PAPUA NEW GUINEA

ACCIDENT INVESTIGATION COMMISSION

Final Report

AIC 24-1002

Kobio Aviation Ltd

P2-KAL

DHC-6-300 Twin Otter

Runway Excursion During Take-off

Kairik Airport, Enga Province

PAPUA NEW GUINEA

19 October 2024

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ABOUT THE AIC

The Accident Investigation Commission (AIC) is an independent statutory agency within Papua New Guinea (PNG). The AIC is governed by a Commission and is entirely separate from the judiciary, transport regulators, policy makers and service providers. The AIC's function is to improve safety and public confidence in the aviation mode of transport through excellence in independent investigation of aviation accidents and other safety occurrences within the aviation system; safety data recording and analysis; and fostering safety awareness, knowledge and action.

The AIC is responsible for investigating accidents and other transport safety matters involving civil aviation in PNG, as well as participating in overseas investigations involving PNG registered aircrafts. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The AIC performs its functions in accordance with the provisions of the PNG Civil Aviation Act 2000, and the Commissions of Inquiry Act 1951, and in accordance with Annex 13 to the Convention on International Civil Aviation.

The objective of a safety investigation is to identify and reduce safety-related risk. AIC investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not a function of the AIC to apportion blame or determine liability. At the same time, an investigation report must include relevant factual material of sufficient weight to support the analysis and findings. At all times the AIC endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why it happened, in a fair and unbiased manner.

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ABOUT THIS REPORT

On 19 October 2024 at 16:05 local time (06:05 UTC), the AIC was notified by NiuSky Pacific about an occurrence that had occurred on the same day at 15:00 local time (05:00 UTC). The occurrence involved a De Havilland Aircraft of Canada Ltd DHC-6-300 Twin Otter aircraft registered P2-KAL, owned by ASHE Aircraft Enterprises Limited, and operated by Kobio Aviation Limited. The AIC immediately began gathering information pertinent to the occurrence and commenced an investigation into the occurrence.

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

The report is based on the investigation carried out by the AIC under the Papua New Guinea Civil Aviation Act 2000, and Annex 13 to the Convention on International Civil Aviation. It contains information, analysis of that information, findings and contributing (causal) factors, other factors, safety actions, and safety recommendations.

Although AIC investigations explore the areas surrounding an occurrence, only those facts that are 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.

Readers are advised that in accordance with Annex 13 to the Convention on International Civil Aviation, it is not the purpose of an AIC 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 (Reference: ICAO Annex 13, Chapter 3, paragraph 3.1). Consequently, AIC reports are confined to matters of safety significance and may be misleading if used for any other purpose.

Maryanne J. Wal

Chief Commissioner

06 June 2025

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GLOSSARY OF ABBREVIATIONS

AFM	:	Aircraft Flight Manual
AGL	:	Above Ground Level
AIC	:	Accident Investigation Commission (AIC)
AIP	:	Aeronautical Information Publication
AMSL	:	Above Mean Sea Level
AOC	:	Air Operator Certificate
ATC	:	Air Traffic Control
ATPL	:	Air Transport Pilot License
ATS	:	Air Traffic Service
CPL	:	Commercial Pilot License
CRM	:	Crew Resource Management
CSN	:	Cycles Since New
CVR	:	Cockpit Voice Recorder
SSCVR	:	Solid-State Cockpit Voice Recorder
F/O	:	First officer or Copilot
FDR	:	Flight Data Recorder
HF	:	High Frequency
ICAO	:	International Civil Aviation Organization
ICUS	:	In Command Under Supervision
IP	:	Instructor Pilot
NG	:	Gas Generator Speed
PIC	:	Pilot in Command
PF	:	Pilot Flying
PM	:	Pilot Monitoring
POH	:	Pilot Operating Handbook
RPT	:	Regular Public Transport
RWY	:	Runway
SHELL	:	Software, Hardware, Environment, Liveware, Liveware
SOP	:	Standard Operating Procedures
S/N	:	Serial Number
SMS	:	Safety Management System
TAF	:	Terminal Aerodrome Forecast
TSN	:	Time Since New
TTIS	:	Total Time in Service
UTC	:	Universal Time Coordinate
VFR	:	Visual Flight Rules
VHF	:	Very High Frequency

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INTRODUCTION

SYNOPSIS

On 19 October 2024, at 15:00 local time (05:00 UTC), a De Havilland Aircraft of Canada Ltd DHC-6-300 Twin Otter aircraft registered P2-KAL, owned by ASHE Aircraft Enterprises Limited, and operated by Kobio Aviation Limited, was conducting a VFR charter flight from Kairik Airport, Enga Province to Mt. Hagen Airport, Western Highlands Province, Papua New Guinea, when during the take-off roll, it experienced a runway excursion and rolled into a drainage ditch which runs along the left side of the runway and impacted an embankment.

There were five persons on board: two pilots and three passengers. No injuries were reported.

The pilot flying was occupying the left seat and was the pilot In-Command Under Supervision (ICUS). The pilot monitoring was occupying the right seat and was the Instructor Pilot (IP).

At 14:58, the aircraft taxied to the RWY 05 threshold and made a tight left turn to align with the centerline. The crew stated that following completion of the required checks, they commenced the take-off roll. During the initial take-off roll, the aircraft began veering right from the centerline, prompting the crew to apply corrective inputs, but the correction was excessive, causing the aircraft to cross the centerline and veer left. Despite the application of asymmetric power and rudder inputs in an attempt to regain directional control, the aircraft continued its leftward drift onto the wet grass area adjacent to the runway surface. The crew then applied full reverse and brakes, but the aircraft continued to swerve off the runway and entered a drainage ditch. The aircraft's left wing struck the edge of the drainage ditch, causing the aircraft to make a sharp left turn, after which the nose impacted the embankment.

The investigation determined that the accident resulted from a combination of operational, human, and environmental factors. During a tight left turn onto RWY 05, excessive tiller inputs led to sequential overcorrections, misaligning the nosewheel to the right of the centerline. The crew omitted the manufacturer-required 3 metre forward roll check to verify nosewheel alignment with the centreline, an item not included in the operator’s SOPs, preventing detection of this misalignment. When the take-off roll began, the aircraft veered right. In response, the crew applied left rudder and asymmetric power; however, the inputs were excessive, causing a sharp left veer across past the centerline, resulting in a loss of directional control. Despite attempts to regain control, the aircraft continued onto the grass and impacted the embankment. The wet and slippery grass surface adjacent to the runway significantly reduced tyre traction and rendered recovery efforts ineffective.

The investigation also identified other safety deficiencies or concerns that should be addressed to prevent future occurrences. These included discrepancies between operator and manufacturer procedures, incomplete checklist execution, a lack of clearly defined CRM guidelines in the company manuals, and inadequate CRM training. Additional findings included missing operational feasibility assessments for Kairik operations.

The investigation issued five safety recommendations to Kobio Aviation Limited to address identified safety deficiencies. These include updating the operator’s SOP to align with manufacturer-prescribed take-off procedures, improving flight crew training and CRM currency, implementing a phased training approach for command endorsements, and conducting documented operational feasibility assessments for approved new operations.

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1 FACTUAL INFORMATION

1.1 History of the flight

On 19 October 2024, at about 15:00[1] local, (05:00 UTC[2]), a De Havilland Aircraft of Canada Ltd DHC-6-300 Twin Otter aircraft registered P2-KAL, owned by ASHE Aircraft Enterprises Limited, and operated by Kobio Aviation Limited, was conducting a VFR[3] charter flight from Kairik Airport, Enga Province to Mt. Hagen Airport, Western Highlands Province, Papua New Guinea, when during the take-off roll, it experienced a runway excursion and rolled into a drainage ditch which runs along the left side of the runway and impacted an embankment.

Figure 1: Depiction of P2-KAL Accident site.

There were five persons on board: two pilots and three passengers.

The pilot flying (PF) was occupying the left seat and was the pilot In Command Under Supervision (ICUS). The pilot monitoring (PM) was occupying the right seat and was the Instructor Pilot (IP).

During an interview with the AIC, the crew stated that they conducted two flights on the day of the accident, both within the Hagen–Kairik–Hagen sector. The second of these flights was the accident flight. In both flights that day out of Kairik, the pilot ICUS was the pilot flying, occupying the left seat, and the IP was the PM, occupying the right seat.

The second flight into Kairik was a passenger and cargo charter flight, landing at Kairik at 00:47. After unloading cargo and passengers at Kairik, they prepared for the return flight to Mt. Hagen Airport by loading new passengers and cargo.

According to the CVR[4] data, the crew made a taxi call, departing Kairik for Mt. Hagen at 14:58, and subsequently began taxiing southwest toward Runway (RWY) 05 threshold.

The crew stated that upon arriving at the designated take-off point for RWY 05, the pilot ICUS executed a sharp left turn, using the tiller to guide the aircraft onto the runway centerline. After completing the take-off checks, they initiated the take-off roll by advancing the power lever to full take-off power.

1 The estimated time of the accident, as established through the synchronised analysis of CVR and ATS 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 Visual Flight Rules: Those rules as prescribed by national authority for visual flight, with corresponding relaxed requirements for flight instruments (Source: The Cambridge Aerospace Dictionary).

4 Cockpit Voice Recorder. Refer to Section 1.11 of this report for more information on the CVR

Observations of the tyre markings on the runway surface indicated that the aircraft initially veered to the right of the centerline after the take-off roll. It then veered left, past the centerline, continued further left until it exited the runway and entered the soft, wet and slippery grass area adjacent to the runway.

The crew stated that when the aircraft initially veered right of centerline, they applied corrective inputs to realign the aircraft onto the centerline, however, the correction was excessive, resulting in the aircraft veering left past the centerline. The crew added that upon observing the leftward deviation, they attempted to bring the aircraft back toward the centerline by applying asymmetric power. However, the aircraft continued to veer left, ending up on the wet and slippery grass surface adjacent to the runway.

The crew further added that, upon realising that the corrective actions were ineffective, they subsequently applied full reverse power and engaged the brakes in an attempt to bring the aircraft to a stop. Despite these efforts, the aircraft continued to swerve towards the left until it impacted the drainage ditch adjacent to the runway, along the edge of the airstrip.

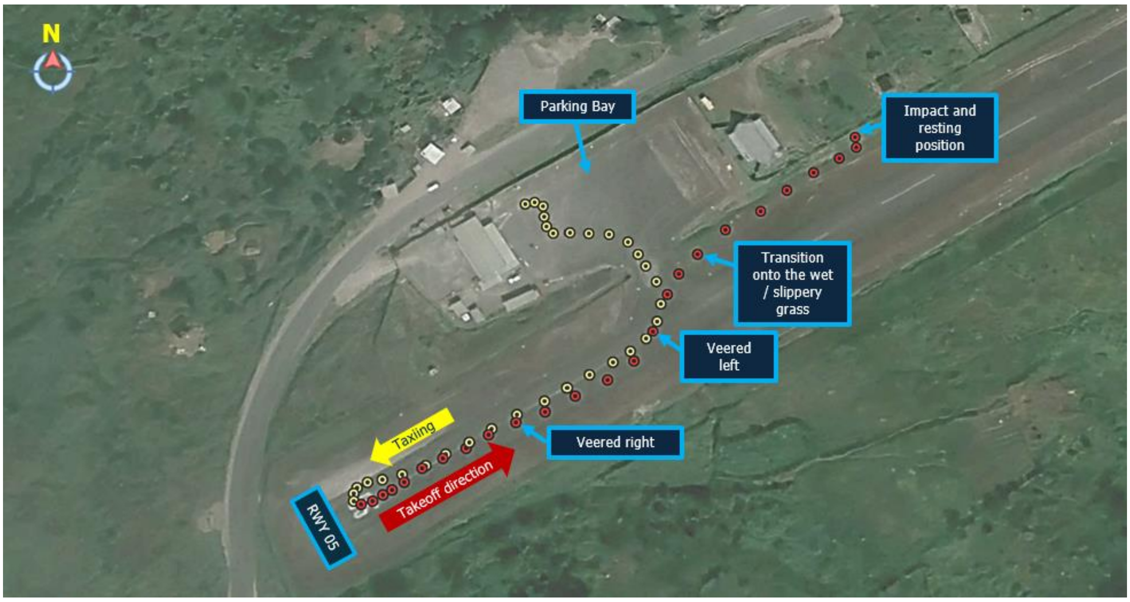

Figure 2: Illustration of the sequence from taxiing, take-off and to the point of impact.

The crew stated that the left wing struck the edge of the drainage ditch, resulting in the aircraft making a sharp left turn, after which the nose impacted the drainage ditch.

During interviews, the crew stated that after the aircraft came to a complete stop, they followed standard procedures for engine shutdown. A helicopter pilot, who was a passenger on the flight, assisted by opening the passenger door and evacuating the other passengers safely, with additional support from New Pogera Limited Aviation staff.

1.2 Injuries to persons

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	Not applicable
Nil Injuries	2	3	5	Not applicable
TOTAL	2	3	5	-

Table 1: Injuries to persons

1.3 Damage

The aircraft sustained substantial damage. 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 Instructor Pilot (IP)

Age	: 56 years
Nationality	: New Zealander
Gender	: Male
Type of licence	: ATPL Aeroplane
Valid to	: Perpetual
Rating	: C208B, DHC6, DHC8.
Total flying time	: 13,310.5 hours
Total on this type	: 2,438.4 hours
Total hours in Command	: 2,293.8 hours
Total last 90 days	: 104.9 hours
Total on type last 90 days	: 104.9 hours
Total last 7 days	: 18.8 hours
Total on type last 7 days	: 18.8 hours
Total last 24 hours	: 0.0 hours
Total on the type last 24 hours	: 0.0 hours
Total on duty last 48 hours	: 8.0 hours
Total rest period(s) last 48 hours	: 34.0 hours – 2 Rest Periods
Last recurrent training	: 19 April 2024
Last proficiency check	: 19 April 2024
Last line check	: 19 April 2024
Route and aerodrome recency	: 19 April 2024
Medical class	: One (1)
Valid to	: 16 June 2025
Medical limitation	: Multi Crew / Spectacles.

The IP's records provided by the operator were assessed to determine crew competency and currency at the time of the accident.

Records showed that the pilot was current with his proficiency and currency checks in accordance with CAR Part 61.257 "Currency Requirements" for the ATPL holders and CAR Part 125.605 "Flight Crew competency checks". His Class one (1) Medical, according to CAR Part 67.61 "Effective date and duration of Medical Certificate", was valid at the time of the accident.

The records reviewed also showed that the IP was issued with a DHC-6 Flight Instructor Part 61 Instrument of Authorization (IOA) to carry out the functions of a Category D Flight Instructor in accordance with Rule 61.305 (d) for the purpose of conducting the following types of flight instruction on the following types of flight instruction on DHC-6 aircraft: -

1)	Line Training	Captains/First Officers
2)	Base Training	Captains/First Officers
3)	Type Rating	Captains/First Officers

The IOA was valid from 15 October 2024 to 15 October 2026.

He was previously issued a C208B Flight Instructor and Airline Flight Examiner IOA by his former employer to carry out the functions of a Category D Flight Instructor in accordance with Rule 61.305 (d) and functions of an airline Flight Examiner in accordance with Rule 61.905 (a)(2). IOA was valid from 13 December 2020 to 13 December 2022.

The records provided also showed that the IP was familiar with Kairik Airport, having flown there on several flights as PIC and Second-In-Command (SIC), occupying the left and right seat respectively, on the DHC-6-300 aircraft.

1.5.2 Pilot In Command Under Supervision (ICUS)

Age	: 32 years
Nationality	: Papua New Guinean
Gender	: Male
Type of licence	: CPL Aeroplane
Valid to	: Perpetual
Rating	: C172; BE76; DHC6
Total flying time	: 2,117.3 hours
Total on this type	: 1,856.1 hours
Total last 90 days	: 249.6 hours
Total on type last 90 days	: 249.6 hours
Total last 7 days	: 26.2 hours
Total on type last 7 days	: 26.2 hours
Total last 24 hours	: 5.4 hours
Total on the type last 24 hours	: 5.4 hours
Total on duty last 48 hours	: 18.7 hours
Total rest period(s) last 48 hours	: 32.7 hours - 2 Rest Periods
Last recurrent training	: 20 April 2024
Last proficiency check	: 20 April 2024
Last line check	: 20 April 2024
Route and aerodrome recency	: 20 April 2024
Medical class	: Class One (1)
Valid to	: 5 October 2025
Medical limitation	: Nil

The pilot ICUS's training records provided were also assessed to determine crew competency and currency at the time of the accident. Records showed that the pilot ICUS was current with his proficiency and currency checks in accordance with *CAR Part 61.207* "*Currency Requirements*" for CPL holders and *CAR Part 125.605 "Flight Crew competency checks and recurrent training"*. His Class one (1) Medical, according to CAR Part 67.61 "Effective date and duration of Medical Certificate", was valid at the time of the accident.

The records provided also showed that the pilot was familiar with Kairik Airport, having flown there on several flights as Co-pilot occupying the right seat and had been part of the crew who operated a flight into Kairik on 18 October 2024, the day before the accident flight. Additionally, the pilot ICUS had completed his base check on the same day and had been cleared to commence his line training for his command. The day of the accident was the pilot's first day occupying the left seat in the role of pilot ICUS.

1.6 Aircraft Information

The DHC-6-300 Series Twin Otter is an all-metal, high-wing monoplane with a fixed tricycle landing gear, equipped with a steerable nose wheel. It is fitted with two Pratt and Whitney, PT6A-27 turboprop engines, with short take-off and landing (STOL) capabilities.

1.6.1 Aircraft Data

Aircraft manufacturer	: De Havilland Aircraft of Canada Ltd
Model	: DHC-6-300
Serial number	: 715
Year of manufacture	: 1980
Nationality and registration mark	: P2-KAL
Name of the owner	: ASHE Enterprises Limited
Name of the operator	: Kobio Aviation Limited
Certificate of Airworthiness number	: 502
Certificate of Airworthiness issued	: 20 March 2024
Certificate of Airworthiness valid to	: Non-Terminating
Certificate of Registration number	: 502
Certificate of Registration issued	: 15 February 2024
Total Hours Since New	: 45,549.50 hours
Total Cycles Since New	: 59,339 cycles

1.6.2 Engine Data

Engine Type	: Turbo propeller
Manufacturer	: Pratt & Whitney Canada
Type	: PT6A-27
Engine number one (Left)	
Serial Number	: PCE-PG0386
Total Time Since New	: 6,694.10 hours
Total Time Since Overhaul	: 3,190.60 hours
Engine number two (Right)	
Serial Number	: PCE-PG25506
Total Time Since New	: 13,785.70 hours
Total Time Since Overhaul	: 2,447.10 hours

Evidence reviewed indicated that the engines were not a contributing factor to this accident.

1.6.3 Propeller Data

Manufacturer	: Hartzell Propellors Inc
Model	: HC-B3TN-3D
Propeller number one (Left)	
Serial Number	: BUA 22301
Total Time Since New	: 2076.90 hours
Total Time Since Overhaul	: 0.0 hour
Propeller number two (Right)	
Serial Number	: BUA 23523
Total Time Since New	: 1761.70 hours
Total Time Since Overhaul	: 0.0 hour

Evidence reviewed indicated that Propellers were not a contributing factor to this accident.

1.6.4 Airworthiness and Maintenance

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

The maintenance records of the aircraft were reviewed during the investigation and identified that there were no outstanding scheduled maintenance and defects before the accident flight.

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

1.6.5 Weight and Balance Data

The investigation determined that the weight and balance were not contributing factors to the accident.

1.6.6 Minimum Equipment List

There was no outstanding Minimum Equipment List (MEL) item at the time of the accident.

1.6.7 Fuel Information

The investigation determined that fuel was not a contributing factor to the accident.

1.6.8 Collision Avoidance Systems

The aircraft was equipped with a Terrain Awareness and Warning System (TAWS) and a Traffic Collision Avoidance System (TCAS). Both systems were serviceable during the accident flight and were not contributing factors to this accident.

1.7 Meteorological information

1.7.1 PNG National Weather Service – Kairik Terminal Aerodrome Forecast

The TAF Kairik was issued at 23: 21 UTC and was valid from 02:00 UTC to 11:00 UTC.

Wind	Variable at 3 kts
Visibility	Greater than 10 km in light showers of rain
Cloud	Scattered at 1800 ft Broken at 3000 ft
QNH	1017 1015 1016 hPa

Table 2: TAF-Kairik Weather Forecast

The TAF also provided intermittent weather information valid from 02:00 UTC to 11:00 UTC with a visibility of 5000 m in showers and rain and cloud broken at 1000 ft.

1.7.2 Crew Observation and Kairik Agent Reported Weather

CVR data indicated that upon arrival at Kairik, the crew reported holding due to heavy rain, despite earlier forecasts from Mt. Hagen suggesting clear weather.

The pilot ICUS contacted the ground agent, who advised that it had been raining along the approach and threshold for the past ten minutes, with broken clouds and heavy showers.

A short time later, the agent reported improved visibility and clearing ridges with only drizzle. Based on this update, the crew proceeded to approach right base for RWY 23, with the runway and nearby road in sight.

The crew noted rain was limited to the right side of the runway, and the crew confirmed that the runway surface was wet and slippery.

1.8 Aids to navigation

Navigational aids and their serviceability were not a contributing factor in this accident.

1.9 Communications

The aircraft's High Frequency (HF) and Very High Frequency (VHF) two-way communication radios were serviceable and did not contribute to the accident.

1.10 Aerodrome information

1.10.1 General

Kairik Airport is located in Enga Province, Papua New Guinea, at an elevation of 7280 ft and about 45 nautical miles (NM) northwest of Wapenamanda Airport. It is a small airport located within the Porgera Mine area. The airport is a small and privately owned by New Porgera Limited (NPL).

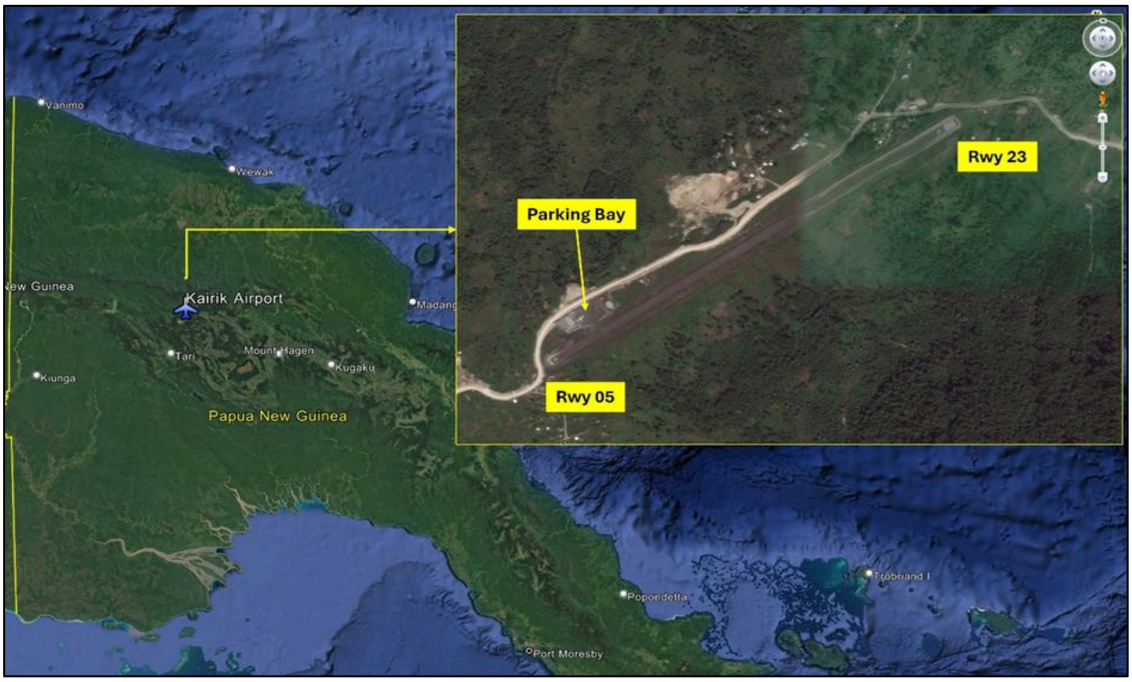

Figure 3: Location of Kairik Airport (Source: Google Earth, annotated by AIC)

According to the *PNG Aeronautical Information Publication under GEN 2.4-7,* the Kairik Airport ICAO designator is AYKX. Other information in the table below was provided by New Porgera Limited.

ICAO Indicator	**AYKX**	**PNG AIP GEN 2.4-7**
Airport Name	Porgera	Information gathered from New Porgera Limited
Airport Class	III	
Airport Authority	New Porgera Limited (NPL)	
Coordinates	5° 26' 51.39"S,143°9' 58.36"E	
Elevation	7280ft	
Runway Identifier	RWY 05/23	
Runway Length	1208 m (3963ft)	
Runway Width	40 m (133ft)	
Wind Indicator	Left of RWY 05 / Left of RWY 23	

Table 3: Kairik Airport Data.

The PNG Airstrip Guide Year 2022, which the crew uses as their guide for operating into Kairik Airport, also indicated that Kairik Airport is a one-way landing and take-off aerodrome with a landing direction of 230°, a take-off direction of 050°, and has a slope of 5.5° northeast.

1.10.2 Observation of Kairik Airport

The investigation identified visible wear on Kairik Airport's runway surface, particularly to the left and right of the centerline. Soft patches adjacent to the runway edges were observed due to recent rainfall.

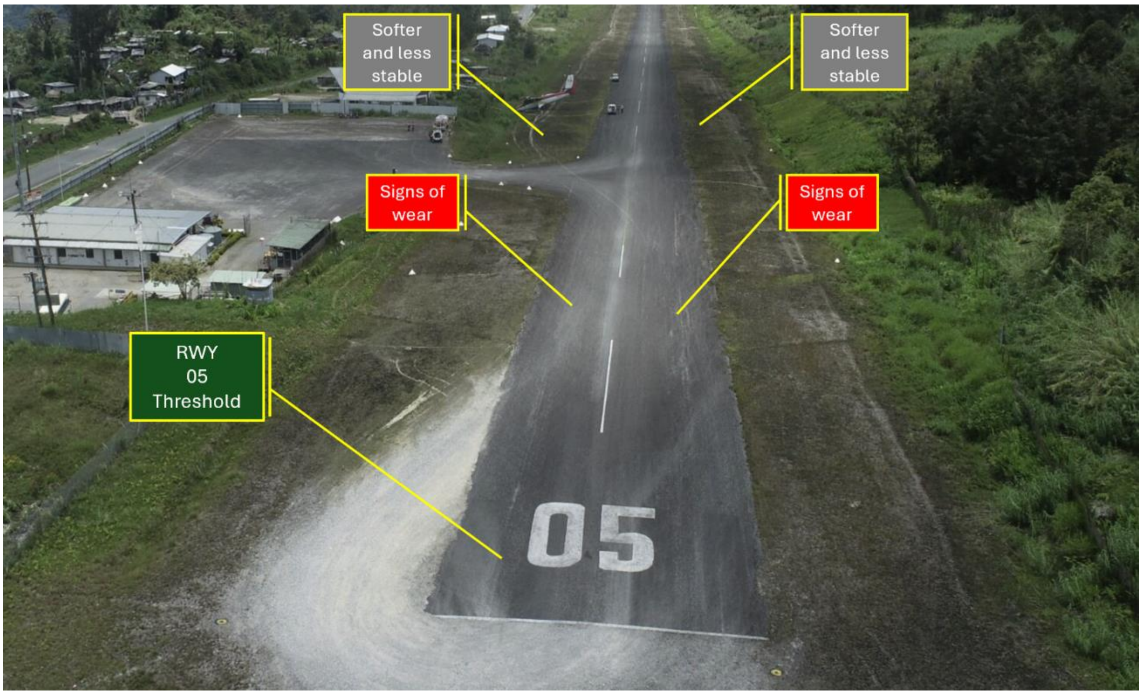

Figure 4: Kairik Airport with indications of the observation by the investigation

1.11 Flight Recorders

The aircraft was equipped with a Solid-State Cockpit Voice Recorder (SSCVR). The aircraft was not equipped with a Flight Data Recorder, and it was not required by PNG Civil Aviation Rules.

The table below outlines the SSCVR information.

Manufacturer	Universal Avionics System Corporation
Model	CVR-120R
Part Number	1606-01-00
Data Storage Memory	Solid-State
Serial Number	2239
Recording Duration	At least 2 hours
Recorded Channels	4 Channels, Channel 1-Captain Channel 2- Co-Pilot Channel 3- Crew 3 PA Channel 4-Cockpit Area Microphone

Table 4: SSCVR Information

The SSCVR was taken to the AIC Flight Recorder Laboratory to undergo data download, playback, and analysis. The data was successfully retrieved and utilised in the investigation.

1.12 Wreckage and Impact Information

1.12.1 General Description of the Wreckage

According to post-accident images provided to the AIC by the operator, it was observed that the aircraft initially travelled approximately 152 metres from the take-off position before exiting the runway onto the adjacent wet, soft, and slippery grass surface. The aircraft then continued for another 43 metres along the soft area before coming to a complete stop.

In total, the aircraft travelled 195 metres from the start of the take-off roll to its final resting position. Additionally, when measured along the runway axis, the distance from the take-off position to the point where the aircraft came to rest was approximately 229 metres.

Observations of the tyre markings on the runway surface indicated that the aircraft initially veered to the right of the centerline during the take-off roll. It then crossed the centerline and began veering to the left, continuing further left until it exited the runway and entered the soft grass area adjacent to the runway.

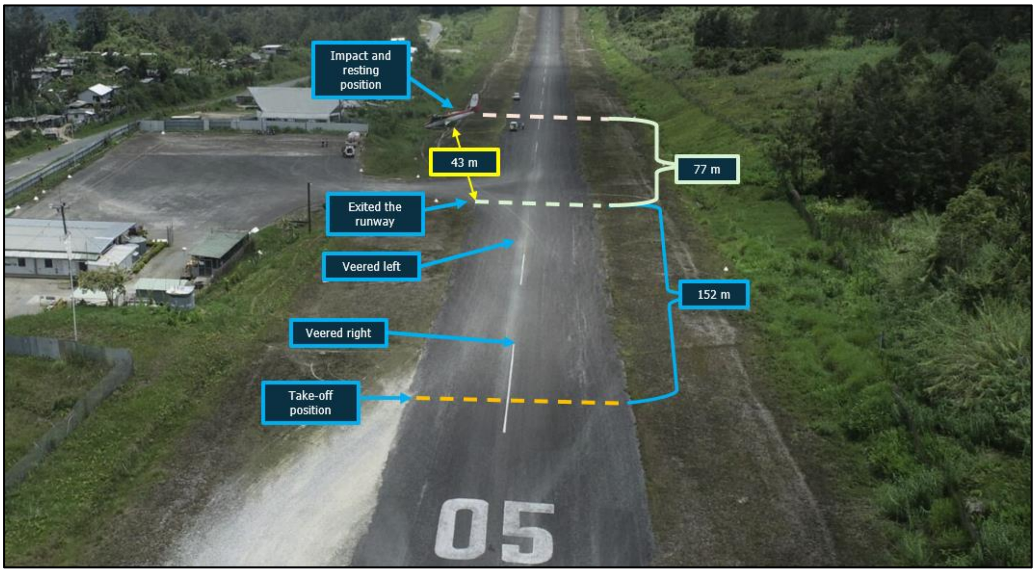

Figure 5: Accident Site Overview: From Take-off Roll to Impact

1.12.2 Aircraft damages

The nose cone sustained damage, and the right main wheel was punctured during the accident. Additional damage was observed on the left-wing tip, left-wing outboard flap, and its aileron. These observations align with the trajectory and impact details captured in the drone image taken at the site post-accident, confirming the sequence of events and the extent of the damage.

Figure 6: Damage to the nose area

Figure 7: Damage to the Left wingtip, outboard flap, and outboard aileron

1.12.3 Post Maintenance Inspection

A post-maintenance inspection conducted by the operator's maintenance team revealed significant damage to the aircraft resulting from the runway excursion. The left-hand wing tip assembly was crushed, with parts of the composite structure torn off, and the navigation lights assembly detached. The left-hand outermost wing rib exhibited bending, with surrounding skins showing ripples and cracks. The left-hand flap-aileron assembly was fractured and bent, requiring replacement, while the nose assembly sustained major structural damage, including crushing and punctures forward of STA 20.0. Additionally, the nose baggage compartment access door was torn, and the left-hand main wheel assembly hub showed scuffing and gouging.

Section 5.1 Appendix A of this report contains the operator's post-accident aircraft defect report.

1.13 Medical and Pathological Information

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

1.14 Fire

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

1.15 Survival Aspects

According to the Air Traffic Services (ATS) recorded data, an INCERFA (Uncertainty Phase) was declared by the ATS Duty Officer at 15:15. Shortly thereafter, the Duty Officer was informed by the Kairik Airport Manager that P2-KAL had veered off the runway and into a drainage ditch located at the edge of the runway.

During the interview, the crew stated that a helicopter pilot who was a passenger on the flight assisted by opening the passenger door and evacuated the other passengers safely.

The crew further stated that while the IP was shutting down the engines and ensuring everything was secured correctly and completely, the pilot ICUS made his way out of the aircraft to evacuate the passengers, however, the passengers were already evacuated by the Kairik staff who arrived immediately at the scene of the accident to assist.

1.16 Tests and Research

No tests or research were required to be conducted as a result of this accident.

1.17 Organisational and Management Information

1.17.1 Kobio Aviation Limited

Kobio Aviation Limited is privately owned with fixed-wing aircraft operations. The operator has an Air Operator Certificate (119/087). The certificate is pursuant to section 47 (3) and 49 of the Civil Aviation Act 2000, Part 119 and Part 125.The certificate authorises Kobio Aviation Limited to perform commercial air operations; Passenger, Cargo and other RPT Non-scheduled (charter), as defined in the approved operations specification and expositions. The AOC was effective from 18 October 2024 and expires on 31 July 2025.

1.17.1.1 *Take-off and Directional Control Procedures*

The Operator's *Standard Operating Procedures (SOP) Manual*, Chapter 3, Section 3.4 (*Cockpit Scan*), contains the First Officer's Take-off Scan and Calls Procedure, which includes the following:

CAPTAIN	FIRST OFFICER
After completion of the Line up Checklist Call	
➤ Call "YOUR CONTROLS"	➤ Respond "MY CONTROLS"
Note: The First Officer shall have directional control of the aircraft via input to the rudder pedals from this point. The Captain shall loosely guard the nose wheel tiller to ensure directional control is maintained.	➤ "TORQUE .... PSI" ➤ "ROTATE ……. KTS" ➤ Calls "SET POWER" • Place both hands on the control wheel and assume directional control via the rudder pedals.
• Sets TKOF Power (allowing for ram effect)	
➤ Replace the First Officers hands on the Power Levers, and advance the Power Levers to take-off power, and call "AUTOFEATHER ARMED" when arm light illuminated.	

Table 5: Operator's First Officer's Take-off Scan and Calls Procedure

Section 5.2 Appendix B of this report provides extract from the operator's *SOP* (Chapter 3, Section 3.4 – *Cockpit Scan*), specifically the First Officer's Take-off Scan and Calls Procedure.

According to the Manufacturer's *Pilot Operating Handbook (POH)* and *Aircraft Flight Manual (AFM)* for the DHC-6 Series 300 (Twin Otter) and variants, Revision 53, dated 10 September 2010, Section 4 *Normal Procedures*, Subsection 4.10 (1) and (2) *Take-off*, the following are specified:

1. Line up on the runway and slowly roll forward a short distance to ensure the nose wheel is centered. Then stop and apply brakes.
2. Advance the power levers until 85% NG is reached. Pause for at least 5 seconds at this setting, allowing all engine indications—particularly T5 temperatures—to stabilize.

Section 10 *Take-off*, Subsection 10.5.1 *Directional Control During Take-off*, further states:

"*The nose wheel must be confirmed to be centered in the straight-ahead position prior to commencing the take-off roll. After maneuvering into take-off position on the runway, center the nose wheel using the tiller, then allow the aircraft to roll forward approximately 3 meters (10 feet) to confirm proper alignment.*"

Section 5.3, Appendix C, and Section 5.4, Appendix D of this report provide extracts from Section 4 and Section 10 of the Manufacturer's Manual, respectively.

The investigation found that the operator's *SOP Manual*, Chapter 3, Section 3.4 (*Cockpit Scan*), the First Officer's Take-off Scan and Calls Procedure, does not fully align with key steps outlined in Section 4 (Normal Procedures) and Section 10 (Safety and Operational Tips) of the Aircraft Manufacturer's Manual. Specifically, the operator's Procedure omits the following:

- *The required 3-meter roll check to verify nose wheel alignment*
- *The 85% NG engine stabilization step with a 5-second brake hold for T5 temperature monitoring*
- *Explicit prohibition of tiller use during the take-off roll*

These omissions reduced the available safety margins for directional control during take-off and removed key procedural safeguards intended to ensure aircraft alignment and directional control.

The crew had completed a flight from Mt Hagen into Kairik and out earlier that day and was uneventful. The crew stated that in the first flight, the above procedure was carried out in Hagen and Kairik. In the second flight, the procedure was not carried out in line up (accident flight). According to the crew, the second flight out of Kairik was slower in the turn to line up and a little heavy.

1.17.1.2 *Challenge and Response*

The Operator's SOP, Section 3.20.57, states:

"If a flight-critical situation is observed by the PM, the PM shall challenge the PF in regard to the situation."

The investigation identified that the crew was unaware of a developing unsafe situation, specifically, that the nose wheel was not properly aligned with the runway centerline before the rapid application of power. However, the evidence reviewed showed that there were clear indications of the misalignment during take-off roll where the IP made slight adjustments to ensure directional control which should have been identified and addressed by the IP, as the PM. Despite these indications of a possible misalignment of the nose wheel the IP did not question or offer any input regarding the actions, or inactions, of the pilot ICUS before and during take-off roll and when deviations were observed.

1.17.1.3 *Cockpit Scans and Calls*

Chapter 3, Section 3.4 of the operator's SOP Manual states;

> *"Kobio Aviation adopts a scan system in its checklist procedures. The scans are actioned and follow the same geographic pattern across each panel as the appropriate checklist. The scans are completed prior to the checklist being read therefore ensuring a double check of all critical actions, as each challenge is acknowledged by the crew member concerned. Each pilot must check his own flight instruments and radio selection. A functional check of each system is made during the initial acceptance check. Some items are action items or a call. Other items require a verbal call (either read, request or response) and other items are scans and no verbal contact is needed to be applied.*
>
> *Each pilot must check his own flight instruments and radio selection. A functional check of each system is made during the initial acceptance check"*

Some checklist items require actions or verbal calls (such as read, request, or response), while others are scans that require no verbal confirmation. As outlined in the SOP Manual, most items are scans, with verbal calls beginning during the *Take-Off Scans and Calls,* following the *Line-Up Scans.*

After completing the *Line-Up Checklist,* the Captain calls *"YOUR CONTROLS,"* sets take-off power allowing for RAM effect, positions the First Officer's hands on the power levers, and calls *"AUTOFEATHER ARMED"* once the light is illuminated. The First Officer responds *"MY CONTROLS,"* and makes the required take-off calls: *"TORQUE __ PSI," "ROTATE...KTS," "ENGINE INSTRUMENTS CHECKED," "POWER SET,"* and *"40 KNOTS."* The First Officer assumes directional control using the rudder pedals, while the captain loosely guards the nose wheel tiller as needed.

The investigation reviewed the CVR recording, which captured the period from *After Start Checks* to *Line-Up Checks*. While the checklists were read and responded to by the crew, the titles were not announced and the checklists were not formally closed upon completion, contrary to SOP Manual Version 0, Section 3.3. This section requires the checklist title (e.g., *"DESCENT CHECKS"*) to be announced and completed with the phrase *"CHECKLIST COMPLETE."* A copy of the *Normal Checklist* is available in Section 5.5, Appendix E of the *Kobio Aviation SOP Manual – Normal Checklist*.

1.17.1.4 *Crew Resource Management Training*

Operators *Training and Competency Manual, Appendix 8* states;

> *The company's aim is for each crew member to complete CRM induction within six months of joining the company.*
>
> *Initial CRM training shall be of two days' duration.*
>
> *CRM training is not formally examined; however, the application of CRM principles is observed and assessed during surveillance and check flights.*
>
> *Failure to apply CRM principles may result in a FAIL assessment during check flights.*

Crew Resource Management Training Syllabus (Initial and Recurrent)

CRM is an extensive and developing subject. The course shall be designed to ensure the attendees are provided with information to allow them to;

> *a) Understand their role on the Flight Deck/Cabin and/or with the Company, and how it is essential to ensure all resources are utilised*
>
> *b) Understand differing means of communicating information*

c) Understand the different situations in which different communications styles are important.

d) Have reviewed at least two case studies of good and/or poor use of CRM

e) Have reviewed the principles of Threat and Error Management (TEM)

f) Have actively contributed to the class.

Completion Standard

On completion of the course, crew members shall be able to :

a) Demonstrate an understanding and appreciation of the principles of CRM

b) Enhance safety through a better understanding of each other's duties, responsibilities, and problems.

c) Promote and encourage better teamwork.

Recurrent training is provided every 24 months.

The investigation found that the pilot ICUS had completed the CRM training on 14 May 2024 with the operator (Kobio Aviation). The IP's last CRM training was done was with his former employer on 22 November 2022. There was no record of CRM training done with the operator (Kobio Aviation Limited).

There are no clearly defined CRM guidelines in the operator's relevant manuals providing guidance to enhance safety, improve communication, promote teamwork, support better decision making, reduces task saturation, build situational awareness and improves crew response to emergencies and ensure flight crew are prepared to manage their responsibilities and maintain safety during critical stages of the flight which includes take-off.

1.18 Additional Information

1.18.1.1 *Development of New Route*

The operator's Route Guide Manual, Section 2.5 *"Development of New Routes,"* states:

The Chief Executive Officer (CEO) will advise the Flight Operations Manager (FOM) of any proposed new route in order to evaluate operational feasibility.

Considerations will include (but are not limited to):

1. *Preferred routing*
2. *Payload*
3. *aircraft performance analysis*
4. *airport physical characteristics*
5. *operational document coverage; and*
6. *any required airport approvals.*

If a new route is approved, the Flight Operations Manager (FOM) is responsible for updating the Route Manual to include the route and relevant aerodrome information. However, the investigation found no record of an operational feasibility assessment for Kairik Operations.

1.18.1.2 *Aerodrome Categorisation*

According to the Route Guide Manual, Section 2.6.2 "Categorization":

> *The category of an airport is used for the purpose of determining airport qualification requirements. There are three airport categories—A, B, and C. The categorization is based on the criteria outlined in Chapter 2, Section 2.16 "Airport Categorization." Only primary and alternate airports are categorized.*

The Route Guide Manual, Section 2.16.2 *"Airport Categorization Criteria,"* states:

> *For the purpose of determining the training required by the Pilot-in-Command (PIC) to meet aerodrome approval requirements, airports are categorized in ascending order of difficulty from Category A to Category C. The categories are defined as follows:*

Category A airports satisfy all of the following criteria:

1. Have a published instrument approach procedure (e.g. LOC, LLZ, ADF, VOR, GPS RNAV)
2. Have at least one runway with no performance-limiting procedures for take-off and/or landing
3. Have a published circling minimum ceiling no higher than 1,500 feet above airport elevation

Category B airports are those that do not satisfy Category A requirements or require additional considerations, such as:

1. Terrain and/or obstructions that abnormally constrain approaches or departures (e.g. turns on approach or departure below 500 ft AGL or greater than 150°)
2. Unusual approach or departure procedures
3. Known extreme local weather conditions (e.g. turbulence due to surrounding topography)

Category C airports are those that require further considerations beyond those identified for Category B airports.

The operator classified Kairik Airport as a Category C airport. However, the investigation found no recorded data of Kairik Airport from the operator to confirm this classification.

1.18.2 James Reason's model of Accident Causation

According to *ICAO Doc 9683*, failures within an aviation system can be categorized into active failures and latent failures:

Section 4.2.11 states.

- *Failures can be of two types, depending on the immediacy of their consequences. An active failure is an error or a violation which has an immediate adverse effect. Such errors are usually made by the front-line operator. A pilot raising the landing gear lever instead of the flap lever exemplifies this failure type.*
- *A latent failure is a result of a decision, or an action made well before an accident, the consequences of which may lie dormant for a long time. Such failures usually originate at the decision-maker, regulator or line management level, that is, with people far removed in time and space from the event. A decision to merge two companies without providing training to standardize operating procedures illustrates the latent failure. These failures can also be introduced at any level of the system by the human condition — for example, through poor motivation or fatigue.*

Section 4.2.12 states

> *Latent failures, which originate from questionable decisions or incorrect actions, although not harmful if they occur in isolation, can interact to create "a window of opportunity" for a pilot, air traffic controller, or mechanic to commit an active failure which breaches all the defences of the system and results in an accident. The front-line operators are the inheritors of a system's defects. They are the ones dealing with a situation in which technical problems, adverse conditions or their own actions will reveal the latent failures present in a system. In a well-guarded system, latent and active failures will interact, but they will not often breach the defences. When the defences work, the result is an incident; when they do not, it is an accident.*

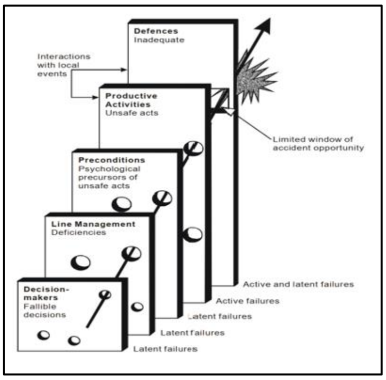

Figure 8: Modified version of James Reason's model of accident causation, showing the various human contributions to the breakdown of a complex system (Source: ICAO Doc 9683 Human Factors Training Manual).

Failures in the system create holes in all the defences. When the holes in all of the slices momentarily align, 'permitting a trajectory of accident opportunity, so that a hazard passes through holes in all of the defences, resulting in accidents as shown in Figure 9.

The investigation identified both active and latent failures in this accident. Active failures included the crew not completing the take-off procedures and ensuring nose wheel was aligned before the take-off roll and lack of effective CRM by the crew in the cockpits. Latent failures included the operator's lack of documented operational feasibility assessments of Kairik Airport before operations.

1.19 Useful or Effective Investigation Techniques

The investigation was conducted in accordance with PNG Legislation and PNG Accident Investigation Commission approved policies and procedures and in accordance with the Standards and Recommended practices of Annex 13 to the Chicago Convention.

2 ANALYSIS

2.1 General

The analysis part of this report will discuss the relevant issues resulting in the accident. The analysis will focus on the following issues, but not necessarily under separate headings.

- Prescribed Take-off Procedures
- Aerodrome
- The accident
- Crew Resource Management
- Organisational

2.1.1 Prescribed Take-off and Directional Control Procedures

The investigation found that the operator's *SOP Manual*, Chapter 3, Section 3.4 (*Cockpit Scan*), the First Officer's Take-off Scan and Calls Procedure, does not fully align with key steps outlined in Section 4 (Normal Procedures) and Section 10 (Safety and Operational Tips) of the Aircraft Manufacturer's Manual. Specifically, the operator's Procedure omits the following:

1) A 3-meter roll forward on line up to verify nose wheel alignment, then stopping and applying brakes.
2) Advancing to 85% NG, followed by a 5-second pause at this setting, allowing all engine indications—particularly T5 temperatures—to stabilize.

The investigation determined that these omissions collectively reduced safety margins for take-off and may have adversely affected directional control during the initial take-off. The 3-metre roll forward on line up is a vital procedure that would have verified nose wheel alignment before take-off roll. The exclusion of the engine stabilization step, specifically the 5-second pause at 85% NG, reduced airflow over the vertical stabilizer and rudder, limiting the rudder's effectiveness for directional control during the early stages of the take-off roll.

2.1.2 Kairik Airport

The investigation established that the wet and slippery surface conditions and soft ground near the runway edges further reduced tyre traction and limited the crew's ability to ensure directional control. These environmental and physical factors significantly affected the aircraft's directional control during take-off roll. The AIC concluded that these conditions directly impacted the crew's ability to ensure the aircraft-maintained alignment with the centerline.

2.1.1 The accident

The investigation found that during the tight left turn onto RWY 05, the crew applied excessive tiller input, causing an initial overcorrection to the left. In an attempt to compensate by steering right with the tiller, the crew likely overcorrected again by applying excessive tiller input, leading to nosewheel deviation right of the centerline, despite momentarily appearing aligned visually.

This initial misalignment went undetected due to the omission of the manufacturer's prescribed *3-metre roll-forward* step during line-up.

This step was also not included in the operator's take-off procedures. Had it been documented and executed by the crew, it would have served as a defence to ensure nosewheel alignment was verified before take-off. Instead, the take-off was initiated without confirming nosewheel alignment with the centerline.

After the take-off roll, the aircraft began veering to the right. As the aircraft began veering to the right, the crew applied corrective inputs to maintain centerline tracking. However, in the view of the investigation, the initial response resulted in an overcorrection. The overcorrection was highly likely due to the excessive application of both the left rudder input as well as the application of asymmetric power to counter the initial tracking to the right of the centerline during the take-off roll. This excessive application of left rudder and asymmetric power significantly increased the magnitude of the left turn and caused the aircraft to veer sharply to the left as the aircraft continued the take-off roll, resulting in a loss of directional control, where the aircraft exited the left strip edge onto the wet grass surface.

Subsequent attempts to regain centreline using asymmetric power and rudder inputs to counter the left veer were ineffective due to the reduced tyre traction on the slippery wet grass, and the aircraft continued to track along the grass strip parallel to the runway before the left wingtip impacted the rising embarkment at the edge of the grass strip followed by the nose. Braking efforts were ineffective due to the soft, wet grass.

The situation developed rapidly, and the crew had little time to react. Excessive control inputs, delayed rudder effectiveness, and poor surface conditions ultimately made a successful recovery impossible.

2.1.1 Organisational and Management Factors

Category C aerodromes are those that require further considerations beyond those identified for Category B aerodromes. The operator classified Kairik as a Category C airport. However, the investigation found no recorded data of Kairik from the operator to confirm this classification and no records of operational feasibility assessment for Kairik operations.

2.1.1 Crew Resource Management

The crew did not identify and manage the threats and errors effectively to ensure a safe take-off. The crew's communication and decision-making were found to be inadequate. This highlights the importance of effective CRM training to prevent such accidents. The investigation identified that there is a need for continuous improvement in CRM training, emphasizing the critical role of communication, situational awareness, and teamwork in preventing accidents and enforcing the importance of effective CRM to ensure clear communication and decision-making in the cockpit.

The investigation found that cockpit communication and coordination were ineffective before and during the take-off roll. The PF not fully completing the take-off procedures to ensure nosewheel alignment was not challenged by the PM, and the indications of nosewheel not aligned were not communicated, despite slight adjustments being made by the PM during the take-off roll. This indicates lack of situational awareness and complacency in terms of effective monitoring of the threats by the crew and managing it to prevent an unsafe aircraft state/condition.

Furthermore, the investigation identified an absence of explicit CRM guidance in the operator’s relevant manuals.

Task saturation and a reduction in safety margins are some issues that may be faced. Task saturation could lead to missed checklists or procedural errors.

The investigation concluded that clearly defined CRM guidelines enhances safety, improves communication, promotes teamwork ,supports better decision making, reduces task saturation, builds situational awareness and improves crew response to emergencies and also ensure flight crew are prepared to manage their responsibilities and maintain safety during critical stages of the flight which includes take off.

2.1.2 Organisational

The investigation found the following organisational issues:

2.1.2.1 *Pilot In Command Under Supervision Command Endorsement Training*

The pilot ICUS was undergoing command endorsement training and was seated on the left seat, and it was the first day of the training. Kairik is a category C aerodrome. According to the operators Route Guide Manual there are 3 categories of aerodromes, Category A, B and C. Aerodromes are categorized in ascending order of difficulty from Category A to Category C. Category C being more difficult . Category C are aerodromes that require additional considerations to Category B aerodromes.

Since it was the first day on the left seat for the pilot ICUS, the command endorsement training should start with the easier or less difficult and challenging aerodromes to be familiar and gain confidence on the left seat before operating to more difficult strips/aerodromes.

For a pilot's first left-seat proficiency check in a DHC-6-300, easier aerodromes help ensure a safe, focused, and fair assessment of core captaincy skills before introducing more complex operational challenges.

The accident flight was the pilot ICUS's first time in command on the left seat and hes managing aircraft operation and the crew. An easier aerodrome would remove environmental stressors so the check can focus on command ability, decision-making, and handling from the left seat. Pilots transitioning from the right to the left seat are adjusting to new responsibilities (e.g., ATC communications, aircraft control priority, checklist flow). A simpler aerodrome offers more margin for error during this critical phase because of thelonger runways, better navigation aids, and fewer terrain or wind challenges. Kairik Airport has narrow and sloped runway or minimal infrastructure so introducing these variables too early in a left-seat upgrade could lead to cognitive overload or unsafe situations during the check. In a low-complexity environment, the examiner can clearly see the pilot's baseline capabilities, flying, leadership and situational awareness without interference from difficult airport features.

The investigation also noted that there is also no specific rule requirement or guidance material regarding which category of airstrip crew members changing from one crew position to a more responsible crew position on the same aeroplane type or variant like pilots ICUS on the left seat can operate to as part of the command endorsement training. However, the rule requires operators to have procedures or policies that ensure they meet limitations for flights to approved aerodromes.

2.4.2 Pairing a new ICUS with a new Flight instructor

The investigation also noted that the Flight Instructor was issued an Instrument of Authorization for a Category D Flight Instructor on the DHC-6 as a Category D Flight Instructor in accordance with 61.305 (d), 4 days before the accident flight so he was new in the role at the time of the accident.

Previously, with his former employer, he had been issued an IOA on 17 October 2020 to perform Category D Flight Instructor and Flight Examiner functions on the C208B.

Pairing both a new pilot ICUS and a new Flight Instructor with limited experience on both sides is not ideal. The pilot ICUS is still learning to command, and the instructor is still learning to supervise and coach while maintaining a safety net. There's less margin for identifying and correcting subtle errors. A new instructor may lack the confidence or situational awareness to challenge or redirect decisions effectively the pilot ICUS may receive unclear or inconsistent guidance. Both may be overly cautious or hesitant, especially in high workload or abnormal situations. This could lead to decision-making delays or missed threats.

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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 and Certificate of Annual Airworthiness Review.

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) There was no evidence of airframe failure or system malfunction prior to the accident.

g) The aircraft was structurally intact prior to impact.

h) The aircraft’s systems, including the tiller and directional control mechanisms, were operational and functioning as intended at the time of the accident.

i) The aircraft's take-off performance was within operational limits but became compromised due to loss of directional control.

j) The engines were operating normally and responded to throttle inputs throughout the take-off roll.

3.1.2 Crew / Pilots

a) The flight crew were licensed, medically fit, and adequately rested for the flight.

b) The flight crew complied with flight and duty time regulations.

c) The IP acted as PM, and the pilot ICUS was designated as PF.

d) There was a lack of effective situational awareness and communication between PF and PM.

e) The IP, as the PM did not take control of aircraft when aircraft began deviating from centerline.

f) The IP had last completed the CRM with a previous employer in 2022. However, there were no CRM training records with the operator (Kobio Ltd).

g) The IP had experience at Kairik Airport as both PIC and SIC on the DHC-6-300.

h) The pilot ICUS had prior experience at Kairik as a Co-pilot in the right seat.

i) The PF had completed his base check the day before, with the accident flight being his first in the left seat as pilot ICUS.

3.1.3 Flight Operations

a) The crew did not carry out the required 3 metre roll-forward nosewheel alignment check before stopping and applying brakes, as per the manufacturer’s procedures.

b) The engine stabilization step was omitted, reducing rudder effectiveness and hindering the correction of the aircraft's nosewheel alignment with the centerline.

c) The pilot ICUS had difficulty aligning the aircraft's nose wheel using the tiller, a challenge made worse by the steep turn to line up.

d) CRM was ineffective before and during the take-off roll.

e) The corrective actions taken were inadequate to prevent aircraft from continuing to veer off the centerline.

f) Although the crew attempted recovery through asymmetric power and braking, reduced tyre traction and limited time prevented successful correction.

3.1.4 Operator

a) The take-off procedures in the operator's SOP did not fully align with key steps in the manufacturer's prescribed take-off procedures.

b) The operator did not conduct a documented operational feasibility assessment for Kairik operations

c) Kairik Airport was designated as a Category C aerodrome. However, there was no record of the classification in the operator's relevant manuals.

d) The operator's Route Guide Manual did not contain data on Kairik Airport.

3.1.5 Air Traffic Services and Airport Facilities

g) ATC provided timely assistance to the crew.

h) Kairik Airport is privately owned and operated by New Porgera Limited.

i) A ground agent at Kairik Airport provided weather updates.

j) The 5.5° runway slope and sharp turn at RWY 05 created take-off challenges.

k) Wet grass and soft adjacent areas offered little support during an attempt by the crew to recover from the left veer onto the grass area and loss of directional control.

3.1.6 Flight Recorders

a) The aircraft was fitted with a Solid-State Cockpit Voice Recorder (SSCVR).

b) The SSCVR was successfully downloaded, providing valuable data for the investigation.

c) The aircraft was not equipped with a Flight Data Recorder (FDR), as it was not required by regulations for this aircraft type.

3.1.7 Medical

a) There was no evidence that the pilots suffered any sudden illness or incapacitation that might have affected his ability to control the aircraft.

b) Both pilots were medically fit and held valid medical certificates at the time of the accident.

c) No toxicological tests were conducted, as there was no indication of impairment due to alcohol, drugs, or other substances.

3.1.8 Survivability

a) The accident was survivable.

b) There were no reported injuries.

c) The aircraft remained structurally intact, allowing for the safe evacuation of all occupants.

d) The crew followed standard emergency procedures, including engine shutdown and passenger evacuation

3.1.9 Safety Oversight

a) The civil aviation authority's safety oversight of the operator's procedures and operations was adequate.

3.2 Contributing Factors

The investigation determined that the accident resulted from a combination of operational, human, and environmental factors. During a tight left turn onto RWY 05, excessive tiller inputs led to sequential overcorrections, misaligning the nosewheel to the right of the centerline. The crew omitted the manufacturer-required 3 metre forward roll check to verify nosewheel alignment with the centreline, an item not included in the operator's SOPs, preventing detection of this misalignment.

When the take-off roll began, the aircraft veered right. In response, the crew applied left rudder and asymmetric power; however, the inputs were excessive, causing a sharp veer left across the centerline and a loss of directional control.

The wet and slippery grass surface adjacent to the runway significantly reduced tyre traction and rendered recovery efforts ineffective. Despite attempts to regain control, the aircraft continued onto the grass, where the left wingtip struck an embankment, causing a sharp turn and a nose impact with a drainage ditch.

The pairing of a newly endorsed pilot ICUS with a new IP increased risks during this high-workload phase. This, combined with procedural gaps, improper control inputs, and adverse runway conditions, contributed to the accident.

3.3 Other Factors

The investigation identified other safety deficiencies or concerns during the course of the investigation that should be addressed with the aim of accident prevention.

The investigation identified the following.

The investigation found that the operator's *SOP Manual*, Chapter 3, Section 3.4 (*Cockpit Scan*), the First Officer's Take-off Scan and Calls Checklist, does not fully align with key steps outlined in Section 4 (Normal Procedures) and Section 10 (Safety and Operational Tips) of the Aircraft Manufacturer's Manual. Specifically, the operator's checklist omits the following:

a) The required 3-meter roll check to verify nose wheel alignment

b) The 85% NG engine stabilization step with a 5-second brake hold for T5 temperature monitoring

c) Explicit prohibition of tiller use during the take-off roll

The investigation also reviewed the CVR recording, which captured the period from *After Start Checks* to *Line-Up Checks*. While the checklists were read and responded to by the crew, the titles were not announced, and the checklists were not formally closed upon completion, contrary to SOP Manual Version 0, Section 3.3.

The investigation further revealed that the IP last completed CRM training with a previous employer on 22 November 2022, with no record of CRM training with Kobio Aviation Limited.

Additionally, there is no evidence that the operator conducted or documented an operational feasibility assessment for Kairik operations, nor was there any record supporting its classification as a Category C airport.

Finally, the operator's manuals did not include clearly defined CRM guidelines. This omission may limit efforts to enhance safety, communication, teamwork, situational awareness, and decision-making, particularly during critical phases of flight such as take-off.

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4 SAFETY RECOMMENDATIONS

4.1 Recommendations

As a result of the investigation into the accident involving Kobio Aviation Limited aircraft registered P2-KAL at Kairik Airport, on 19 October 2024, the PNG Accident Investigation Commission issued the following recommendations to address safety issues identified in this investigation.

4.1.1 Recommendation number AIC 25-R01/24-1002 to Kobio Aviation Limited

The PNG Accident Investigation Commission recommends that Kobio Aviation Limited,

a) revise its SOP Manual to fully align with the manufacturer's prescribed take-off and directional control procedures, as outlined in Subsections 4.10 and 10.5 of the AFM/POH, including:

1) 3 m forward roll, then stop and apply brakes to verify nosewheel alignment

2) Advancing power levers to 85% NG, followed by a 5-second pause at this setting, allowing all engine indications—particularly T5 temperatures—to stabilize.

3) Explicit prohibition of tiller uses during take-off roll

b) ensure that the flight crew are trained, checked, and assessed in these procedures

Action requested

The AIC requests that Kobio Aviation Limited note recommendation AIC 25-R01/24-1002 and provide a response to the AIC within 90 days of the issue date, but no later than 28 July 2025, and explain (including with evidence) how Kobio Aviation Limited has addressed the safety deficiency identified in the safety recommendation.

4.1.2 Recommendation number AIC 25-R02/24-1002 to Kobio Aviation Limited

The PNG Accident Investigation Commission recommends that Kobio Aviation Limited,

a) revise its relevant manuals to provide explicit and structured guidance on CRM, including crew roles and responsibilities, communication protocols, decision-making processes, leadership, and teamwork.

b) ensure that all flight crew are assessed during flight checks on CRM elements, should Kobio amend its manuals pursuant to part (a), specifically:

1) Crew Communication

2) Decision-making

3) Leadership and teamwork

Action requested

The AIC requests that Kobio Aviation Limited note recommendation AIC 25-R02/24-1002 and provide a response to the AIC within 90 days of the issue date, but no later than 28 July 2025, and explain (including with evidence) how Kobio Aviation Limited has addressed the safety deficiency identified in the safety recommendation.

4.1.3 Recommendation number AIC 25-R03/24-1002 to Kobio Aviation Limited

The PNG Accident Investigation Commission recommends that Kobio Aviation Limited to monitor flight crew training to ensure flight crew remain current, and records are accurately maintained and accessible.

Action requested

The AIC requests that Kobio Aviation Limited note recommendation AIC 25-R03/24-1002 and provide a response to the AIC within 90 days of the issue date, but no later than 28 June 2025, and explain (including with evidence) how Kobio Aviation Limited has addressed the safety deficiency identified in the safety recommendation.

4.1.4 Recommendation number AIC 25-R04/24-1002 to Kobio Aviation Limited

The PNG Accident Investigation Commission recommends that Kobio Aviation Limited implement a phased training approach for pilots undergoing command endorsement, starting with less challenging aerodromes before progressing to Category C aerodromes like Kairik Airport.

Action requested

The AIC requests that Kobio Aviation Limited note recommendation AIC 25-R04/24-1002 and provide a response to the AIC within 90 days of the issue date, but no later than 28 July 2025, and explain (including with evidence) how Kobio Aviation Limited has addressed the safety deficiency identified in the safety recommendation.

4.1.5 Recommendation number AIC 25-R05/24-1002 to Kobio Aviation Limited

The PNG Accident Investigation Commission recommends that Kobio Aviation Limited,

a) *conduct operational feasibility assessments on Kairik operations to ensure the flight crews are adequately prepared*

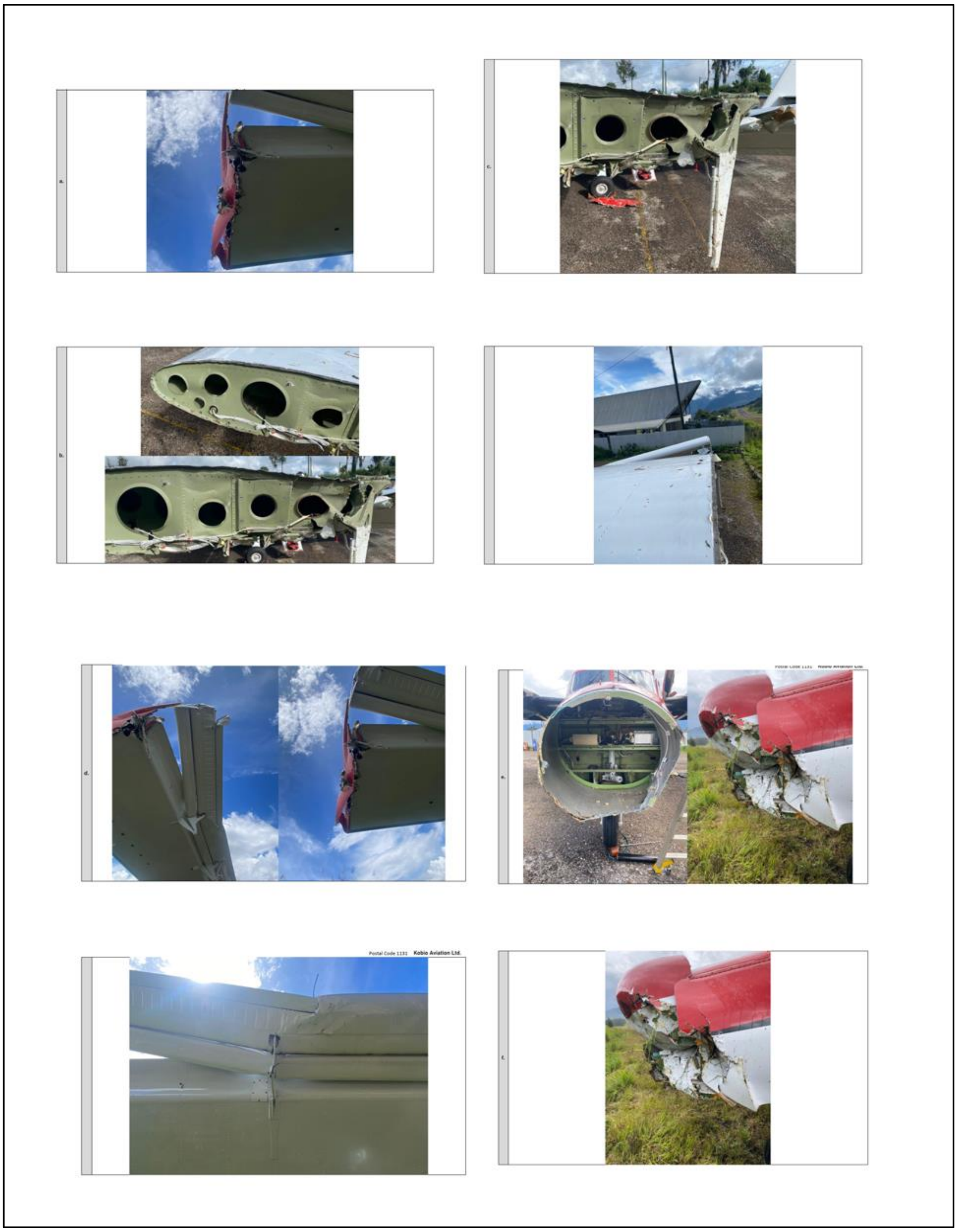
b) *if a new operation is approved, a feasibility assessment to be conducted to ensure the flight crews are adequately prepared.*

Action requested

The AIC requests that Kobio Aviation Limited note recommendation AIC 25-R05/24-1002 and provide a response to the AIC within 90 days of the issue date, but no later than 28 July 2025, and explain (including with evidence) how Kobio Aviation Limited has addressed the safety deficiency identified in the safety recommendation.

5 APPENDICES

5.1 Appendix A: Extracts of Kobio Aviation Ltd Post-accident aircraft defect report.



5.2 Appendix B: FIRST OFFICER TAKE-OFF SCANS AND CALLS.

KAL Kabo Aviation Ltd.	STANDARD OPERATING PROCEDURES MANUAL Section 3 – Normal and Abnormal Procedures	SOP DHC 6

Note:
Rolling Takeoffs are acceptable after a sound brief has been conducted confirming the expected sequence of events to come.

FIRST OFFICER'S TAKE-OFF SCANS AND CALLS	
CAPTAIN	**FIRST OFFICER**
After completion of the Line up Checklist Call	
➢ Call "**YOUR CONTROLS**"	
Note: *The First Officer shall have directional control of the aircraft via input to the rudder pedals from this point. The Captain shall loosely guard the nose wheel tiller to ensure directional control is maintained.*	➢ Respond "**MY CONTROLS**" ➢ "**TORQUE .... PSI**" ➢ "**ROTATE .... KTS**" ➢ Calls "**SET POWER**". • Place both hands on the control wheel and assume directional control via the rudder pedals.
• **Sets TKOF Power** (allowing for ram effect)	
➢ Replace the First Officers hands on the Power Levers, and advance the Power Levers to take-off power, and call "**AUTOFEATHER ARMED**" when arm light illuminated.	

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5.3 Appendix C: Manufacturer's Normal Procedures - Take-off

4.10 Take-Off

1 Line up on the runway and slowly roll forward a short distance until certain that the nose wheel is centered. Then, stop and apply brakes.

2 Advance the power levers until 85% N_G is reached, then pause for at least 5 seconds at this power setting until all engine indications – particularly the T_5 temperature indications – have stabilized.

NOTE

Pausing for at least five seconds at 85% N_G allows time for the engine compressor bleed valves to close and allows the pilot the opportunity to confirm (by observing the engine temperatures) that both compressor bleed valves have closed. This procedure also establishes airflow over the vertical stabilizer and rudder prior to brake release, which facilitates effective directional control of the aircraft by rudder pedal input during the early stages of the take-off roll.

WARNING

IT IS MANDATORY TO SET FULL CALCULATED TAKE-OFF POWER AS DERIVED FROM THE POWER SETTING CHART FOR EVERY TAKE-OFF, REGARDLESS OF AIRCRAFT WEIGHT OR RUNWAY LENGTH. REDUCED POWER TAKE-OFFS ARE PROHIBITED.

IT IS MANDATORY TO PAUSE FOR AT LEAST 5 SECONDS AT 85% N_G PRIOR TO SETTING FULL CALCULATED TAKE-OFF POWER.

IF EITHER ENGINE IS NOT CAPABLE OF ACHIEVING FULL CALCULATED TAKE-OFF POWER, OR IF EITHER ENGINE REACHES THE T_5 LIMIT OR THE N_G LIMIT PRIOR TO REACHING THE FULL CALCULATED TAKE-OFF POWER TORQUE VALUE, THEN THE CONDITION OF THE ENGINE HAS DETERIORATED AND THE PROBLEM MUST BE INVESTIGATED AND CORRECTED BEFORE FLIGHT.

IF EITHER ENGINE CANNOT ACHIEVE THE FULL CALCULATED TAKE-OFF POWER TORQUE VALUE AS PUBLISHED IN THE TAKE-OFF POWER SETTING CHART, OR IF THE T_5 OR N_G LIMIT IS REACHED BEFORE THE FULL CALCULATED TAKE-OFF POWER TORQUE VALUE IS REACHED, THE ENGINE IS NOT AIRWORTHY AND THE AIRCRAFT MUST NOT BE FLOWN.

5.4 Appendix D: Manufacturer's Safety and Operational Tips

10.5 Take-Off

10.5.1 Directional Control During Take-Off

The nose wheel must be confirmed to be centered in the straight-ahead position prior to commencing the take-off roll. After maneuvring to take-off position on the runway, center the nose wheel using the tiller, then allow the aircraft to roll forward approximately 3 meters (10 feet) to confirm that the nose wheel is correctly centered.

Normal take-off procedures dictate that N_G must be increased to approximately 85% and held at that value for 5 seconds (with brakes applied) prior to commencing the take-off roll. This requirement ensures that the compressor bleed valves at engine station 2.5 fully close prior to application of take-off power, and allows the pilot to confirm (by observation of the sharp drop in T_5 on both engines) that both bleed valves have closed.

A significant additional benefit of stabilizing N_G at 85% for 5 seconds prior to brake release is that this practice establishes sufficient airflow over the rudder to enable the rudder – rather than nose wheel steering – to be used to maintain directional control during the first few hundred feet of the take-off run. Use of the nose wheel steering tiller during the take-off roll is strongly discouraged; maintaining directional control with rudder and/or asymmetric application of power is the preferred (and safest) technique.

Allowing the engines to stabilize at 85% N_G for 5 seconds prior to brake release also provides uniform engine acceleration when full take-off power is set, thus minimizing directional control problems. This is particularly important if crosswinds exist or the runway surface is slippery. Achieving an exact initial setting of 85% N_G on both engines is not as important as setting symmetrical torque when both engines are operating at or above 85% N_G.

Under normal circumstances, when the all of the above procedures are followed, nose wheel steering should not be required at any time during the take-off run.

10.5.2 Noise Abatement

Normal take-off procedures satisfy typical noise abatement requirements. When departing airports that have particularly demanding noise abatement procedures, maintaining best rate of climb speed in the take-off configuration (80 KIAS with 10° of flap) and leaving take-off power set until reaching circuit height is the most effective way of containing the aircraft noise footprint within the airport boundary.

5.5 Appendix E: Kobio Aviation SOP Manual Normal Checklist.

Checklist	Read By	Response By	Action Item	Remarks
INITIAL ACCEPTANCE	FIRST OFFICER	CAPTAIN	PARK BRAKE,CIRCUIT BREAKERS/FUSES,BUS TIE,GENERATORS,LIGHTING,CAUTION LIGHT/STALL WARNING,FLAPS,WINDSCREEN HEAT, IGNITION, AUTO FEATHER, FUEL SHUTOFF VALVES,FIRE HANDLES,FIRE WARNINGS,FUEL QUANTITY GAUGES,FUEL CROSS FEED, BOOST PUMP,STANDBY BOOST PUMPS,HYDRAULIC CB/PRESSURES,VOLTAGE,BATTERY TEMP GAUGE/LIGHT,HYDRAULIC HAND PUMP HANDLE,CREW OXYGEN,STATIC SELECTOR.	This check is called for and completed after the Flight Deck preparation scan where no verbal contact is applied by both crew and when the avionics is not on yet. Therefore, the completion of this checklist was not captured on the recorded data (CVR). Once this checklist is complete ATC clearance is then requested by the crew once the avionics are on and both crews available.
BEFORE START (DOWN TO LINE)	CAPTAIN	SILENT	PARK BRAKE,MASTER/BATTERY SELECTOR,CAUTION PANEL,PWR/PROP/FUL LVRS,BLEED AIR,FUEL QTY & SELECTOR,BOOST PUMPS,ENG AREA.	No verbal contact is needed to be applied for this checklist.
BEFORE START (AFTER LINE)	FIRST OFFICER	CREW	DOORS,TAIL STAND,FUEL,TAKE OFF DATA	
AFTER START	FIRST OFFICER	CAPTAIN	EXTERNAL POWER,BATT/GENERATORS,FLT INST,NAV AIDS,HYDRAULICS,BLEED AIR,FLAPS,CAUTION PANEL,FLIGHT CONTROLS,AUTOFEATHER,TRIMS	This checklist is called for and completed after the After Start Scans and Calls. There was evidence on recorded data of checklist being read by the PIC on the right seat and responded to by the Pilot ICUS on the left. Flaps was set to 26.However,requirement is 10 to 20
TAXI	FIRST OFFICER	CAPTAIN	AAI,FLIGHT INSTR,FRICTION NUTS,PROPS & FUEL LEVERS,ENGINE INSTRUMENTS,TERRAIN OVER-RIDE,TAKEOFF BRIEF.	This checklist is called for and completed after the Taxing Scans and Calls which does not require verbal contact. There was evidence on recorded data of checklist being read by the PIC on the right seat and Pilot ICUS on the left responded.
LINE UP	FIRST OFFICER	CREW	RADAR,TRANSPONDER, LIGHTS, PITOT HEAT, TAKE OFF CLR	This checklist is called for and completed after the Line Up Scans which does not require verbal contact.
AFTER TAKE OFF	PILOT MONITORING	PILOT FLYING	FLAPS, TERRAIN OVER-RIDE,NOSEWHEEL	Aircraft had veered off the runway during take-off roll.
DESCENT	PILOT MONITORING	PILOT FLYING	APPROACH BRIEF,FUEL, ALTIMETERS	Not applicable for this occurrence
PRE-LANDING	PILOT MONITORING	PILOT FLYING	ALTIMETERS,NOSEWHEEL,BRAKES,HYD PRESSURE,LIGHTS,BLEED AIR,FLAPS,PROPS,LANDING CLEARANCE,NOSEWHEEL	Not applicable occurrence.
AFTER LANDING	FIRST OFFICER	SILENT	PITOT HEAT,EXTERNAL LIGHTS,WINDSREEN HEAT,FLAPS,TRIMSRADAR,TRANSPONDER,SAR WATCH	Not applicable for this occurrence.
SHUT DOWN	CAPTAIN	SILENT	PARK BRAKE,ENGINES,BATT SWITCHES	Not applicable for this occurrence.
TERMINATING	FIRST OFFICER	CAPTAIN	BOOST PUMPS,BATT SWITCHES,CREW OXYGEN, FLPAS	Not applicable for this occurrence.