



**KOMITE NASIONAL KESELAMATAN TRANSPORTASI  
REPUBLIC OF INDONESIA**

# **PRELIMINARY**

**KNKT.21.09.12.04**

**Aircraft Accident Investigation Report**

**Rimbun Abadi Aviasi**

**DHC-6-300; PK-OTW**

**2 Nm South West of Bilorai Airport, Papua**

**Republic of Indonesia**

**15 September 2021**

**2021**

This Preliminary Report was published by the Komite Nasional Keselamatan Transportasi (KNKT), Transportation Building, 3<sup>rd</sup> 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, 31 October 2021

**KOMITE NASIONAL  
KESELAMATAN TRANSPORTASI  
CHAIRMAN**



**SOERJANTO TJAHHJONO**

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## ABBREVIATIONS AND DEFINITIONS

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ACO	:	Aeronautical Communication Officer
AFIS	:	Aerodrome Flight Information Service
ALAR	:	Approach and Landing Accident Reduction
ARP	:	Aerodrome Reference Point
ARQ	:	Airport and Route Qualification
ATS	:	Air Traffic Services
C of A	:	Certificate of Airworthiness
C of R	:	Certificate of Registration
CASR	:	Civil Aviation Safety Regulation
CFIT	:	Controlled Flight into Terrain
CPCP	:	Corrosion Prevention and Control Program
CVR	:	Cockpit Voice Recorder
DGCA	:	Directorate General of Civil Aviation
EMMA	:	Equalized Maintenance for Maximum Availability
FAA	:	Federal Aviation Administration
FDR	:	Flight Data Recorder
FLTA	:	Forward-Looking Terrain Avoidance
Km	:	Kilometers
KNKT	:	Komite Nasional Keselamatan Transportasi
LT	:	Local Time
Nm	:	Nautical Mile
OM	:	Operation Manual
PDA	:	Premature Descent Alert
PF	:	Pilot Flying
PIC	:	Pilot in Command
PM	:	Pilot Monitoring
RMI	:	Radio Magnetic Indicator
RWY	:	Runway
SIC	:	Second in Command
TAWS	:	Terrain Awareness and Warning System
TEM	:	Threat and Error Management
TSB	:	Transport Safety Board
TSO	:	Technical Standard Order
UTC	:	Universal Time Coordinated
VFR	:	Visual Flight Rules

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## SYNOPSIS

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On 15 September 2021, a DHC-6-300 (Twin Otter) aircraft registered PK-OTW was being operated for an unscheduled cargo flight from Douw Aturure Airport (WABI), Nabire, Papua to Bilorai Airport (WAYB), Intan Jaya, Papua. The aircraft was operated by two pilots accompanied by one engineer on board.

At 0644 LT, the aircraft departed and climbed to the cruising altitude of 9,500 feet. Prior to the departure, there was no record or report of aircraft system malfunction. During flight, both pilots monitored weather information provided by the pilot of another aircraft that flew ahead of the PK-OTW to Bilorai.

During flight, both pilots monitored weather information provided by the pilots of two other aircraft that flew ahead of the PK-OTW to Bilorai. The PK-OTW pilots monitored that the first aircraft (Cessna 208B EX) landed using Runway 27 while the second aircraft (Cessna 208B) would use Runway 09. Thereafter, the PIC advised the SIC to use the Runway 27 for landing.

The PK-OTW made a go around from Runway 27 and turned to the left with intention to land using Runway 09. During the turning maneuver to the left, the aircraft impacted terrain. The aircraft was found on a hillside area with elevation about 8,100 feet which located about 2 Nm South West of Bilorai on bearing 260°.

The aircraft was destroyed and all occupants was fatally injured.

At the time of issuing this Preliminary Report, the KNKT had not been informed of safety actions resulting from this occurrence. The KNKT issued safety recommendations addressed to the aircraft operator.

The investigation is ongoing, should further safety issues emerge during the course of the investigation, KNKT will bring the issues to the attention of the relevant parties and issue safety recommendation(s) as required. This investigation involved the participation of the Transport Safety Board (TSB) Canada as the State of Design and the State of Manufacture. The agency has appointed the accredited representatives to participate in this investigation in accordance with the provisions of the ICAO Annex 13.

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# 1 FACTUAL INFORMATION

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## 1.1 History of the Flight

On 15 September 2021, a DHC-6-300 (Twin Otter) aircraft registered PK-OTW was being operated for an unscheduled cargo flight from Douw Aturure Airport (WABI), Nabire, Papua<sup>1</sup> to Bilorai Airport (WAYB), Intan Jaya, Papua<sup>2</sup>. The aircraft was operated by two pilots accompanied by one engineer on board.

The filed flight plan for the flight indicated that the aircraft would be operated under Visual Flight Rule (VFR) with fuel endurance of 2 hours 30 minutes. The estimate time departure for the flight was at 0640 LT<sup>3</sup>.

At 0610 LT, the pilot received weather observation report from the Bilorai aeronautical communication officer (ACO) that the visibility was 5 up to 7 kilometers, several clouds over the airport and all final areas were clear. About 7 minutes later, the ACO updated the observation report which indicated that the visibility changed to 7 up to 8 kilometers (km).

After the cargo loading process and the flight preparation had completed, the aircraft taxied to Runway 16. At 0644 LT, the aircraft departed and climbed to the cruising altitude of 9,500 feet. Prior to the departure, there was no record or report of aircraft system malfunction. The Pilot in Command (PIC) acted as Pilot Monitoring (PM) while the Second in Command (SIC) acted as Pilot Flying (PF).

At 0658 LT, the PK-OTW pilot reported to the Nabire air traffic control that the aircraft was at 25 Nm with altitude of 9,500 feet. At 0702 LT, the SIC asked the PIC to have the aircraft control as PF. During flight, the PK-OTW pilots monitored weather information provided by the pilots of two other aircraft that flew ahead of the PK-OTW to Bilorai. Both pilots monitored that the first aircraft (Cessna 208B EX) landed using Runway 27 while the second aircraft (Cessna 208B) would use Runway 09. At 0715 LT, the PIC advised the SIC to use the Runway 27 for landing.

At 0719 LT, the SIC made initial contact with the ACO and advised that the aircraft was approaching Bilai<sup>4</sup> at altitude of 9,500 feet and the estimate time arrival at Bilorai was 0726 LT. The ACO acknowledged the pilot report and provided current weather observation as follows "...wind westerly 3 until 5 knots, final 09 open<sup>5</sup> with broken fog and final 27 open, visibility 5 until 7 km, blue sky overhead". The SIC acknowledged the weather information and advised the ACO would report when the aircraft position was on left downwind Runway 27.

At 0721 LT, the SIC read the descent checklist included the item of Landing Data/Approach Briefing and was replied by completed. The Cockpit Voice Recorder (CVR) did not record any pilot's discussion regarding to the airport minimum safe altitude since the beginning of the recording.

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

2 Bilorai Airport (WAYB), Intan Jaya, Papua will be named as Bilorai for the purpose of this report.

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

4 Bilai is an airstrip that located about 10 Nm on west of Bilorai.

5 The term "open" using by the ACO means that the area was not covered by clouds or fog.



At 0723 LT, a pilot of DHC-6-400 aircraft registered PK-OTJ, asked the PK-OTW pilot of the weather condition in Bilorai. The PK-OTJ flew behind the PK-OTW with from Nabire to Bilorai. The SIC then responded that the PK-OTW was on descend and would fly through clouds about 5 Nm to Bilorai. Thereafter, the ACO provided traffic information to PK-OTW pilot that there was an aircraft (Cessna 208B aircraft) on final Runway 09. The PIC who acted as PF acknowledged the traffic information and advised to the ACO that the PK-OTW would join left downwind Runway 27 for the landing approach.

At 0725 LT, the SIC advised to the ACO that the aircraft was on left downwind Runway 27. The ACO then advised the PK-OTW pilot to report when on final Runway 27.

At 07:26:12 LT, a stall warning recorded in the Cockpit Voice Recorder (CVR) then the PIC asked to the SIC to check the aircraft speed. The SIC responded the aircraft speed was 65 knots.

At 07:26:16 LT, the PIC asked to the SIC to advise the ACO that they were making a go around. The SIC then advised the ACO that the PK-OTW was making a go around and was responded to report when on final. The CVR did not record pilot's discussion about the plan maneuver of the go around.

At 07:26:45 LT, the PIC informed that they were making a go around to the PK-OTJ pilot. The PK-OTJ pilot responded that the aircraft was approaching Homeyo<sup>6</sup> and would reduce the speed to make enough separation with the PK-OTW. The PIC then advised the PK-OTJ that the PK-OTW would attempt to land using Runway 09.

Based on the data transmitted from the flight following system, at 07:27:57 LT, the aircraft was about 3 Nm outbound from Bilorai on direction of 238°.

At 07:28:22 LT, the PK-OTJ pilot advised to the ACO that the aircraft was about 6 nm to Bilai<sup>7</sup> and the pilot intended to make holding maneuver over Bilai to make enough separation with the PK-OTW.

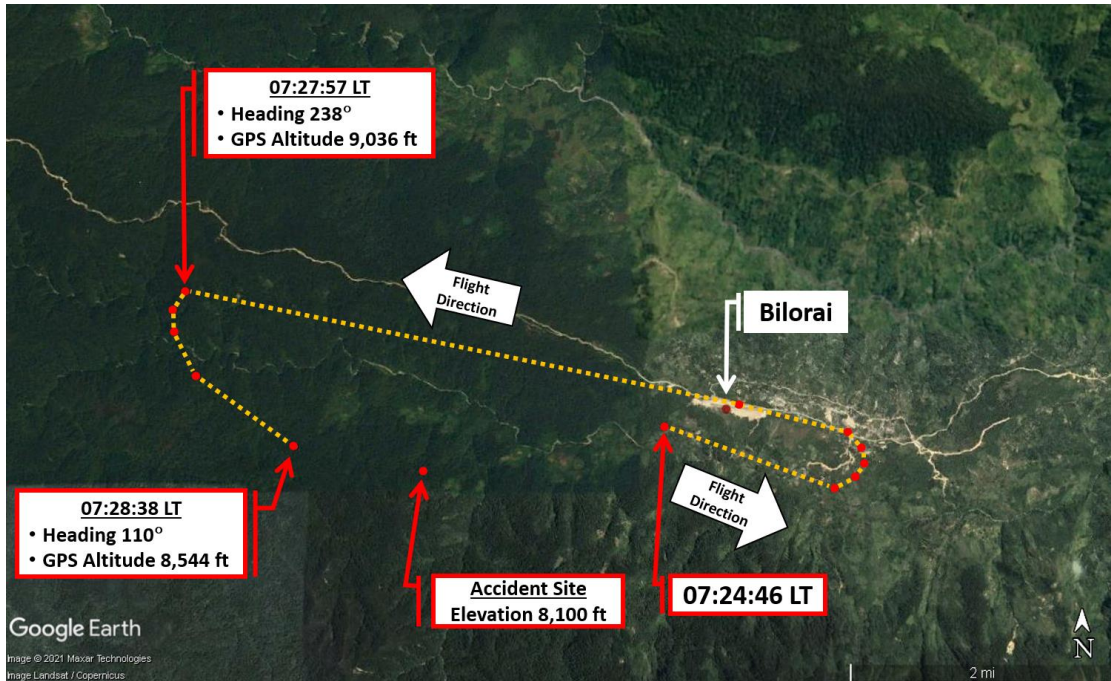
At 07:28:33 LT, the SIC advised the PIC that the aircraft was at 8,200 feet and was responded that the PIC initiated turning the aircraft. A few second later, the SIC advised to the PIC that the aircraft was turning, and the aircraft was at 3.2 Nm outbound from Bilorai.

At 07:28:38 LT, the last data of the flight following system recorded that the aircraft was on direction of 110°.

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<sup>6</sup> Homeyo is an airstrip that located about 20 Nm on north west of Bilorai.

<sup>7</sup> Bilai is an airstrip that located about 10 Nm on west of Bilorai.



**Figure 1: Flight trajectory based on flight following data (Source: Google Earth, annotated by KNKT)**

At 07:29:25 LT, the SIC advised the PIC to fly left. Thereafter, the SIC advised the PIC that the aircraft was passing 8,000 feet.

At 07:29:35 LTC, the PIC asked to the SIC about the distance to Bilorai and was responded 2.5 Nm. The SIC, reminded the PIC to fly left as the aircraft flew too close to the terrain. At 07:29:49 LT, the CVR recorded the first impact sound and the CVR recording stopped at 07:29:55 LT.

At 0730 LT, the ACO asked the PK-OTW pilot intention as the aircraft was not visible from the ACO working position, and the pilot did not respond the ACO. At about the same time, the ACO heard impact sound that was predicted coming from terrain area on west of Bilorai.

The ACO then called the PK-OTW pilot several times without response. Several pilots also attempted to contact the PK-OTW with the same result.

The PK-OTW was found on a ridge at elevation of 8,100 feet, about 2 Nm on bearing 260° from Bilorai.

## 1.2 Injuries to Persons

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	3	-	3	-
Serious	-	-	-	-
Minor	-	-	-	Not applicable
None	-	-	-	Not applicable
<b>TOTAL</b>	<b>3</b>	<b>-</b>	<b>3</b>	<b>-</b>

All fatally injured occupants were Indonesian citizens.

### **1.3 Damage to Aircraft**

The aircraft was destroyed.

### **1.4 Other Damage**

No other damage to property and/or the environment.

### **1.5 Personnel Information**

#### **1.5.1 Pilot in Command**

Age	:	58 years old
Nationality	:	Indonesia
Date of joining company	:	17 February 2021
License	:	Airline Transport Pilot License
Date of issue	:	20 March 2006
Aircraft type rating	:	Casa 212-200, DHC-6
Instrument rating validity	:	30 November 2021
Medical certificate	:	First Class
Last of medical	:	6 April 2021
Validity	:	20 October 2021
Medical limitation	:	Shall possess glasses that correct for near vision

The Pilot in Command (PIC) had total flying hours of 13,158 hours 44 minutes, included 8,051 hours 44 minutes on DHC-6 aircraft type. In the last 24 hours, the PIC had flown for 6 hours 41 minutes including 44 minutes of the occurrence flight.

The PIC had flown in Papua area since 1997 and had flown to Bilorai for several times. In the last three days prior to the occurrence, the PIC had flown from Nabire to Bilorai 9 times. In all those flights, the PIC was paired with the same SIC of the occurrence flight.

The last proficiency check for the PIC was on 24 November 2020, which was conducted in the previous company, the result was satisfactory without any remarks.

The last Airport and Route Qualification (ARQ) check for the PIC for route Nabire to Bilorai was conducted on 24 February 2021. On the ARQ items check, the airport and route knowledge were part of check items. The check result was satisfactory without any remark.

The last line check for the PIC was conducted on 31 July 2021 without any remarks.

The PIC had conducted training of controlled flight into terrain (CFIT) training combined with approach and landing accident reduction (ALAR) training in March 2020. The total duration of the training was 8 hours of ground course.

### 1.5.2 Second in Command

Age	: 26 years old
Nationality	: Indonesia
Date of joining company	: 18 January 2021
License	: Commercial Pilot License
Date of issue	: 9 December 2014
Aircraft type rating	: DHC-6
Instrument rating validity	: 30 September 2020
Medical certificate	: First Class
Last of medical	: 13 April 2021
Validity	: 11 November 2021
Medical limitation	: None

The Second in Command (SIC) had total flying hours of 974 hours 44 minutes, included 807 hours 44 minutes on DHC-6 aircraft type. In the last 24 hours, the PIC had flown for 6 hours 41 minutes including 44 minutes on the occurrence flight.

The SIC had flown in Papua area since 2018 and including route to Bilorai for several times. In the last three days prior to the occurrence, the SIC had flown from Nabire to Bilorai 9 times. In all those flights, the SIC was paired with the same PIC of the occurrence flight.

The last proficiency check was conducted on 28 February 2021 and the result was satisfactory with remarks “need preparation for procedure”.

The SIC had conducted training of CFIT training combined with ALAR training in August 2021. The total duration of the training was 8 hours of ground course.

### 1.5.3 Aircraft Engineer

Age	: 41 years old
Nationality	: Indonesia
Date of joining company	: 24 February 2021
License	: Aircraft Maintenance Engineer License
Date of issue	: 2 October 2013
Type rating	: DHC-6, PT6A Series
Instrument rating validity	: 30 September 2020
Medical certificate	: First Class
Last of medical	: 13 April 2021
Validity	: 11 November 2021
Medical limitation	: None

#### **1.5.4 Aeronautical Communication Officer**

Age : 27 years old  
Nationality : Indonesia  
Year of joining company : 2015  
License : Aeronautical Communication Officer License  
Date of issue : 30 September 2015  
Type rating : Basic Aeronautical Fixed

### **1.6 Aircraft Information**

#### **1.6.1 General**

The DHC-6-300 aircraft with serial number of 493, registered PK-OTW was manufactured by de Havilland Inc, Canada in 1976.

The aircraft had valid Certificate of Airworthiness (C of A) and Certificate of Registration (C of R) issued by the Directorate General of Civil Aviation (DGCA). The C of A for the PK-OTW aircraft was standard airworthiness certificate and was issued on 22 February 2021 with category for normal aircraft without any limitations.

The total hours since new of the aircraft was 40,332.32 hours and the total cycles since new was 78,749 cycles. Last major check for the aircraft was Corrosion Prevention and Control Program (CPCP) inspection that was conducted on 23 March 2020, and the last minor check was Equalized Maintenance for Maximum Availability (EMMA) #23 check that conducted on 29 August 2021.

According to the DHC-6 Twin Otter Series 300 Maintenance Manual Volume 1, the DHC-6-300 aircraft is configured for 20 passengers in commuter type seating. The PK-OTW aircraft was configured for cargo operation with one passenger seat in rear cabin.

#### **1.6.2 Engines**

Manufacturer : Pratt & Whitney Canada  
Type/Model : PT6A-27  
Serial Number-1 engine : PCE-42579  
▪ Time Since New : 16,077.35 hours  
▪ Cycles Since New : 32,046 cycles  
Serial Number-2 engine : PCE-42995  
▪ Time Since New : 10,333.27 hours  
▪ Cycles Since New : 10,569 cycles

#### **1.6.3 Weight and Balance**

The weight and balance information will be included in the final report.

#### 1.6.4 Ground Proximity Warning System/Terrain Awareness and Warning System

The aircraft was installed with Sandel ST3400 Terrain Awareness and Warning System (TAWS)/Radio Magnetic Indicator (RMI) with part number ST3400-000 and serial number 3346. The ST3400 TAWS/RMI is a multi-function display with a self-contained TAWS which provided alerts of Forward-Looking Terrain Avoidance (FLTA) and Premature Descent Alert (PDA). The alert system of ST3400 TAWS/RMI includes an annunciation and aural alerts.

The TAWS function in the ST3400 TAWS/RMI is certified in accordance with United States of America Federal Aviation Administration (FAA) Technical Standard Order (TSO)-C151B.

The ST3400 TAWS/RMI in PK-OTW aircraft located at the Pilot in Command (left) side instrument panel (see the red square on the following figure).

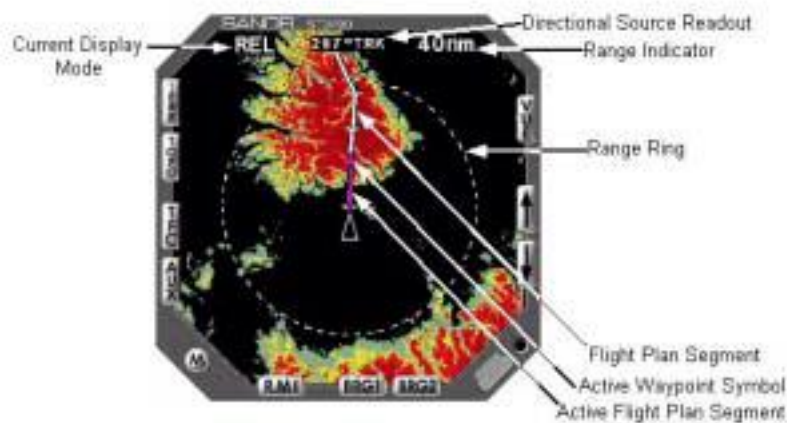


**Figure 2: The ST3400 TAWS/RMI location (red square)**

According to the ST3400 TAWS/RMI Pilot's Guide, the display can be selected into several modes as follows:

<i>DISPLAY SELECTION BUTTONS</i>		
<i>Button</i>	<i>View</i>	<i>Description</i>
<i>TERR</i>	<i>RELative Altitude</i>	<i>Color coded above/below aircraft current altitude; flight plan displayed. This selection pops-up from any other selection in the event of a terrain alert.</i>
	<i>PREDictive Altitude</i>	<i>Color coded above/below aircraft flight path angle (predicted altitude)</i>
<i>TOPO</i>	<i>TOPOgraphic</i>	<i>Topographic view of the terrain without</i>

		<i>regard to aircraft altitude; flight plan displayed.</i>
<i>TFC</i>	<i>Traffic</i>	<i>Traffic is displayed. No terrain or flight plan is displayed.</i>
<i>RMI</i>	<i>RMI</i>	<i>Compass rose is displayed, no terrain or flight plan is displayed</i>
<i>VUE</i>	<i>FULL</i>	<i>360-degree view</i>
	<i>ARC</i>	<i>70-degree view (not available for TFC) Size of terrain cells is maintained when toggling between FULL view and ARC</i>

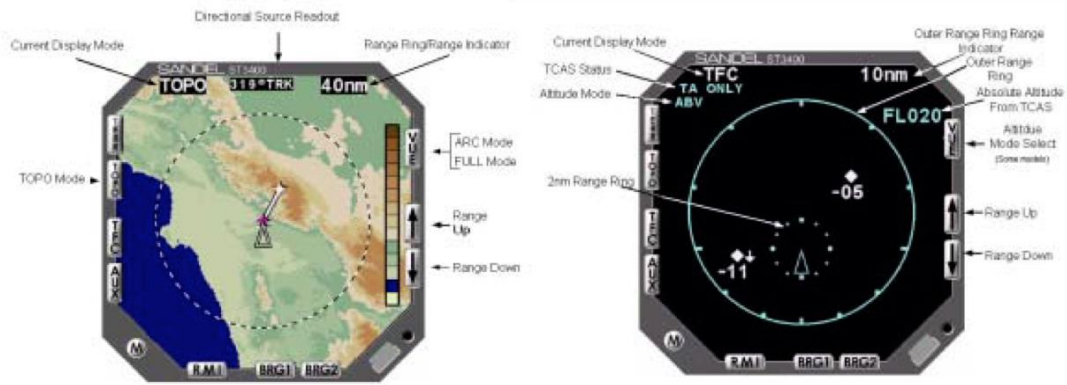


**Figure 3: Typical ST3400 TAWS/RMI display in REL view (taken from ST3400 TAWS/RMI Pilot's Guide)**

In the TERR (REL or PRED) display mode, the ST3400 TAWS/RMI Pilot's Guide described color zone of the display as follows:

*On the RELative and PREDicted altitude displays, terrain that is farthest below the aircraft altitude is shown in black. Terrain closer to the aircraft altitude is shown in green. Terrain even closer to the aircraft altitude is shown in yellow. Terrain above the aircraft altitude is shown in light red. Terrain way above the aircraft altitude is shown in dark red.*

*On an approach to the airport, the color bands become compressed; in effect the yellow/green bands shrink as the aircraft gets closer to the runway. Within 1nm of the airport (during flight) and when on the ground, green and yellow are suppressed. Red is used to depict terrain above the aircraft.*



**Figure 4: Typical ST3400 TAWS/RMI display in TOPO view (left) and TFC view (right) – (taken from ST3400 TAWS/RMI Pilot’s Guide)**

The ST3400 TAWS/RMI Pilot’s Guide described terrain alerts as follows:

*The FLTA Alert Area is an internal computation that covers an area mostly in front of and somewhat to the side of the aircraft.*

*Through sophisticated look-ahead algorithms, alerts are generated if terrain or an obstacle conflict with the flight path angle of the aircraft.*

*Range and altitude of the aircraft are computed along the projected flight path at one-second intervals. The projected range is based on current aircraft location and the aircraft’s ground speed. The projected altitude is based on current aircraft altitude and the aircraft’s vertical speed. Within the Alert Area the aircraft’s projected flight path and each terrain cell’s elevation are compared to check for terrain threats. This area of potential conflict projects forward and to the sides of the aircraft. In turning flight, the covered alert area grows in the direction of the turn.*

*During enroute operations, a caution typically occurs approximately 60 seconds ahead of the terrain conflict. A caution will turn into a warning if evasive action is not taken. An audible and visual alert will be produced at the closest cell in which a threat is detected.*

The ST3400 TAWS/RMI Pilot’s Guide described the TAWS inhibit as follows:

*FLTA and PDA alerting, can be inhibited using the Pilot’s Menu TAWS INHIBIT (or if installed the external TAWS INH pushbutton). This function also inhibits REL and PRED displays.*

...

*Be aware that the TAWS INH function cancels all FLTA and PDA alerts but does not cancel basic GPWS alerting modes 1-6. By regulation, there is no provision to disable GPWS modes except by pulling the TAWS Circuit Breaker.*

The ST3400 TAWS/RMI Pilot’s Guide described that the unit has self-test capability including test of the on-screen annunciation and audio system alerts of the TAWS.

The aircraft operator Quick Reference Handbook (QRH) for DHC-6-300 described that pilot must perform TAWS test during cockpit preparation.



### **1.6.5 Flight Following System**

The aircraft installed with flight following system manufactured by Spider Tracks Limited which manufactured in New Zealand. The flight following system recorded an interval data reporting including time, coordinate, aircraft GPS altitude, ground speed and bearing.

The investigation retrieved the reporting Spider Tracks data of the accident flight and included the relevant information in the chapter 1.1 (history of the flight).

## **1.7 Meteorological Information**

The weather information for air traffic at Bilorai was based on aeronautical communication officer observation and pilot report, there was no aviation meteorological unit to provide meteorological information.

### **1.7.1 Aeronautical Communication Officer Weather Observation**

The Bilorai aeronautical communication officer (ACO) provided PK-OTW's pilot that at 0610 LT, the visibility at Bilorai was 5 up to 7 kilometers, several cloud base over the airport and all final area was clear with blue sky on overheard of the airport. About 7 minutes later, the ACO updated the observation report which indicated that the visibility changed to 7 up to 8 kilometers (km).

At 0720 LT, the ACO provided weather observation report to the PK-OTW's pilot that the wind was westerly with velocity about 3 up to 5 knots, there was broken fog on final area of Runway 09 and the final area of Runway 27 was clear, airport visibility was about 5 up to 7 km with blue sky overhead the airport.

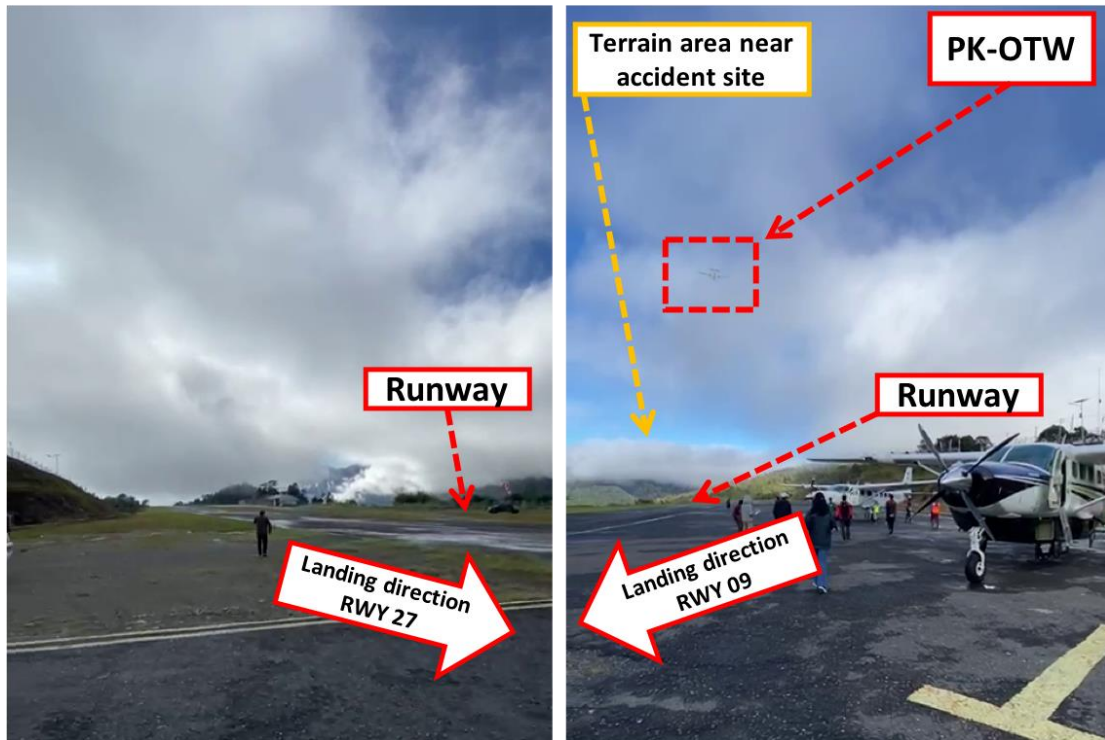
At 0729 LT, the ACO provided weather observation report to the PK-OTJ pilot (DHC-6-400 aircraft from the same company that also flew from Nabire to Bilorai behind the PK-OTW). The final area of Runway 09 was hazy while the final area of Runway 27 covered by clouds.

### **1.7.2 Pilot Weather Report**

The pilot of Cessna 208B who landed using Runway 09 at 0723 LT, broadcasted in the ACO frequency that during the landing approach on Runway 09, the aircraft entered clouds and had visual about 1 Nm to Bilorai. At 0725 LT, the Cessna 208B pilot from the Bilorai apron broadcasted that the terrain area on final Runway 27 was covered by clouds.

### **1.7.3 Video Footage**

A video footage taken from Bilorai apron area, captured the weather condition when PK-OTW was making a go around and flew overhead the airport. The video indicated that the final area of Runway 27 and the terrain area near the accident site were covered by clouds.



**Figure 5: The images from video footage when the PK-OTW was making a go around**

## 1.8 Aids to Navigation

No ground-based navigation aid provided at Bilorai.

The aircraft operator Operation Manual – Part C (OM – Part C), provided area, route and aerodrome information for Nabire to Bilorai flight as follows:

### *Route Plan*

<i>POINT</i>	<i>TRACK</i>	<i>DISTANCE</i>	<i>TOTAL DISTANCE</i>	<i>GRID MORA</i>	<i>ALTITUDE</i>
<i>Nabire</i>	<i>106</i>				<i>9,500 ft</i>
<i>Point B</i>	<i>102</i>	<i>37</i>		<i>11,900 ft</i>	
<i>Point E</i>	<i>105</i>	<i>24</i>	<i>61</i>		
<i>Homeyo</i>	<i>100</i>	<i>22</i>	<i>83</i>	<i>14,500 ft</i>	
<i>Bilai</i>	<i>090</i>	<i>7</i>	<i>90</i>	<i>14,500 ft</i>	
<i>Sugapa</i> <sup>8</sup>		<i>12</i>	<i>102</i>	<i>14,600 ft</i>	

*After departure Nabire continue climb to 9.500 ft via overhead station proceed to point B Nabire tower will keep monitoring until 10 nm out from Nabire and then transfer to 122.4 MHz TIBA<sup>9</sup> frequency Paniai area for monitor traffic.*

*After passing the Homeyo airstrip try contact to Sugapa radio on 122.6 MHz and*

<sup>8</sup> Sugapa is the other name of Bilorai.

<sup>9</sup> Traffic Information Broadcast by Aircraft (TIBA).

*approaching Bilai airstrip start descent to circuit altitude and proceed to final R/W 09 Sugapa If using R/W 27 Sugapa descend to circuit altitude proceed to L/D or R/D<sup>10</sup> whichever is possible.*

***Terrain Clearance***

*For flight clearance terrain must be above 2.000 feet from top of highest terrain, and above 1.000 feet flight over city.*

The aircraft operator Runway Analysis Manual for DHC-6-400 (PT6A-34), provided the information for flight to Bilorai, included terrain, and a go around (missed approach) procedure as follows:

<i>TERRAIN</i>	<i>TERRAIN IS TO THE NORTH, SOUTH AND WEST. CLOSEST TERRAIN TO THE SOUTH AND WEST</i>
<i>MISSED APPROACH</i>	<i>27 ABEAM TOWER ON FINAL RIGHT TURN OUT. 09 ON SHORT FINAL, GO STRAIGHT A HEAD DO NOT GO AROUND ONCE WHEEL ON THE GROUND.</i>

Based on the interview with several pilots of the aircraft operator, the investigation was advised a best practice when conducted a go around from Runway 27 of Bilorai. The best practice was to fly straight until reaching over Bilai Airstrip (about 10 Nm west of Bilorai) then make a turn maneuver to Bilorai. The maneuver over Bilai Airstrip was considered to be safer as the area was flatter compared to the final area of Runway 09.

## **1.9 Communications**

All communications between ACO and the pilot were recorded by ground based automatic voice recording equipment and CVR. The quality of the aircraft's recorded transmissions was good. The detail information of the communication will be included in the final report.

## **1.10 Aerodrome Information**

Airport Name	: Intan Jaya Airport
Airport Identification	: WAYB
Airport Operator	: Directorate General of Civil Aviation
Coordinate	: 03°44'23" S; 137°01'51" E
Elevation	: 7,316 feet
Runway Direction	: 09 - 27
Runway Length	: 750 meters
Runway Width	: 18 meters
Surface	: Asphalt

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<sup>10</sup> L/D refers to left down wind and R/D refers to right down wind.

## 1.11 Flight Recorders

### 1.11.1 Flight Data Recorder

The aircraft was fitted with Apibox Flight Data Recorder (FDR) of part number i9220-003 and serial number 20200034, manufactured by iAero. At the time of the issuance of this preliminary report, the FDR has not been recovered.

### 1.11.2 Cockpit Voice Recorder

The aircraft was fitted with Solid State Memory Cockpit Voice Recorder (CVR) of part number 980-6020-011 and serial number 2731, manufactured by Honeywell International Inc. The CVR was recovered by the search team and transported to the Komite Nasional Keselamatan Transportasi (KNKT) flight recorders facility for data downloading. The read-out was performed by KNKT investigators.

The CVR recorded 30 minutes of audio record on four channels with hearable quality. The CVR recorded two stall warning activations and did not record any aural alert of the aircraft TAWS. The significant information of the CVR was included in the subchapter 1.1 of this report (History of the Flight), and the detail information of the CVR will be included in the final report.

## 1.12 Wreckage and Impact Information

The aircraft was found on a hillside area with elevation about 8,100 feet which located about 2 Nm South West of Bilorai on bearing 260°.

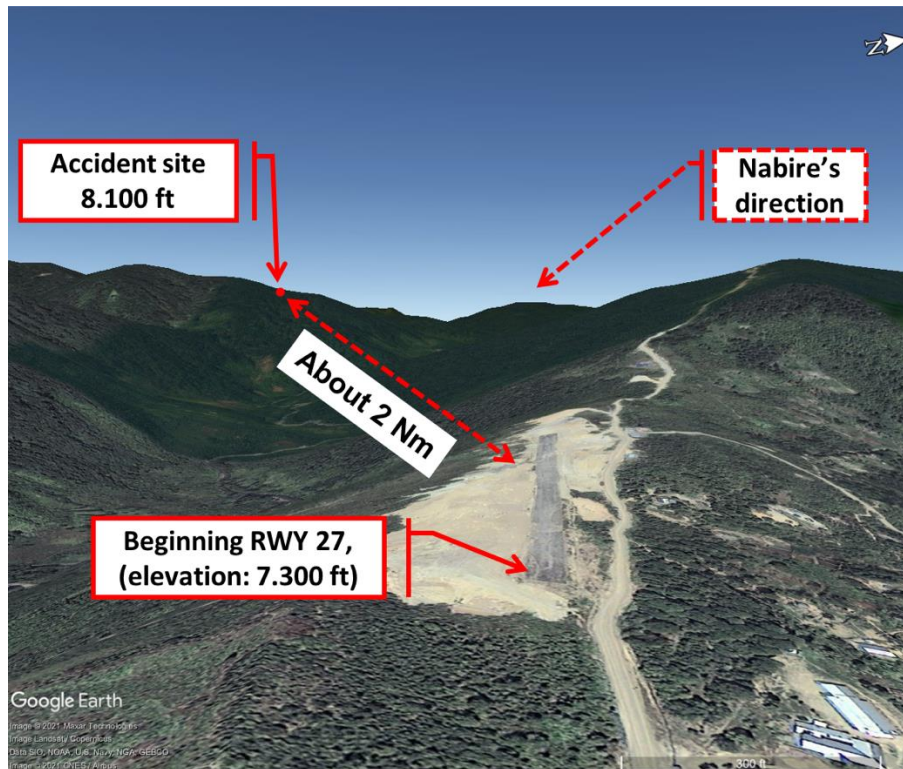


Figure 6: The accident site (Source: Google Earth, annotated by KNKT)

## 1.13 Medical and Pathological Information

This information was not available at the time of the issuance of this report. Should any medical and/or pathological information be obtained in the course of this investigation that is of relevance to this investigation, it will be included in the final report.

## 1.14 Fire

There was no evidence of in-flight fire.

## 1.15 Survival Aspects

The accident was not survivable.

## 1.16 Tests and Research

This information was not available at the time of the issuance of this report. Should any test and research information be obtained during this investigation that is relevance to this investigation, it will be included in the final report.

## 1.17 Organizational and Management Information

### 1.17.1 Aircraft Operator

The DHC-6-300 aircraft, registered PK-OTW was owned by AER, LLC and operated by Rimbun Abadi Aviiasi. The aircraft operator held a valid Air Operator Certificate, number 135-065. The aircraft operator operated a total of two DHC-6-400, one DHC-6-300 (the accident aircraft) and one Boeing 737-300F.

#### 1.17.1.1 Visual Flight Rules Weather Minimum Requirement

The aircraft operator Operation Manual – Part A (OM – Part A) subchapter 8.6.1 described a basic Visual Flight Rules (VFR) weather minimum which was referred to the Civil Aviation Safety Regulation (CASR) Part 91 – General Operating and Flight Rules. The requirement restricts any pilot to operate an aircraft under VFR to fly through clouds, and specifically prohibits pilot to fly on airspace class G when the flight visibility is less, or at a distance from clouds that is less, than that prescribed for the corresponding altitude and class of airspace in the following table:

<i>Airspace</i>	<i>Flight Visibility</i>	<i>Distance/Clouds</i>
<i>CLASS G</i>	<i>8 km above 10.000 feet</i>	<i>1,000 feet above</i>
	<i>5 km below 10.000 feet.</i>	<i>1,000 feet above</i>
	<i>The higher of 3000 feet AMSL 5 km or 1000 feet AGL in sight</i>	<i>1,500 meters horizontal Clear of clouds</i>

#### 1.17.1.2 Pilot's Briefing Policy

According to the OM – Part A subchapter 10.7.3 described that:

*Upon receiving the appropriate approach information, the PF shall nominate the procedures to be used for the approach. Normally 10 minutes prior to descent and*

*not later than 10,000 ft. AFE<sup>11</sup>.*

The subchapter 10.7.3 also requires pilot to conduct approach briefing using Threat and Error Management (TEM) concept, and the briefing shall contain several information including minimum safe altitude surrounding the airport and missed approach procedure.

#### **1.17.2 Air Traffic Services Provider**

The Air Traffic Services (ATS) in Bilorai was provided by Perum LPPNPI (AirNav Indonesia) branch office Bilorai that had valid ATS provider certificate. The ATS included an Aerodrome Flight Information Service (AFIS) which provided services within the radius of 5 Nm centered at Bilorai Aerodrome Reference Point (ARP), with vertical limit from surface up to 4,000 feet above the airport elevation. The airspace classification in Bilorai was class G airspace.

#### **1.18 Additional Information**

The data collection in the accident site was limited due to travel limitation during the COVID-10 pandemic and security issue. This investigation involved the participation of the Transport Safety Board (TSB) Canada as the State of Design and the State of Manufacture. The agency has appointed the accredited representatives to participate in this investigation in accordance with the provisions of the ICAO Annex 13.

The investigation is ongoing, should further safety issues emerge during the course of the investigation, KNKT will bring the issues to the attention of the relevant parties and issue safety recommendation(s) 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.

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<sup>11</sup> AFE is above field elevation.

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## 2 FINDINGS

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The 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.

According to information gathered during the investigation, the KNKT identified initial findings as follows:

1. The pilots held valid licenses and medical certificates.
2. The aeronautical communication officer (ACO) held valid license.
3. The aircraft had valid Certificate of Airworthiness (C of A) and Certificate of Registration (C of R).
4. The aircraft was installed with Sandel ST3400 Terrain Awareness and Warning System (TAWS)/Radio Magnetic Indicator (RMI). The ST3400 TAWS/RMI is a multi-function display with a self-contained TAWS which provided alerts of Forward-Looking Terrain Avoidance (FLTA) and Premature Descent Alert (PDA). The alert system of ST3400 TAWS/RMI includes an annunciation and aural alerts.
5. The aircraft installed with flight following system manufactured by Spider Tracks Limited that recorded an interval data reporting including time, coordinate, aircraft GPS altitude, ground speed and bearing.
6. Prior to the departure, there was no record or report of aircraft system malfunction. The pilot decided to depart after received the weather observation reports from the Bilorai aeronautical communication officer (ACO) which stated the visibility was 7 up to 8 kilometers.
7. The filed flight plan for the flight indicated that the aircraft was operated under Visual Flight Rule (VFR).
8. During the departure from Nabire, the Pilot in Command (PIC) acted as Pilot Monitoring (PM) while the Second in Command (SIC) acted as Pilot Flying (PF). Thereafter, the SIC handed over the aircraft control to the PIC.
9. During flight, both pilots monitored weather information provided by the pilots of two other aircraft that flew ahead of the PK-OTW to Bilorai. The PK-OTW pilots monitored that the first aircraft (a Cessna 208B EX) landed using Runway 27 while the second aircraft (a Cessna 208B) would use Runway 09. Thereafter, the PK-OTW pilots decided to use Runway 27 for landing.
10. The SIC read the descent checklist included the item of Landing Data/Approach Briefing and was replied by completed. The Cockpit Voice Recorder (CVR) did not record any pilot's discussion regarding to the airport minimum safe altitude since the beginning of the recording.
11. When the PK-OTW was about 5 Nm to Bilorai, the SIC advised a pilot of DHC-6-400 aircraft registered PK-OTJ that the PK-OTW was on descend and would fly through clouds.

12. The aircraft operator Operation Manual – Part A (OM – Part A) subchapter 8.6.1 restricts any pilot to operate an aircraft under VFR to fly through clouds.
13. After the ACO advised that there was Cessna 208B aircraft would land using Runway 09, the PIC advised the ACO that the PK-OTW would join left downwind Runway 27 for the landing approach.
14. The pilot of Cessna 208B who landed using Runway 09 at 0723 LT, broadcasted in the ACO frequency that during the landing approach on Runway 09, the aircraft entered clouds and had visual about 1 Nm to Bilorai. At 0726 LT, the Cessna 208B pilot from the Bilorai apron broadcasted that the terrain area on final Runway 27 was covered by clouds.
15. At 07:26:48 LT, the PIC made a go around. The CVR did not record pilot's discussion about the plan maneuver of the go around.
16. A video footage taken from Bilorai apron area, captured the weather condition when PK-OTW was making a go around and flew overhead the airport. The video indicated that the final area of Runway 27 and the terrain area near the accident site were covered by clouds.
17. At 07:26:45 LT, the PIC informed that they were making a go around to the PK-OTJ pilot. The PK-OTJ pilot responded that the aircraft was approaching Homeyo and would reduce the speed to make enough separation with the PK-OTW. The PIC then advised the PK-OTJ that the PK-OTW would attempt to land using Runway 09.
18. At 07:28:22 LT, the PK-OTJ pilot advised to the ACO that the aircraft was about 6 nm to Bilai and the pilot intended to make holding maneuver over Bilai to make enough separation with the PK-OTW.
19. At 07:28:33 LT, the SIC advised the PIC that the aircraft was at 8,200 feet and was responded that the PIC initiated turning the aircraft. A few second later, the SIC advised to the PIC that the aircraft was turning, and the aircraft was at 3.2 Nm outbound from Bilorai.
20. At 07:28:38 LT, the last data of the flight following system recorded that the aircraft was on direction of 110°.
21. At 07:29:25 LT, the SIC advised the PIC to fly left. Thereafter, the SIC advised the PIC that the aircraft was passing 8,000 feet.
22. At 07:29:35 LTC, the PIC asked to the SIC about the distance to Bilorai and was responded 2.5 Nm. The SIC, reminded the PIC to fly left as the aircraft flew too close to the terrain. At 07:29:49 LT, the CVR recorded the first impact sound and the CVR recording stopped at 07:29:55 LT..
23. At 0730 LT, the ACO asked the PK-OTW pilot intention as the aircraft was not visible from the ACO working position, and the pilot did not respond the ACO. At about the same time, the ACO heard impact sound that was predicted coming from terrain area on west of Bilorai.
24. The PK-OTW was found on a ridge at elevation of 8,100 feet, about 2 Nm on bearing 260° from Bilorai.
25. The CVR recorded 30 minutes of audio record on four channels with hearable



quality. The CVR recorded two stall warning activations and did not record any aural alert from the aircraft TAWS.

26. The aircraft operator provided a go around procedure at Bilorai in Runway Analysis Manual for DHC-6-400 (PT6A-34). The go around (missed approach) procedure for Runway 27 was “abeam tower on final right turn out”.
27. Several pilots of the aircraft operator advised the best practice when conducted a go around from Runway 27 of Bilorai is to fly straight until reaching over Bilai Airstrip (about 10 Nm west of Bilorai) then make a turn maneuver to Bilorai. The maneuver over Bilai Airstrip was considered to be safer as the area was flatter compared to the final area of Runway 09.

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### **3 SAFETY ACTION**

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

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## **4 SAFETY RECOMMENDATIONS**

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### **4.1 Rimbun Abadi Aviasi (aircraft operator)**

- **04.O-2021-12.01**

The filed flight plan for the accident flight indicated that the aircraft was operated under Visual Flight Rule (VFR). The aircraft operator Operation Manual – Part A (OM – Part A) subchapter 8.6.1 restricts any pilot to operate an aircraft under VFR to fly through clouds.

When the PK-OTW was about 5 Nm to Bilorai, the SIC advised a pilot of DHC-6-400 aircraft registered PK-OTJ that the PK-OTW was on descend and would fly through clouds. Flying under VFR through clouds is contrary to the OM – Part A subchapter 8.6.1 which could make the pilot unable to see terrain or obstacle of the surrounding area.

Therefore, KNKT recommends the aircraft operator to ensure all flights under VFR shall be conducted at or above the required weather minima.

- **04.O-2021-12.02**

The aircraft was installed with Sandel ST3400 Terrain Awareness and Warning System (TAWS)/Radio Magnetic Indicator (RMI) which provided alerts of Forward-Looking Terrain Avoidance (FLTA) and Premature Descent Alert (PDA). The alert system of ST3400 TAWS/RMI includes an annunciation and aural alerts. Prior to the departure, there was no record or report of aircraft system malfunction.

The CVR recorded 30 minutes of audio record on four channels with hearable quality. The CVR did not record any aural alert from the aircraft TAWS. The investigation has not determined the absence of the TAWS alert. However, as the aircraft operating in a mountainous area, the alerts from the TAWS will increase the pilot awareness when flying close to terrain.

Therefore, KNKT recommends the aircraft operator to ensure all TAWS installed in their aircraft are functioning and able to generate alert as intended.

- **04.O-2021-12.03**

The aircraft operator provided go around procedure at Bilorai in Runway Analysis Manual for DHC-6-400 (PT6A-34). The procedure was “abeam tower on final right turn out”. However, several pilots advised the best practice when conducted a go around from Runway 27 of Bilorai is to fly straight until reaching over Bilai Airstrip.

The differences between the procedure and the undocumented best practice maneuver could make the pilot confuse to select the safest go around maneuver.

Therefore, KNKT recommends the aircraft operator to review the go around maneuver at Bilorai and determines the safe maneuver to be followed by the pilot.

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