



**KOMITE NASIONAL KESELAMATAN TRANSPORTASI
REPUBLIC OF INDONESIA**

PRELIMINARY

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Aircraft Accident Investigation Report

Yayasan Pelayanan Penerbangan Tariku

PAC 750 XL; PK-RWR

Bayabiru Airstrip, Paniai, Papua

Republic of Indonesia

15 October 2020

2021

This Preliminary Report was published by the Komite Nasional Keselamatan Transportasi (KNKT), Transportation Building, 3rd Floor, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

The report is based upon the initial investigation carried out by the KNKT in accordance with Annex 13 to the Convention on International Civil Aviation Organization, the Indonesian Aviation Act (UU No. 1/2009) and Government Regulation (PP No. 62/2013).

The preliminary report consists of factual information collected until the preliminary report published. This report will not include analysis and conclusion.

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Jakarta, 20 January 2021

**KOMITE NASIONAL
KESELAMATAN TRANSPORTASI
CHAIRMAN**



SOERJANTO TIAHJONO

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ABBREVIATIONS AND DEFINITIONS

ACL	:	Authorization, Conditions & Limitation
AIP	:	Aeronautical Information Publication
BMKG	:	The Badan Meteorologi, Klimatologi & Geofisika
°C	:	Celcius
C of A	:	Certificate of Airworthiness
C of R	:	Certificate of Registration
CDU	:	Cockpit Display Unit
CPL	:	Commercial Pilot License
DAAM	:	Data Acquisition Alarm Monitor
DGCA	:	Directorate General Civil Aviation
FSS	:	Flight Service Station
GPS	:	Global Positioning System
kg	:	Kilogram
KNKT	:	Komite Nasional Keselamatan Transportasi
lbs	:	Pound
LT	:	Local Time
MHz	:	Megahertz
OC	:	Operator Certificate
PF	:	Pilot Flying
PIC	:	Pilot in Command
PM	:	Pilot Monitoring
POH	:	Pilot's Operating Handbook
RPM	:	Rotation Per Minute
SIC	:	Second in Command
SOP	:	Standard Operating Procedure
TIBA	:	Traffic Information Broadcasting by Aircraft
UTC	:	Universal Time Coordinated
VHF	:	Very High Frequency

SYNOPSIS

On 15 October 2020, a PAC 750 XL aircraft registered PK-RWR was being operated by Yayasan Pelayanan Penerbangan Tariku (Tariku Aviation) on unscheduled passenger and cargo flight from Douw Aturure Airport (WABI), Nabire, Papua to Bayabiru Airstrip, Paniai, Papua.

Prior to the flight, the pilot was informed that the weather condition at Bayabiru did not rain at the previous night, and drizzle between 0500 to 0700 LT. The weather information was provided by resident at Bayabiru.

During this flight, the Pilot in Command (PIC) who was the chief pilot for the company would also conduct route qualification check for the Second in Command (SIC). The PIC acted as Pilot Monitoring (PM), seated on the right pilot seat and the SIC acted as Pilot Flying (PF), seated on the left pilot seat.

At 0935 LT, the flight departed and cruised at altitude of 9,000 feet. The flight continued uneventfully until the aircraft commencing for approach at Bayabiru.

When the aircraft approached Bayabiru, the weather was clear with high overcast clouds. On final, the pilot calculated the wind was tail wind about 5 knots, by the indication of the wind shock and comparison between the groundspeed and the indicated airspeed.

On final approach the pilot recalled the aircraft speed was about 75 knots and the flaps were full down at 40°. Both pilots were unable to determine whether the runway was wet or dry as the runway was grass-surface runway.

At 1003 LT, the aircraft touched down at Bayabiru with main landing gear first about 15 meters from beginning runway. During the touchdown the pilots felt that the runway was slippery, and the PF then set the brake to maximum and the propeller lever to Beta Mode intended for slowing down the aircraft. The PIC felt the aircraft did not decelerate as intended and took over the aircraft control. The PIC then selected the propeller to reverse to increase deceleration. The aircraft overran and impacted higher ground at the end of the runway.

No one injured in this accident, and the aircraft substantially damaged.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 15 October 2020, a PAC 750 XL aircraft registered PK-RWR was being operated by Yayasan Pelayanan Penerbangan Tariku (Tariku Aviation) on unscheduled passenger and cargo flight from Douw Aturure Airport (WABI), Nabire, Papua¹ to Bayabiru Airstrip, Paniai, Papua².

The flight plan for the flight was filed with estimate time of departure at 0030 UTC (0930 LT³).

At 0600 LT, the aircraft engineer of Tariku Aviation conducted pre-flight inspection of the aircraft included brake checking, and there was no abnormality in the aircraft system. During the preflight check, the weather at Nabire was raining.

At 0608 LT, the Pilot in Command (PIC) asked the weather condition at Bayabiru, to personnel who provide the cargo (cargo provider) in Nabire. The cargo provider then asked one of Bayabiru resident. The communication among them conducted via mobile messaging application.

At 0613 LT, the cargo provider asked the Bayabiru resident of the weather condition including the picture of the weather condition. The cargo provider also asked whether Bayabiru was raining on the previous night. The Bayabiru resident advised the cargo provider that there was no rain on the previous night and only drizzled in the morning about 0500 LT. The resident also sent photo which depicted several clouds over the airstrip.

At 0637 LT, the cargo provider then advised the PIC that the Bayabiru was drizzling, and informed that there was no rain at night.

At 0700 LT, the cargo provider received photo from the Bayabiru resident which depicted the sun was shining on the airstrip.

At 0902 LT, the cargo provider asked again the Bayabiru resident to send photos of the weather condition and confirmed whether Bayabiru drizzled again. The Bayabiru resident send photos which depicted the airstrip was in cloudy condition and advised that the drizzled had stopped. Thereafter, at 0905 LT, the cargo provider forwarded the photos to the PIC which depicted the Bayabiru was not drizzling.

At 0907 LT, the PIC reconfirmed to the cargo provider whether the Bayabiru did not rain at the previous night and only drizzle in the morning about 0500 LT. The cargo provider then responded that the cargo had been X-rayed, provided photo of the Bayabiru airstrip taken at 0907 LT, and advised that the drizzled had stopped.

The PIC considered that the drizzled from the morning might have dried as the drizzled would have less water intensity than rain. Based on that consideration the PIC decided to conduct the flight to Bayabiru.

¹ Douw Aturure Airport (WABI), Nabire, Papua will be named as Nabire for the purpose of this report.

² Bayabiru Airstrip, Paniai, Papua will be named as Bayabiru for the purpose of this report.

³ The 24-hours clock in Local Time (LT) is used in this report to describe the local time as specific events occurred. Local time is Universal Time Coordinated (UTC)+9 hours.

After the passenger boarding and cargo loading completed, the pilot requested clearances for start engine and taxi to the Nabire tower controller and it were approved. During the taxi, the pilot conducted a brake check and the brakes were functioning normally. On board the aircraft for this flight were two pilots and two passengers. During this flight the PIC who was the chief pilot for the company would also conduct route qualification check for the Second in Command (SIC).

The PIC acted as Pilot Monitoring (PM), seated on the right pilot seat and the SIC acted as Pilot Flying (PF), seated on the left pilot seat.

At 0935 LT, the Nabire tower controller issued takeoff clearance and the aircraft was airborne at 0936 LT. The aircraft was instructed to climb to altitude of 9,000 feet.

At 0943 LT, the pilot reported to the Nabire tower controller that the aircraft was at 10 Nm from Nabire passing altitude of 5,500 feet. The Nabire tower controller acknowledged the pilot report and instructed to change the frequency to 122.4 MHz.

The flight continued uneventfully until the aircraft commencing for approach at Bayabiru.

When the aircraft approached Bayabiru, the weather was clear with high overcast clouds. On final, the pilot noticed the wind shock indicated that the wind was tailwind and the pilot predicted the wind velocity was about 5 knots. The pilot also calculated the wind velocity by comparing the groundspeed with the indicated airspeed of the aircraft instrument. The calculated wind velocity was consistent with the predicted wind velocity from the wind shock.

On final approach the pilot recalled the aircraft speed was about 75 knots and the flaps were full down at 40°. Both pilots were unable to determine whether the runway was wet or dry as the runway was grass-surface runway. Considering that there was no rain and only drizzled in the morning, the pilots assumed that the runway was dry and continued the landing approach.

When performed a landing flare⁴, the PF recalled that the stall warning was active and the speed had been reduced to about 60 knots.

At 1003 LT, the aircraft touched down at Bayabiru with main landing gear first about 15 meters from beginning runway. During the touchdown the pilots felt that the runway was slippery, and the PF then set the brake to maximum and the propeller lever to Beta Mode⁵ intended for slowing down the aircraft. The PIC felt the aircraft did not decelerate as intended and took over the aircraft control. The PIC then selected the propeller to reverse to increase deceleration. The aircraft overran and impacted higher ground at the end of the runway.

1.2 Injuries to Persons

No one injured in this occurrence.

1.3 Damage to Aircraft

The aircraft was substantially damaged.

⁴ The landing flare is the transition phase between the final approach and the touchdown on the landing surface.

⁵ Beta Mode is corresponding to a range of operation where the blade angle is between Primary Blade Angle (PBA) and reverse. Control of the propeller pitch is a direct function of the position of the beta valve.

1.4 Other Damage

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

1.5 Personnel Information

1.5.1 Pilot in Command

The Pilot in Command (PIC) was 31 years old, India nationality, held valid Commercial Pilot License (CPL) and qualified as a single engine land aircraft pilot. The PIC had valid first-class medical certificate with medical limitation to wear corrective lenses.

The PIC had total flying hour of 4,905 hours, included 3,147 hours on PAC 750XL aircraft. The total flying hour on Papua area was 3,109 hours. The total flying hour in the last 30 days was 46.3 hours.

The last proficiency check for the PIC was conducted on 9 September 2020, the result was satisfactory without any remarks.

The PIC was the chief pilot for PAC 750XL aircraft in the Tariku Aviation.

The PIC had flown to Bayabiru several times, based on the PIC logbook, in the last 90 days, the PIC had flown nine times to Bayabiru including the occurrence flight, and all the flight was on October 2020.

On 31 July 2020, the PIC had experienced runway excursion when flying as PF at Papua airstrip using PAC 750XL aircraft.

1.5.2 Second in Command

The Second in Command (SIC) was 26 years old, Indonesia nationality, held valid Commercial Pilot License (CPL) and qualified as a single engine land aircraft pilot. The SIC had first-class medical certificate without any medical limitation that valid until 3 September 2020. Due to the Covid-19 pandemic, the Directorate General of Civil Aviation (DGCA) issued exemption letter to extend the validity of medical certificate up to 180 days.

The SIC had total flying hour of 701 hours, included 540 hours on PAC 750XL aircraft, which all flight on PAC 750 XL conducted in Papua area. The total flying hour in the last 30 days was 11.8 hours.

The last proficiency check for the pilot was conducted on 4 March 2020, the result was satisfactory without any remarks.

The SIC had flown to Bayabiru several times, based on the SIC logbook, in the last 90 days, the SIC had flown four times to Bayabiru including the occurrence flight, and all the flight was on October 2020.

The occurrence flight was the first time for the SIC to fly to Bayabiru as PF and seated on the left pilot seat.

On 31 July 2020, the SIC had experienced runway excursion at Papua airstrip with the PIC using PAC 750XL aircraft, at that time the SIC seated on the right pilot seat as observer.

1.6 Aircraft Information

1.6.1 General

The PAC750 XL aircraft with serial number of 183, registered PK-RWR was manufactured by Pacific Aerospace Limited, New Zealand in 2012.

The aircraft had valid Certificate of Airworthiness (C of A) and valid Certificate of Registration (C of R).

The aircraft had total hour since new was 5,943.9 hours and the total cycles since new was 10,442 cycles. The engine installed on the aircraft was PT6A-34 model, manufactured by Pratt & Whitney Canada with serial number of PCE-RB0706. The total time of the engine since new was 3124.5 hours.

The aircraft was not fitted with flight data recorder or cockpit voice recorder. Neither recorder was required by current Indonesian aviation regulations.

1.6.2 Aircraft Limitation

The Pilot's Operating Handbook and Civil Aviation Authority of New Zealand Approved Flight Manual for the PAC 750XL (POH), subchapter 2.19 described that the aircraft was approved for operation on paved and grass runway.

1.6.3 Weight and Balance

On 19 June 2019, the Tariku Aviation conducted aircraft weighing after engine replacement. During the weighing process, all the passenger seats (8 passenger seats) and the cargo pod were installed on the aircraft. The result for the aircraft empty weight was 4,304 lbs (1,952 kg). The Tariku Aviation described that the weight of each passenger seat was 11.5 kg. On the occurrence flight, the aircraft was installed with 4 passenger seats, and the aircraft empty weight should be 1,906 kg (4,203 lbs)

The weight and balance calculation of the occurrence flight provided by the Tariku Aviation indicated that the calculation for the aircraft empty weight only included 2 passenger seats. The detail information of the calculation was as follows:

aircraft empty weight	:	1,884 kg/4,153 lbs
usable fuel	:	264 kg/ 582 lbs
total occupants and cargo	:	1,170 kg/2,579 lbs
fuel burn for taxi, start-up	:	18 kg/ 39 lbs
fuel burn for en-route	:	80 kg/ 176 lbs

Based on the data above, the Tariku Aviation determined the following weight:

ramp weight ⁶	:	3,318 kg/7,315 lbs
takeoff weight ⁷	:	3,300 kg/7,275 lbs (maximum 3,401 kg/7,500 lbs)
landing weight ⁸	:	3,220 kg/7,099 lbs (maximum 3,231 kg/7,125 lbs)

6 Ramp weight is weight during ground maneuver. Consisting aircraft empty weight, usable fuel, total occupants and cargo on board weight.

7 Takeoff weight is weight during the start of the takeoff roll. Calculating from ramp weight minus the fuel burned for taxi and start-up engine.

8 Landing weight is weight during touchdown. Calculating from takeoff weight minus the fuel burned for enroute.

1.6.4 Engine Trend Monitoring

The aircraft is equipped with Data Acquisition Alarm Monitor (DAAM) system manufactured by Perkins Technologies, Australia. The DAAM system is an onboard self-contained aircraft system monitor which is capable of monitoring, displaying, and recording critical aircraft and engine parameters, flight times, engine hours, engine trend monitoring data, and exceedance alarms.

The DAAM system can provide to pilot visual notification of any exceedance from the preset parameter limits of the aircraft, displayed in the single Cockpit Display Unit (CDU). The CDU is also equipped with a data port to download flight data from the system to a computer for review and analysis.

The system records 14 parameters data as follows:

- Starter button;
- Compressor Rotation Per Minute (RPM);
- Propeller RPM;
- Fuel flow;
- 24-volt supply voltage;
- Air filter pressure;
- Outside air temperature;
- Torque;
- Fuselage g force;
- Turbine temperature;
- Indicated air speed;
- Pressure altitude;
- Horsepower;
- Engine oil pressure.

After the occurrence, the KNKT transported the DAAM unit of the aircraft to the KNKT facility for downloading purpose. The information of the downloaded data would be included in the final report.

1.7 Meteorological Information

Aviation meteorological provider was not available at Bayabiru. The Tariku Aviation relied on the visual observation report from the cargo provider.

The cargo provider received the visual observation conducted by resident at Bayabiru to determine the weather condition. The Bayabiru resident who provided the weather observation did not have knowledge of meteorological nor flight operation. The observation was conducted from the Bayabiru resident house which located about 120 meters from the beginning runway 10.

At the day of the occurrence, the Bayabiru resident provided information to the cargo provider that there was no rain at the previous night and only drizzled in the morning about 0500 LT which at 0700 LT had been stopped.

The information of no rain at night was based on the assumption of the Bayabiru resident that until the resident went to sleep about 2100 LT there was no rain. When the Bayabiru resident woke up about 0500 LT, the Bayabiru was drizzled.

The pilot recalled that when the aircraft on final, the wind was tailwind with velocity about 5 knots. The wind condition was based on pilot observation to the wind shock located on settlements about 170 meters from beginning runway 10 on bearing 275°, and based on the calculation between ground speed and the indicated airspeed.

Based on the satellite images provided by *Badan Meteorologi Klimatologi dan Geofisika* (BMKG – Bureau of Meteorology, Climatology and Geophysics), on 0050 UTC (0950 LT) and 0100 UTC (1000 LT), indicated several convective clouds (dense)⁹ over Bayabiru with temperature between -7 up to -41°C.

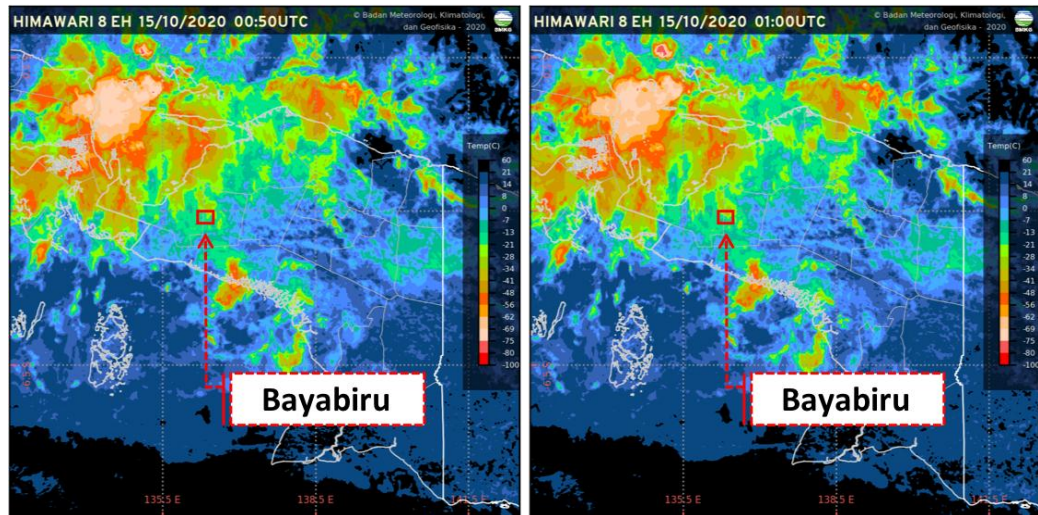


Figure 1: The satellite image of the Bayabiru (red square)

1.8 Aids to Navigation

A ground-based navigation aid was not available in the Bayabiru and the airstrip information for Bayabiru was not included in the Aeronautical Information Publication (AIP).

The aircraft was fitted with Global Positioning System (GPS) Garmin GNS 430 and Garmin GNS 530 which can provides navigation data. The GNS 530 allows the pilot to create, edit and store up to 20 flight plans with up to 31 waypoints on each flight plan. The GNS 530 can use direct point-to-point navigation to provide guidance from a certain point or position to another point on the flight plan.

The Tariku Aviation developed route guide and airstrip chart that were used for internal use.

⁹ Convective clouds are clouds that are formed by convection, which is simply the process of warmer air rising since it is less dense than the surrounding atmosphere.

Route Guide		
Frequencies : Nabire TWR: 122.3 Local Area: 122.4 Local Area: 122.1	<u>WABI – BYB – WABI</u> Approx. Flight Time: 50 MINS	GPS Flight Plan:
	RADIAL: 115 NBR DISTANCE: 49 NM REQ FUEL: 350 LTRS	
WABI S03° 22.08', E135° 29.83'	POINT B S03 30 39 E135 54 59	BYB S03 37 06 E136 16 00
Recommended Cruising Altitudes:		
To BYB : 7500 FT	To WABI : 8500 FT	
Safe Altitude En-route / Low Level Navigation: 7500 FT		
Airfields En-route:		
SIRIWO		
BAYABIRU	NABIRE	
Approach Options: 1) From point B, proceed to overhead Bayabiru. 2) If not visual, no option for continuing Approach. Return to Base	1) Can start descend around 35 nm NBR. 2) 5000ft up to 18 nm. 3) 3500ft up to 10 nm. 4) Visual Approaches most of the time.	
Departure Options: 1) Right Turn follow the valley.	1) As directed by ATC.	
Alternates :	Return to Nabire	
Fuel :	Not available. Nearest is Nabire.	
January 2020		

Figure 2: The route guidance from Nabire to Bayabiru and return

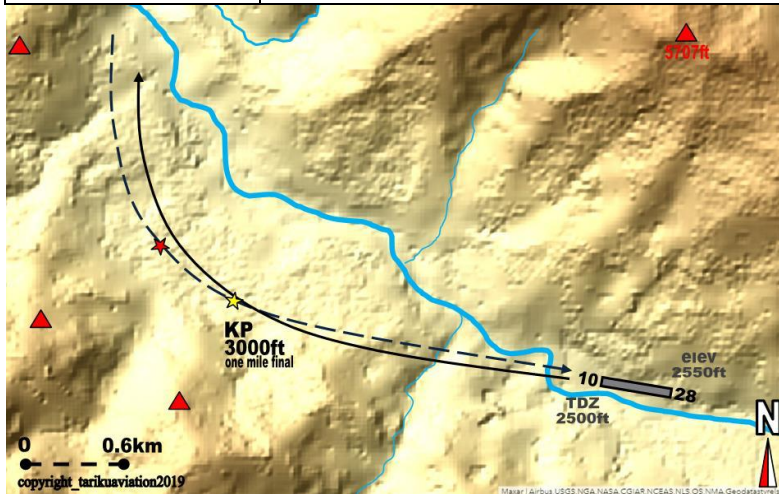


Radial : 115 NBR

Airfield Chart

Distance : 49 nm

Class: M1R	<u>BAYABIRU(BYA)</u>	Elev: TDZ: 2500 Ft
Wind: 1200		Elev: 2550 Ft
Freq: 121.1/122.4		KP: 3000 Ft



Length: 350 m
Width: 30 m
Slope: 5% TDZ, 7%, level at top.
Surface: Grass, Slippery when wet
Weight Limits(T/O): 300 Kg
Finals: 75 KIAS
Runway:
T/O: 28
LDG: 10

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Location/Terrain: Situated in a tight valley, terrain to the north and south.
Weather Pattern: Occasional early morning fog and rain by midday. Wind picks up around noon (1200).
Aborted Approach: Turning final go around straight ahead. Swerve right if unable to stop.
Aborted Takeoff: At brake release, swerve right if unable to stop.
EFATO Locations: Along the river.
Hazards / Notes: Lot of helicopter traffic. People, animals crossing the runway no fence, incursion possible. Can be slippery and soft if wet. Side slope parking area.

Coordinates: S03 37 06 E136 16 00

August 2020

Figure 3: The airfield chart of Bayabiru

1.9 Communications

After departure, the Nabire tower controller instructed the pilot to contact the frequency of 122.4 MHz. This frequency was a Traffic Information Broadcast by Aircraft (TIBA) frequency for Paniai Area, which according to the AIP Supplement number 05/18, the procedure of using TIBA frequency has been terminated since 29 June 2018.

Based on AIP Volume I ENR 6.2-B (FIR Ujung Pandang) amendment 64, after 10 Nm from Nabire until Bayabiru, flight information service would be provided by Biak Flight Service Station (FSS) on frequency 6,631 kHz.

The pilot used two-way Very High Frequency (VHF) radio communication to communicate with Nabire tower controller and when made broadcast on the TIBA frequency. The communication between pilot and Nabire tower controller was recorded in ground-based communication recorder, and the communication in the TIBA frequency was not recorded.

1.10 Aerodrome Information

The Bayabiru airstrip situated on a valley and beside a river. The airstrip was operated by local government of Paniai which had not been certified by the Directorate General of Civil Aviation (DGCA). Based on the airstrip chart developed by the Tariku Aviation, the airstrip information was as follow:

Coordinate	: 03°37'06" S 136°16'00" E
Elevation	: 2,550 feet above mean sea level
Runway Direction	: 10/28
Runway Length	: 350 meters
Runway Width	: 30 meters
Surface	: grass
Slope	: 5% at touchdown and 7% level at top

The Tariku Aviation used the runway 10 for landing and runway 28 for takeoff.

During the on-site investigation, the KNKT measured the runway length which both ends of runway were marked by bushes and higher ground. The measurement result was about 330 meters. The KNKT also retrieved the Bayabiru airstrip information from the other aircraft operator which described the runway length of the Bayabiru was 330 meters.



Figure 4: The airstrip condition

The airstrip was equipped with wind sock, located on the settlements near the airstrip about 170 meters from beginning runway 10 on bearing 275°.



Figure 5: The windsock location (yellow dot) and the airstrip



Figure 6: The windsock location (inside red-dotted square)

1.11 Flight Recorders

The aircraft was not fitted with a flight data recorder or cockpit voice recorder. Neither recorder was required by current Indonesian aviation regulations.

1.12 Wreckage and Impact Information

The aircraft touched down marks found on runway 10 about 15 meters from the beginning runway and stopped by impacting higher ground at the end of the runway. The aircraft last position was about 315 meters from the location of the aircraft touched down.



Figure 7: The aircraft last position

The damaged of the aircraft was as follow:

- propeller blades were damaged;
- nose gear was bent backward;
- front section of cargo pod was damaged;
- left landing gear strut was broken and punctured the left wing;
- left flap was torn;
- aft section of the aircraft was damaged.



Figure 8: The damaged propeller blades



Figure 9: The bent of nose landing gear strut (left picture) and the damaged of cargo pod (right picture)



Figure 10: The damaged of left wing

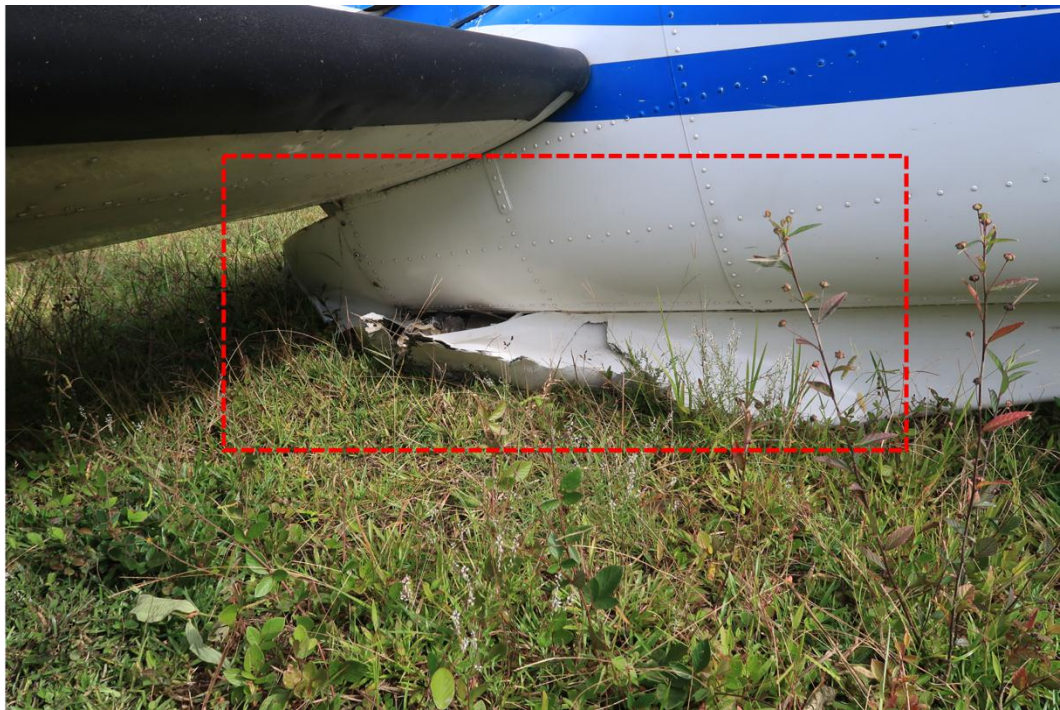


Figure 11: The damaged on the aft section

1.13 Medical and Pathological Information

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

1.14 Fire

There was no evidence of fire in-flight or after the aircraft impacted higher ground.

1.15 Survival Aspects

All occupants used the safety belt during the occurrence and no one were injured. After the aircraft stop, all occupants were self-evacuated from the aircraft.

1.16 Tests and Research

Should any test and research in this investigation would be included in the final report.

1.17 Organizational and Management Information

1.17.1 Aircraft Operator

Aircraft owner and operator : *Yayasan Pelayanan Penerbangan Tariku*
(Tariku Aviation)
Address : Jalan Yabaso, No. 89, PO BOX 257, Sentani,
Papua, Republic of Indonesia

The aircraft operator had valid Operator Certificate (OC) number 91-007. According to the Authorization, Condition and Limitations (ACL) issued by the DGCA, the Tariku Aviation was authorized to conduct non-commercial general aviation flight within Indonesia with no geographic restriction as long as continuously comply with the requirement of the Civil Aviation Safety Regulation Part 91.

The Tariku Aviation operated two PAC 750 XL aircraft registered PK-RBP and PK-RWR. The PK-RBP aircraft experienced runway excursion on 31 July 2020 at Dadao Airstrip, Paniai Papua. The occurrence was being investigated by KNKT and no safety action taken by Tariku Aviation had been reported following this occurrence.

The Tariku Aviation developed operation manual and standard operating procedures as guidance for the aircraft operation.

1.17.1.1 Obtaining Weather Report and Forecast Policy

The Tariku Aviation Standard Operating Procedures (SOP) subchapter 6.1 described that the flight operation was conducted based on pilot self-dispatch system which means the authority and responsibility for flight release, operation, and flight following were delegated to pilot in command (PIC). The PIC then must be familiar with all available information including:

a) Weather reports and forecasts

Local weather reports can be obtained from the BMKG website. But since in Papua detailed weather reports for most of the airstrips are not available thus use the help of HF radio to obtain observed weather from locals at the appropriate airstrips who have been trained by various organizations to give simple weather reports and airstrip conditions. Caution should be used when using these reports since these reports are from unqualified personnel and may not be accurate.

1.17.1.2 Flight Planning

The Tariku Aviation Operation Manual (OM) subchapter 8.1 described flight planning procedure which required PIC not to commence a flight unless he was satisfied of several conditions including:

- k. Runway lengths at airports of intended use from the available airfield plates relating to aircraft performance under expected values of airport elevation and runway slope, aircraft gross weight, and wind and temperature and the following takeoff and landing distance information from the aircraft manual.*

1.17.1.3 Landing Procedures

The OM subchapter 10.12 described that during landing, pilot must consider the airstrip condition as follow:

Consider and examine the following airstrip conditions before each landing. Pay particular attention when strip conditions are unknown or haven't been reported recently.

- a. Grass height. If grass is tall enough to hide small animals or other dangers the strip should be temporarily closed until the grass is COMPLETELY cut.*
- b. Surface condition. Check for standing water, mud holes, soft ground, runway colour, pig damage to the strip, etc.*
- c. Make a low pass to evaluate the actual condition if at all in doubt.*

The POH subchapter 4.18 provided by the Tariku Aviation described normal landing procedure as follow:

The following landing technique, with maximum braking, was the technique used to achieve the landing performance data in Section 5.

<i>Flaps Speed</i>	<i>SELECT FULL FLAP, 40°</i>
<i>Speed</i>	<i>75 KIAS (refer to Section 5 for speeds at reduced weights)</i>
<i>Landing</i>	<i>MAIN WHEELS FIRST</i>
<i>Power Lever</i>	<i>IDLE STOP – (refer Section 5 for landing performance using beta and reverse)</i>
<i>Brakes</i>	<i>APPLY BRAKING AS REQUIRED WHILE HOLDING STICK AFT</i>

The POH subchapter 4.27 provided by the Tariku Aviation the described amplified procedure for normal landing as follow:

The normal landing technique is also the technique to be used for short field landings. Landings require accurate speed and approach path control. This requires the airplane to be configured in sufficient time to allow the required parameters to be set and maintained. The aim of a landing is to arrive at the touchdown point at the selected airspeed. The approach should be flown with 400 flap and power to maintain the approach path. An approach angle of about 30 should be flown. Airspeed should be maintained at 75 KIAS in a powered approach until a height of 50 ft and then power gradually reduced to allow a speed decay, while maintaining the approach angle, to arrive at the touchdown point just above stall speed of 58 KIAS with power at idle.

Flare to land main wheels first and apply wheel braking as required without skidding the tires. Maximum braking is required, if the landing distance performance tabled in Section 5 is required. Further reduction in landing distance of about 10% can be achieved with the use of beta and reverse thrust after touchdown. During the ground roll and after the nose wheel is firmly on the ground ensure the control column is held fully aft to assist maximum wheel braking and to maximize propeller clearance.

The POH subchapter 5.14 provided by the Tariku Aviation described performance for landing distance as follow:

NORMAL LANDING TECHNIQUE

CONDITIONS:

<i>Power</i>	<i>: To maintain a 3° approach angle to touchdown.</i>
<i>Flap</i>	<i>: 40°</i>
<i>Propeller Lever</i>	<i>: Maximum rpm</i>
<i>Airspeed</i>	<i>: 1.3 V_{so}¹⁰ to 50 ft then reducing.</i>
<i>Braking</i>	<i>: Maximum wheel braking.</i>
<i>Surface</i>	<i>: Paved, level, dry runway.</i>

NOTES

- 1. Normal Landing technique as specified in Section 4.*
- 2. Decrease distance by 7% for each 5 knots of headwind.*
- 3. Up to 10 knots of tailwind increase distances by 12% for each 2.5 knots of tailwind.*
- 4. For operations on dry grass, increase ground roll distance by 15%.*
- 5. If required to land flaps up, add 8 to 13 knots to the approach speed (8 knots at 4,000 lbs weight up to 13 knots at maximum landing weight of 7,125 lbs) and increase the required landing distance by 25%.*
- 6. Use of beta and reverse thrust may reduce ground roll distance on a dry runway by 5%.*

¹⁰ V_{so} is stalling speed or the minimum steady flight speed at which the airplane is controllable in the landing configuration.

(7,125 lbs and all lesser weights)

Pressure Altitude (ft)	ISA Deviation (°C)	Ground Roll (ft)	Total distance over a 50' obstacle (ft)
0	-10	791	1,928
	0	866	2,075
	10	851	2,046
	20	881	2,105
	30	911	2,164
2,000	-10	851	2,045
	0	883	2,108
	10	915	2,172
	20	948	2,236
	30	980	2,301
4,000	-10	916	2,173
	0	951	2,242
	10	985	2,312
	20	1,020	2,382
	30	1,055	2,452
6,000	-10	987	2,315
	0	1,024	2,390
	10	1,062	2,466
	20	1,099	2,542
	30	1,137	2,618
8,000	-10	1,065	2,570
	0	1,105	2,656
	10	1,146	2,741
	20	1,186	2,828
	30	1,227	2,914
10,000	-10	1,150	2,856
	0	1,194	2,953
	10	1,237	3,050
	20	1,281	3,148
	30	1,325	3,245

Figure 12: Landing distance table

1.17.1.4 Risk Assessment for Bayabiru Flight Operation

On 24 August 2020, the Tariku Aviation conducted hazard identification and risk assessment for the flight operation at Bayabiru. There were several hazards had been identified including the runway was slippery when wet. Considering this hazard, the Tariku Aviation developed mitigation as follow:

Landing on wet runway is RESTRICTED; need to wait minimum 6 hours after recent rain. Obtain reliable runway condition information.

The PIC who also the chief pilot for PAC 750XL aircraft in the Tariku Aviation was aware of the mitigation for the slippery runway at Bayabiru. The PIC considered that drizzle have less water intensity than rain and did not assumed that the runway would be wet, therefore the requirement to wait for minimum of 6 hours was not required.

1.18 Additional Information

The data collection in the occurrence site was limited due to the travel limitation during the Corona virus (Covid-19) pandemic. The investigation is continuing, should any further relevant safety issues emerge during the course of the investigation, KNKT will immediately bring the issues to the attention of the relevant parties and publish as required.

1.19 Useful or Effective Investigation Techniques

The investigation was conducted in accordance with the KNKT approved policies and procedures, and in accordance with the standards and recommended practices of Annex 13 to the Chicago Convention.

2 FINDINGS

Findings are statements of all significant conditions, events or circumstances in the accident sequence. The findings are significant steps in the accident sequence, but they are not always causal, or indicate deficiencies. Some findings point out the conditions that pre-existed the accident sequence, but they are usually essential to the understanding of the occurrence, usually in chronological order.

In this occurrence, the KNKT identified several findings as follows:

1. Both pilots held valid Commercial Pilot License (CPL) and qualified as a single engine land aircraft pilot. Both pilots also had valid first-class medical certificates. The PIC had medical limitation to wear corrective lenses during flight and no limitation for the SIC.
2. The last proficiency check PIC was conducted on 9 September 2020 and the SIC was conducted on 4 March 2020, the results were satisfactory without any remark.
3. The aircraft had valid Certificate of Airworthiness (C of A) and a valid Certificate of Registration (C of R).
4. The aircraft was not fitted with flight data recorder or cockpit voice recorder. Neither recorder was required by current Indonesian aviation regulations.
5. The aircraft was equipped with Data Acquisition Alarm Monitor (DAAM) system that capable to record aircraft and engine parameters. After the occurrence, the KNKT transported the DAAM unit of the aircraft to the KNKT facility for downloading purpose.
6. The pre-flight inspection by the aircraft engineer of Tariku Aviation did not find any abnormality on the aircraft system.
7. During the taxi, the pilot conducted a brake check and the brakes were functioning normally.
8. At the day of the occurrence, the pilot received weather information from cargo provider that Bayabiru did not rain at the previous night and only drizzled in the morning about 0500 to 0700 LT. The weather information was from Bayabiru resident who did not have knowledge of meteorological nor flight operation.
9. The information of no rain at the previous night was based on the assumption of the Bayabiru resident that until the resident went to sleep about 2100 LT there was no rain. When the Bayabiru resident woke up about 0500 LT, the Bayabiru was drizzling.
10. The observation of the Bayabiru resident was conducted from the resident house which located about 120 meters from the beginning runway 10.
11. The Tariku Aviation Standard Operating Procedures (SOP) subchapter 6.1 described that pilot must be careful when using local weather report from unqualified personnel, since the report might be not accurate.
12. On 24 August 2020, the Tariku Aviation conducted hazard identification and risk assessment for the flight operation at Bayabiru which identified the runway was slippery when wet and restrict to land when the runway was wet.

13. The PIC was aware of the mitigation for the slippery runway at Bayabiru. The PIC considered that drizzle have less water intensity than rain and did not assumed that the runway would be wet, therefore the requirement to wait for minimum of 6 hours was not required.
14. During the flight to Bayabiru, the PIC who was the chief pilot for the company would also conduct route qualification check for the Second in Command (SIC).
15. The PIC acted as Pilot Monitoring (PM), seated on the right pilot seat and the SIC acted as Pilot Flying (PF), seated on the left pilot seat.
16. After departure, the Nabire tower controller instructed the pilot to contact to change the frequency to 122.4 MHz. This frequency was a Traffic Information Broadcast by Aircraft (TIBA) frequency for Paniai Area, which according to the Aeronautical Information Publication number 05/18 the procedure of using TIBA frequency has been terminated since 29 June 2018.
17. When the aircraft approached Bayabiru, the weather was clear with high overcast clouds.
18. On final, the pilot calculated the wind was tail wind about 5 knots, by the indication of the wind shock and comparison between the groundspeed and the indicated airspeed.
19. The pilot recalled that on final approach, the aircraft speed was about 75 knots and the flaps were full down at 40°.
20. Both pilots were unable to determine whether the runway was wet or dry as the runway was grass-surface runway. Considering that there was no rain and only drizzle in the morning, the pilots assumed that the runway was dry and continued the landing approach.
21. When performed the landing flare, the PF recalled that the stall warning was active and the speed had been reduced to about 60 knots.
22. After touchdown, the pilots felt that the runway was slippery, and the PF then set the brake to maximum and the propeller lever to Beta Mode for deceleration.
23. The PIC felt the aircraft did not decelerate as intended and took over the aircraft control, thereafter selected the propeller to reverse to increase deceleration.
24. The aircraft touched down marks found on runway 10 about 15 meters from the beginning runway and stopped by impacting higher ground at the end of the runway.
25. All occupants used the safety belt during the occurrence and no one were injured. After the aircraft stop, all occupants were self-evacuated from the aircraft.
26. The airstrip was operated by local government of Paniai which had not been certified by the Directorate General of Civil Aviation (DGCA). The airstrip information for Bayabiru was not included in the Aeronautical Information Publication (AIP).
27. The Tariku Aviation developed route guide and airstrip chart that were used for internal use. In the airstrip chart, the runway length at Bayabiru was 350 meters.

28. During the on-site investigation, the KNKT measured the runway length which both ends of runway were marked by bushes and higher ground. The measurement result was about 330 meters. The KNKT also retrieved the Bayabiru airstrip information from the other aircraft operator which described the runway length of the Bayabiru was 330 meters.

3 SAFETY ACTION

At the time of issuing this report, the KNKT had not been informed of any safety actions resulting from this occurrence.

4 SAFETY RECOMMENDATIONS

4.1 Tariku Aviation

- **04.O-2020-22.1**

On 24 August 2020, the Tariku Aviation conducted hazard identification and risk assessment for the flight operation at Bayabiru. There were several hazards had been identified including the runway was slippery when wet. Considering this hazard, the Tariku Aviation required pilot to obtain reliable runway condition information and must wait at minimum 6 hours after the rain.

The Tariku Aviation Standard Operating Procedures (SOP) subchapter 6.1 described that local weather reports can be obtained from the BMKG website or local resident at the certain airstrip. The subchapter 6.1 also had provided warning that the weather report from the local resident might not be accurate since these reports are from unqualified personnel.

Prior to the departure, the pilot had received information that Bayabiru did not rain at the previous night and only drizzled in the morning from about 0500 to 0700 LT. The source of the information was from Bayabiru resident who did not have knowledge of meteorological nor flight operation.

The information of no rain at the previous night was based on the assumption of the Bayabiru resident that until the resident went to sleep about 2100 LT there was no rain. When the Bayabiru resident woke up about 0500 LT, the Bayabiru was drizzled.

The pilot considered that the drizzled from the morning might have dried as the drizzled would have lesser water intensity than rain. Based on that consideration the PIC decided to conduct the flight to Bayabiru. The pilot consideration of the runway condition was diverse with the actual runway condition, where the pilots felt the runway was slippery after touchdown.

Therefore, the KNKT recommends the Tariku Aviation to obtain accurate runway condition information to support pilot decision making.

- **04.O-2020-22.2**

The calculation of the aircraft empty weight on the weight and balance form of the occurrence flight was based on the calculation of 2 passenger seats installed, while the aircraft was installed with 4 passenger seats. This resulted in the aircraft empty weight that should be heavier.

Therefore, the KNKT recommends the Tariku Aviation to ensure the calculation of weight and balance is conducted based on the actual aircraft configuration.

4.2 AirNav Indonesia branch Nabire

- **04.O-2020-22.3**

After departure, the Nabire tower controller instructed the pilot to contact the frequency of 122.4 MHz. This frequency was a Traffic Information Broadcast by Aircraft (TIBA) frequency for Paniai Area, which according to the Aeronautical Information Publication (AIP) Supplement number 05/18 the procedure of using TIBA frequency had been terminated since 29 June 2018.

Based on AIP Volume I ENR 6.2-B (FIR Ujung Pandang) amendment 64, after 10 Nm from Nabire until Bayabiru, flight information service would be provided by Biak Flight Service Station (FSS) on frequency 6,631 kHz.

Two different frequencies on the same uncontrolled area might increase the possibility of pilots on the area unable to communicate each other to determine their relative positions.

Therefore, the KNKT recommends the AirNav Indonesia branch Nabire to review the use of radio communication frequency on uncontrolled area to ensure pilots on the same area communicates on the same frequency.

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