ACCIDENT INVESTIGATION COMMISSION

FINAL REPORT

AIC 22-2002

Hevilift (PNG) Aviation Limited

Viking DHC-6 300 Twin Otter

MAF PNG Limited

Cessna 208 Caravan

Close proximity serious incident

Mt Hagen Airport, Western Highlands Province

Papua New Guinea

26 August 2022

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 serious incidents, 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.

About this report

The AIC was informed at 09:33 local time (23:33 UTC) on 30 August 2022, via email by CASA PNG of a "loss of separation" serious incident[1] involving a Viking Canada DHC-6-300 Twin Otter aircraft, registered P2-KSI owned and operated by Hevilift PNG Aviation Limited and a Cessna 208 Caravan aircraft, registered P2-MEW owned and operated by MAF PNG at Mt Hagen Airport, Western Highlands Province, Papua New Guinea. The AIC immediately gathered information regarding the occurrence and commenced the investigation.

This accident investigation *Final Report* has been produced by the AIC, P O Box 1709, Boroko 111, 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.

Captain Aria Bouraga, MBE

Acting Chief Commissioner

9 June 2023

[1] *Annex 13* to the *Convention on International Civil Aviation defines a* ***serious incident*** *as:* An incident involving circumstances indicating that there was a high probability of an accident and associated with the operation of an aircraft which, in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time as it comes to rest at the end of the flight and the primary propulsion system is shut down.
Note 1.— The difference between an accident and a serious incident lies only in the result.

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GLOSSARY OF ABBREVIATIONS

ACC	**: Area control centre**
ADC	**: Aerodrome control**
AFTN	**: Aeronautical fixed telecommunication network**
AGL	**: Above ground level**
AIC	**: Accident investigation commission**
AIP	**: Aeronautical information publication**
APP	**: Approach**
AMSL	**: Above mean sea level**
AOC	**: Air operator certificate**
ASD	**: Air situation display**
ATC	**: Air traffic control**
ATIS	**: Aerodrome terminal information service**
ATM	**: Air traffic management**
ATS	**: Air traffic services**
ATPL	**: Airline transport pilot licence**
ATZ	**: Air traffic zone**
AWOS	**: Aerodrome weather observation system**
CADAS	**: Comsoft aeronautical data access system**
CAR	**: Civil aviation rules**
CASA	**: Civil aviation safety authority**
CPL	**: Commercial pilot licence**
CRM	**: Crew resource management**
ENR	**: En-route**
ETA	**: Estimated time of arrival**
FPB	**: Flight progress board**
FIR	**: Flight information region**

HF	**: High frequency**
NM	**: Nautical miles**
PIC	**: Pilot in command**
RAC	**: Rules of the air and air traffic control**
RAT	**: Reliability acceptance test**
SATCO	**: Senior air traffic controller outstations**
NSPL	**: NiuSky Pacific Limited**
VHF	**: Very high frequency**
VCS	**: Voice communication system**
MATS	**: Manual of air traffic services**
UTC	**: Coordinated Universal Time**

INTRODUCTION

SYNOPSIS

On 26 August 2022, at about 08:26 local (22:26 UTC) a Viking Canada DHC6-300 Twin Otter aircraft, registered P2-KSI owned and operated by Hevilift (PNG) Aviation Limited and a Cessna 208 Caravan aircraft, registered P2-MEW owned and operated by Mission Aviation Fellowship (MAF) PNG Limited came into relatively close proximity when they passed each other at Mt Hagen Airport, Western Highlands Province, Papua New Guinea

KSI was conducting an IFR charter flight from Kairik Airport, Enga Province to Mt Hagen Airport, while MEW was conducting a VFR charter flight from Mt Hagen Airport to Simbai Airstrip, Madang Province.

According to ATS recorded data, KSI departed Kairik at 07:53, climbed to an altitude of 11,000ft AMSL and began tracking south-east to Mt. Hagen with an estimated time of arrival at 08:26.

At 08:13 MEW requested for taxi via taxiway Alpha for Runway 12 and was subsequently cleared by ATC for taxi. At 08:16, MEW reported ready for take-off and was instructed by ATC to hold at the holding point due to inbound traffic. At 08:18, KSI reported to ATC that they were 14 nautical miles to Hagen via Tomba Area and were passing through 10,000ft AMSL.

At 08:23, KSI reported to ATC that they were wide left-downwind for Runway 30 and was subsequently instructed by ATC to continue approach for Runway 30, the duty runway. A few seconds later, MEW requested an intersection departure on Runway 12, the opposite Runway, if available.

At 08:24, ATC issued line up clearance to MEW on Runway 12 intersection Alpha and instantly advised KSI that MEW was lining up for take-off on Runway 12 intersection for a left turn via the Tremearne Gap on climb 9,000ft. A few seconds later, MEW reported *"ready on lineup"* and was subsequently cleared for takeoff.

The pilot of MEW stated during interview that the aircraft was manoeuvred slightly to the left to avoid cloud prior to making the left turn onto the planned track, as instructed by ATC. According to both aircrafts' recorded data, at the time MEW initiated the left manoeuvring, KSI was still on the base leg for Runway 30.

At 08:25:53, while MEW was in the initial climb phase, ATC cleared KSI for landing on Runway 12 and not Runway 30. A few seconds later, at about 0.5 nm from the Runway 30 threshold, the aircraft passed each other at a proximity of 330ft vertical and 208m lateral distance apart.

While Hevilift the operator notified CASA of the serious incident on the day of the occurrence, CASA did not notify the PNG AIC until 30 August in direct contravention of *Section 62* of the *Civil Aviation Act 2000 (as amended) (CAAct)*. The legislation places the obligation to notify CASA on the pilot.

The AIC issued *Safety Recommendations* to Hevilift Aviation (PNG) Limited, MAF (PNG) Limited, and Niusky Pacific Limited with respect to their non-compliance with *Section 60 of the CAAct*, and *PNG Civil Aviation Rules (CAR) Parts 1 and 12*.

Safety Recommendations were also issued to the Civil Aviation Safety Authority of PNG with respect to its non-compliance with *Section 62 of the CAAct*, and the need to promulgate a reminder to PNG AOC holders, Airport operators, and Nuisky Pacific to comply with their 24/7 notification obligations under Section 60 of the *CAAct*, and *CAR Parts 1 and 12*.

1 FACTUAL INFORMATION

1.1 History of the flight

On 26 August 2022, at about 08:26 local (22:26 UTC[2]) a Viking Canada DHC6-300 Twin Otter aircraft, registered P2-KSI (KSI) owned and operated by Hevilift (PNG) Aviation Limited and a Cessna 208 Caravan aircraft, registered P2-MEW (MEW) owned and operated by Mission Aviation Fellowship (MAF) PNG Limited came into relatively close proximity when they passed each other at Mt. Hagen Airport, Western Highlands Province, Papua New Guinea.

KSI was conducting an IFR[3] charter flight fro m Kairik Airport, Enga Province to Mt Hagen Airport while MEW was conducting a VFR[4] charter flight from Mt Hagen Airport to Simbai Airstrip, Madang Province. Kairik Airstrip is 290 deg and 70NM from Mt Hagen Airport.

According to Air Traffic Services (ATS) audio recordings, KSI departed Kairik at 07:53, climbed to an altitude of 11,000ft AMSL[5] and began tracking south-east for Mt. Hagen with an estimated time of arrival at 08:26.

Figure 1: Mt. Hagen Airport runways and Control Tower

At 08:09:03[6], MEW contacted Mt Hagen tower for a startup clearance for Simbai via the Tremearne Gap. The aerodrome controller acknowledged and gave a QNH of 1022 mb. A minute later there were sounds of broken aircraft transmissions in which the controller responded by acknowledging P2-KSO (KSO).

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[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 serious incident, Papua New Guinea (Pacific/Port Moresby Time) is UTC +10 hours.

[3] Instrument Flight Rules

[4] Visual Flight Rules

[5] Above Mean Sea Level

6 Times are taken from ATS recorded data.

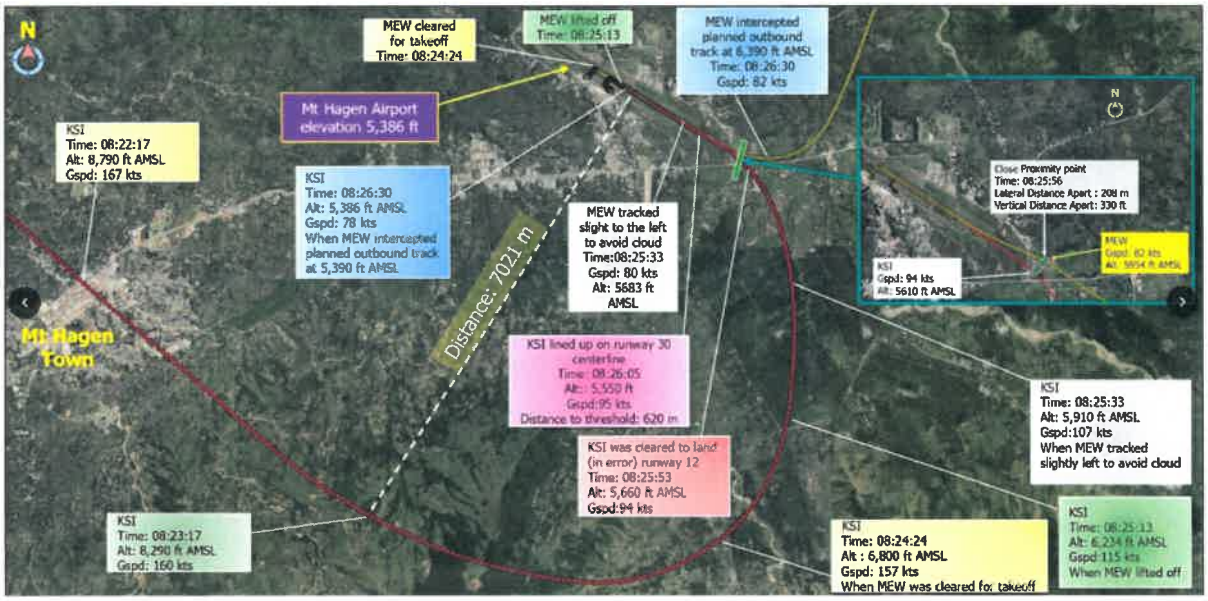

Figure 2. Depiction of the aircraft flight paths.

Figure 2 is reproduced in Appendix 5.4 for clarity. The caption boxes are colour coded for corresponding times of KSI and MEW.

KSO was another Hevilift Twin Otter that had departed ahead of KSI from Kairik for Mt. Hagen and reported passing 11 miles Mt Hagen 08:11:05 and estimating Hagen at 08:19. KSO was then instructed by the aerodrome controller to report passing 10 miles.

At 08:13:13, MEW requested taxi clearance via Taxiway Alpha for Runway 12 and was subsequently cleared by tower to taxi.

At 08:14:56, KSO advised Mt Hagen tower that they were passing 10 miles tracking for runway 30 and requested that the tower confirm if they were to track for a left downwind. The controller confirmed the left downwind track. A minute later, MEW reported ready and was instructed to hold at the holding point due to inbound traffic[7].

At 08:17:04, KSO reported early left downwind and was instructed to continue approach. At this instance, the aerodrome controller called Moresby FIS[8] to relay the taxiing report on MEW and immediately switched to the tower VHF[9] frequency to pass traffic information to MEW on the two inbound Twin Otters. MEW acknowledged; however, the radio communications were broken.

At 08:18:20, KSI reported that they were 14 nautical miles from Hagen via the Tomba area and were passing through 10,000ft AMSL and estimating Mt Hagen at 08:24. Due to broken communications, the pilot of KSI did not clearly hear the contents of the aerodrome controller's transmission and asked the controller to say again.

At 08:20:44, the aerodrome controller issued a landing clearance to the preceding Twin Otter, KSO. Two minutes later a helicopter started up and a minute later KSI reported wide left downwind for runway 30 and was subsequently instructed to continue approach. The Hagen Tower flight strips indicated that KSO landed at 08:22.

At 08:23:47 MEW requested an "*intersection Alpha departure* [on Runway 12, the opposite runway,] *if available*".

At 08:24:01, the aerodrome controller issued a line up clearance to MEW on Runway 12 intersection Alpha and instantly advised KSI that MEW was lining up for take-off on Runway

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[7] The traffic, P2-KSO and P2-KSI

8 Flight Information Service

9 Very High Frequency

12 intersection for a left turn via the Tremearne Gap on climb 9,000ft. KSI acknowledged the traffic information.

At 08:24:20, MEW reported *"will be ready on lineup"* and was cleared for takeoff at 08:24:24.

At 08:25:13 MEW became airborne off Runway 12.

The pilot of MEW stated during interview that during the initial climb phase, the aircraft was manoeuvred slightly to the left to avoid cloud prior to making the left turn onto the planned outbound track as instructed by the aerodrome controller.

At 08:25:53, while MEW was in its initial climb phase, the aerodrome controller cleared KSI for landing on Runway 12 (in error) and not Runway 30.

According to both aircrafts' recorded data[10], at the time MEW lifted off, KSI was still on a curved left base at 6,234ft and did not establish on final approach for Runway 30 at 5,500ft until 08:26:05, one min after MEW lifted off.

The co-pilot of KSI reported that she had identified the developing unsafe situation of diminishing separation with KSI coming into relatively close proximity with MEW before it had happened and suggested to the PIC that they conduct an orbit, but the PIC elected to continue approach and land, as they had the *"right of way"*. He believed that it was in accordance with approved procedures for aircraft approaching to be given priority to land irrespective of an aircraft ready for take-off.

At 08:26:01 the pilot of KSI read back the landing clearance without acknowledging the landing runway identifier. Recorded data revealed that at the time KSI was issued the landing clearance it was still turning onto final from the curved base leg and had a distance to run of 389m to be lined up on final.

A few seconds later, when KSI was about 926m (0.5NM) from the Runway 30 threshold, KSI and MEW passed each other at a proximity of 330ft vertically and 208m laterally.

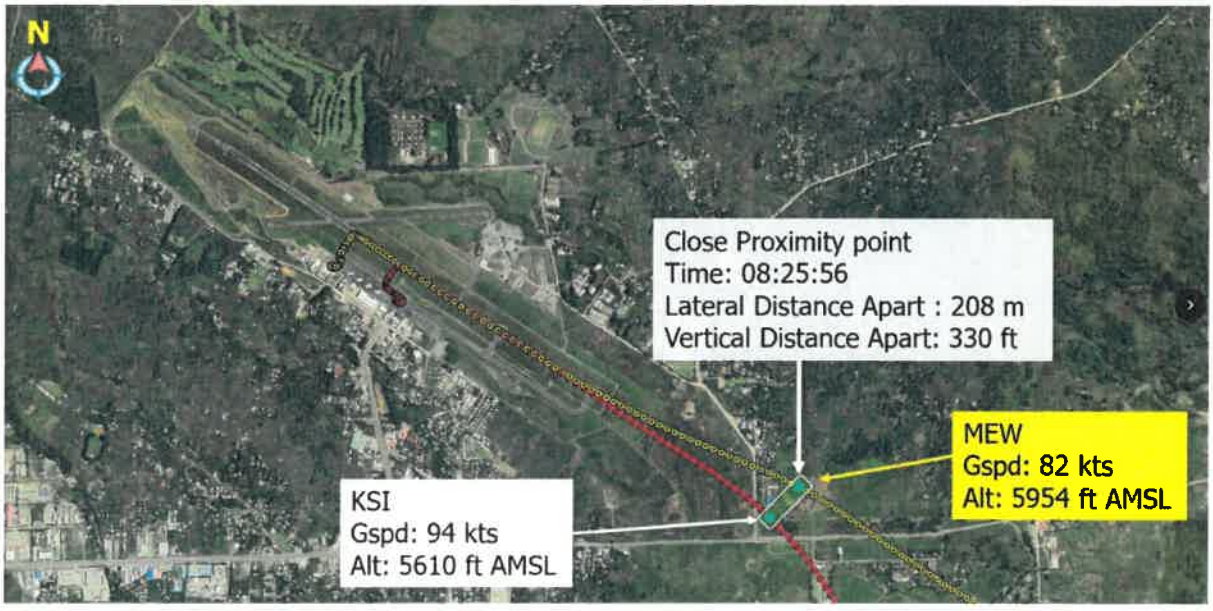

Figure 3: Depiction of close proximity KSI and MEW.

At 08:26:05, KSI lined up with the centreline of Runway 30 at an altitude of 5,550ft, at a groundspeed of 95kts and a distance to run to the threshold of Runway 30 of 620m.

10 Data recorded by P2-MEW Garmin G1000 and P2-KSI Appareo V1000

KSI continued and landed on runway 30 at Mt. Hagen Airport, and MEW continued its flight to Simbai Airstrip.

While Hevilift notified the Civil Aviation Safety Authority of PNG (CASA) of the serious incident on the day of the occurrence, CASA did not notify the PNG Accident Investigation Commission (AIC) until 30 August. That was in direct contravention of *Section 62* of the *Civil Aviation Act 2000 (as amended)*. See *Paragraph 1.18.9.*

1.2 Injuries to persons

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	Not applicable
Nil Injuries	2	13	15	Not applicable
TOTAL	2	13	15	-

Table 1: KSI Injuries to persons information.

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

Table 2: MEW injuries to persons information.

1.3 Damage to aircraft

The aircraft were not damaged.

1.4 Other damage

There was no damage to property or the environment.

1.5 Personnel information

1.5.1 P2-KSI

1.5.1.1 Pilot in command

Age	: 74
Gender	: Male
Type of License	: ATPL
Valid to	: Perpetual
Aircraft Type Ratings	: BN2; Baron Travel Air; C402; DHC6; DHC8
Total flying time	: 23,786.5 hours
Total on this type	: 10,258.5 hours
Total last 90 days	: 99.5 hours
Total on type last 90 days	: 99.5 hours
Total last 7 days	: 22.3 hours
Total on type last 7 days	: 22.3 hours
Total last 24 hours	: 2.1 hours
Total on type last 24 hours	: 2.1 hours
Last Proficiency check	: 23 April 2022
Last line check	: 26 March 2022
Route check	: 26 March 2022
Medical class	: One
Valid to	: 27 November 2022
Medical limitations	: Required to wear prescription lenses.

The PIC's training records provided by Hevilift to the AIC were assessed to determine crew competency and currency at the time of the occurrence. Records showed that recurrent training was conducted in accordance with *CAR Part 61.807 Currency Requirements* for the holder of an instrument rating.

The PIC reported that he was wearing his prescribed spectacles at the time of the occurrence.

On the occurrence flight, the PIC was the pilot flying (PF).

1.5.1.2 Co-pilot

Age	: 26 years
Gender	: Female
Type of licence	: CPL
Valid to	: Perpetual
Aircraft Type Rating	: BN2A, DCH6
Total flying time	: 2,399.9 hours
Total on this type	: 111.5 hours
Total in Command	: 2,079.3 hours
Total last 90 days	: 60.3 hours
Total on type last 90 days	: 60.3 hours
Total last 7 days	: 16.5 hours
Total on type last 7 days	: 16.5 hours
Total last 24 hours	: 1.5 hours
Total on the type last 24 hours	: 1.5 hours
Last proficiency check	: 3 July 2022
Last line check	: 3 July 2022
Route and aerodrome recency	: 3 July 2022
Medical class	: One
Valid to	: 4 April 2023
Medical limitation	: Nil

The co-pilot's training records provided by Hevilift to the AIC, were assessed to determine crew competency and currency at the time of the occurrence. Records showed that recurrent training was conducted in accordance with *CAR Part 61.807 Currency Requirements* for the holder of an instrument rating.

On the occurrence flight, the co-pilot was the pilot monitoring (PM).

1.5.2 P2-MEW Pilot in command

Age	: 42 years
Gender	: Female
Type of licence	: CPL
Valid to	: Perpetual
Aircraft Type Rating	: Cessna 208
Total flying time	: 1,316.4 hours
Total on this type	: 218.5 hours
Total in command	: 841.3 hours
Total last 90 days	: 128.4 hours
Total on type last 90 days	: 128.4 hours
Total last 7 days	: 9.3 hours
Total on type last 7 days	: 9.3 hours
Total last 24 hours	: 0 hours
Total on the type last 24 hours	: 0 hours
Last proficiency check	: 30 May 2022
Last line check	: 30 May 2022
Route recency	: 30 May 2022
Aerodrome recency	: 30 May 2022
Medical class	: One
Valid to	: 9 September 2022
Medical limitation	: Nil

Crew Training records provided by MAF to the AIC were assessed to determine crew competency and currency at the time of the occurrence. Records showed that recurrent training was conducted in accordance with *CAR Part 135 Subpart I Training – 135.563 Flight Crew Training Programme.*

1.5.3 Aerodrome controller

The Aerodrome Controller was recruited in 2018 as a cadet and went through the ATS ab-initio course for 8 weeks at Port Moresby. Immediately after that course she was allocated a flight data position at the Port Moresby ATS Unit, followed by 4 years in the simulator assisting as a Target Generating Officer (TGO). In 2021 she was selected to attend an Aerodrome Control Course at Port Moresby for 8 weeks. The controller spent 4 weeks in classroom theory and 4 weeks in the simulator.

Upon completion of the course, she was posted to Mt Hagen for on-the-job training that commenced on 7 October 2021. On 7 January 2022 she attained her initial Aerodrome Control Rating. At the time of the occurrence, she had completed her 6-months recurrency check and was checked out by the Senior Air Traffic Controller Outstations (SATCO) on 18 July 2022. She held a class 3 medical valid until 4 August 2025.

The day before the occurrence the Aerodrome Controller commenced a 7-hour rostered shift at 6:00 am. On the day of the occurrence, she also commenced a 7-hour rostered shift at 6:00 am.

1.6 Aircraft information

Both aircraft were certified as being airworthy at the time of the occurrence.

1.6.1 P2-KSI

1.6.1.1 Aircraft data

Aircraft manufacturer	: Viking Air Limited
Model	: DHC-6-300
Serial number	: 706
Year of manufacture	: 1980
Total airframe hours	: 27,092.96
Total airframe cycles	: 42,860
Registration	: P2-KSI
Certificate of Registration number	: 096
Certificate of Registration issued	: 25 July 2019
Certificate of Registration valid to	: Perpetual
Name of the Owner	: Hevilift PNG Aviation Limited
Name of the Operator	: Hevilift PNG Aviation Limited
Certificate of Airworthiness issued	: 27 June 2009
Certificate of Airworthiness valid to	: Non terminating

1.6.1.2 Engine data

Engine type	: Turbo propeller
Manufacturer	: Pratt & Whitney Canada
Model	: PT6A-27
No. 1 engine (Left)	
Serial number	: PCE-40070
No. 2 engine (Right)	
Serial number	: PCE-PG0156

Engine data is not relevant to this serious incident.

1.6.1.3 Propeller data

Propeller 1 (Left)	
Manufacturer	: Hartzell Propeller Inc.
Model number	: HC-B3TN-3D
Serial number	: BUA 19786
Propeller 2 (Right)	
Manufacturer	: Hartzell Propeller Inc.
Model number	: HC-B3TN-3D
Serial number	: BUA-22938

Propeller data is not relevant to this serious incident.

1.6.2 P2-MEW Aircraft Data

Aircraft manufacturer	: Textron Aviation Inc.
Model	: Cessna 208 Caravan
Serial number	: 20800617
Year of manufacture	: 2018
Total airframe hours	: 1626.1
Total airframe cycles	: 3019
Registration	: P2-MEW
Certificate of Registration number	: 450
Certificate of Registration issued	: 14 August 2019
Certificate of Registration valid to	: Perpetual
Name of the Owner	: MAF PNG Limited
Name of the Operator	: MAF PNG Limited
Certificate of Airworthiness issued	: 17 September 2019
Certificate of Airworthiness valid to	: Non terminating

1.6.3 Engine data

Engine type	: Turbo propeller
Manufacturer	: Pratt & Witney Canada
Model	: PT6A-114A
Serial number	: PCE-PC2291
Year of manufacture	: 2018
Total time since new	: 2,858 hours
Cycles since new	: 1,626.1
Cycles since overhaul	: 3564

Engine data is not relevant to this serious incident

1.6.4 Propeller data

Manufacturer	: McCauley Propeller System
Model number	: 3GFR34C703-B/B-106GA-0
Serial number	: 180187

Propeller data is not relevant to this serious incident

1.7 Meteorological information

1.7.1 Mt Hagen ATIS

The ATIS[11] information Tango was recorded at time 08:14 on VHF 128.9 MHz as shown below:

"ARRIVAL 30 DEPARTURE 12 ***TEST*** *INFORMATION WIND VARIABLE ZERO KNOTS MAXIMUM FOUR KNOTS VISIBILITY ONE ZERO KILOMETRES OR MORE CLOUD SCATTERED TWO THOUSAND FEET TEMPERATURE ONE SEVEN DEW POINT ONE THREE QNH 1022 HAZE"*

According to the ATIS information, arrival 30 indicated that arriving traffic would expect to land Runway 30 and departing traffic would expect to use Runway 12.

1.7.2 National Weather Service

Mt Hagen Terminal Aerodrome Forecast 1 (TAF 1) issued on 26 August 13:19 and was valid from 13:00 to 16:00.

Wind	Calm			
Visibility	Greater than 10km in light showers and rain			
Cloud	Scattered at 16,000ft, Broken at 30,000ft			
Inter from 04:00 -0800				
Visibility	4000m in heavy showers			
Cloud	Broken at 800ft			
QNH	1019	1021	1020	1018

1.7.3 Aerodrome Controller reported weather

The controller informed the AIC that at the time of KSI's arrival the actual weather was:

RWY 30, late left downwind, base leg and final, clouds were few at 010 [1,000ft] and scattered at 015 [1,500ft].

RWY 30 take-off path had a lot of low clouds broken at about 800ft.

1.7.4 Pilot Reported Weather

According to AIC interviews, the flight crew of both aircraft advised that there was fog within the Mt. Hagen Airport area. Arriving crew stated that the weather wasn't really good, however it was acceptable for the flight to get in. They stated that Runway 12 wasn't an option due to cloud and rain and since they managed to get into the circuit area, they joined wide left downwind for runway 30, the arrivals runway according to the ATIS. There was weather towards the Waghi Valley [east- southeast of MT. Hagen Airport] and broken clouds over the top of the airport. The PIC of KSI stated that the direction of the inbound flight path [west-northwest of Mt. Hagen Airport] was "soaked in black clouds and rain".

P2-MEW opted to depart off runway 12 at intersection Alpha as it was the departure runway on the ATIS broadcast.

1.8 Aids to navigation

Ground-based navigation aids/onboard navigation aids/aerodrome visual ground aids and their serviceability were not a factor in this occurrence.

11 Aerodrome Terminal Information Service

1.9 Communication

KSI and MEW were equipped with two VHF radios and a HF radio, the required radio communication systems respectively, and were serviceable on the day of the occurrence. Apart from the requirement for aircraft to report flight details to FIS, all inbound aircraft are required to establish communication with Hagen Air Traffic Zone (ATZ) on tower frequency of 120.5 MHz as soon as possible at, or prior to 15 NM inbound to the aerodrome. This was to provide for situation awareness and traffic management for the ADC to provide runway separation and circuit regulation in accordance with *PNG AIP ENR 1.4.* Continuous two-way communication with the tower is required and on calling inbound, aircraft are required to provide information such as:

- Confirm Inbound Track
- Advise Revised ETA[12]
- Advise Intentions
- Special Requests for Emergencies or Anormal Ops if required.

Aircraft departing Hagen ATZ are to establish communication with the tower prior to taxi, or prior to engine start when required. From the recording provided by Hagen Tower, it was confirmed that MEW established communication prior to taxi.

Recorded audio revealed that pilot of MEW requested clarification from the tower a number of times due to the poor readability on the tower frequency. The investigators noted the poor reception of transmissions on the recording with the inbound traffic, KSI and KSO.

All communications between the Hagen Tower Controller and the crew of KSI and MEW were recorded by ground based automatic voice recording equipment for the duration of the flights within the Hagen ATZ. There were numerous broken transmissions between the tower and the aircraft. The communication issue was confirmed by the two operators as it had been ongoing for the previous two weeks.

The communications between MEW and ATC used standard terms and phraseology with clearance requests, clearances, and clearance readbacks in accordance with prescribed terminology and phraseology.

At 08:23:21, KSI reported wide left downwind and was instructed to continue approach. At that time KSI had passed abeam the Hagen Control Tower and had commenced turning onto base. Forty-six seconds later ATC gave KSI traffic information on MEW, which KSI acknowledged. The communications between KSI and ATC used standard terms and phraseology until KSI was on the late base leg.

At 08:24:24, MEW was cleared for takeoff. One minute and 39 seconds after clearing MEW to takeoff on Runway 30 from intersection Alpha, the controller cleared KSI to land on Runway 12. Eight seconds later KSI responded *"Clear to land, Kilo Sierra India"*. The assigned runway clearance for Runway 12 was an error that the crew of KSI did not question, nor was it corrected by the controller. Terms and phraseology in the last vital seconds were non-standard.

When KSI was on final approach, the PIC made a further unnecessary non-standard comment to the Controller.

See *Section 5.3 ATC transcript.*

12 Estimated Time of Arrival

1.10 Aerodrome information

1.10.1 Mt Hagen aerodrome

Location	Mt. Hagen Airport	
	Latitude: S 5°49′40.08"	Longitude: E 144° 17′ 58.26"
Elevation	5387ft	
Runway Direction	12/30	
Length	2190m	
Width	30m	
Slope	0.64% down to SE	

Table 3: Mt. Hagen aerodrome data from PNG AIP

1.10.2 Class F Airspace

According to *PNG AIP ENR 1.4 Class F airspace* is:

> All uncontrolled airspace including Aerodrome Traffic Zones in which runway separation and circuit regulation service is provided. IFR and VFR flights are permitted. IFR flights receive traffic information in respect to all flights. VFR flights receive traffic information in respect to IFR flights, and in respect to other VFR flights on request. All flights receive flight information service. Continuous two-way communication for all flights.

The Mt. Hagen airspace is classified as a Class F Airspace, Air Traffic Zone (ATZ), from ground level to 20,000ft AMSL and extends out to 15 NM radius. It is active and staffed by NiuSky Pacific controllers from 19:00 to 09:00 UTC with a staffing ceiling of four, including a supervisor.

1.10.3 Services provided in an ATZ

According to *MATS RAC Section 1.3 & 2-2, 3-29, Para 13.1* ATC services and procedures together with pilot procedures are detailed in *RAC 2-2, para 1.2*, and controllers shall provide ATC services specified in the manner indicated therein:

> Para 13.1.1 An Approach Control service (separation of arriving and departing IFR traffic) is not provided. The following services will be provided.
>
> (a) Runway separation service.
>
> (b) Surface movement control service.
>
> (c) Traffic information service.
>
> (d) Alerting service.
>
> (e) Automatic Terminal Information Service (if installed); and
>
> (f) Regulation of aerodrome traffic circuit in VMC.

The ADC controls aircraft on the ground and maintains separation on the active runway. A maximum of one aircraft has possession of the runway and the controller should have only one slot on their control board for the strip for an aircraft for runway possession. Once an aircraft is cleared to line up or land, the runway is theirs. KSI only had rights to the runway once it had been cleared to land.

In an ATZ, the controller regulates traffic, although it is a controlled aerodrome. Mt Hagen provides a runway separation service. Accordingly, the ADC gave traffic information to MEW on the inbound aircraft KSO and KSI.

1.10.4 Pilot and ATC responsibilities within an ATZ

According to *MATS RAC 2-2* responsibilities of ATC and pilot within an ATZ are as follows:

1.2-1within Aerodrome Traffic Zones, the pilot is responsible for maintaining separation from all other aircraft irrespective of flight category.

1.2.2 ATC's responsibility for separation is limited to runway separation and a normal Surface Movement Control Function in accordance with paras1.1.2 and 1.1.5

1.2.3 ATC, when clearing an aircraft to take-off or to land shall ensure that separation is provided in accordance with the standards of sub-section 3, except that formation flights are exempted from the separation minima with respect to separation from other aircraft of the same formation.

1.1.2: Separation shall be provided in accordance with the standards contained in sub-section 3 between all aircraft landing and taking-off at an aerodrome where ATC is in attendance.

1.1.5: The separation of aircraft taxying on the maneuvering area of a controlled aerodrome is a joint pilot and controller responsibility involving for the controller, as required by these instructions, the regulation of traffic to minimize possible conflict and the provision of a traffic and alerting service.

1.10.4.1 Right of way rules

The Manual of Air Traffic Services, RAC-3-44*, Appendix 13 ASSESSMENT OF PRIORITIES paragraph 1.6* states:

A landing aircraft will have priority over a departing aircraft if the latter cannot take off with prescribed separation standards.

The *Manual of Air Traffic Services* is a reference document containing procedures for operational use by Air Traffic Controllers, Flight Information Service Officers, and other operational staff, and includes separation standards, operational information, and instructions.

Civil Aviation Rule Part 91.229 Right-of-way rules **states:**

(a) ***Right-of-Way***. A pilot of an aircraft—

(1) shall, when weather conditions permit, regardless of whether the flight is performed under IFR or under VFR, maintain a visual lookout so as to see and avoid other aircraft; and

(2) that has the right of way, shall maintain heading and speed, but shall not be relieved from the responsibility of taking such action, including collision- avoidance manoeuvres based on resolution advisories provided by ACAS equipment, that will best avert collision; and

(3) that is obliged to give way to another aircraft, shall avoid passing over, under, or in front of the other aircraft, unless passing well clear of the aircraft, taking into account the effect of wake turbulence.

(b) ***Approaching Head-On***. A pilot of an aircraft shall, when approaching another aircraft head-on, or nearly so, alter heading to the right.

(c) ***Aircraft Converging***. A pilot of an aircraft that is converging at approximately the same altitude with another aircraft that is to its right, shall give way, except that the pilot operating—

(1) a power-driven heavier-than-air aircraft shall give way to airships, gliders, and balloons; and

(2) an airship shall give way to gliders and balloons; and

(3) a glider shall give way to balloons; and

(4) a power-driven aircraft shall give way to aircraft that are towing other aircraft or objects; and

(5) all aircraft shall give way to parachutes.

(d) ***Overtaking Aircraft.*** A pilot of an aircraft that is overtaking another aircraft shall, if a turn is necessary to avoid that aircraft, alter heading to the right, until it is entirely past and clear of the other aircraft.

(e) For the purpose of paragraph (d), an overtaking aircraft is an aircraft that approaches another from the rear on a line forming less than 70 degrees with the plane of symmetry of the latter.

(f) ***Landing aircraft.*** A pilot of an aircraft in flight or on the surface shall—

(1) give way to any aircraft that is on final approach to land or is landing; and

(2) when the aircraft is one of two or more heavier-than-air aircraft approaching an aerodrome

for the purpose of landing, give way to the aircraft at the lower altitude; and

(3) not take advantage of right-of-way under subparagraph (2) to pass in front of another aircraft, which is on final approach to land, or overtake that aircraft.

(g) **Taking-Off.** A pilot of an aircraft shall not take-off if there is an apparent risk of collision with another aircraft.

1.11 Flight Recorders

1.11.1 P2-KSI

1.11.1.1 Flight Data Recorder

The aircraft was not fitted with a flight data recorder (FDR), nor was an FDR required under *PNG Civil Aviation Rules* current at the time of the serious incident.

1.11.1.2 Cockpit Voice Recorder

The aircraft was fitted with a Cockpit Voice Recorder (CVR) with a capacity of 30 minutes continuous recording time before automatic erasure.

Due to the excessive delay in reporting[13] the serious incident to the PNG AIC, the cockpit voice recorder data had been overwritten and was not available to the investigation.

The investigation also identified that the CVR installed in P2-KSI at the time of the occurrence did not meet the current requirement under *CAR Part 125, A.3 (1) of Appendix,* for the CVR to have a minimum capacity of 2 hours continuous recording time before automatic erasure.

Cockpit Voice Recorder (CVR)	
Manufacturer	Loral Data Systems
Model	A100S
Part Number	S100-0080-00
Recording Duration	At least 30 min
Recording Capability	4 Channels Captain First Officer Passenger Address (PA) Cockpit Area Microphone (CAM)

Table 4: Specifications of CVR installed on KSI.

13 In contravention of the *Civil Aviation Act 2000 (as amended), Section 62*, CASA PNG did not notify the AIC of the serious until 30 August 2022.

1.11.1.3 Airborne Image Recording System (AIRS)

An Appareo Vision 1000 flight data monitoring recorder was installed on KSI and was serviceable at the time of the occurrence.

The unit recorded the following information: cockpit image, intercom system audio for crew and air traffic control (ATC) communications, WAAS[14] GPS flight data (latitude, longitude, groundspeed, vertical speed, GPS altitude, etc), Attitude data (G forces) and rates of rotation and recorded the data in a SD card.

The recorded information and parameters of the occurrence flight were extracted from the SD card by the AIC and it was used during the investigation.

1.11.2 P2-MEW

1.11.2.1 Flight Data Recorder

The aircraft was not fitted with a flight data recorder (FDR), nor was a FDR required under *PNG Civil Aviation Rules* current at the time of the serious incident.

1.11.2.2 Cockpit Voice Recorder

The aircraft was not fitted with a cockpit voice recorder. nor was a CVR required under *PNG Civil Aviation Rules* current at the time of the serious incident.

1.11.2.3 Electronic flight instrument system (EFIS)

The aircraft was fitted with a Garmin 1000 electronic flight instrument system.

The system is capable of recording the primary instrument display data and engine parameters at an interval of 1 second on a flight data log memory card. The data was extracted by the operator and given to AIC.

The data was used by AIC to complement the investigation.

1.12 Wreckage and impact information

Not applicable.

1.13 Medical and pathological information

No medical or pathological investigations were conducted as a result of this occurrence.

1.14 Fire

Not applicable.

1.15 Survival aspects

Not applicable.

1.16 Test and research

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

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14 WAAS. 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.

1.17 Organisational and management information

1.17.1 Hevilift Aviation (PNG) Limited

Hevilift is a Fixed and Rotary-wing Aviation Services operator providing charter operations.

Hevilift head office is based in Singapore with regional offices based in Myanmar, Indonesia, Malaysia, Australia, and Papua New Guinea (PNG). The head office and Maintenance facility for the PNG operations is in Mt Hagen, Western Highlands Province and a branch is in Port Moresby.

Hevilift has an Air Operator Certificate, *AOC number: 119/040* issued on 24 March 2020 and expires on 31 March 2023.

1.17.2 Mission Aviation Fellowship (PNG) Limited

Mission Aviation Fellowship (PNG) Limited holds an *AOC number: 119/003*, valid till 30 June 2025, under *CAR Part 119* and performs commercial air operations transporting passengers and cargo on a non-scheduled basis. The operator also holds a *MOC number 145/003* under *CAR Part 145* providing aircraft maintenance and *CAR Part 141/005* providing aviation training.

The headquarters of MAF PNG is at Mt. Hagen Airport and it operates throughout the country and into the rural areas of PNG.

1.17.3 NiuSky Pacific Limited

NiuSky Pacific Limited (NSPL) is the new Corporate Identity of the former PNG Air Services Limited (PNGASL), the sole provider of Air Navigation Services for Papua New Guinea. NSPL's primary business is to provide Air Traffic Management (ATM) and Air Navigation Services (ANS) to the Aviation Industry in PNG for both domestic and international air operators who use PNG's designated airspace which is known as the Flight Information Region (FIR). Its area of responsibility spans 1.6 million square kilometers of airspace, extending from the sea level up to 60,000ft.

PNG Air Services was registered as an independent company in 2007. It has evolved from a Government Agency, the Civil Aviation Authority (CAA) into a self-funding commercial entity, providing Air Traffic Management (ATM) and Air Navigation Services (ANS) to the Aviation Industry in Papua New Guinea.

The Government of Papua New Guinea remains the sole shareholder through the Minister for Finance and the Minister for Civil Aviation.

1.18 Additional information

1.18.1 Mt Hagen ATZ Mt Hagen Tower Relocation Project 2022

NiuSky Pacific Limited had just completed the *Mt. Hagen Tower Relocation Project 2022* for the new Air Traffic Control Tower Facility, which was in four phases. Prior to the relocation, a *Safety Test Training* for the controllers was conducted by the NSPL Senior Management Team, between 4 August 2022 and 7 August 2022. *Reliability Acceptance Testing (RAT) Phase 1*, the *Ghosting Phase* took place between 8 August 2022 and 14 August 2022. Phase 2, the *Mimicking Phase* took place between 15 August 2022 to 21 August 2022. During the *Ghosting Phase*, service was provided from the old tower, while observation was conducted from the new tower.

During the *Mimicking Phase*, service was provided from the new tower, while observation was conducted at the old tower. Post *RAT* review commenced on 19 August to 22 August 2022. This review was conducted by Manager Outstations, Manager Jacksons and the SATCO Mt. Hagen. The final phase, *Stand Alone* took place on 22 August 2022 which was the cutover from the old tower to the new tower. Operations subsequently commenced from the New Control Tower.

There are two operational positions in the New Control Tower, ADC Position 1 and ADC Position 2. At the time of the cutover, the relocation of the relevant equipment and supporting administration and backup services to the New Control Tower were underway by NSPL Engineering Services Team and had been coordinated with the senior ATS management team.

1.18.2 Ghosting Phase

The intent of the *Ghosting Phase* was for the ADC Officers rostered to operate in the New Control Tower to familiarise themselves with the airfield layout view from the new location. Additionally, VCS[15] layout, Airfield Lighting Panel, ASD[16], ATIS[17], CADAS[18] AFTN[19], AWOS[20] and VHF[21] radios will be operational and rostered personnel to familiarise themselves with the locations and operations of the ATC facilities.

During that phase, the ADC position in the New Control Tower also required simulate traffic coordination on traffic movements affecting their respective sectors/positions through the monitoring of the relevant operating frequencies, via the installed ASDs, CADAS AFTN messages received and by coordination messages relayed from the duty ADC officer from the active old Control Tower.

The ADC officers in the New Control Tower were required to interact with the functionalities of VCS, ASD and CADAS AFTN while monitoring and coordinating correct AWOS and ATIS transmissions from its new location. If there were any issues identified during the phase, it was to be logged in the relevant ATS and technical logbooks. At the end of the *Ghosting Phase* a safety risk rating was carried out to determine whether the *Mimicking Phase* would commence.

1.18.3 Mimicking Phase

The intent of the *Mimicking Phase* was the live testing of the operational environment and new equipment from the New Control Tower ADC positions. During this phase, New Mt Hagen Tower was to coordinate with Moresby and Goroka to confirm traffic disposition, coordination completed/outstanding and any other pertinent information tested to meet operational requirements.

The backup ADC position would continue to operate from old Control Tower however, a rostered officer was to operate these positions.

1.18.4 Mt. Hagen Operations During the Extension of Mimicking Phase

The *Mimicking Phase* had been extended from 15 August 2022 to 29 August 2022. Throughout the mimicking period, two aerodrome controllers were rostered. The controller at the old tower reported for duty at 08:00 just in case anything happened and switch over will take place. All facilities had been transferred to the new control tower and all operations have actively been performed at the new facility.

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15 Voice Communication System
16 Air Situation Display
17 Automatic Terminal Information Service
18 Comsoft Aeronautical Data Access System
19 Aeronautical Fixed Telecommunication Network
20 Aerodrome Weather Observation System
21 Very High Frequency

The investigation interview with the Aerodrome Controller (ADC) revealed that operations were for the most part as usual, however the controller experienced delays in receiving flight plans due to an outage of the CADAS[22] and AFTN[23] systems. Upon receipt of flight plans through the CADAS, a controller extracts relevant flight data information and inserts it onto a paper flight strip and manually displays them on the Flight Progress Board (FPB) located at the ADC position for planning purposes.

The ADC advised that in the old tower, the CADAS was connected to an antenna but when they moved to new tower, it was connected remotely from Port Moresby. The CADAS network was offline on the morning of the serious incident due to network issues.

1.18.5 Displaying of Flight Progressive Strips

MATS RAC 4-13 Para 2.3.2-1 states;

> Unlike ACC positions, APP and ADC (or combined ADC/APP) positions display an 'Active' designator. Strips for all aircraft operating in the controller's area of responsibility are displayed whether on frequency or not. (Where a departure instruction for a departing flight has been issued, the flight is 'active').

On the morning of the occurrence, the controller received a flight plan for KSO a Hevilift Twin Otter and MEW. However, KSI's flight plan was not received as the controller recalled seeing the FPB almost empty and stated that it was unusual for the Mt. Hagen traffic.

The *Mt. Hagen TL2[24] paragraph 3.11* states:

> The backup ADC position shall remain operational from the old Control Tower, however, 08A/08C staff shall operate these positions. The backup shift officer shall check the backup ADC positions VCS and telephone lines, CADAS, ASD[25], AWOS & ATIS equipment every morning, to be ready for any contingency scenarios that would require a rollback of operations to the old Control Tower.

The two Hevilift Twin Otters departed Kairik 5 minutes apart and were on the same route to Mt. Hagen. The controller had only become aware of KSI when Moresby FIS called up to relay its position report. By that time KSI was 14 NM northwest of Mt. Hagen Airport descending from 10,000ft.

While coordination between Hagen and Moresby ATS was taking place, MEW had reached the holding point of taxiway intersection Alpha and reported ready for takeoff. Subsequently a helicopter called up for taxi, and the controller advised him to stand by as there was no flight plan received. At time 08:17:51 the controller gave traffic information on the two inbound Twin Otters to P2-MEW.

1.18.6 James Reason's model of Accident Causation

ICAO Doc 9683, Chapter 3, sub-section 5.2.11 states;

> The objectives of ATC are to prevent collisions between aircraft and avoid other potential hazards by means which nevertheless promote efficiency of flight.

ICAO Doc 9683, section 4.2.11 and *4.2.12* 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.

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22 Comsoft Aeronautical Data Access System

23 Aeronautical Fixed Telecommunication Network

24 TL2: Temporary Local Instructions covering the extension of phase 2 mimicking of the relocation of ATC tower operations to the new Mt Hagen ATC Tower.

25 Air Situation Display

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.....These failures can also be introduced at any level of the system by the human condition — for example, through poor motivation or fatigue.

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.

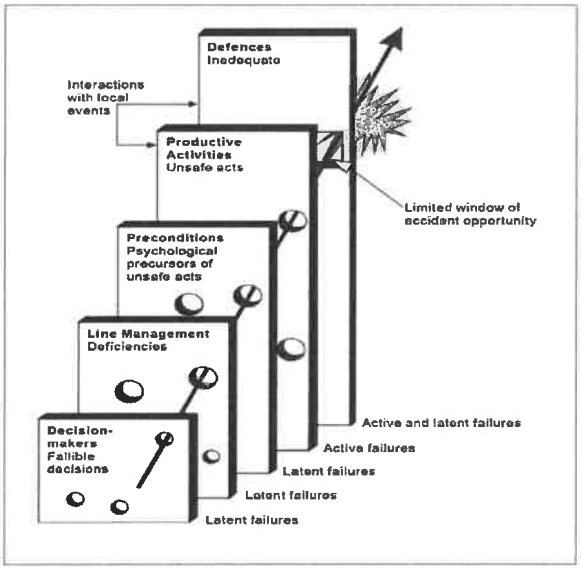


Figure 4: Modified version of James Reason's model of accident causation.

Failures in the system create holes in all the defences and when the holes align, it 'permits a trajectory of accident opportunity', so that a hazard passes through holes in all of the defences, resulting in accidents as shown in Figure 4. Some of the latent conditions and active failures are discussed throughout this report and in *Section 2 – Analysis* of this report.

1.18.7 SHELL Model

The investigation also used the SHELL model to analyse the interaction of the human with multiple system components to show how the system had broken down and how the human (Air Traffic Controller and Flight Crew of KSI and MEW) had contributed to the breakdown which led to the serious incident. The SHELL Model does not cover the interfaces which are outside Human Factors. The SHELL model considers both active and latent failures in the aviation system which are explained in the James Reason Model.

ICAO Doc 9859, sub-sections 2.2.5 to 2.2.7 states;

The SHELL Model contains four satellite components:

a) Software (S): procedures, training, support, etc.;

b) Hardware (H): machines and equipment;

c) Environment (E): the working environment in which the rest of the L-H-S system must function; and

d) Liveware (L): other humans in the workplace

Figure 5. SHELL Model.

Liveware. The critical focus of the model is the humans at the front line of operations and depicted in the centre of the model. However, of all the dimensions in the model, this is the one which is least predictable and most susceptible to the effects of internal (hunger, fatigue, motivation, etc.) and external (temperature, light, noise, etc.) influences. Although humans are remarkably adaptable, they are subject to considerable variations in performance. Humans are not standardized to the same degree as hardware, so the edges of this block are not simple and straight.

a) Liveware-Hardware (L-H). The L-H interface refers to the relationship between the human and the physical attributes of equipment, machines, and facilities. This considers the ergonomics of operating the equipment by personnel, how safety information is displayed and how switches and operating levers are labelled and operated so they are logical and intuitive to operate.

b) Liveware-Software (L-S). The L-S interface is the relationship between the human and the supporting systems found in the workplace, e.g., regulations, manuals, checklists, publications, processes and procedures, and computer software. It includes such issues as the recency of experience, accuracy, format and presentation, vocabulary, clarity and the use of symbols. L-S considers the processes and procedures - how easy they are to follow and understand.

c) Liveware-Liveware (L-L). The L-L interface is the relationship and interaction between people in their work environment. Some of these interactions are within the organization (colleagues, supervisors, managers), many are between individuals from different organizations with different roles (air traffic controllers with pilots, pilots with engineers etc.). It considers the importance of communication and interpersonal skills, as well as group dynamics, in determining human performance. The advent of crew resource management and its extension to air traffic services (ATS) and maintenance operations has enabled organizations to consider team performance in the management of errors. Also within the scope of this interface are staff/management relationships and organizational culture.

d) Liveware-Environment (L-E). This interface involves the relationship between the human and the physical environment. This includes things such as temperature, ambient light, noise, vibration and air quality. It also considers the externally environmental factors, such as weather, infrastructure and terrain.

The AIC identified factors that interacted with the human operators (Air Traffic Controller and flight crew of both aircraft) within the system to affect the performance which resulted in the close-proximity serious incident.

Liveware-Software

The CADAS-ATS that provides messaging services and flight planning capabilities was unserviceable at the time of the occurrence. The Aerodrome Controller did not have the Flight Plan for KSI and P2-AHA (AHA), a helicopter in order to pre-plan and manage aerodrome traffic. AHA was on the ground requesting to start, while KSI was on the frequency inbound.

Cessna 208 MEW was holding short of runway 12 at the holding point intersection Alpha. The Aerodrome Controller gave MEW a clearance to make left turn and to take off when KSI was early into a curved base leg and was sighted.

Liveware-Liveware

The crew of both aircraft (KSI and MEW) did not communicate with each other to ensure separation between their aircraft. Interviews with the crew of both aircraft and ATC audio recordings indicated that the crew of KSI was aware of the ADC's clearance to MEW to take off when they were early into a curved base leg, although their recollection during the subsequent investigation interview was that they were on final approach. They reported that they believed they were too low to do a go-around and/or orbit and they had the *"right of way"*.

Due to the deteriorating weather beyond the departure end of Runway 30, a go around from short final was not an option.

Liveware-Hardware

There were broken transmissions between the tower and both aircraft. Poor readability on tower frequency. This was evident in the ATC recording and from the information provided separately during the investigation interviews with the crew of both aircraft.

Liveware-Environment (weather)

Deteriorating weather in the Mt. Hagen sector. According to interviews with the crew of KSI, they joined downwind for Runway 30, because Runway 12 wasn't an option due to black clouds and rain. They stated that they normally enter the circuit from the west and land on Runway 30. On this flight, because the weather was quite bad on their inbound track, Hagen Tower instructed them to join left downwind and land on Runway 30. They informed the investigation that before turning left base they descended and maintained the approach as cleared by the ADC. The recorded data showed that they descended to 8,290ft then commenced a curved left base. MEW had opted for a departure on Runway 12 from intersection Alpha.

Liveware-Environment

According to the roster provided to the AIC, the first Hagen Tower ADC shift of the day showed that the shift began at 5am. However, according to interviews with ATC personnel in Mt. Hagen, due to safety reasons the shift has been modified to begin at 6 am daily. Therefore, an hour of planning and preparation of the flow of known air traffic was lost.

1.18.8 Decision making and situational awareness.

According to CASA Australia *Safety Behaviours: Human Factors for Pilots 2nd Edition*: *Resource Booklet 6 'Situational Awareness'* (SA);

> One of the leading researchers on situational awareness, Dr Mica Endsley's, formal definition of situational awareness is:

- the perception of the elements in the environment within a volume of time and space
- the comprehension of their meaning
- the projection of their status in the near future

Simply put, the three key processes of SA, therefore, are:

1. perception (scanning, gathering data) of what is happening (level 1)
2. understanding what has been perceived (comprehension) (level 2)
3. using what has been understood to think ahead (projection) (level 3)

Understanding the situation triggers decision making, action and review.

Situational Awareness precedes decision making because pilots must understand their environment before they make a decision and act upon it.

According to CASA Australia *Safety Behaviours: Human Factors for Pilots 2nd Edition: Resource Booklet 7 Decision making;*

> Decision making is the act of choosing between alternatives under conditions of uncertainty. We consider the circumstances and reach a judgment or choose an option or action depending on the situation.

The crew of KSI did not comply with the Hevilift *Standard Operating Procedures* (SOPs) in accordance with the *Operations Manual* for *Standard Visual Circuit* procedures with respect to speeds. These speeds are, downwind V_{FE} +10 or less and base V_{ref}+10. VFE is listed as 103kts airspeed. The investigation was not able to conclusively determine the airspeed flown on the downwind and base legs because the Appareo recorded data only recorded groundspeed. However, given that the speeds on downwind were 167kts reducing to 160kts, and on base 157kts to 103kts by late base reducing to 95kts when lined up on final for Runway 30, it demonstrates that the speeds flown by KSI, even accounting for a small difference between groundspeed and airspeed were significantly higher than required in accordance with Hevilift SOPs. Furthermore, the SOP calls for the base leg to be commenced when the aircraft is 45deg laterally to the landing threshold. Recorded data revealed that KSI commenced the turn onto base when abeam the Hagen Control Tower and continued on a curved base leg.

The Aerodrome Controller cleared MEW to take off on Runway 12 when KSI was early into a curved base leg for Runway 30, and 1 minute and 45 seconds before KSI lined up on final approach for Runway 30. See *Section 1.1 History of the Flight* and *Appendix 5.4* of this report.

ATC audio recordings and interviews with the crew of both aircraft indicated that KSI was aware of the departing aircraft (MEW) when they were on the curved base leg, but the PIC elected to continue their approach instead of conducting an orbit as suggested by the co-pilot. Due to the deteriorating weather beyond the departure end of Runway 30, a go around from short final was not an option.

The PIC stated during interview that his decision was based on the altitude of their aircraft on final approach, the landing aircraft (KSI) had the *'right of way'*, safety of the passengers and the deteriorating weather.

The pilot of MEW was also aware of KSI's position when she requested *"an intersection departure on runway 12 if available"* and advised the aerodrome controller that they will be *"ready on lineup"*. The ADC subsequently cleared MEW to take off when KSI early into the base leg of the circuit.

During the investigation interview the pilot of MEW stated that she was aware that KSI was on base when she commenced the take-off roll. She further stated that she knew KSI was approaching from the opposite runway and knew that she needed to be out of their way, but she also knew that she couldn't turn into the cloud so that's why she moved as far left as possible to stay in VMC and climb up between the clouds rather than climbing out on the centerline. She also stated that she thought she had enough time to depart on the opposite runway and may have misjudged how quickly they were approaching each other.

1.18.9 Serious Incident notification

The day of the serious incident, 26 August 2022, was a public holiday in PNG.

At 12:49 pm on 26 August 2022, the Hevilift Safety & Quality Manager notified CASA PNG of the serious incident, as a *TCAS ATC Incident*.

However, CASA did not inform the AIC until 30 August at 9:09 am via email.

Furthermore, NiuSky Pacific Limited did not inform the AIC until 10:31 am on 31 August.

The MAF pilot reported the serious incident to the Flight Operations Manager, but the MAF notification of the serious incident to CASA and the AIC was delayed because 26 August was a public holiday.

The investigation noted the following:

a) Hevilift complied with the legislated notification requirements in so far as they promptly notified CASA of the serious incident. However, in accordance with *Section 60* of the *Civil Aviation Act 2000 (as amended)* it is the pilot's responsibility to make such notification.

b) MAF did not comply with the legislated notification requirements and the notification was not submitted to CASA by the pilot, and the submission of the notification was delayed until 30 August due to internal procedures and staffing over the public holiday long weekend.

In accordance with *Section 60* of the *Civil Aviation Act 2000 (as amended) and Part 12* of the *Civil Aviation Rules* it is the pilot's responsibility to make such notification.

> The pilot-in-command of an aircraft that is involved in an accident or incident shall notify the accident or incident to CASA as soon as practicable.

The AIC understands that an operator's procedures may require a pilot to notify the operator of an accident or serious incident for the operator to make an internal assessment and notify CASA. However, if the operator fails to notify CASA **as soon as practicable** with a minimum of delay and by the most suitable and quickest means possible, the pilot is responsible under the Civil Aviation Act. However, by the pilot not complying with the legislated requirements the delayed notification resulted the loss of CVR data due to further flights being conducted in KSI on 26 August 2023. The CVR would have been quarantined for data download and analysis at the AIC Recorder Laboratory in Port Moresby.

c) NiuSky Pacific Limited did not comply with the legislated notification requirements and the notification was not submitted to CASA by the Air Traffic Controller, and the submission of the notification was delayed until 31 August due to internal procedures and staffing over the public holiday long weekend.

Section 60 of the *Civil Aviation Act 2000 (as amended)* specifies the reporting requirement and *Civil Aviation Rule Part 12.55 (b) states:*

> A person who is involved in an incident that is a serious incident or an immediate hazard to the safety of aircraft operations must notify the Authority of the incident as soon as practicable, if the person –
>
> (1) Operates, maintains, services, or does any other act in respect of any aircraft, aeronautical produce, or aviation related service.

Therefore, the responsibility to notify CASA **as soon as practicable** with a minimum of delay and by the most suitable and quickest means possible rests with the controller.

The AIC understands that NiuSky Pacific's internal procedures may require the controller to notify ATC management of an accident or serious incident for the NiuSky to make an internal assessment and notify CASA. However, if NiuSky fails to notify CASA **as soon as practicable** with a minimum of delay and by the most suitable and quickest means possible, the controller is responsible under the *Civil Aviation Act.*

d) CASA PNG did not comply with the legislated notification requirements and the notification was not submitted to the AIC until 30 August due to internal procedures and staffing over the public holiday long weekend.

Section 62 of the *Civil Aviation Act 2000 (as amended)* and *Civil Aviation Rule Part 1*, require CASA PNG to notify the AIC, and do so **as soon as practicable** with a minimum of delay and by the most suitable and quickest means possible.

The delayed notification resulted in a 3-day delay in the AIC commencing the safety investigation and the loss of CVR data. Had the AIC been notified immediately and prior to further flights by KSI on 26 August 2023, the CVR would have been quarantined for data download and analysis at the AIC Recorder Laboratory in Port Moresby.

1.19 Useful or effective investigation techniques

The investigation was conducted in accordance with the *Papua New Guinea Civil Aviation Act 2000 (As Amended),* and the Accident Investigation Commission's approved policies and procedures, and in accordance with the *Standards and Recommended Practices* of *Annex 13* to *the Conventional on International Civil Aviation.*

2 ANALYSIS

2.1 GENERAL

The analysis part of this report will discuss the relevant issues resulting in the serious incident involving a Twin Otter DHC-6-300 & Cessna 208 Caravan, KSI and MEW respectively coming into relatively close proximity. The investigation determined that there were no safety issues with the aircraft and that their systems were operating normally. Both aircraft were certified as airworthy prior to departure for their respective flights.

The analysis will therefore focus on the following issues, but not necessarily under separate headings:

- Flight Operations
- Aerodrome Controller Actions
- Aerodrome controller Experience and Qualification
- Crew Experience and Qualification
- Human Factors

2.2 Flight Operations

During the flight, broken radio communications were experienced between the pilots and the air traffic controller in the new control tower. Some vital information may have been over transmitted and as a result, there were instances where pilots requested the tower to repeat certain transmissions which occupied the frequency, causing further delays for a free flow of communications.

The crews of both operators confirmed that there were instances where the ADC's transmissions were clipped and not fully completed, which reduced the substance of the radio transmissions. Additionally, having to relay flight plans via telephone lines or intercom links due to the outage of the CADAS system may have contributed to less than optimum planning by the aerodrome controller.

The investigation was not able to conclusively determine the airspeed flown on the downwind and base legs because the Appareo recorded data only recorded groundspeed. However, given the speeds on downwind were 167kts reducing to 160kts, and on base 157kts to 103kts by late base reducing to 95kts when lined up on final for Runway 30, it demonstrates that the speeds flown by KSI, even accounting for a small difference between groundspeed and airspeed, were significantly higher than specified in the Hevilift SOPs. Furthermore, the SOP calls for the base leg to be commenced when the aircraft is 45deg laterally to the landing threshold. Recorded data revealed that KSI commenced the turn onto base when abeam the Hagen Control Tower and continued on a curved base leg.

The early commencement of a curved based leg and the higher speeds on downwind and base reduced the margin of distance available for the safe departure of MEW.

The co-pilot of KSI had identified the developing unsafe situation (closing separation with the departing MEW) before it had happened and suggested that they conduct an orbit, but the PIC had elected to continue the approach and land as he considered that they had the 'right of way' and that right of way was in accordance with approved procedures for a landing aircraft established on final approach to be given priority to land irrespective of an aircraft ready for take-off.

However, when MEW was cleared for takeoff, KSI was early into a curved base leg rolling from the downwind leg towards final approach.

MEW continued taking off and manoeuvred slightly left to avoid clouds prior to making the left turn onto the outbound track as instructed by the ATC. At the time MEW lifted off, KSI was still on the curved left base leg for Runway 30 at an altitude of 6,370ft and 1 min before lining up on final approach for Runway 30. See *Section 1.1 History of the Flight* and *Appendix 5.4* of this report. At 120kt groundspeed (and decreasing) KSI had 2NM to run to the point where it was lined up with the centreline of Runway 30.

The PIC of KSI reported that when they were on final approach they received a traffic alert at close proximity. The flight data revealed that the close proximity occurred when KSI rolled onto final approach. At that time MEW and KSI were separated 330ft vertically and 208m laterally.

However, the crew of KSI took no further action as a result of this alert because the PIC judged that KSI was by then committed to land and MEW was in a climbing left turn onto the outbound track.

2.2.1 Crew resource management (CRM)

The co-pilot of KSI reported that she had identified the developing unsafe situation of diminishing separation with KSI coming into relatively close proximity with MEW before it had happened and suggested to the PIC that they conduct an orbit, but the PIC had elected to continue approach and land as he believed they had the *"right of way"* and it was in accordance with approved procedures for the landing aircraft once on final approach to be given priority to land irrespective of an aircraft ready for take-off.

The investigation found that a steep cockpit authority gradient was present, with a highly experienced pilot paired with a much younger inexperienced co-pilot.

The pilots of KSI were aware of the developing unsafe situation, but the PIC's decisions and the actions he took were influenced by what he considered to be external factors such as weather, their relative locations when each of the aircraft was given clearance to take off and land, and operational procedures (*right of way*).

The justifications used by the PIC of KSI for not conducting an orbit and therefore bringing his aircraft into relatively close proximity with MEW are considered to be indefensible, given the evidence from the recorded flight data. His co-pilot, in *"suggesting"* they orbit to remain clear of MEW showed proactive safety thinking and call.

Despite the operational procedure for right of way, prudence would dictate that such action should not be taken when a safer option such as an orbit on base leg was available.

The use of non-standard phraseology following the controller incorrectly clearing KSI to land on Runway 12, which included the landing clearance readback by KSI not including the runway identifier, deprived the controller of the opportunity to immediately reissue the correct landing clearance.

The crew of KSI did not question the assigned runway clearance.

2.3 Mt. Hagen new control tower change

The new Mt. Hagen Control Tower changeover implementation was in progress at the time of the serious incident. Change design was a potential source of risk. NiuSky Pacific was aiming to mitigate the risk by ghosting and mimicking etc. with the old tower.

Risks associated with the change (old to new tower) were addressed or mitigated in the NiuSky work plans and procedures. However, on the day of the occurrence, the CADAS system was offline, so the controller did not have access to the flight plans.

The ADC advised that in the old tower, the CADAS was connected to an antenna but when they moved to new tower, it was connected remotely from Port Moresby so according to the ADC it was offline at the time due to network issues. This was an active failure.

2.4 Aerodrome Controller actions

On the morning of the occurrence, the controller received a flight plan for KSO a Hevilift Twin Otter and MEW. However, KSI's flight plan was not received as the controller recalled seeing the FPB almost empty and stated that it was unusual for the Mt Hagen traffic.

The investigation found that there were no major contingency scenarios, however the CADAS AFTN system was offline. With the backup controller in the old control tower there should have been some assistance provided to the controller in the new tower to identify that flight plans were missing. Proactive coordination with Moresby or nearby sectors would have resolved the issue of missing flight plans or other operational messages.

The ADC controls aircraft on the ground and maintains separation on the active runway. A maximum of one aircraft has possession of the runway and the controller should have only one slot on their control board for the strip for an aircraft for runway possession. Once an aircraft is cleared to line up or land, the runway is theirs. KSI only had rights to the runway once it had been cleared to land.

In the Mt. Hagen ATZ, the controller regulates traffic although it is a controlled aerodrome. Mt Hagen provides a runway separation service. Accordingly, the ADC gave traffic information to MEW on the inbound aircraft KSO and KSI.

The investigation considered that if the ADC had said, *"KSI, opposite direction traffic is a Cessna 208 taking off from runway 12, maintain own separation with that aircraft"*, conversations between the two aircraft could have ensued to facilitate separation. Such an instruction would leave the pilots to be responsible for their own separation. As in uncontrolled airspace, aircraft to aircraft communication in the circumstance would have aided safety.

When clearing MEW to take off and KSI to land on opposite runways the ADC complied with Runway Separation Standards, which state that take offs are not permitted after an arriving aircraft has commenced a final approach. KSI was not established on final approach.

Pilots operating under VFR are required to maintain visual separation from other aircraft.

2.5 Aerodrome Controller experience and qualifications

The Aerodrome controller was appropriately trained and qualified at the time of the serious incident and had 5 months continuous service as an Aerodrome Controller.

2.6 Human Factors

Inattention, or decreased vigilance has been a contributor to operational errors, incidents, and accidents. Decreased awareness manifests itself in several ways which can be hazardous.

These include:

1. Absorption. A state of being so focused on a specific task that other tasks are disregarded.
2. Fixation: A state of being locked onto one task, or one view of a situation, even as evidence accumulates that attention is necessary elsewhere, or that the particular view is incorrect.
3. Channelised attention: A mental state which exists when a person's full attention is focused on one stimulus to the exclusion of all others. This becomes a problem when the

person fails to perform a task or process information of a higher priority and thus fails to notice or has no time to respond to cues requiring immediate attention.

4. Fascination: An attention anomaly in which a person observes environmental cues but fails to respond to them.

Note: The term 'fixation' has been chosen to describe state of alertness of the PIC of KSI, which provides a clearer idea of 'being locked onto one task', than 'absorption'. Findings support this condition, for example:

- The PIC of KSI did not change his plan to continue the approach and rejected the co-pilots suggestion to conduct an orbit, although there was diminishing separation between KSI and the departing MEW.

He based this decision on his knowledge that the approved procedures states that take offs are not permitted after an arriving aircraft has commenced final approach until it is sighted by the tower controller and reasonable assurance exists that a landing can be accomplished, or until separation standards can be applied between an arriving aircraft which misses its approach and an aircraft desiring take off clearance.

However, he was still on the base leg when MEW was cleared for takeoff with a left turn after takeoff. In the unfolding circumstances his decision to press on with the approach and landing, in the full knowledge that MEW had commenced taking off, was unsound and imprudent.

Several other factors not directly linked to the incident both latent and active also contributed to the decisions and actions carried out by the Aerodrome Controller and Flight Crew of both aircraft. These included:

- CADAS Software offline (Active)
- Inexperienced Aerodrome Controller (Latent)
- ATC roster actual start time (6am instead of 5am) (Latent)
- Weather (Active)

3 CONCLUSIONS

3.1 FINDINGS[26]

1. Aircraft

a) Both aircraft were certified, equipped and maintained in accordance with existing *PNG Civil Aviation Rules* and approved procedures.

b) Both aircraft had a valid *Certificate of Airworthiness*.

c) Both aircraft were certified as being airworthy when dispatched for the respective flights.

d) There was no evidence of any defect or malfunction in the aircraft that could have contributed to the serious incident.

2. Crew/pilots

a) The flight crews were properly licensed, qualified, medically fit and adequately rested to operate the respective flights.

b) The flight crews were in compliance with the flight and duty time Rules.

3. Flight operations

a) The flight crews of both aircraft carried out normal radio communications with the relevant ATC units.

b) The crew of KSI did not read back the runway identifier when the controller incorrectly cleared them to land on runway 12 instead of runway 30.

c) The crew of KSI did not comply with the operator's Standard Operating Procedures (SOPs) in accordance with the *Operations Manual* for *Standard Visual Circuit* procedures with respect to speeds on the downwind and base legs of the circuit and the base leg profile to be flown.

d) The crew of both aircraft (KSI and MEW) did not communicate with each other to ensure separation between their aircraft.

e) The crew of KSI was aware of the unsafe situation developing, but their decisions and the actions taken were influenced by external factors such as weather, their locations when each of the aircraft was given clearance to take off and land, and operational procedures (*right of way*).

- Despite the *Civil Aviation Rule* and operational procedure for right of way for the landing aircraft once that aircraft was on final approach, KSI was not on final approach when MEW was cleared for takeoff.

f) The crew of KSI continued the approach from base leg when a safer option for an orbit or go around was available from base leg.

26 Findings are not listed in an order of hierarchy or importance.

4. Air traffic services and airport facilities

a) The aerodrome controller was properly licensed, medically fit and correctly rated to provide the service.

b) The number of air traffic controllers on duty in the tower was in accordance with the *Civil Aviation Rules* and NiuSky Pacific Limited procedures.

c) The CADAS system that normally receives operational messages was offline, causing a delay of flight plan details being received at the new control tower.

d) The air traffic controller's workload was increased due to CADAS system being offline.

e) The air traffic controller incorrectly cleared KSI to land on runway 12 instead of the previously assigned runway 30.

3.2 Causes (Contributing factors)

The crew of KSI did not comply with the operator's *Standard Visual Circuit Procedures* with respect to speeds on the downwind and base legs of the circuit and the base leg profile to be flown, thereby reducing the margin of distance between them and the departing MEW.

The serious incident occurred when KSI came into close proximity with MEW as a result of KSI continuing the approach, with the PIC of KSI exercising his perceived right to *right of way*, even though his aircraft was still on a curved base leg when the opposite direction aircraft MEW was cleared for takeoff.

3.3 Other Factors

While not causal to the serious incident the CADAS system that normally receives operational messages was offline, causing a delay of flight plan details being received at the new control tower and increased workload for the controller.

4 SAFETY ACTIONS AND RECOMMENDATIONS

4.1 Recommendations

As a result of the investigation into the serious incident involving KSI and MEW at Mt Hagen, on 26 August 2022 the Accident Investigation Commission issues the following recommendations to address safety issues identified in this report.

4.1.1 Recommendation number AIC 23-R08/22-2002 to Hevilift Aviation (PNG) Limited

The PNG Accident Investigation Commission (AIC) recommends that that Hevilift Aviation (PNG) Limited ensure that their relevant documents, manuals and operational procedures are amended to comply with the requirements of *Section 60* of the *Civil Aviation Act 2000 (as amended)* and the *Civil Aviation Rules Part 12.* Specifically:

1. For a pilot in command who is involved in an accident or incident to notify CASA *with a minimum of delay and by the most suitable and quickest means possible;*
2. For a pilot in command who is involved in an accident or incident to notify the company *with a minimum of delay and by the most suitable and quickest means possible*, which may include by telephone or company radio; or
3. If a pilot in incapacitated or is unable to notify CASA, the company, after being notified of an accident or serious incident should notify CASA *with a minimum of delay and by the most suitable and quickest means possible.*

Furthermore, when Hevilift flight operations are conducted on public holidays and on weekends, qualified operations staff should be on duty to assist the pilots to ensure prompt action is taken to meet the notification requirements in the event of an accident or serious incident.

Action requested

The AIC requests that Hevilift Aviation (PNG) Limited note recommendation *AIC 23-R08/22-2002* and provide a response to the AIC within 90 days of the issue date and explain (including with evidence) how Hevilift Aviation (PNG) Limited has addressed the safety deficiency identified in the safety recommendation.

Hevilift PNG Aviation Limited response

On 25 April 2023 Hevilift PNG provided the AIC evidence of their safety action to address the deficiency identified in the Safety Recommendation AIC 23-R08/22. The Hevilift PNG's SMMV10.0 has been amended.

PNG AIC assessment of the response from Hevilift PNG

The AIC has assessed the response by Hevilift PNG and noted that the updated wording of the SMMV10.0 addresses the AIC Safety Recommendation.

The AIC assigns Hevilift PNG response as *fully satisfactory* rating.

The AIC has recorded the Status of the Recommendation: CLOSED

4.1.2 Recommendation number AIC 23-R09/22-2002 to MAF (PNG) Limited

The PNG Accident Investigation Commission (AIC) recommends that MAF (PNG) Limited should ensure, their relevant documents, manuals and operational procedures are amended to comply with the requirements of *Section 60* of the *Civil Aviation Act 2000 (as amended)* and the *Civil Aviation Rules Part 12*. Specifically:

1. For a pilot in command who is involved in an accident or incident to notify CASA *with a minimum of delay and by the most suitable and quickest means possible;*
2. For a pilot in command who is involved in an accident or incident to notify the company *with a minimum of delay and by the most suitable and quickest means possible*, which may include by telephone or company radio; or
3. If a pilot in incapacitated or is unable to notify CASA, the company, after being notified of an accident or serious incident should notify CASA *with a minimum of delay and by the most suitable and quickest means possible.*

Furthermore, when MAF flight operations are conducted on public holidays and on weekends, qualified operations staff should be on duty to assist the pilots to ensure prompt action is taken to meet the notification requirements in the event of an accident or serious incident.

Action requested

The AIC requests that MAF (PNG) Limited note recommendation *AIC 23-R09/22-2002* and provide a response to the AIC within 90 days of the issue date and explain (including with evidence) how MAF (PNG) Limited has addressed the safety deficiency identified in the safety recommendation.

MAF (PNG Limited response

On 19 May 2023, MAF PNG response to AIC on the safety action taken to address the deficiency.

The AIC assigns MAF PNG's response as *fully satisfactory* rating.

The AIC has recorded the **Status of the Recommendation: CLOSED**

4.1.3 Recommendation number AIC 23-R10/22-2002 to NiuSky Pacific Limited

The PNG Accident Investigation Commission (AIC) recommends that NiuSky Pacific Limited should ensure their relevant documents, manuals and operational procedures are amended to comply with the requirements of *Section 60* of the *Civil Aviation Act 2000 (as amended)* and the *Civil Aviation Rules Part 12.*

Specifically, as related to the requirements of *Civil Aviation Rules Part 12.55 (b)* an Air Traffic Controller being:

(b) A person who is involved in an incident that is a serious incident or an immediate hazard
to the safety of aircraft operations must notify the Authority of the incident as soon as practicable, if the person –

1. operates, maintains, services, or does any other act in respect of any aircraft, aeronautical product, or aviation related service.

Furthermore, because flight operations are conducted on public holidays and on weekends NiuSky Pacific Limited should ensure that a qualified officer is on duty to assist an Air Traffic

Controller involved in a serious incident to take prompt action to meet the notification requirements to notify CASA *with a minimum of delay and by the most suitable and quickest means possible.*

Action requested

The AIC requests that NiuSky Pacific Limited note recommendation *AIC 23-R10/22-2002* and provide a response to the AIC within 90 days of the issue date and explain (including with evidence) how NiuSky Pacific Limited has addressed the safety deficiency identified in the safety recommendation.

4.1.4 Recommendation number AIC 23-R11/22-2002 to the Civil Aviation Safety Authority of PNG

The PNG Accident Investigation Commission (AIC) recommends that CASA PNG should ensure their relevant documents, manuals and operational procedures are amended to ensure compliance with the requirements of *Section 62* of the *Civil Aviation Act 2000 (as amended), specifically*:

The Authority shall notify the Commission that the Authority has been notified of the accident or incident where it is of any of the following kinds:–

(*a*) an accident involving aircraft;

(*b*) a serious incident in accordance with the provisions of the Convention.

Furthermore, because flight operations are conducted on public holidays and on weekends CASA PNG should ensure that the CASA PNG 24-hour telephone and email notification services are staffed by a qualified officer(s) to ensure the PNG AIC is notified of accidents and serious incidents with a minimum of delay and by the most suitable and quickest means possible.

Action requested

The AIC requests that CASA PNG note recommendation *AIC 23-R11/22-2002* and provide a response to the AIC within 90 days of the issue date and explain (including with evidence) how CASA PNG has addressed the safety deficiency identified in the safety recommendation.

4.1.5 Recommendation number AIC 23-R12/22-2002 to the Civil Aviation Safety Authority of PNG

The PNG Accident Investigation Commission (AIC) recommends that CASA PNG should promulgate a reminder to all AOC holders, Airport operators, and air traffic service providers of their 24/7 obligation to comply with the accident and serious incident requirements of:

PNG Civil Aviation Act 2000 (as amended) Section 60;

Civil Aviation Rule Part 12; and

PNG CAR Part 1 Definitions with respect to notification submission which states:

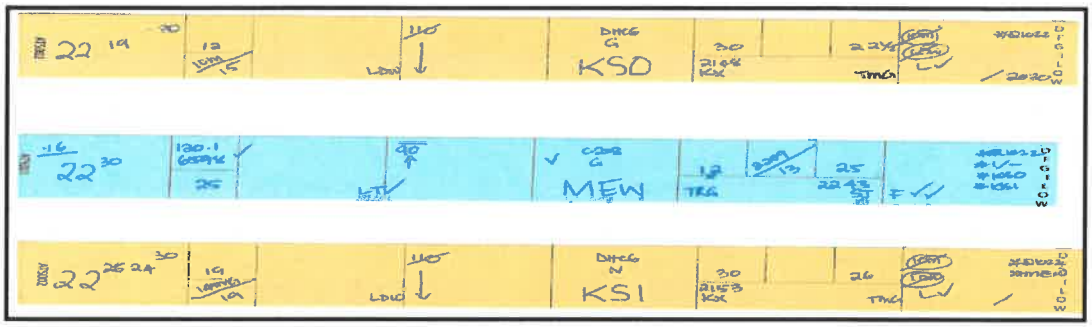
> **As soon as practicable** means with a minimum of delay and by the most suitable and quickest means possible.

Action requested

The AIC requests that CASA PNG note recommendation *AIC 23-R12/22-2002* and provide a response to the AIC within 90 days of the issue date and explain (including with evidence) how CASA PNG has addressed the safety deficiency identified in the safety recommendation.

5 APPENDICES

5.1 Mt Hagen tower flight strips



5.2 Flight plan copies

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Group: BRIEFING_OFFICE_GROUP                                  UTC Time
User: GIMA_TAU                                  2022.09.05-03:24:05

LYA0365 050323
GG AYPMYNYX
050323 AYPMYJYX
LYA1001 251048
FF AYMHZTZX AYPMYJYX AYPMYSYX AYPMYSYZ AYPMZRZX AYPMZTZX
251048 YBBBZEZX
(FPL-KSO-IG
-DHC6/L-S/C
-AYKX2030
-N0150A110 DCT
-AYMH0030
-DOF/220825 REG/P2KSO)

LYA1003 251048
FF AYMHZTZX AYPMYJYX AYPMYSYX AYPMYSYZ AYPMZRZX AYPMZTZX
251048 YBBBZEZX
(FPL-KSO-IG
-DHC6/L-S/C
-AYKX0300
-N0150A110 DCT
-AYMH0030
-DOF/220826 REG/P2KSO)

LYA1020 251104
FF AYMHZTZX AYPMYJYX AYPMYSYX AYPMYSYZ AYPMZRZX AYPMZTZX
251104 YBBBZEZX
(FPL-KSI-IN
-DHC6/L-SG/E
-AYKX2030
-N0150F110 DCT 0538S14354E DCT
-AYMH0030 AYMD
-DOF/220825 REG/P2KSI OPR/HEVILIFT AVIATION PER/A)

LYA0517 260450
FF AYMHZTZX AYPMYJYX AYPMYSYX AYPMYSYZ AYPMZRZX AYPMZTZX
260450 AYMHZTZX
(CNL-MEW-AYMH0020-AYSJ-DOF/220826)


LYA0519 260450
FF AYMHZTZX AYPMYJYX AYPMYSYX AYPMYSYZ AYPMZRZX AYPMZTZX
260450 AYMHZTZX
(CNL-MEW-AYMH0210-AYSJ-DOF/220826)


LYA1556 252154
FF AYMHZTZX AYPMYJYX AYPMYSYX AYPMYSYZ AYPMZRZX AYPMZTZX
252154 YBBBZEZX
(FPL-MEW-VG
-C208/L-SGH/LB2
-AYMH2230
-N0150A090 DCT
-AYSJ0016
-DOF/220825 REG/P2MEW CODE/898119 PER/B)

Source: Retrieval Result                                        1/2
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5.3 ATC transcript.

The transcript of the ATC recording for the time from MEW commencing taxi to KSI landing are listed in this Appendix.

22:18:08	MEW	Copied traffic by two, Mike Echo Whiskey and transmission was partly broken for your information	
22:18:20	KSI	Hagen, Kilo Sierra India 14 miles inbound from the Tomba passing 10,000ft	
22:18:30	KSI	Estimate time 24	
22:18:39	Tower	Kilo Sierra India runway 30 variable at 3kts, QNH 1022 temperature 16 report again passing 10 miles	
22:18:52	KSI	Say again, you're breaking up please, (fading)	
22:19:02	Tower	Kilo Sierra India runway 30, variable at 3kts, QNH 1022, temperature 16 track report left downwind runway 30	
22:19:16	KSI	Report left downwind runway 30 copied 1022, Kilo Sierra India	
22:23:21	KSI	Hagen, Kilo Sierra India, wide left downwind runway 30	
22:23:28	Tower	Kilo Sierra India, runway 30 continue approach	
22:23:34	KSI	Continue approach runway 30, Kilo Sierra India	
22:23:47	MEW	Tower, Mike Echo Whiskey will take intersection Alpha departure if available	
22:23:57	Tower	Mike Echo Whiskey	
22:24:01	Tower	Ah, Mike Echo Whiskey, line up runway 12 intersection Alpha	
22:24:04	MEW	Line up 12 intersection Alpha, Mike Echo Whiskey	
22:24:07	Tower	Kilo Sierra India, traffic Mike Echo Whiskey lining up intersection Alpha runway 12 now will be on a left turn outbound via the Tremearne on climb 9000	
22:24:17	KSI	Copied traffic, Kilo Sierra India	
22:24:20	MEW	And Mike Echo Whiskey will be ready on line up	
22:24:24	Tower	Mike Echo Whiskey runway 12 intersection Alpha, make a left turn, cleared for takeoff	
22:24:28	MEW	Intersection Alpha runway 12 left turn cleared for takeoff, Mike Echo Whiskey	
22:25:53	Tower	Kilo Sierra India, runway 12 clear to land	**Note:** Tower gave KSI wrong runway number on the landing clearance
22:26:01	KSI	Clear to land, Kilo Sierra India	**Note:** KSI reads back landing clearance without the runway number (Slight pause on the readback)
22:26:08	KSI	Ah, Kilo Sierra India, we just had a very close encounter with Mike Echo Whiskey. *[non standard comment to the Controller]*	
22:26:22	Tower	Kilo Sierra India, tower apologies	

5.4 Depiction of the aircraft flight paths.