head
STATIC PORTS DO NOT DEFORM OR PLUG HOLES
Buckling around Static Ports


Buckling R/H
bottom corner of
crew door


Nose Wheel Tyre


Severed and bent Hydraulic Hoses – Structural damage – Ventilation Duct dislodged


Severed and bent Hydraulic Hoses – Structural damage – Ventilation Duct dislodged


Severed and bent Hydraulic Hoses – Structural damage – Ventilation Duct dislodged