ACCIDENT INVESTIGATION COMMISSION

FINAL REPORT

AIC 23-1002

Helifix Operations Ltd

P2-HFA

Cessna 208B Grand Caravan

Runway Excursion During Landing

Eliptamin Airstrip, Sandaun Province

PAPUA NEW GUINEA

10 February 2023

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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 aircraft. 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 (As Amended), 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

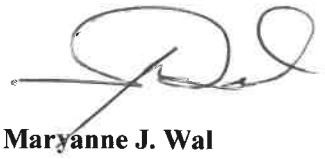
On 10 February 2023 at 15:19 local time (05:19 UTC), the AIC was notified by Helifix Operations Limited (Ltd) via phone call of an accident involving a Cessna 208B Grand Caravan aircraft registered P2-HFA, owned and operated by Helifix Operations Ltd at Eliptamin Airstrip, Sandaun Province. The AIC immediately began gathering information pertinent to the occurrence and commenced the investigation. The accident occurred at 13:43 on 10 February 2023.

This *Final Report* has been produced by the PNG AIC P.O Box 1709, Boroko 1111, NCD, Papua New Guinea. It has been approved for public release by the Commission in accordance with Para 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 (As Amended)*, 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.

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

8 February 2024

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GLOSSARY OF ABBREVIATION

ATS	: Air Traffic Service
CPL A	: Commercial pilot license Aeroplane
CVR	: Cockpit voice recorder
ELT	: Emergency locator transmitter
ERP	: Emergency response plan
ETA	: Estimated time of arrival/Estimating arrival
FDR	: Flight data recorder
FM	: Flight Manual
Ft	: Foot (feet)
H	: Hour(s)
HF	: High frequency (3 000 to 30 000 kHz)
Kt	: Knot(s)
M	: Metre (s)
MEL	: Minimum Equipment List
MH_z	: Megahertz
Nm	: Nautical miles
SMS	: Safety Management System
SOP	: Standard Operating Procedure(s)
UTC	: Coordinated Universal Time
VFR	: Visual flight rules
VHF	: Very high frequency (30 to 300 MHz)

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INTRODUCTION

SYNOPSIS

On 10 February 2023, at 13:43 local time, (03:43 UTC) a Cessna 208B Grand Caravan aircraft, registered P2-HFA, owned and operated by Helifix Operations Limited (Ltd), was conducting a VFR passenger charter flight from Kiunga Airport, Western Province to Eliptamin Airstrip, Sandaun Province, Papua New Guinea, when it experienced a runway excursion accident during its landing roll at Eliptamin and impacted a drainage embankment along the edge of the strip. There were 4 persons on board: the pilot and 3 passengers. There were nil reported injuries.

According to the recorded data, the aircraft arrived overhead Eliptamin Airstrip at an altitude of about 3,000 ft above ground level (AGL), where the pilot conducted an aerial inspection of the airstrip and subsequently continued with the flight.

When turning onto final approach, the aircraft encountered turbulent winds and a strong tailwind. The pilot recognised the prevailing wind conditions but was unable to discontinue the approach as he was past the committal point. During the approach, the groundspeed reached a maximum speed of 126 kts and the aircraft subsequently touched down with a groundspeed of 116 kts.

Upon touchdown, the aircraft immediately became airborne again and travelled forward for about 160 m in the air before dropping back on to the ground, and immediately got airborne again for the second time. The aircraft travelled forward for another 90 m, whilst in the air and dropped back on to the ground again, and rolled forward, covering a distance of about 276 m before impact.

The investigation determined that the flight to Eliptamin from Kiunga Airport was outside the operational times recommended in the company's Operations Manual. Additionally, the investigation determined that the aircraft was too high when overhead the airstrip for the pilot to appropriately assess the surface condition of the airstrip and the prevailing wind conditions. The investigation assessed the parameters of the circuit flown by the pilot, and the tailwind component that was present at the time and determined that the pilot had conducted an unstabilised approach. Furthermore, turbulent winds and a strong tailwind encountered during the final approach significantly exceeded the operator's permitted tailwind component.

It was also determined that the amount of mud deposits on the aircraft's wheels and airframe determined that the strip surface was not completely dry at the time of the accident. This would have had a negative impact on the braking capacity of the aircraft during the landing roll. As a result of this investigation, there were three safety recommendations issued to the Operator.

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1 FACTUAL INFORMATION

1.1 History of the flight

On 10 February 2023, at 13:43 local time, (03:43 UTC) a Cessna 208B Grand Caravan aircraft, registered P2-HFA, owned and operated by Helifix Operations Ltd, was conducting a VFR[1] passenger charter flight from Kiunga Airport, Western Province to Eliptamin Airstrip, Sandaun Province, Papua New Guinea, when during the landing roll, the aircraft overran the strip and impacted a drainage embankment along the edge of the strip.

Figure 1:Overview of the accident site.

There were four persons on board: the pilot and three passengers.

During an interview with the AIC, the pilot stated that the planned departure time of 08:30 from Kiunga was delayed due to reported fog in the Eliptamin area. At about 12:30, the pilot was informed by the local agent[2] on the ground at Eliptamin that the fog was clearing up.

According to the recorded data[3], the aircraft departed Kiunga at 13:07, climbed to an altitude of 11,700 ft AMSL[4] and began tracking Northeast to Eliptamin. The pilot subsequently advised Air Traffic Services (ATS) that his estimated arrival time would be 13:34.

About 13 NM[5] to Eliptamin Airstrip, the pilot commenced a descent and continued tracking to Eliptamin. When the aircraft was positioned about 8NM Southwest of Eliptamin Airstrip, the pilot initiated a manoeuvre to the left of track due to fog and continued descending before initiating another left turn and commenced a climb. The pilot subsequently established on track at 13.37 and climbed up to an altitude of 9,750 ft AMSL and tracked over Mt Doner for Eliptamin.

At 3.5 NM, Southwest of Eliptamin Airstrip, the pilot a commenced a descent into the circuit area.

1 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).
2 Refer to Section 1.7.2 Local Agent Reported Weather
3 The recorded data is referring to aircraft Appareo data and ATC recorded data synchronised. An Appareo is a lightweight digital flight data recorder. Refer Section 1.11.1.1. Referred to hereon as recorded data.
4 Above Mean Sea Level
5 Nautical Miles

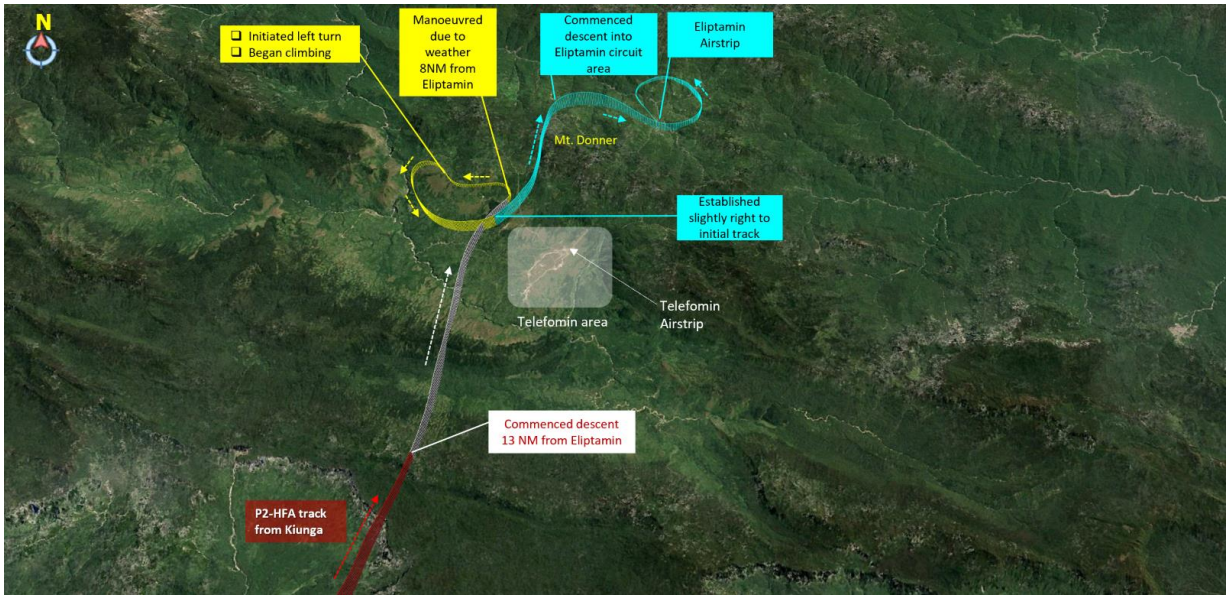

Figure 2:P2-HFA Flight Path from top of descent to Eliptamin Airstrip.

The aircraft arrived in the circuit area at 13:39 and the pilot subsequently cancelled SARWATCH[6]

The recorded data showed that at 13:40, the aircraft tracked overhead the airstrip for the pilot to conduct an aerial strip inspection while passing through 3,000 ft AGL[7] on descent and established in the circuit on crosswind at 2,700 ft AGL. The pilot stated that when positioned overhead, he visually assessed the airstrip as being suitable for landing and decided to continue with the approach.

The recorded data showed that at 13:41, the aircraft turned left on to downwind while passing 2,400 ft AGL and continued tracking in the Northwest direction. The aircraft then turned left onto base while passing 1,400 ft AGL at a steep decent rate of 1,750 fpm, tracking in a Southwest direction. As the aircraft commenced a left turn from base to final while passing through 700 ft AGL and still maintaining a Southwest direction, there was a significant reduction in the rate of descent from 1750 fpm to about 500fpm, and a gradual increase in groundspeed. Just before establishing on to final in a Southeast direction, with the aircraft fully configured for landing, the rate of descent increased again from 500 fpm to 1500 fpm with the groundspeed continuing to increase. *Refer figure 13.*

About 0.8 NM to the threshold and passing 220 ft AGL, the aircraft was established on final approach with a groundspeed of 122 kts, which continued to increase, while the rate of descent began to reduce. As the aircraft continued approach, the rate of descent continued to reduce, however, the groundspeed continued increasing reaching a maximum speed of 126 kts, before decreasing as the aircraft got closer to the threshold.

[6] Search and Rescue Watch; Monitoring of a flight to activate emergency services if not requested by the pilot to be cancelled by a specific time.
7 Above Ground Level (AGL)-All altitude data obtained from the Appareo Unit recorded data are reference to the Eliptamin Airstrip elevation of 4,739 ft

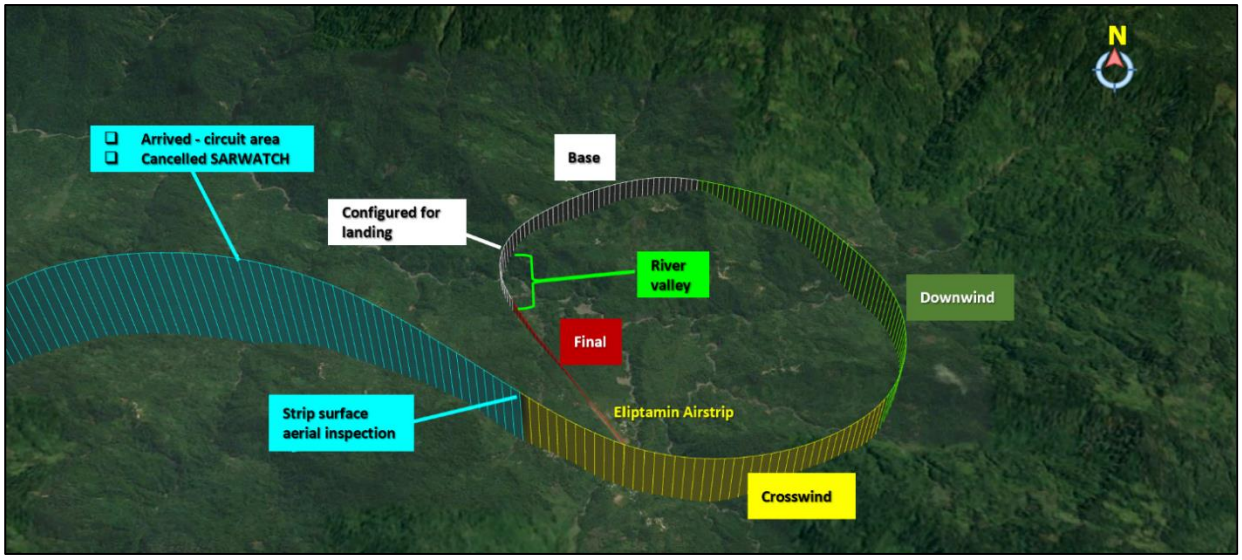

Figure 3:Eliptamin Circuit Area.

According to the pilot, as he turned on to final, he encountered very strong winds in the valley on the approach path. Since he was already past the committal point[8], he continued the approach. The pilot recalled that on final approach, the airspeed was fluctuating between 85 to 90 kts with prevailing gusts[9] of wind.

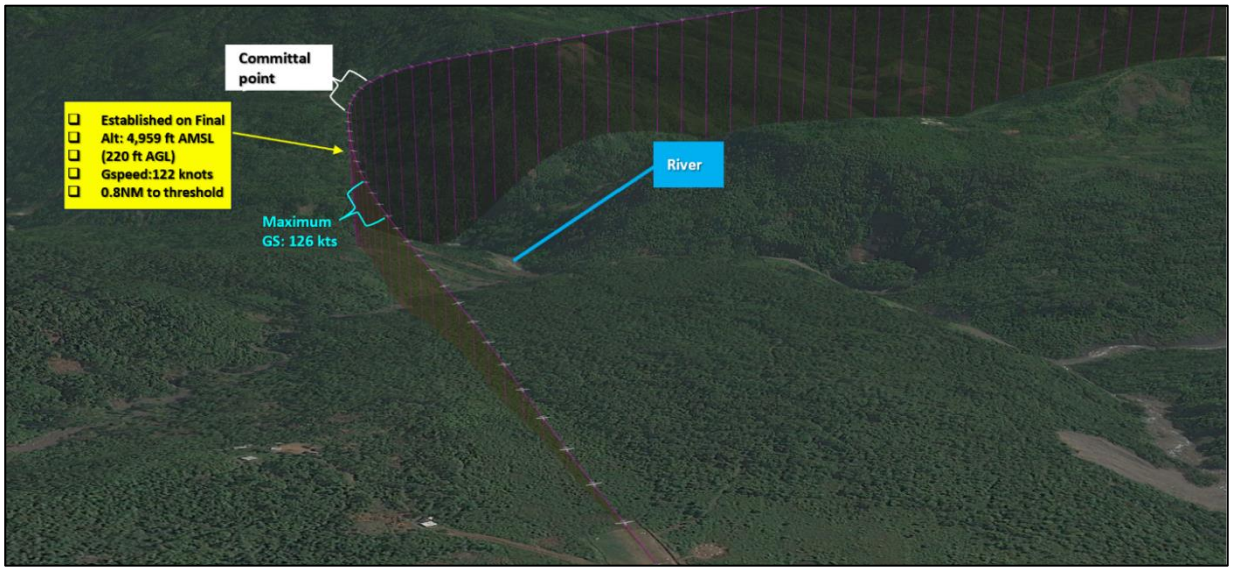

Figure 4:Final Approach.

According to the recorded data, at 13:43:12, the aircraft touched down on the threshold with a groundspeed of 116 kts and the pilot applied reverse thrust. The aircraft immediately became airborne again and travelled forward for about 160 m in the air before dropping back on to the ground, and immediately got airborne again for the second time. The aircraft travelled forward for another 90 m, as it remained airborne and at 13:43:17, it dropped back on to the ground, rolled forward for 11 seconds, covering a distance of about 276 m before impacting the embankment.

The pilot stated that after initial touchdown, he immediately applied reverse thrust, however, in the opinion of the pilot, the aircraft got airborne by a sudden gust of wind and was pushed forward. The pilot attempted to maintain control of the aircraft by keeping the wings level. The aircraft subsequently dropped back on to the ground and bounced up, becoming airborne once again. While airborne for the second time,

8 The point in the approach at which the pilot flying decides that, in the event of an engine failure being recognised, the safest option is to continue to the elevated final approach and take-off area (elevated FATO). The Operator's committal point for operations into Eliptamin is the valley river.
9 A sudden strong blast of wind.

the aircraft was pushed further forward. By the time the aircraft was back on the ground, for the third time, the pilot attempted to slow down the aircraft. However, at that point the aircraft had reached the end of the runway, where it impacted the embankment of a drain which runs along the edge of the airstrip, before coming to a complete stop.

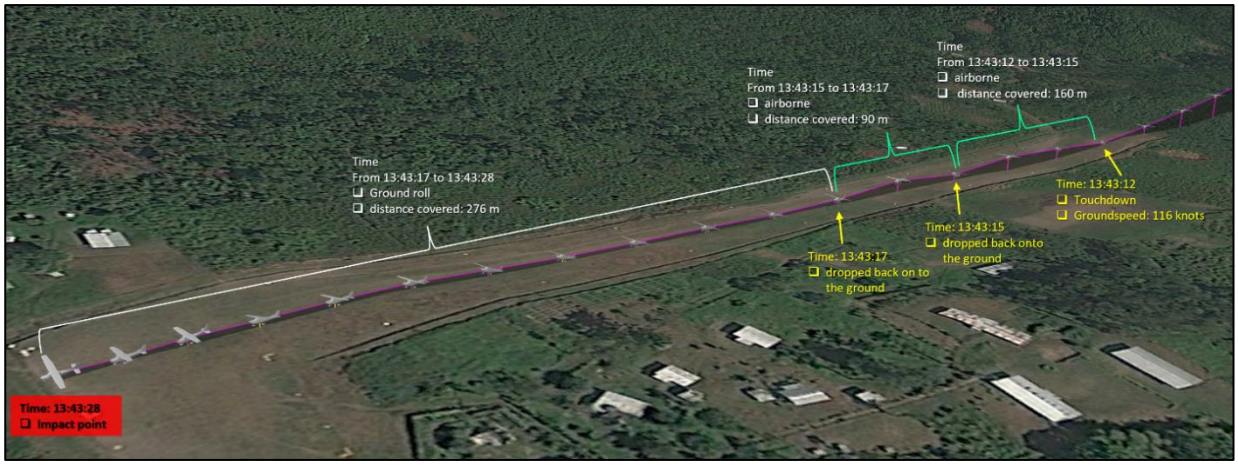

Figure 5: Initial touchdown to impact.

The pilot subsequently pulled the emergency shutdown lever which effectively cut fuel to the engine and shutdown the engine. He then evacuated all three passengers through the left-side cockpit door and assessed that all the passengers were not injured.

1.2 Injuries to persons

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	Not applicable
Nil Injuries	1	3	4	Not applicable
TOTAL	1	3	4	-

Table 1: Injuries to Persons.

1.3 Damage to aircraft

The aircraft sustained substantial damage. Refer to *Section 1.12* for a detailed description of damage to relevant components of 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

Age	: 52
Gender	: Male
Nationality	: Papua New Guinea
Position	: Training Captain / Flight Operations Manager
Type of license	: CPL (A)[10]
Valid to	: Perpetual
Rating	: C208; DHC6
Total flying time	: 9,351.6 hours[11]
Total last 90 days	: 62.4 hours
Total on type last 90 days	: 62.4 hours
Total last 7 days	: 1.6 hours
Total on type last 7 days on type	: 1.6 hours
Total last 24 hours	: 0.6 hours
Total hours last 24 hours on type	: 0.6 hours
Total on duty last 48 hours	: 8.0 hours
Total rest period(s) last 48 hours	: 2 rest periods[12]
Last recurrent training	: 11 December 2022
Last proficiency check	: 11 December 2022
Last line check	: 11 December 2022
Route recency	: 11 December 2022
Medical class	: One (1)
Valid to	: 02 March 2023
Medical limitation	: Spectacles/Multicrew

Appareo recorded video footage showed that the pilot was wearing his spectacles during the accident flight.

The pilot's records provided by the Operator to the investigation showed that the pilot was employed by Helifix Operations Ltd in 2020. The records also showed that the pilot's recurrent training was conducted in accordance with *CAR Part 61.807 Currency Requirements* for holder of an instrument rating and his competency checks was in accordance with *CAR Part 135.607 Flight Crew Competency Checks*.

According to the pilot's records, he met all route and aerodrome qualification requirements for the intended operations.

The pilot was also issued with an Instrument of Authorisation (IOA) by the Civil Aviation Safety Authority (CASA) of PNG on 10 June 2022 to carry out functions of a Flight Examiner in accordance with *CAR Part 61.905(a)(2)* and a Flight Instructor in accordance with *CAR Part 61.305(d).*

[10] Commercial Pilot License (Aeroplane)
[11] The pilot's total flying hours in accordance with the pilot's current logbook which captures his pilot experience between 2017 to present.
[12] One rest period consists of hours covering 10pm to 6am in accordance with *CAR Part 122.105 Duty Time Limitations and Rest Periods*

1.5.2 Pilot's recent history on Cessna 208B Grand Caravan operation into Eliptamin Airstrip

From the pilot's logbook records for the preceding 6 months provided by the Operator, as well as from Appareo recorded data, the investigation identified that the pilot had conducted a total of nine flights into Eliptamin Airstrip prior to the accident flight.

The last flight the pilot conducted to Eliptamin Airstrip before the accident flight was on 2 February 2023, eight days prior to the accident flight. According to the Appareo data, the aircraft touchdown in Eliptamin at 14:07 in the afternoon.

1.6 Aircraft Information

1.6.1 Aircraft data

Aircraft Manufacturer	: Textron Aviation
Model	: C208B
Serial Number	: 208B0954
Year of Manufacture	: 2002
Total Airframe Hours	: 11,645.8 hours
Total Airframe Cycles	: 17,724
Registration	: P2-HFA
Name of the Owner	: Helifix Operations Limited
Name of the Operator	: Helifix Operations Limited
Certificate of Registration number	: 248
Certificate of Registration issued	: 21 May 2012
Certificate of Registration valid to	: Non-Terminating
Certificate of Airworthiness number	: 248
Certificate of Airworthiness issued	: 21 May 2012
Certificate of Airworthiness valid to	: Non-Terminating

1.6.2 Engine data

Engine Type	: Turbo propeller
Manufacturer	: Honeywell
Model	: TPE 331
Serial Number	: P123145
Year of Manufacture	: 2012
Total Time Since New	: 5,965.3 hours
Total Time Since Overhaul	: 0.0 hours
Cycles Since New	: 8,917

1.6.3 Propeller data

Manufacturer	: Hartzell Propeller Inc
Model	: HC-B4TN-5QL
Serial Number	: CDA-5430
Total Time Since Overhaul	: 609.6 hours

1.6.4 Airworthiness and Maintenance

At the time of the accident, the aircraft had a current Certificate of Airworthiness (CoA), Certificate of Annual Airworthiness Review (AAR), Certificate of Registration (CoR), and was certified as being airworthy.

The maintenance records were reviewed during the investigation and identified that there were no outstanding scheduled maintenance and defects. Therefore, the aircraft was serviceable at the time of the accident.

1.6.5 Fuel information

Documents containing fuel information provided by the Operator to the AIC indicated that a total of 430 litres (L) of Jet A1 fuel was on board the aircraft in Kiunga, prior to departure.

During the interview with the AIC, the pilot indicated that there was no engine abnormality observed during the accident flight.

The AIC determined that fuel was not a contributing factor to this accident.

1.6.6 Weight and Balance

According to the *Aircraft Flight Manual Supplement for Cessna 208B Caravan Landplane, effective 7 November 2019*, the following are the weight limitations of the aircraft for passengers:

Weight	Limitations	
Maximum Takeoff	8,750 lbs	3,969kg
Maximum Landing	8,500 lbs	3,855 kg

Table 2:Aircraft weight limitations.

The Load and Trim Sheet for the accident flight showed that the aircraft departed from Kiunga with a take-off weight of 3,985 kg, 16 kg above the maximum take-off weight. The aircraft landed at Eliptamin Airstrip with a weight of 3,853 kg and was within the weight limits for landing.

The AIC determined that the aircraft's weight and balance was not a factor in this accident.

1.6.7 Minimum Equipment List

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

1.6.8 Collision Avoidance Systems

The aircraft was equipped with a Mode C transponder and its serviceability was not a factor in this accident.

1.7 Meteorological information

1.7.1 Weather Forecast

The Area Forecast was issued by PNG National Weather Service (NWS) at 02:00 on 10 February 2023. The validity of the forecast was between 09:00 to 21:00 as follows:

Upper Winds	At 2,000 ft: winds blowing at 320°at 45 kts At 5,000 ft: winds blowing at 320°at 45 kts At 7,000 ft: winds blowing at 320°at 45 kts At 10,000 ft: winds blowing at 320°at 45 kts
Cloud	1,800ft-45,000ft: isolated cumulonimbus clouds 500ft-3,000ft: broken stratus clouds including precipitation 1,500ft-10,000ft: scattered cumulus clouds in broken showers 3,000ft-8,000ft: scattered stratocumulus clouds with broken rain and drizzles 10,000ft-18,000ft: scattered Altocumulus and Altostratus clouds
Visibility	500m fog, 3,000m Thunderstorms and rain, 4,00m showers of rain, and drizzles of rain

Table 3: Area Forecast.

According to the Area Forecast, there were North-westerly winds in the Eliptamin area at the time of the accident.

1.7.2 Satellite Image

The Satellite image of Papua New Guinea around the time of the accident was provided to the investigation by PNG NWS. The satellite image displayed weather between 13:00-13:59 (03:00-03:59 UTC). The image indicated that there was no rainfall over Eliptamin area at the time of the accident.

Refer to *Appendices, Section 5.1 Appendix A* of this report for the Satellite image.

1.7.3 Actual Weather

1.7.3.1 Local Agent's Reported Weather

On the morning of the day of the accident, while in Kiunga, the pilot received weather information for Eliptamin from the local agents on the ground.

Initial information provided to the pilot by local agent was that there was fog in the area.

At midday, while still in Kiunga, the pilot received an update on the weather conditions at Eliptamin. The information provided by the local agent was that the weather was fine, the fog had lifted from the valley and there was sunlight with visual of the blue skies. There was no rain, but it had rained the night before.

1.7.3.2 Pilot's observation of weather and airstrip conditions at Eliptamin area

The pilot stated in the interview that during the accident flight, he observed the Eliptamin area was clear of fog towards the West of the airstrip. He, therefore, elected to descend for a fly-over from that direction of the airstrip. While overhead the airstrip, the pilot stated that the aerial view indicated the airstrip surface looked dry and firm. Furthermore, there were no indications of strong winds. However, when he turned onto the final approach, at which point he was committed to land, he experienced wind gusts in the valley.

1.7.3.3 Aircraft within the Eliptamin Airstrip vicinity

A Mission Aviation Fellowship (MAF) aircraft, registered P2-MAL, was also intending to operate into Eliptamin Airstrip after P2-HFA landed. About 5 minutes after the accident, P2-MAL was positioned overhead of Eliptamin Airstrip at about 6,500 ft AMSL (1,760 ft AGL) and the pilot took an aerial view picture of the airstrip with P2-HFA in its resting position.

The picture also captured the windsock located at the south-eastern (departure) end of the airstrip, in the parking bay. The windsock was indicating wind coming from a north-westerly direction with an approximate magnitude of about 10-15 knots.

Figure 6: Picture taken by the pilot of P2-MAL overhead Eliptamin Airstrip about 5 minutes after the accident.

1.8 Aids to navigation

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

1.9 Communication

The aircraft was equipped with a High Frequency (HF) and Very High Frequency (VHF) two-way communication radio. Both communication systems were determined to be serviceable and were not a contributing factor to this accident.

1.10 Aerodrome information

1.10.1 General Information

Eliptamin Airstrip is located in Telefomin District of Sandaun Province and about 70NM Northeast of Kiunga Airport.

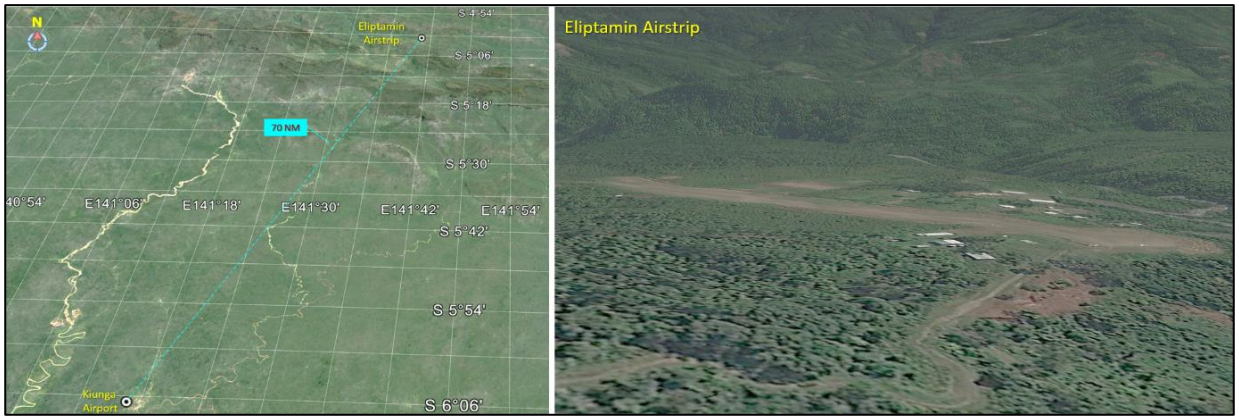

Figure 7: Eliptamin Airstrip Location.

1.10.2 Airstrip Data

The Operator provided AIC with the Eliptamin Airstrip data in the Operator's Fixed Wing Operations Manual Part C, Section 3, Airport Data, dated 21 Feb 2020.

On 13 February 2023, the Rural Airstrip Agency[13] (RAA) provided AIC with the *Rural Airstrip Survey Report* of Eliptamin Airstrip. The survey was conducted on 10 June 2020 using the guideline from *CASA PNG Advisory Circular (AC) 139-6.*

The AIC reviewed the *Rural Airstrip Survey Report* of Eliptamin Airstrip and the *Operator's Operations Manual Part C* and found variations in data between the survey data and Operator's Eliptamin Airstrip data, specifically the slope, elevation and runway length.

During the investigation, the AIC used the Appareo data to establish the elevation of Eliptamin Airstrip and also to calculate the average slope and runway length.

The table below summarises the variation of data between the Operator's Eliptamin Airstrip data, RAA Eliptamin Survey data and the data derived from Appareo data.

Runway Characteristics	RAA Survey Data	Operator's Eliptamin Airstrip Data	Eliptamin data derived from Appareo data
Airstrip Type	One-way	One-way	
Take off direction	315°	320°	
Landing direction	Not Available	140°	
Coordinates	Latitude: 5°02'34.68"S Longitude: 141°40'46.44"E	Latitude: 05° 02' 35" S Longitude: 141° 40' 47"E	
Elevation	4,739 ft	5,600 ft	4,756 ft
Runway length	594 m	530 m	586 m
Runway width	10+ [1]m	30 m	
Runway Strip width	20+[1] m	45 m	
Average Slope	7.2 %	8.4%	6.9 %
Surface type and conditions	Patchy grass, fine-grain soil (silt, clay), soil moisture saturated/non-serviceable, hard, and rough surface. Surface soft at bottom end. Centreline hard at top end. Top half of runway has been scrapped, creating a kerb at edge, therefore the full width is not usable.	Grassed brown clay SECN Group IV	

Table 4:Eliptamin Airstrip Data from the Operator and RAA.

The investigation identified that the slope, elevation, and runway length data from RAA for Eliptamin Airstrip and data derived from Appareo data was closely similar and had significant differences to the data from the Operator.

1.10.3 Topography Data

According to the topography data, Eliptamin Area is located on the slopes of D'Aibertis Dome at the collective headwaters of the Sepik River. The Eliptamin Airstrip is situated in a valley and is surrounded by a river and mountain ranges of Mt. Donner, Mt. Leech and Mt Bemh.

The aircraft tracked past Mt. Doner, which had ridges peaking at about 6,800 ft, as it approached the Eliptamin area. When entering the circuit at Eliptamin, the aircraft was positioned over ranges that peaked at about 4,800 ft.

[13] RURAL AIRSTRIP AGENCY (RAA) OF PNG LIMITED (CN 1-87723) is a not-for-profit company. RAA, a wholly owned subsidiary of Mission Aviation Fellowship (MAF PNG Holding Limited) with a widely representative board including members from the National and Provincial Governments, airstrips owners, Aircraft operators and donor organisations. RAA has been established for the primary purpose of facilitating and conducting maintenance and restoration of rural airstrips in Papua New Guinea.

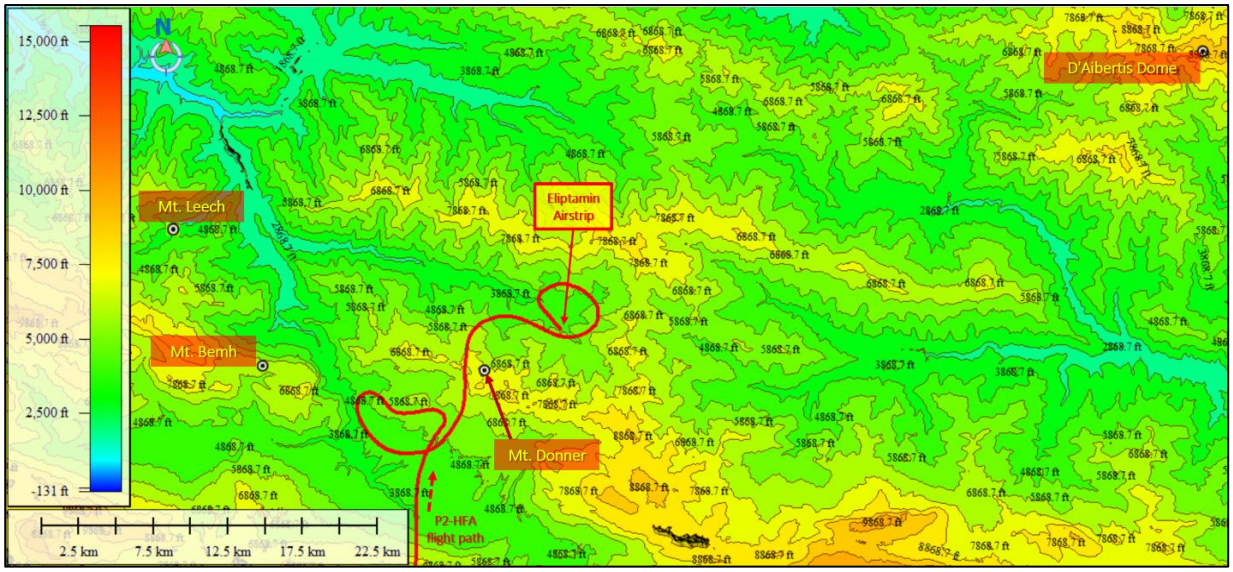

Figure 8: Topography of Eliptamin Area.

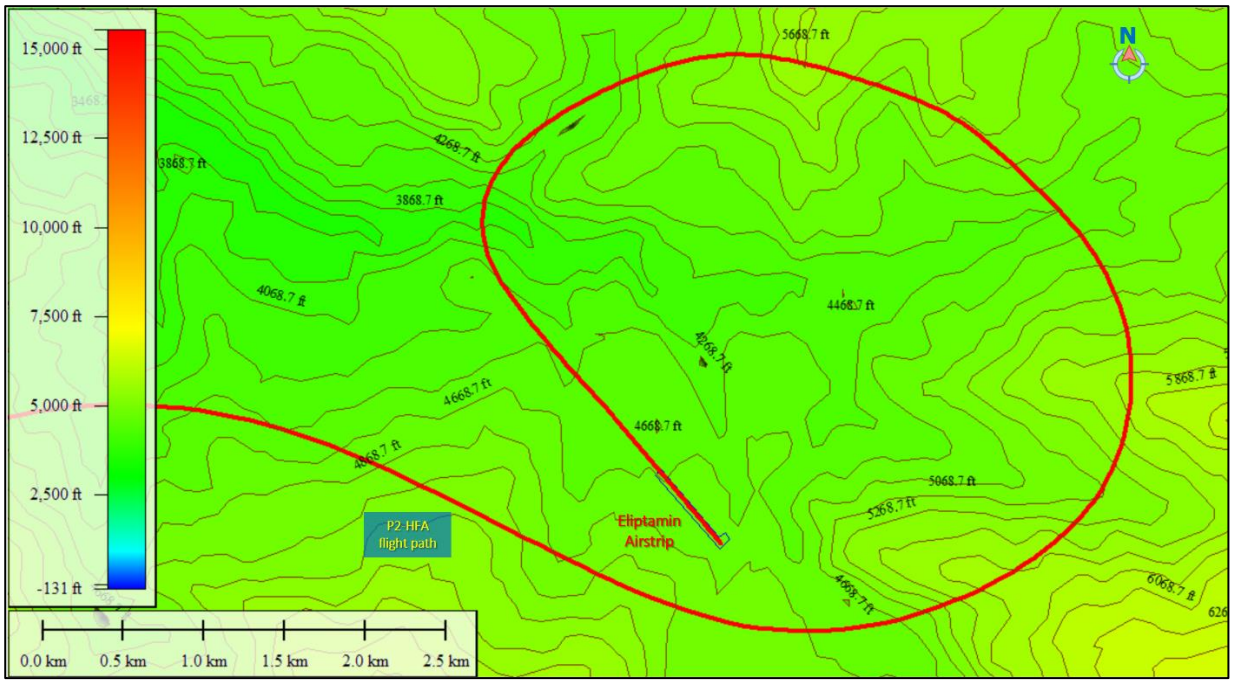

Figure 9: Topography of Eliptamin Airstrip.

Given Eliptamin Airstrip's geographical location with surrounding mountain ranges and a valley river that runs to the Southeast of the airstrip, there is localised wind and weather experienced at Eliptamin. The airstrip is prone to turbulent winds that wash off from the leeward side of adjacent mountains, and convective current winds[14] acting over the valley lake.

1.10.4 Onsite Observation of Eliptamin Airstrip.

During the onsite investigation, it was observed that the runway surface of Eliptamin Airstrip was firm and compact with scarce short grass. The airstrip was predominantly covered with grass around the runway and towards the strip edges. The airstrip had water drainage run-off on the edges on both sides of the runway.

[14] When hot air rises from a liquid mass and is displaced by cool air from land mass during the day, and conversely at night.

There were two windsocks at Eliptamin Airstrip observed by the on-site team. One windsock was located at the south-eastern (departure) end of the airstrip, in the parking bay and the other windsock was located on the approach end of runway 14.

According to *CASA PNG Advisory Circular (AC) 139-6 Chapter 5, Section 5.1 Wind Direction indicator (Windsock)*, it states that;

> *5.1.2 The windsock should be located in an open space most suited to the prevailing wind conditions.*
>
> *5.1.4 The windsock should be located in such a way as to be free from the effects of air disturbances caused by nearby objects.*

Refer to *Appendices, Section 5.2 Appendix B* of this report for the abstract of the AC.

The on-site team observed that the windsock in the parking bay was surrounded by obstructions and the location was not suited to the prevailing wind conditions and not free from the effects of air disturbances caused by nearby objects.

According to the pilot in an interview with the AIC, he indicated that the windsock in the parking bay does not reflect the true direction of the wind most times due to the obstructions surrounding its location.

Interviews conducted with the pilot also indicated that he was unaware of the windsock located at the approach end of runway 14.

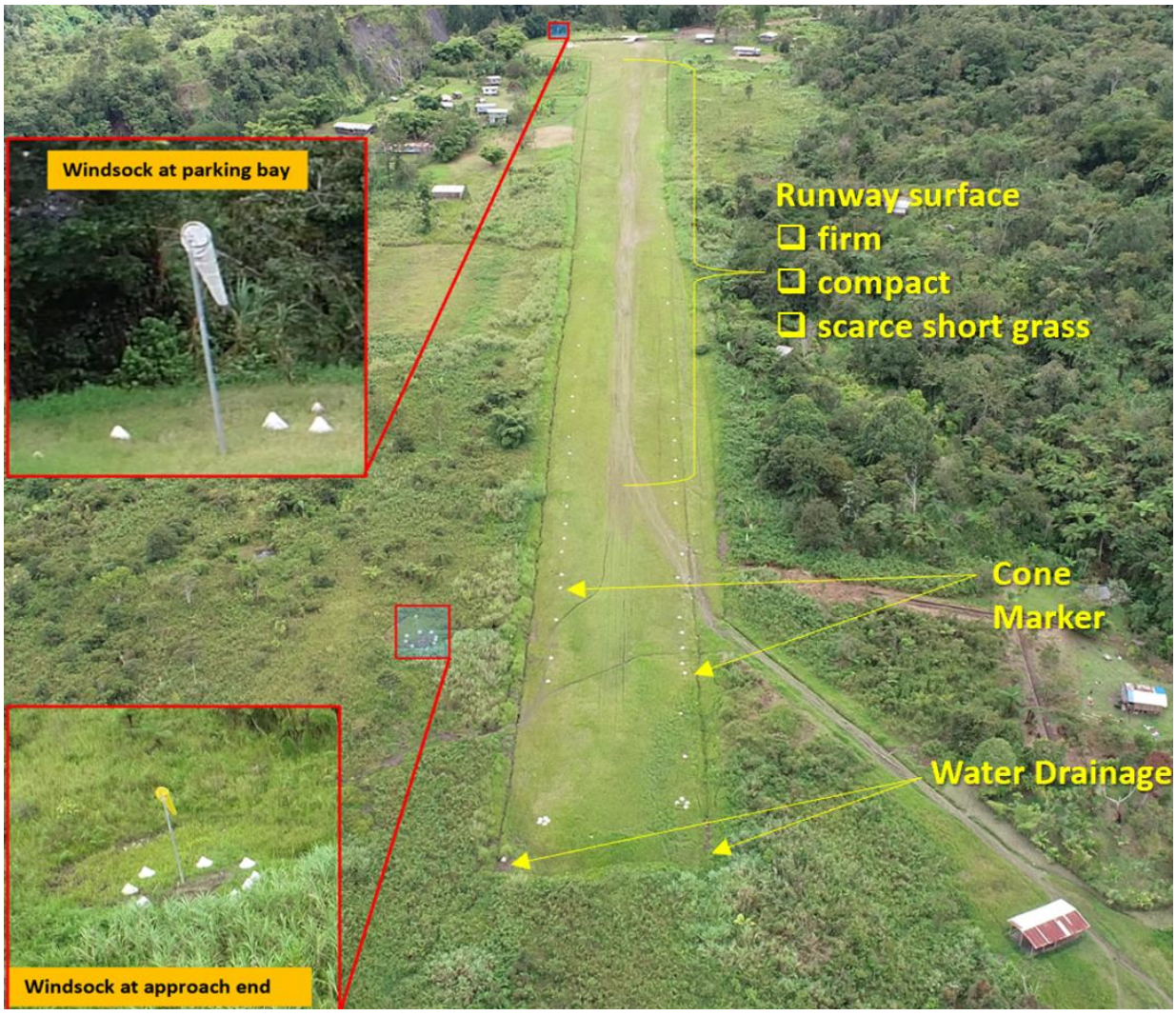

Figure 10: On-site team observation of Eliptamin Airstrip.

1.11 Flight recorders

The aircraft was not equipped with a flight data recorder or a cockpit voice recorder, neither were they required by *PNG Civil Aviation Rules*.

1.11.1 Other Electronic Data Recording Device

1.11.1.1 Appareo Vision 1000

The aircraft was fitted with an Appareo Vision 1000 recorder for flight data monitoring purposes. The unit captured the following information: cockpit image recording, intercom system audio for crew and ATS communications and WAAS[15] GPS[16] (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.

The SD card was obtained by AIC and taken to the AIC Flight Recorder Laboratory for data extraction. During the data extraction process using the Appareo System's software, it was found that the SD card did not have the accident flight datafile.

The AIC, therefore, used another method for extracting the datafile directly from Appareo Vision 1000's internal memory using the appropriate software from the manufacturer. The AIC followed all the manufacturer's required procedures and the accident flight, including previous flights' datafiles were successfully extracted and dumped into another SD card provided by the Operator.

The extracted recorded information and parameters of the accident flight was used during the investigation.

1.11.1.2 P2-HFA Circuit Profile

The AIC used the Appareo recorded data and generated graphical plots containing the altitude, groundspeed, rate of descent and other significant parameters from the time the aircraft joined the circuit to impact.

The groundspeed began increasing, when the aircraft turned left to establish on final, reaching a peak of 126 knots and then decreased gradually when the aircraft was on final. Two seconds before touchdown, the groundspeed decreased significantly and continued to decrease until impact. The groundspeed at touchdown was 116 knots.

The plot also showed that the aircraft had a constant rate of descent of 1,750 fpm when the aircraft was on base. When the aircraft was turning from base to final, the rate of descent reduced significantly from 1,750 fpm to about 500 fpm. Refer to *Figure 11, 12 and 13*.

The AIC also used the Appareo data to recreate the profiles from the time the aircraft entered Eliptamin circuit to touchdown, for the accident flight and previous flights to Eliptamin for comparison purposes.

From the recreated profiles, the AIC identified that the accident flight profile differed to the previous flights. The aircraft joined the circuit during the accident flight at an altitude of about 7,450 ft AMSL (2,711 ft AGL) whereas the previous flight profiles, the aircraft joined the circuit at an average of 6,200 ft AMSL (1,400 ft AGL). The Appareo recorded video footage also showed that the pilot inspected the airstrip at an altitude of 7,757 ft AMSL (3,018 ft AGL).

Recorded data of the previous flights to Eliptamin also showed that when the aircraft positioned overhead the airstrip, the AGL ranged between 1,200 ft and 1,700 ft. Refer to *Figure 14*.

The AIC also used the Appareo's recorded data to generate a graphical plot to compare the groundspeed of the accident flight against the previous flights into Eliptamin. Refer to *Figure 15.*

15 The Wide Area Augmentation System is an air navigation aid developed by the Federal Aviation Administration to augment the Global Positioning System, with the goal of improving its accuracy, integrity, and availability.
16 Global positioning system.

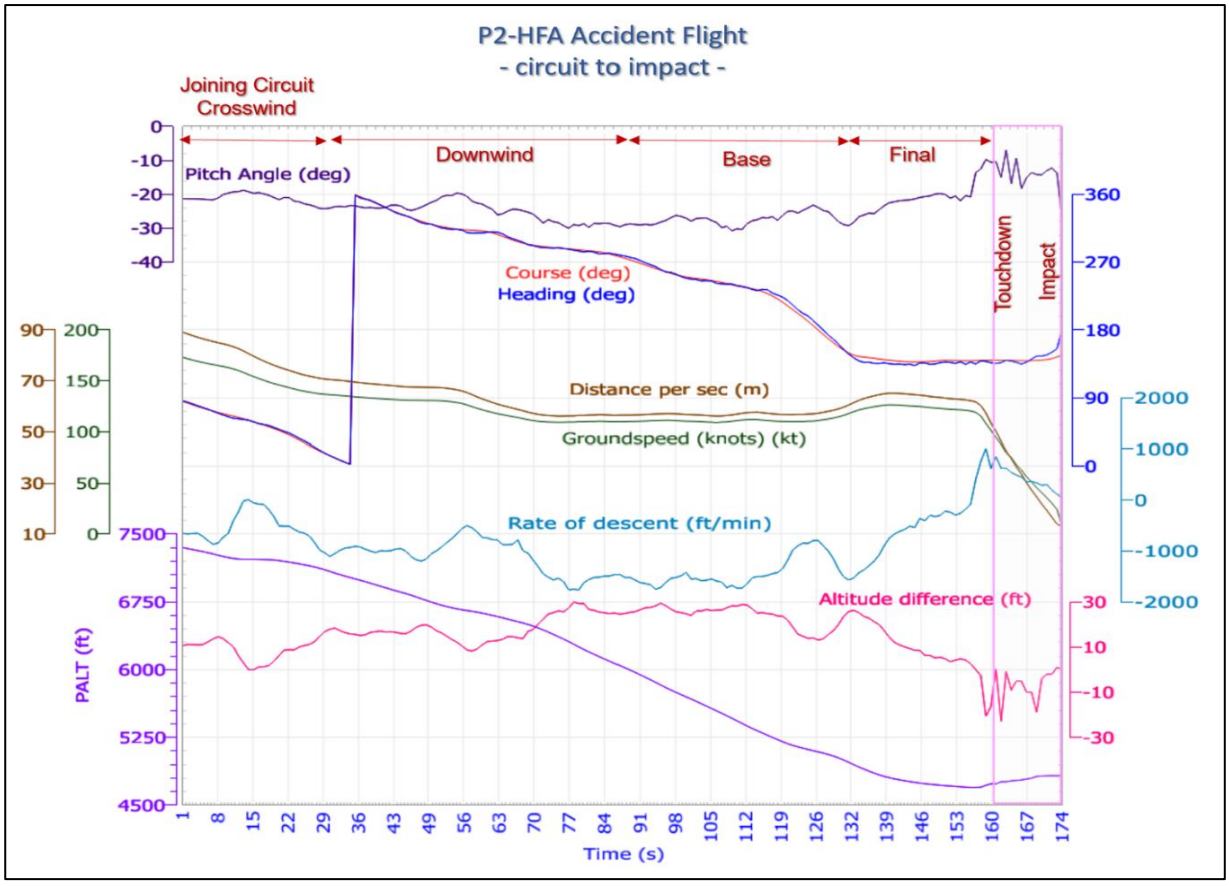

Figure 11:P2-HFA from joining circuit to impact.

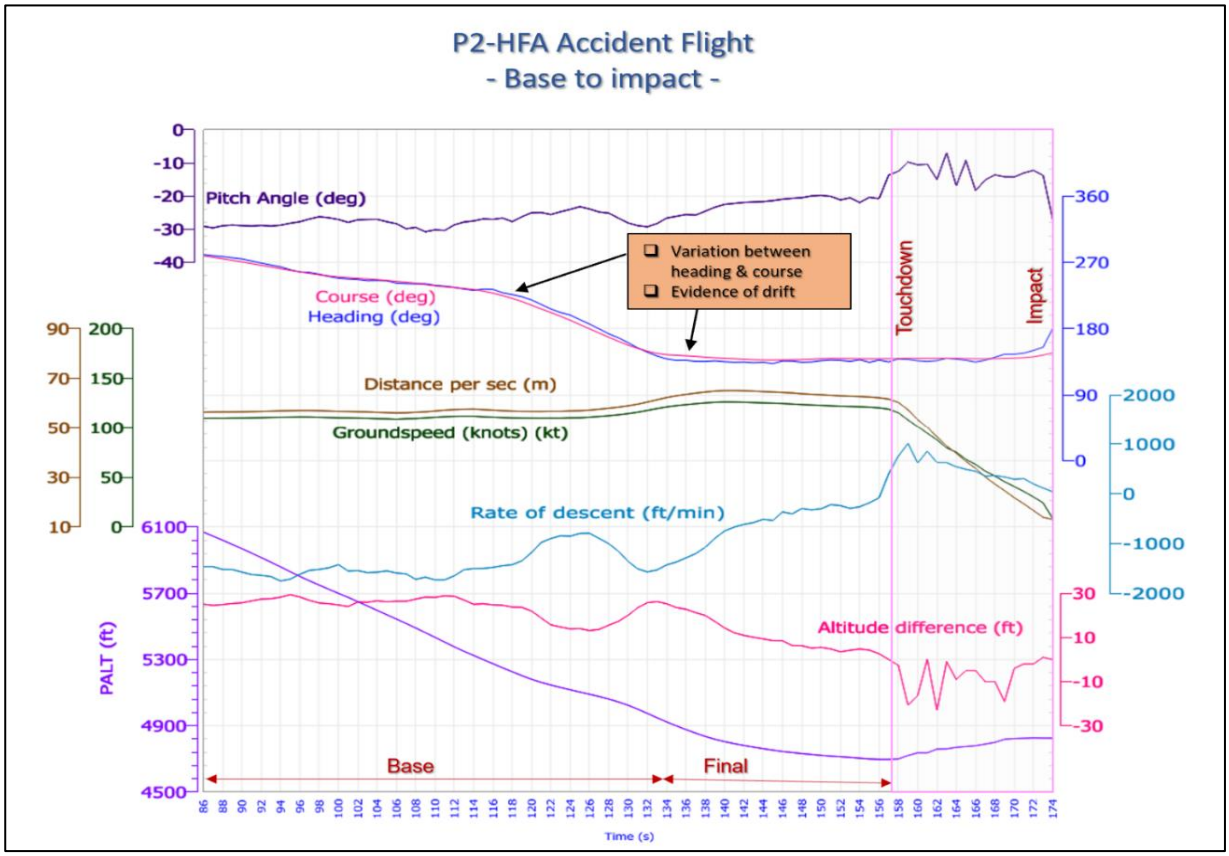

Figure 12: P2-HFA from Base to impact.

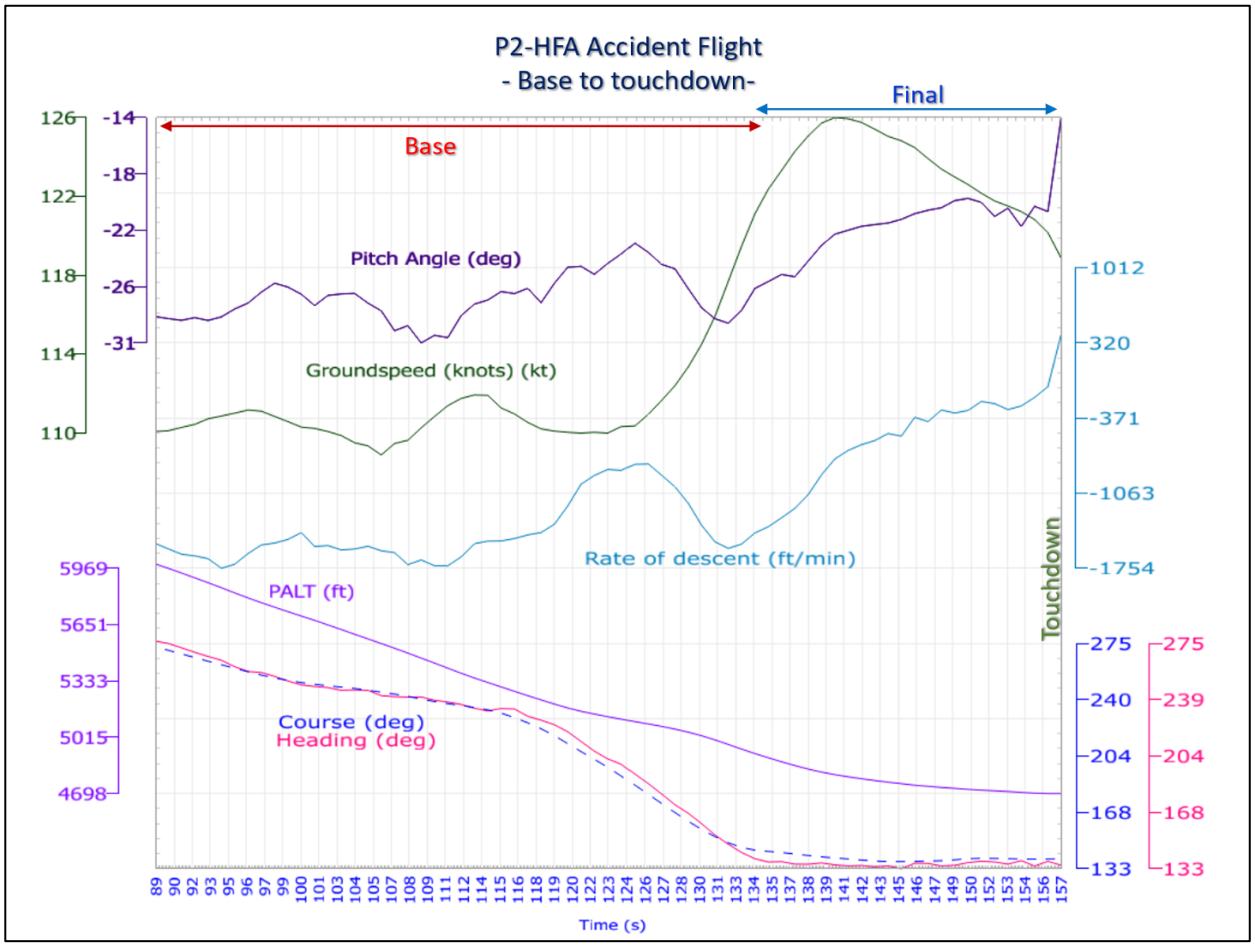

Figure 13: P2-HFA from Base to touchdown.

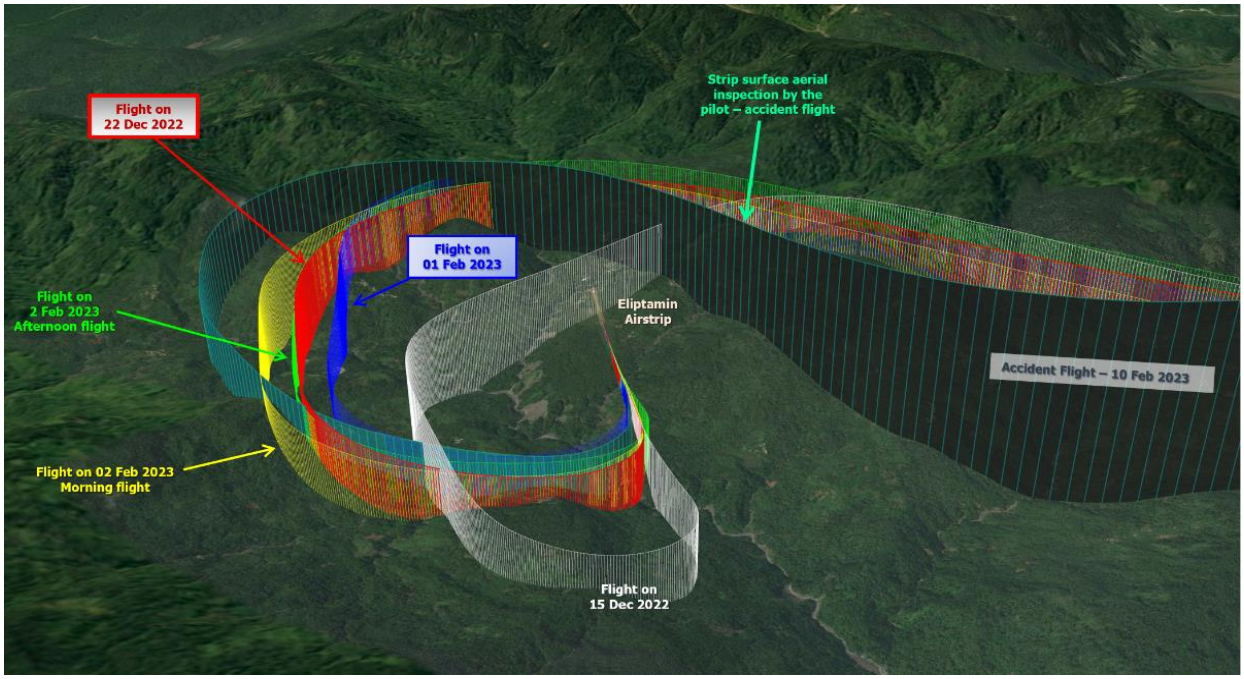

Figure 14:Circuit profiles for the accident flight and previous flights to Eliptamin Airstrip.

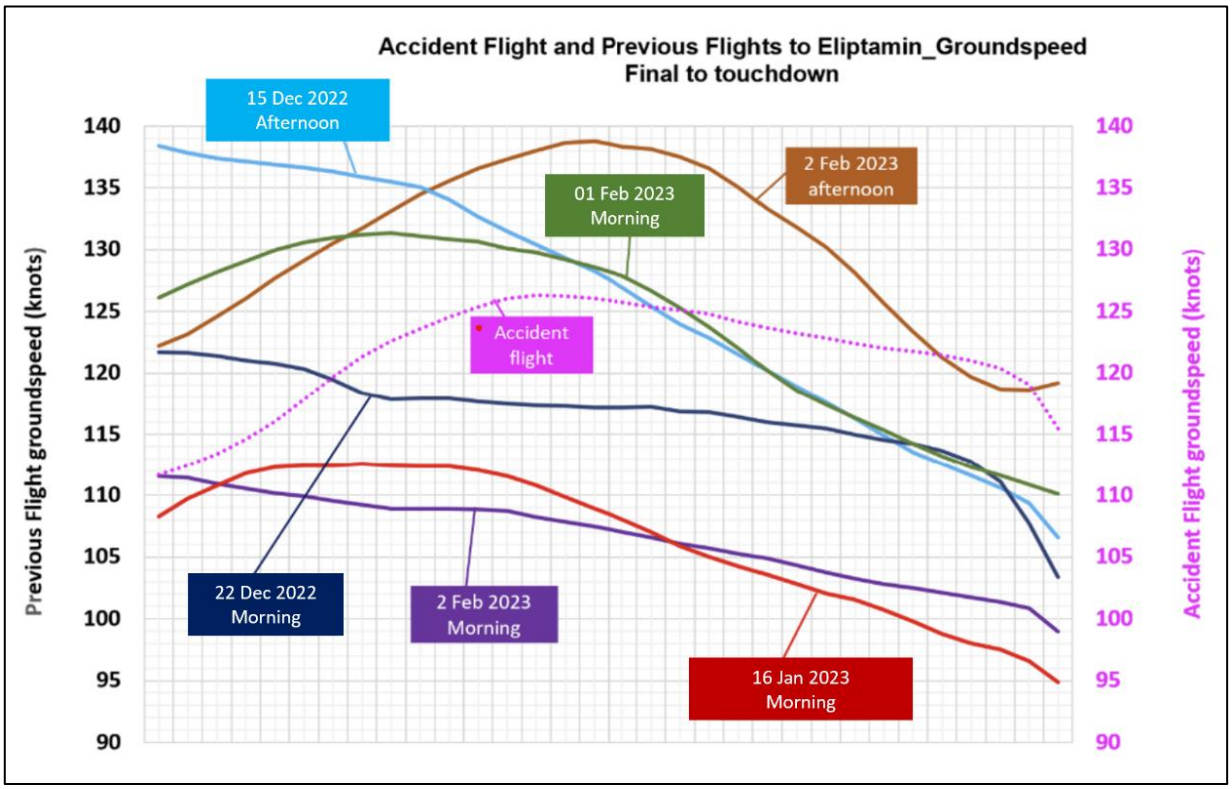

Figure 15: The groundspeed of the accident flight and previous flights to Eliptamin Airstrip.

1.12 Wreckage and impact information

1.12.1 Overview of the wreckage distribution

During the on-site investigation, the investigators identified three locations with clear evidence of wheel markings along the runway from the accident flight and measurements were taken in reference to the aircraft's resting position as follows;

- Location 1: 365 m from the resting position of the aircraft.
- Location 2: 83 m from the resting position of the aircraft.
- Location 3: 40 m from the resting position of the aircraft.

Refer to *Figure 16*.

The evidence of tyre markings on the surface indicated that the main wheels were in contact with the ground all the way to impact, however, there was no evidence of the tyre markings from the nose wheel on the runway surface. The investigation, therefore, determined that the nose wheel was not lowered and did not contact the strip during the ground roll until impact. Refer to *Figure 17*.

The tyre markings from the main wheels indicated that the aircraft was rolling on the centre hard surface of the runway strip and maintaining the runway heading of 140º. The markings also indicated that the aircraft's main wheels turned slightly to the right when the aircraft was about 44m to its resting position. The aircraft impacted the drainage ditch and came to rest at a heading of about 180º, facing South. Refer to *Figure 18*.

The ground markings on the drainage ditch observed by the on-site investigation team indicated that the aircraft impacted with significant force. Refer to *Figure 19.*

The on-site team also observed mud deposits on the aircraft's wheels and airframe.

Figure 16:P2-HFA tyre marks along runway 14.

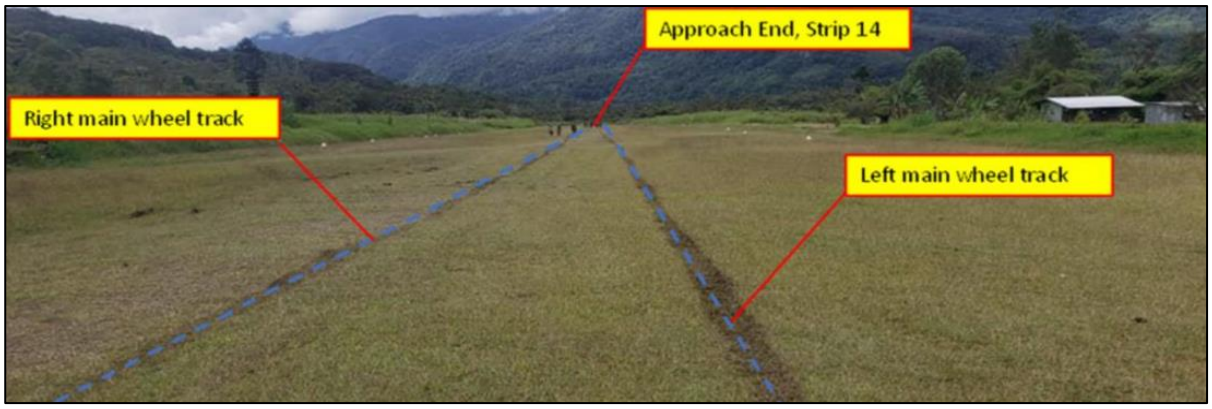

Figure 17: P2-HFA tyre tracks form the main wheels.

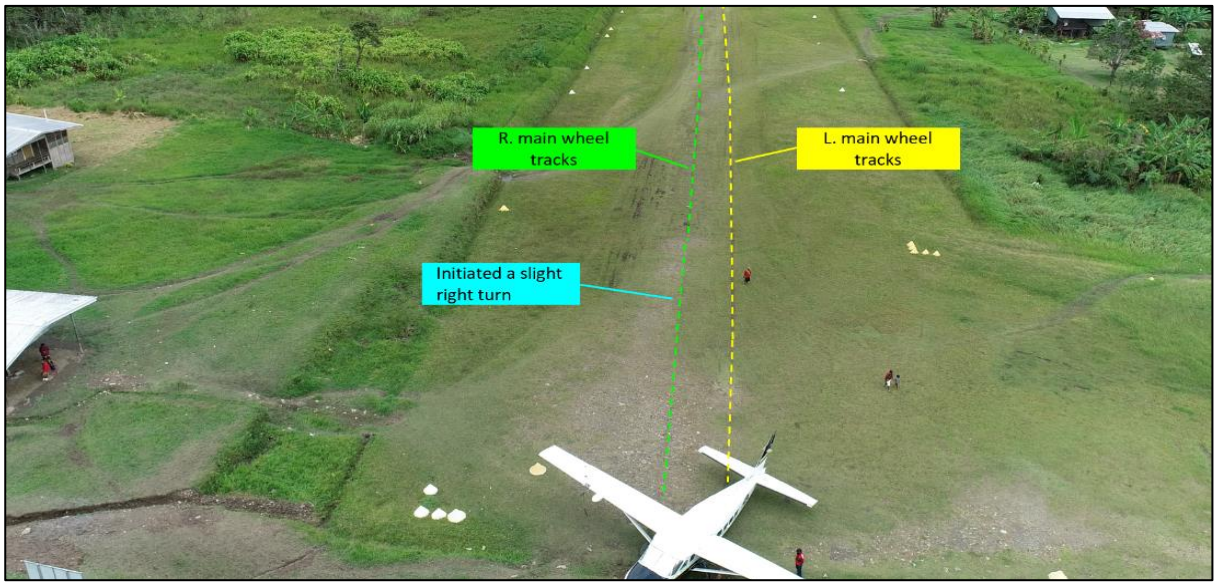

Figure 18: Tyre marks of hte main wheels showing the aircraft's heading

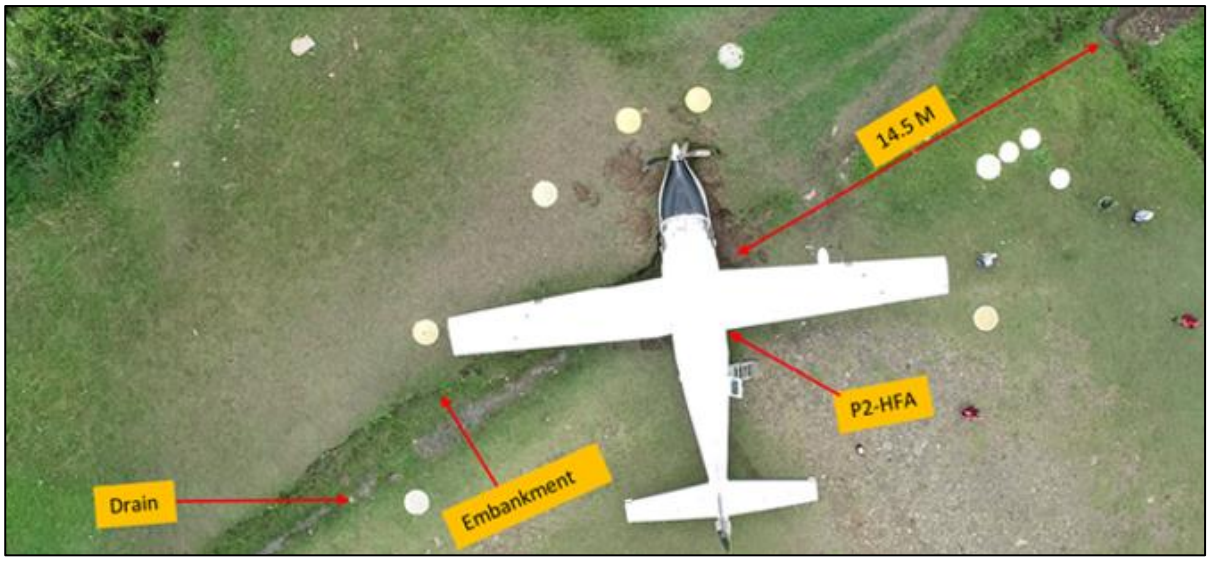

Figure 19:Wreckage following impact.

1.12.2 On-site Inspection of Damage

The on-site team inspected the aircraft and identified that the aircraft sustained substantial damage to the left wing, propellers, engine mounting, its structure, and a number of components, which included the propeller assembly, the spinner and the Nose Landing Gear (NLG). Refer to *Figure 20*.

The pilot stated during the interview that the left hand (LH) wing impacted the embankment followed by the propellers and the NLG. The investigation observed that the LH outboard wing sustained substantial damage to the leading edge. The investigation determined that the damage indicated the aircraft had experienced significant impact force due to the sudden stop following the impact. Refer to *Figure 21*.

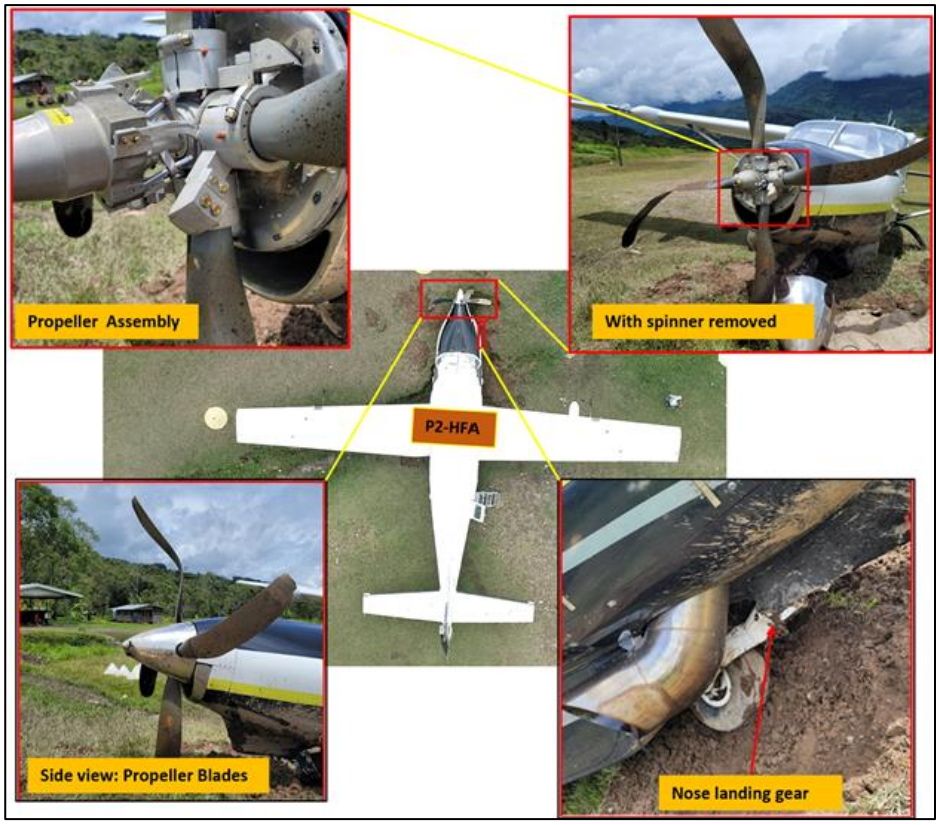

Figure 20:Damage sustained to the NLG and propeller assembly.

Figure 21:Damage to the LH wing and the LH wing flap.

There was fresh paint missing on both lower wing strut attachment bolts, indicating a major flex forward of both aircraft wings due to the sudden impact with the embankment. Refer to *Figure 22*.The impact

force on the propeller blades and engine mount, resulted in the engine mounting brackets causing severe damage to the engine firewall. Refer to *Figure 23*.

Figure 22:Left and right lower wing strut (Source : Helifix Operations Ltd).

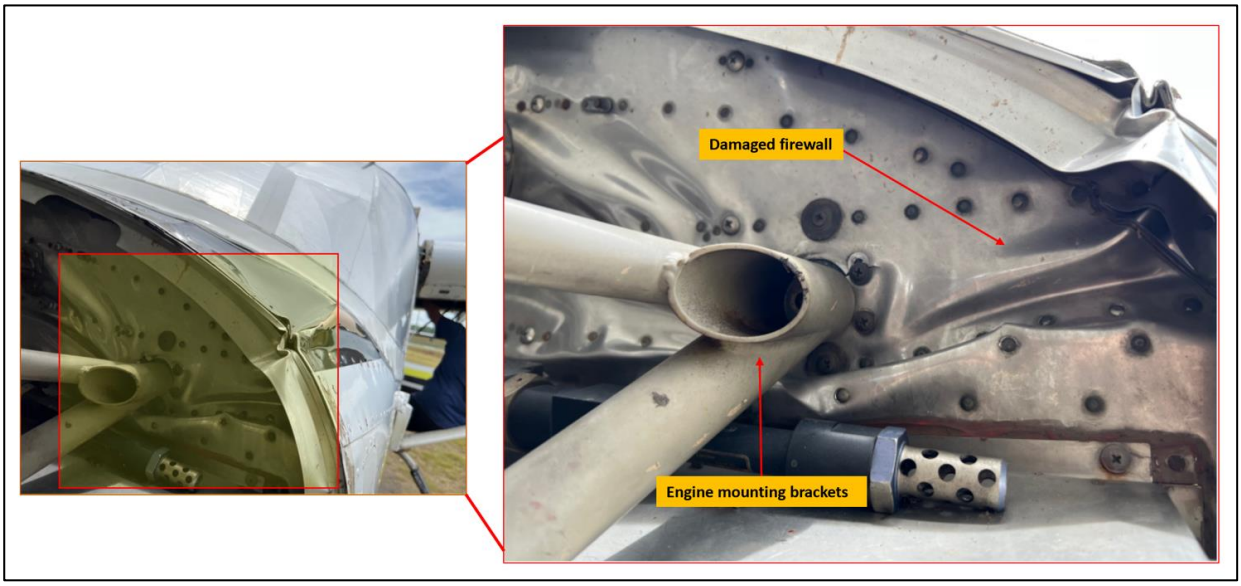

Figure 23:Damage sustained on the engine firewall (Source :Helifix operations Ltd).

1.13 Medical and pathological information

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

1.14 Fire

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

1.15 Survival Aspects

According to the ATS records, at 13:40, the pilot cancelled SARWATCH when he arrived in the Eliptamin circuit area. About nine minutes later, a MAF aircraft, that was intending to land at Eliptamin Airstrip, advised Moresby ATS that it observed from overhead Eliptamin that HFA had overran the airstrip. The airstrip was subsequently closed due to disabled aircraft at the end of the airstrip.

The investigation determined that the Emergency Locator Transmitter (ELT) did not activate because not enough horizontal momentum was exerted on it during the runway excursion.

At 14:03, the pilot contacted ATS and advised that he had experienced a strong tailwind on approach to land at Eliptamin Airstrip and ran off the airstrip runway. According to the pilot, he then contacted the Operator, and the Company activated their Emergency Response Plan (ERP).

The pilot stated that all passengers were safely evacuated through the left side cockpit door and there were no injuries to the passengers.

1.16 Test and Research

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

1.17 Organisational and Management Information

1.17.1 Helifix Operations Limited

Helifix Operations Limited is a Port Moresby based aviation company, established in 1998 and provides helicopter and fixed wing aircraft charter and maintenance services to Papua New Guinea. Helifix has an Air Operator certificate 119/026 which authorises Helifix to perform commercial air operations in accordance with *Civil Aviation Rule (CAR)* (Fixed Wing) and *CAR Part 136* (Rotary Wing). Helifix also holds a Maintenance Organisation Certificate (MOC) 145/026.

1.17.2 Operator's Fixed Wing Operations Manual, Part B

According to the Operator's Fixed Wing Manual, Part B, Subsection *2.10.1 Short Field Landing*, which is consistent with the *Pilot's Operating Handbook* and *FAA Approved Airplane Flight Manual Grand Caravan*, it states that:

- *"For short field landings, make a power approach at 78 KIAS with the speed lever at MAX (full forward) and with full flaps. After all approach obstacles are cleared, reduce power to idle. Maintain 78 KIAS approach speed by lowering the nose of the airplane. Touchdown should be made with the power lever at IDLE, and on the main wheels first. Immediately after touchdown, lower the nose gear, reposition the power lever to GROUND IDLE (1/2" aft of the flight idle stop in the BETA range), and apply heavy braking, as required.*
- *For maximum brake effectiveness after all three wheels are on the ground, hold full nose up elevator, retract the flaps, and apply maximum possible brake pressure without sliding the tires. Raising the flaps in this instance would be more suitable for paved runways. On grass runways especially after rain, use of Reverse would take precedence over using brakes due to the possibility of sliding the tyres. In this instance as the power lever is being repositioned into BETA, GROUND IDLE then held in REVERSE, taking your hand off the Power Lever and selecting the flap lever would*

make the Power Lever spring back to GROUND IDLE.

- *Caution when using MAX REVERSE as the Aircraft will have a tendency to change direction to the RIGHT due to propeller torque effect."*

According to the pilot, it is a company procedure to compensate for the elevation and slope of Eliptamin Airstrip. For every 1% of slope, 2 kts will be added to the published approach speed, which is 78 kts under normal conditions. He further stated in his interview that based on this company procedure, he elected 90 kts as his reference speed on approach to touchdown.

The AIC requested a copy of the Operator's Manual that contained the procedure for calculating the reference speed on approach into steeper airstrips such as Eliptamin, however, there was no evidence provided to the investigation.

1.17.3 Operator's Fixed Wing Operations Manual, Part C

1.17.3.1 Operators Route Guide

According to *CAR Part 125.83 (b) Use of Aerodromes;*

> *(b), The certificate holder shall, where its aeroplanes use an aerodrome not promulgated in the PNGAIP, maintain a register containing—*
> *(1) the aerodrome data;*
> *(2) procedures to ensure that the condition of the aerodrome is safe for that operation; and*
> *(3) procedures to ensure that the condition of any required equipment, including safety equipment, is safe for that operation; and*
> *(4) details of any limitations on the use of the aerodrome*

The investigation reviewed the Route and Aerodrome Guide and found that there was aerodrome data for airstrips that they operate to, however, there was no information on windsocks. The investigation also determined that although there is no rule requirement on the specific data for the route and aerodrome guide, the investigation deemed it necessary for information on windsocks to be included in the Route and Aerodrome guide for the proper conduct of flights.

Refer to Appendices, *Section 5.3 Appendix C* of this report for the Operator's Aerodrome Data – Eliptamin Airstrip

1.17.3.2 Operator's additional requirements for Eliptamin Airstrip

The Operator's additional requirements for Eliptamin Airstrip in the Operator's F*ixed Wing Operation Manual, Part C Section 3* states;

> *Weather conditions in Eliptamin can be volatile, however, it is often most suitable in early to mid-morning operations. Not so much the aerodrome itself but the surrounding valley required to be available are often clouded over or subject to heavy rainfall.*
>
> *Tailwinds can be associated with orographic uplifting from about 10 am- Caution MAX 10 kts TWC[17] permitted.*

17 Tailwind component

The accident flight and some of the previous flights to Eliptamin Airstrip from the Appareo recorded data showed that the flights were conducted after 10am.

1.17.4 Operator's Aerodrome Inspections

According to the *Helifix Fixed Wing Operations Manual Part C,* Section *2.17.3 Airport Categorization Criteria,* Helifix classifies aerodromes into three categories in ascending order of difficulty from Category A to Category C.

Type	Timeframe	Inspections
Type A	Conducted Annually	Aerodrome Inspections are conducted annually by an approved HELIFIX employee and are a complete review of the suitability of the aerodrome. These will generally be conducted on around 15th January each year. On commencement of flights to an aerodrome where the inspection is deemed required. An assessment will be made as to whether these needs to be prior to the first flight, or on the first landing Type A inspections shall include an in-depth review of all the standards.
Type B	Conducted every 3 months	Aerodrome inspections are conducted every 3 months, by an approved HELIFIX employee and are in quick review of the ongoing suitability of the aerodrome for the next 3months. The inspection will include the following areas; 1. Surface conditions, specifically; a. Grass length on the runway and strip b. Vegetation height on the lateral clearway c. Any soft areas d. Ruts and erosion e. Standing water 2. Obstacle Splay, specifically; a. Obvious growth or other obstacles infringing the take-off splay (note: only a visual inspection is required)
Type C	Conducted prior to the landing of the aircraft on all flights	These are conducted prior to every landing. The inspection will include the following areas; 1. Surface condition, specifically; a. Any soft areas b. Ruts and Erosion c. Standing water Where a pre-landing inspection is required, a Captain shall not land at that aerodrome unless the agent has placed an orange trampoline marker in the parking area to denote that the inspection has occurred, and that the aerodrome is suitable for a landing.

Table 5:Types of Aerodrome Inspections.

The Operator advised the AIC that the last Type A inspection that was conducted on Eliptamin Airstrip was in 2020. However, there was no evidence of an inspection report. They further added that Helifix pilots communicate the surface conditions through daily email to all stakeholders, and verbal briefs on the conditions at the respective airstrips by local agents on site daily.

1.17.5 Safety Management System

The Operator has an existing Safety Management System which includes the safety communication and reporting system.

According to the operator's Safety Manual, section 3.2 Safety Reporting;

> *The Company shall have a formal process for safety reporting. Safety reporting is defined as the systematic reporting of all situations, events and conditions which have occurred, or which could occur, which have the potential for compromising the safety goals of the Company.*
>
> *The Quality & Safety Manager is responsible for the Safety Reporting System. Department Heads are responsible for ensuring that their employees comply with both statutory and company policies regarding safety reporting.*
>
> *Any safety related incident or concern should be relayed to the appropriate department head and where practical, immediate remedial action is required to ensure continued safe operations*

The investigation reviewed the Operator's Safety Reports extracted from Air Maestro for the years 2021 to 2023. The safety reports identified hazards and risks related to ground and flight operations, workplace/Organisational and security. The extract of the safety reports provided to the AIC indicated that between the years 2021 to 2023, less than 20 incidents were reported.

The Operator's safety report register was also reviewed and identified that there were no reported incidents associated with the windsock or any other reported hazards at Eliptamin Airstrip.

1.18 Additional information

1.18.1 Stabilised approach

Flight Safety Foundation, in its FSF ALAR Briefing Note 7.1 provides the recommended elements of a Stabilised Approach, as follows:

All flights must be stabilized by 1,000 ft above airport elevation in instrument meteorological conditions (IMC) and by 500 ft above airport elevation in visual meteorological conditions (VMC). An approach is stabilised when all of the following criteria are met:

1. The aircraft is on the correct flight path;

2. Only small changes in heading/pitch are necessary to maintain the correct flight path;

3. The aircraft speed is not more than VREF[18] + 20kt indicated airspeed and not less than VREF;

4. The aircraft is in the correct landing configuration;

5. Sink rate is no greater than 1000 fpm; if an approach requires a sink rate greater than 1000 fpm a special briefing should be conducted;

6. Power setting is appropriate for the aircraft configuration and is not below the minimum power for the approach as defined by the operating manual;

7. All briefings and checklists have been conducted;

8. Specific types of approach are stabilized if they also fulfil the following: instrument landing system (ILS) approaches must be flown within one dot of the glide-slope and localizer; a Category II or III ILS approach must be flown within the expanded localizer band; during a circling approach wings should be level on final when the aircraft reaches 300 ft above airport elevation; and,

9. Unique approach conditions or abnormal conditions requiring a deviation from the above elements of a stabilized approach require a special briefing.

An approach that becomes unstabilized below 1000 ft above airport elevation in IMC or 500 ft above airport elevation in VMC requires an immediate go-around.

1.19 Useful or effective investigation techniques

The investigation was conducted in accordance with *PNG Civil Aviation Act 2000* (as amended) and *Civil Aviation Rules*, and *PNG Accident Investigation Commission* approved policies and procedures, and in accordance with the *Standards and Recommended Practices of Annex 13 to the Convention on International Civil Aviation.*

[18] Reference landing speed as defined by the aircraft flight manual.

2 ANALYSIS

2.1 General

The analysis part of this report will discuss the relevant issues resulting in the accident. The investigation determined that there were no safety issues with the aircraft and that the aircraft systems were operating normally. However, there were other safety related issues identified in the investigation which contributed to the accident.

The analysis will therefore focus on the following issues:

- Flight Operations
- Aerodrome
- Organisational
- Weather

2.2 Flight Operations

The investigation determined that the flight was planned for the morning on the day of the accident however, due to the reported weather conditions, the flight was delayed and commenced after 13:00 pm when confirmation was received that the weather at Eliptamin had improved. Upon arrival in the Eliptamin area, the pilot observed fog and was not able to continue with his descent to Eliptamin, he therefore opted to climb to a higher altitude to avoid the fog before proceeding to Eliptamin Airstrip. The pilot then arrived overhead the airstrip at an altitude which was much higher than his usual range of 1,200 ft to 1,700 ft AGL overhead circuit pattern. The investigation identified that the aircraft was at 3,000 ft AGL when the pilot conducted the overhead inspection.

It is the view of the AIC that an inspection height of about 3,000 ft AGL was far too high to properly assess the surface condition of the airstrip and the wind behaviour. The AIC believes that the overhead inspection was conducted at a height significantly higher compared to his previous flights into Eliptamin where he was no higher than 1,700 ft AGL when positioned overhead the airstrip. *Refer figure 14.*

The pilot joined the circuit at a height of 2,700 ft AGL which was higher than his previous flights to Eliptamin. It was observed that the pilot flew a wider circuit which indicates that he was attempting to quickly descend to circuit height. Upon commencing a turn from base to final, the pilot conducted a steep descent and joined final approach less than a mile from the threshold at 220 ft AGL. He then encountered turbulent winds and a strong tailwind during the final approach, which was past the committal point. The pilot recognized the prevailing wind conditions but was unable to discontinue the approach as he was past the committal point. The pilot adjusted to a higher power setting to maintain an airspeed of about 90 kts, which fluctuated due to the turbulent conditions. The recorded corresponding groundspeed during the approach reached up to a maximum of 126 kts. Although an actual tailwind component could not be determined, the investigation believes that the tailwind component significantly exceeded the Operator's permitted tailwind component.

The evidence gathered during the investigation showed that at least two of the criterions for a *stabilized approach* were not maintained by the pilot during the final approach, as follows:

a. The flight must be stabilized by 500 ft above airport elevation in visual meteorological conditions

b. The aircraft speed is not more than VREF + 20kt indicated airspeed and not less than VREF;

The investigation established that the pilot conducted an unstable approach.

Given the strong tailwinds including the influence of localised turbulent winds at the airstrip, the investigation considers that there is a high possibility that the aircraft landed with excess speed. The AIC believes that this most likely caused the aircraft to bounce off the ground upon touchdown on the threshold. The aircraft was then pushed up strip by the prevailing airstrip wind conditions, while in the air. The pilot attempted to control the aircraft and managed to get the aircraft back onto the ground, however, the aircraft bounced off the ground once more and travelled further up strip while in the air. The pilot finally got the aircraft back onto the ground, however, at that point, there was no sufficient runway available to bring the aircraft to a stop. The investigation established that the aircraft travelled a total of 250 m up strip while being in the air, and later travelled an additional 270 m on the ground right before impact.

Additionally, from the amount of mud deposits on the aircraft's wheels and airframe, the investigation determined that the strip surface was not completely dry at the time of the accident. This would have had a negative impact on the braking capacity of the aircraft during the landing roll.

2.3 Eliptamin

The investigation determined that the flight to Eliptamin was operated outside of the company's required time, which is early to mid-morning. The pilot was aware of the volatile conditions at Eliptamin and the operator's operational requirements, however, he operated to the airstrip past the recommended time. The pilot had departed Kiunga Airport at 13:00 and arrived at Eliptamin at 13:43.

Onsite investigation observed two windsocks at Eliptamin Airstrip. One is located at the south-eastern (departure) end of the airstrip, in the parking bay, while the other windsock is located at the approach end of runway 14. The investigation determined from interviews with the pilot that he was not situationally aware of the windsock located at the approach end of runway 14. The investigation confirmed that although records showed the pilot had operated numerous times into Eliptamin prior to the accident flight, he was not aware that there was another windsock stationed at the approach end of this airstrip.

The windsock in the parking bay that the pilot had referenced when overhead the airstrip, was located at a position that did not give it optimum exposure to prevailing wind conditions in the area. There are obstacles surrounding the windsock obstructing the free flow of air. As a result, the windsock indication of wind strength is unreliable. Additionally, according to the pilot, the windsock in the parking bay provides erroneous and unreliable information during overhead inspection.

2.4 Organisational

2.4.1 Operator's Airstrip Inspection

The investigation determined that the company has procedures for carrying out its own inspections of the airstrips they operate to. Inspections are to be conducted annually, every 3 months and prior to the landing of the aircraft on all flights. The investigation found that there was no record of inspections being carried out by the operator on Eliptamin Airstrip or other airstrips.

2.4.2 Safety Reporting Culture

The investigation identified that there were fewer than 20 reports recorded in the Operator's database for the period of three years. The investigation considers that the number of the Operator's safety reports may indicate either a safe operation or may indicate a poor reporting culture within the organisation. The AIC believes that safety awareness on the safety reporting process and the importance of reporting incidents will ensure staff, especially flight crew, identify hazards in the organisation and during operations, and report them.

2.4.3 Route and Aerodrome Guide

The Operator's Route and Aerodrome Guide data was reviewed against the data from the RAA inspection survey that was conducted in June 2020. The investigation found variations between the Operators data and RAA data. The AIC used the Appareo data to establish the elevation and also to calculate the runway length and the average slope of Eliptamin Airstrip and found that the RAA's data for Eliptamin was closely similar with the AIC's derived data from Appareo. The Operator's Route and Aerodrome data was found to be inconsistent with the Appareo data.

The existence of windsock at the approach end of the airstrip was not known to the pilot who had operated for the Operator into Eliptamin numerous times during his employment.

The Operators Route and Aerodrome guide does not mention windsocks at the airstrip. Although it is not a mandatory requirement to include information on windsocks in the Route and Aerodrome guide, the investigation deemed that it is necessary for safe operations into the airstrips.

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3 CONCLUSIONS

3.1 Findings

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 Certificate of Annual Airworthiness Review and had been maintained in compliance with the regulations.

c) The maintenance records indicated that the aircraft was equipped and maintained in accordance with existing regulations and approved procedures.

d) The aircraft was airworthy when dispatched for the flight.

e) The mass and the centre of gravity of the aircraft were within the prescribed limits for landing.

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

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

h) The aircraft was structurally intact prior to impact.

i) All control surfaces were accounted for and all damage to the aircraft was attributable to the impact forces.

j) The aircraft sustained substantial damage by impact forces.

2. Pilot

a) The pilot was licensed and qualified for the flight in accordance with existing regulations.

b) The pilot was properly licensed, medically fit, and adequately rested to operate the flight.

c) The pilot was in compliance with the flight and duty time regulations.

d) The pilot's actions and statements indicated that his knowledge and understanding of the aircraft systems was adequate.

e) The pilot was not situationally aware of the windsock located at the approach end of runway 14.

3. Flight Operations

a) The flight was conducted in accordance with the procedures in the company Operations Manual.

b) The flight was operated outside of the company's required time, which is early to mid-morning.

c) The pilot carried out normal radio communications with the relevant ATS units.

d) The pilot conducted aerial inspection of the airstrip at a high altitude.

e) The pilot was not aware of prevailing wind conditions at the airstrip.

f) There was a significant increase in the rate of descent during the turn from base to final.

g) The aircraft established on final at 220 ft AGL at 0.8 NM from the threshold of runway 14.

h) The aircraft experienced gusts of tailwind exceeding 20 kts during the final approach.

i) After the touchdown at the threshold, the aircraft got airborne by a strong gust of wind and travelled 160 m up strip.

j) The aircraft then bounced on the airstrip surface becoming airborne once again and travelled further forward for another 90 m.

k) The aircraft then dropped down onto the ground and rolled forward 270 m before coming to a complete stop after impacting the embankment.

l) The wind conditions in which the pilot landed the aircraft were outside the limits detailed in the Flight Manual and the Operations Manual.

m) Braking performance was ineffective given the airstrip runway surface conditions at the time of the accident.

n) The aircraft could not stop on the available runway.

4. Operator

a) The Operator did not have records of an inspection carried out on Eliptamin Airstrip in accordance with their Operations Manual.

b) There were no hazards and associated risks identified by the operator pertaining to Eliptamin Airstrip.

5. Air Traffic Services and Airstrip Facilities

a) ATS provided prompt and effective assistance to the pilot.

b) The airstrip had appropriate visual aids available to the pilot.

c) The white windsock located in the departure end of the airstrip in the parking bay was located at an area that was obstructed by the surrounding environment and did not give a true indication of the prevailing winds at the time of the accident.

6. Flight Recorders

a) The aircraft was not equipped with an FDR or a CVR; neither was required by regulation.

b) The aircraft was fitted with an Appareo Vision 1000 recorder for flight data monitoring purposes.

7. Medical

a) There was no evidence that the pilot suffered any sudden illness or incapacity which might have affected his performance.

b) The pilot was wearing his spectacles during the accident flight as required.

8. Survivability

a) The accident was survivable.

b) There were no reported injuries.

c) The ELT did not activate on impact.

9. Safety Oversight

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

3.2 Causes [Contributing factors]

There were several factors that contributed to the accident.

- The flight to Eliptamin from Kiunga Airport was outside the operational times recommended in the company's Operations Manual.
- The aircraft was overhead the airstrip at a height of about 3,000 ft AGL, which was higher compared to the pilot's previous flights to Eliptamin where the altitude did not exceed 1,700 ft AGL when overhead the airstrip.
- The AIC believes that the overhead inspection was conducted at a far too high altitude to properly assess the surface condition of the airstrip and the wind behaviour.
- Excessive groundspeed on approach and touchdown due to the tailwind was attributed to the localised weather present at Eliptamin Airstrip.
- The pilot could not identify that there were strong winds present at Eliptamin Airstrip.
- The pilot lacked awareness of the windsock located at the approach end of runway 14, and the windsock located at the departure end of the runway near the parking bay, did not give the appropriate indication of the prevailing winds at Eliptamin Airstrip.
- The tailwind component that was experienced on final approach and touchdown was beyond the allowable limit of 10 kts as stated in the Operator's Manual and the Aircraft Flight Manual.
- The aircraft landed with excess speed which caused the aircraft to bounce off the ground upon touchdown on the threshold. The aircraft was then pushed up strip by the prevailing airstrip wind conditions, while in the air. The pilot attempted to control the aircraft and managed to get the aircraft back onto the ground, however, the aircraft bounced off the ground once more and travelled further up strip while in the air. The pilot finally got the aircraft back onto the ground, however, at that point, there was no sufficient runway available to bring the aircraft to a stop.
- While in the air both times following the touchdown at the threshold, the aircraft was pushed further down the runway and eventually ran out of runway length and impacted the embankment at the end of the runway.
- On-site investigation team observed from the amount of mud deposits on the aircraft's wheels and airframe that the strip surface was not completely dry at the time of the accident and may have had a negative impact on the braking capacity of the aircraft during the landing roll.

3.3 Other factors

Although not directly causal to the accident, the operator did not carry out aerodrome inspections as per their documented procedures to carry out inspections annually, every 3 months and prior to the landing of the aircraft on all flights.

Additionally, there were inconsistencies in the Eliptamin Airstrip data provided by RAA and Helifix. Specifically, the length of the runway, elevation, and slope. The investigation derived data from Appareo of the average slope, elevation and the runway length for Eliptamin Airstrip and found that its data was closely similar with RAA's data for Eliptamin.

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4 SAFETY RECOMMENDATION

4.1 Recommendation number AIC 23-R17/23-1002 to Helifix Limited.

The PNG Accident Investigation Commission recommends that Helifix Operations Limited should amend their Route Guide to;

a) include information on visual aids such as windsocks. Although not a mandatory requirement, the investigation deems it necessary so that flight crew are aware of all visual aids at the airstrips and fully utilize them for safe operations.
b) contain accurate aerodrome data; slope, runway length and elevation consistent with data from Rural Airstrip Agency Survey data for Eliptamin.

Action requested.

The AIC requests that Helifix Limited note recommendation *AIC 23-R17/23-1002* and provide a response to the AIC within 90 days of the issue date and explain (including with evidence) how Helifix Operations Limited has addressed the safety deficiency identified in the safety recommendation.

4.2 Recommendation number AIC 23-R18/23-1002 to Helifix Limited.

The PNG Accident Investigation Commission (AIC) recommends that Helifix Operations Limited implement its procedures outlined in the Fixed Wing Operations Manual, Part C, section 4.3, with respect to aerodrome inspections that are required to be carried out annually, every 3 months and before every landing to ensure the suitability of the aerodromes.

Action requested.

The AIC requests that Helifix Limited note recommendation *AIC 23-R18/23-1002* and provide a response to the AIC within 90 days of the issue date and explain (including with evidence) how Helifix Operations Limited has addressed the safety deficiency identified in the safety recommendation.

4.3 Recommendation number AIC 23-R19/23-1002 to Helifix Limited.

The PNG Accident Investigation Commission recommends that Helifix Operations Limited ensure Flight Crew are aware of the safety reporting system and report all hazards identified or observed at the aerodromes operated to and during all other flight operational duties.

Action requested.

The AIC requests that Helifix Limited note recommendation *AIC 23-R19/23-1002* and provide a response to the AIC within 90 days of the issue date and explain (including with evidence) how Helifix Operations Limited has addressed the safety deficiency identified in the safety recommendation.

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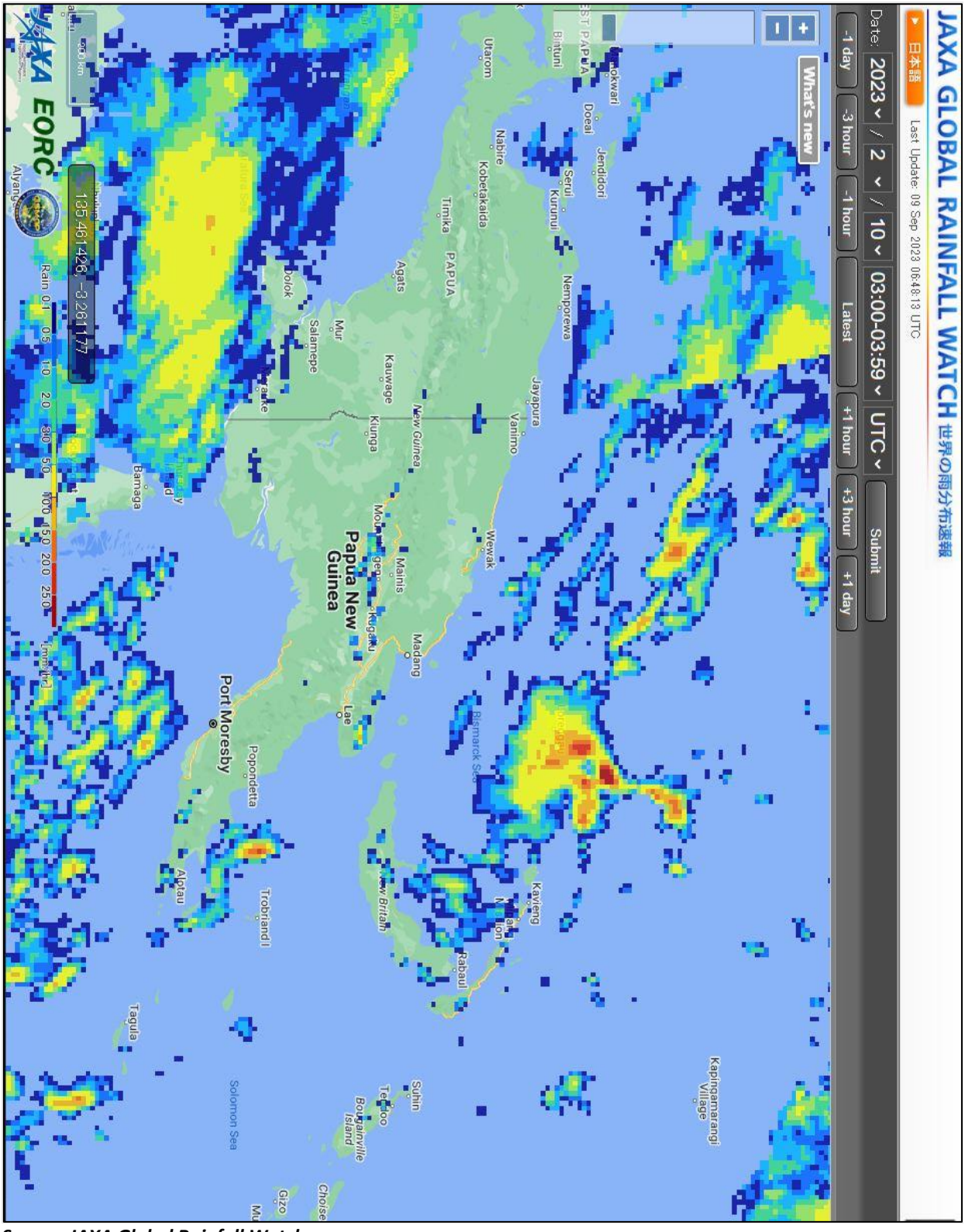
5 APPENDICES

5.1 Appendix A: Satellite image for weather between 13:00-13:59 (03:00-03:59 UTC).



Source: JAXA Global Rainfall Watch

5.2 Appendix B: CASA PNG AC - 139-6 Chapter 5- Visual Aids for Navigation

CHAPTER 5 — Visual Aids for Navigation

5.1 Wind Direction Indicator (Windsock)

5.1.1 Each runway should be provided with at least one windsock.

5.1.2 The windsock should be located in an open space most suited to the prevailing wind conditions.

5.1.3 The windsock should be located at least 20 m from the runway centreline.

5.1.4 The windsock should be located in such a way as to be free from the effects of air disturbances caused by nearby objects.

5.1.5 The windsock should be in the form of a truncated cone made of fabric. It should be coloured white, yellow or light orange and constructed so that it gives a clear indication of the direction of the surface wind and a general indication of wind speed when seen from a height of 300 m (1,000 ft).

Figure 5-1- Windsock Locations

5.1.6 The circle around the wind indicator must be 15 meters diameter, blackened and the boundary marked with painted white stones or cone markers.

5.2 Unpaved Runway - Markers

Markers for general use

5.2.1 Markers should not pose a hazard to aircraft. It is recommended that markers be standard cone markers. Specific markers should be cone markers.

5.3 Appendix C: Operator's Aerodrome Data – Eliptamin Airstrip

3.26 Eliptamin

ELIPTAMIN **AYEL**

Latitude/Longitude: ..... **5 05° 02' 35" E 141° 40' 47"**

Elevation: ..... **5600 ft**

Category: ..... **C**

RADIO COMMUNICATIONS

Type	Call sign	VHF	HF	
ATS	Moresby	124.9 MHz	5565 KHz	8861 KHz

RUNWAY INFORMATION

RWY Characteristics	Runway 14	Runway 32
RWY Dimension:	530m x 30m	530m x 30m
RWY Strip	530m x45m	530m x45m
Alignment:	133° M	313° M
Slope:	+8.4%	-8.4%
Restriction	Land RWY 14	Take off RWY 32
Surface / PCN	Grassed brown clay SLCN Group IV	

AERODROME OPERATING INFORMATION

Terrain

Eliptamin is located on the slopes of D'Albertis Dome at the collective headwaters of the Sepik River. IT is surrounded by high terrain at the top of the valley with the most ideal approach from the NW near the Sepik Gorge.

Weather

Weather condition in Eliptamin can be volatile however, it is often most suitable in early to mid-morning operations. Not so much the aerodrome itself but the surround valley required to be available are often clouded over or subject to heavy rainfall.

Tailwinds can be associated with orographic upli'ting from about 10 am- Caution MAX 10 kts TWC permitted.

Company Operating Requirements

- For all operations into AYEL fuel to a suitable coastal alternate airfield must be carried
- LEFT circuits ONLY
- Caution slippery in grassed areas- CENTRLINE MAINTENANCE ESSENTIAL
- No missed approach - committal height 200 ft. RAD ALT make left turn for escape '270' to fly away from aerodrome PRIOR to commencing circuit re-join.

Maximum Take-off Weight Limitations

- Airfield does not permit viable load ASDAIASDR (stop/go) capability. In order to provide compliance with OEI terrain clearance in case of OEI, the following maximum take-off weights are to be utilised for ALL DHC6 operations:

OAT	25°C	30°C
MTOW	5250 kg	5100 kg

Approaching from West

RWY 31Departure Paths