

PRELIMINARY
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**KOMITE
NASIONAL
KESELAMATAN
TRANSPORTASI**

Aircraft Accident Investigation Report

**PT.Aviastar Mandiri
DHC6-Twin Otter; PK-BRM
Collision with terrain
at coordinate 3° 25' 52.80" S, 120° 4' 12.10" E
Republic of Indonesia
02 October 2015**



**KOMITE NASIONAL KESELAMATAN TRANSPORTASI
REPUBLIC OF INDONESIA
2016**



This Preliminary report was produced by the Komite Nasional Keselamatan Transportasi (KNKT), 3rd Floor Ministry of Transportation, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

The report is based upon the 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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ABBREVIATIONS AND DEFINITIONS

ADC	:	Air Data Computer
ADF	:	Automatic Direction Finder
AirNav	:	Indonesia Air Traffic Service Provider
AMSL	:	Above Mean Sea Level
AOC	:	Air Operator Certificate a commercial transport license for airlines
AFIS	:	Aerodrome Flight Information Services
ATC	:	Air Traffic Control
ATPL	:	Air Transport Pilot License is the highest level of aircraft pilot licence
ATIS	:	Automatic Terminal Information Service
ATS	:	Air Traffic Service
BMKG	:	Badan Meterologi Klimatologi dan Geofisika (Metrological Climatology and Geophysical Agency)
BASARNAS	:	<i>Badan Search and Rescue Nasional</i> (National Search and rescue Agency)
°C	:	Degrees Celsius
CVR	:	Cockpit Voice Recorder
DGCA	:	Directorate General of Civil Aviation of Indonesia
DME	:	Distance Measuring Equipment
EGPWS	:	Enhance Ground Proximity Warning System
ELT	:	Emergency Locator Transmitter
EMMA	:	Equal Maintenance for Maximum Availability
FDR	:	Flight Data Recorder
GPS	:	Global Positioning System
HF	:	High Frequency
ICAO	:	International Civil Aviation Organization
IFR	:	Instrument Flight Rules
Kg	:	Kilogram (s)
Km	:	Kilo meter (s)
KNKT	:	Komite Nasional Keselamatan Transportasi
Kts	:	Knots (Nm/hours)
LT	:	Local time
m	:	Meters
mbs	:	Millibars

mm	:	Millimetre(s) is a unit of length in the metric system
Nm	:	Nautical mile(s)
PF	:	Pilot Flying
PIC	:	Pilot in Command
PM	:	Pilot Monitoring
PNF	:	Pilot Non flying
P/N	:	Part Number
RAD Alt	:	Radio Altimeter
SAR	:	Search and Rescue
SIC	:	Second in Command
TWAS	:	Terrain Awareness and Warning System
UTC	:	Universal Time Coordinate
VFR	:	Visual Flight Rules
VHF	:	Very High Frequency
VOR	:	Very High Frequency Omni-directional Range
WX Radar	:	Weather Radar
XPDR	:	Transponder

INTRODUCTION

This information is published to inform the aviation industry and the public of general circumstance of this occurrence and the investigation to date. The information must necessarily be regarded as being preliminary and subject to alteration and correction as additional evidence becomes available.

On 02 October 2015 a DHC-6 Twin Otter, registered PK-BRM was being operated by PT. Aviastar Mandiri on a scheduled passenger service flight from Masamba (WAFM) to Makassar (WAAA) with flight number MV 7503. The aircraft departed from Masamba at 0625 UTC (1425 LT) and estimated time of arrival Makassar at 0739 UTC. On board on this flight were 10 persons consist of two pilots, one company engineer and seven passengers (four adults one child and two infants).

The flight from Masamba to Makasar was the 6th sector of the flights of the day, in this flight the PIC acted as Pilot Flying and the SIC acted as Pilot Monitoring. The flight cruised at altitude of 8000 feet. At 0637 UTC both pilots agreed to fly direct to BARRU.

At 06:49, the CVR stopped recording.

On 5 October 2015, the aircraft wreckage was found on top of Bajaja Mount, Dusun Gamaru, Desa Ulusalu, Kabupaten Luwu, South Sulawesi on the coordinate of 3° 25' 52.80" S, 120° 4' 12.10" E with elevation 7,734 feet AMSL. The BASARNAS did not receive any signal of ELT

All occupants were fatally injured and the aircraft was destroyed by impact force and post impact fire.

Following this preliminary report, the Komite Nasional Keselamatan Transportasi (KNKT) issues the safety recommendations to PT. Aviastar Mandiri.

The investigation is continuing. Should any further critical 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 FACTUAL INFORMATION

1.1 History of the Flight

On 2 October 2015, a DHC-6 Twin Otter, registered PK-BRM was being operated by PT. Aviastar Mandiri as a scheduled passenger flight with flight number MV 7503. The aircraft departed from Andi Jemma Airport, Masamba¹ (WAFM) intended destination to Sultan Hasanuddin International Airport of Makassar² (WAAA), South Sulawesi, Indonesia. On board on this flight were 10 persons consist of two pilots, one company engineer and seven passengers (four adults, one child and two infants).

The previous flights were from Makassar – Tana Toraja – Makassar – Masamba – Seko - Masamba and the accident flight was from Masamba to Makassar which was the 6th sector of the flights of the day.

The PIC acted as Pilot Flying while the SIC acted as pilot monitoring.

According to the flight plan clearance issued by Andi Jemma Airport Air Traffic Information Service (ATIS) the pilot intended to fly VFR with altitude of 8000 feet and fly direct route from Masamba to Makassar.

The aircraft departed from Masamba at 0625 UTC³ (1425 LT) and estimated time of arrival Makassar at 0739 UTC.

The satellite image published by Badan Meteorology, Klimatology dan Geofisika (BMKG – Meteorology, Climatology and Geophysics Agency) at 0630 UTC and 0700 UTC, showed partial cloud formation at about 60 Nm from Masamba on the direct track to Makassar around Mount Bajaja and Mount Latimojong.

At 0630 UTC, the pilot reported to Ujung Pandang Information officer that the aircraft passed altitude 4,500 feet and was climbing to 8,000 feet. The Ujung Pandang Information officer requested the pilot of the estimate time at position of 60 Nm out from MKS VOR/DME.

At 0632 UTC, the pilot discussed about the calculation of estimate time to reach 60 Nm out from MKS and afterward the pilot informed Ujung Pandang Information officer that the estimate at 60 Nm was at 0715 UTC.

At 0633 UTC, the Ujung Pandang Information officer informed to the pilot to call when reaching 8,000 feet and this call was acknowledged by the pilot.

At 0636 UTC, the pilot informed the Ujung Pandang Information officer that the aircraft had reached 8,000 feet and requested the squawk number (ATC transponder code). The Ujung Pandang Information officer acknowledged and gave the squawk number of A5616, which was acknowledged by the pilot.

At 0637 UTC, the pilots discussed to fly direct to Barru from that position. Barru is a town located at about 45 Nm north of Makassar. Both pilots agreed to fly direct and

1 Andi Jemma airport, Masamba will be named as Massamba for the purpose of this report

2 Sultan Hasanuddin international airport Makassar will be named Makassar for the purpose of this report

3 The 24-hour clock used in this report to describe the time of day as specific events occurred is in Coordinated Universal Time (UTC). Local time for Masamba is Central Indonesia Standard Time/Waktu Indonesia Tengah (WITA) is UTC + 8.

the SIC explained the experience of flying direct on the flight before. Few second later the SIC suggested to delay the direct flight for a while.

At 06:50 UTC, the PIC told to SIC that wanted to climb and the CVR stopped recording.



Figure 1: Shows the Masamba Airport, accident site and Makassar Airport

At 0718 UTC, Ujung Pandang Information officer called PK-BRM pilot but there was no reply from the pilot. At 0735 UTC, Ujung Pandang Air Traffic Services (ATS) operational coordinator contacted the company branch officer at Makassar, to confirm whether the pilot had made a contact to the company branch officer. There was no communication between the company branch officer and the pilot.

The Ujung Pandang ATS operation coordinator contacted Masamba Airport officer to confirm whether the aircraft returned to Andi Jemma Airport or diverted to other airports nearby such as Tana Toraja, Mamuju, Bua or Bone. The Masamba Airport officer did not have any information from the pilot and the aircraft did not return to Masamba.

At 0742 UTC, the Ujung Pandang ATS operation coordinator contacted the Search and rescue (SAR) Agency and informed the lost contact of PK-BRM. The emergency operation search and rescue team was assembled. The team consisted of the SAR Agency, PT. Angkasa Pura I, Airport Authority regional V, AirNav (Air Traffic Services provider), local government, police, and army. The Badan SAR Nasional (BASARNAS – the Indonesia Search and Rescue Agency) did not receive any signal of Emergency Locator Transmitter (ELT).

On 5 October 2015, the wreckage was found by ground search team on top of Bajaja Mount, Gamaru, Ulusalu Village, Luwu District, South Sulawesi at coordinate of 3° 25' 52.80" S, 120° 4' 12.10" E at elevation of 7,734 feet AMSL.

All occupants were fatally injured and the aircraft was destroyed by impact force and post impact fire.

On 6 October 2015 the CVR was recovered and handover form BASARNAS to KNKT.

1.2 Injuries to Persons

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	2	8	10	
Serious	-	-	-	
Minor/None	-	-	-	
TOTAL	2	8	10	

1.3 Damage to Aircraft

The aircraft was destroyed by impact force and post impact fire.

1.4 Other Damage

There were sign of impact marks on several trees started from about one hundred meter from the main wreckage on approximately 255° direction.

1.5 Personnel Information

1.5.1 Pilot in Command

Gender	: Male
Age	: 40 years old
Nationality	: Indonesia
Marital status	: Married
Date of joining company	: 3 June 2009
License	: ATPL
Aircraft type rating	: DHC-6 Twin otter
Instrument rating	: 25 November 2014
Medical certificate	: First Class
Last of medical	: 15 September 2015
Validity	: 31 March 2016
Medical limitation	: Holder shall possess glasses that correct for the near vision
Last line check	: 06 June 2015
Last proficiency check	: 25 November 2014
Flying experience	
Total hours	: 2,911 hours 58 minutes
Total on type	: 2,911 hours 58 minutes
Last 90 days	: 209 hours 25 minutes
Last 60 days	: 138 hours 24 minutes
Last 24 hours	: -

This flight : Approximately 25 minutes

1.5.2 Second in Command

Gender : Male
Age : 39 years old
Nationality : Indonesia
Marital status : Married
Date of joining company : 15 January 2015
License : ATPL
 Aircraft type rating : DHC-6 Twin Otter
Instrument rating : 29 January 2015
Medical certificate : First Class
 Last of medical : 9 July 2015
 Validity : 09 January 2016
 Medical limitation : Holder shall wear corrective lenses
Last line check : 21 February 2015
Last proficiency check : 29 January 2015
Flying experience
Total hours : 4,035 hours 36 minutes
Total on type : 4,035 hours 36 minutes
Last 90 days : 180 hours 19 minutes
Last 60 days : 136 hours 54 minutes
Last 24 hours : 06 hours 08 minutes
This flight : Approximately 25 minutes

1.6 Aircraft Information

1.6.1 General

Registration Mark : PK-BRM
Manufacturer : de Havilland Canada
Country of Manufacturer : Canada
Type/ Model : DHC-6
Serial Number : 741
Year of manufacture : 1981
Certificate of Airworthiness

Issued	: 15 January 2015
Validity	: 16 January 2016
Category	: Normal
Limitations	: None
Certificate of Registration	
Number	: 3606
Issued	: 30 December 2014
Validity	: 29 December 2015
Time Since New	: 45,242.8 hours
Cycles Since New	: 75,241 cycles
Last EMMA	: 45,196.78 hours
Next EMMA	: 45,321.78 hours

1.6.2 Other equipment installed

Dual audio	: KMA 24-70H
HF	: KHF 950
RAD Alt	: KRA 405
TAWS	: KGP 560
XPDR	: GTX 330
DME	: KN 63/ KDI 572
TCAS	: GTS 850
ELT	: C 406-2
Dual GPS	: GNS 430 W
Dual NAV/COM	: GNS 430 W
WX Radar	: RDR 2000
Gyro system	: KG 102A
ADF	: KR 87
ADC	: ADC 200

The aircraft certified for both Instrument Flight Rules (IFR) and Visual Flight Rules (VFR).

1.6.3 Engines

Manufacturer	: Pratt & Whitney Canada
Type/Model	: PT6A-27
Serial Number-1 engine	: PCE-41835

- Time Since New : 16,795.1 hours
 - Cycles Since New : 27,154 cycles
- Serial Number-2 engine : PCE-50853
- Time Since New : 1,525.28 hours
 - Cycles Since New : 1,338 cycles

1.7 Meteorological Information

Weather report for Andi Jemma Airport Masamba, issued on 2 October 2015, at 0600 UTC were as follows:

- Wind : 260 / 02 knots
- Horizontal visibility : 9 km
- Weather : Nil
- Temperature : 33°C
- Dewpoint : 18°C
- Humidity : 49%
- QNH : 1013 mbs
- QFE : 1006 mbs

The satellite weather image over the centre of Sulawesi which was provided by BMKG on the day of the occurrence at 0300 UTC, 0630 UTC and 0700 UTC, and the circles showed the clouds formation at around the crash site.

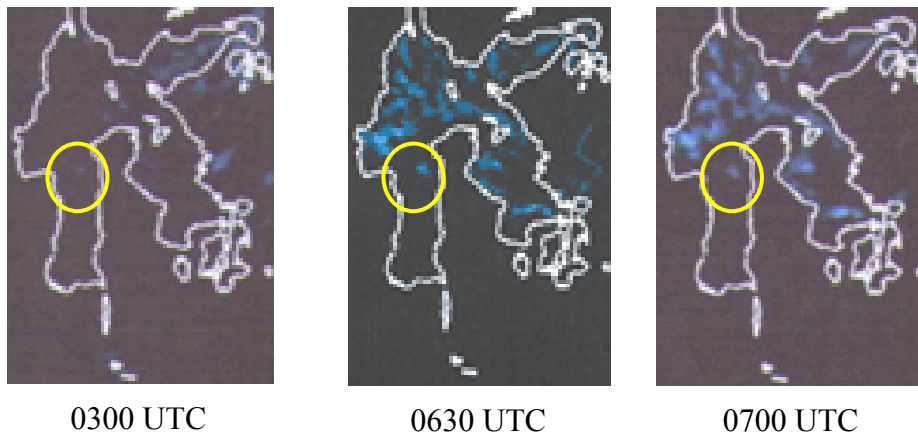


Figure 2: satellite weather images at the accident site (yellow circle)

1.8 Aids to Navigation

The navigation aids available between Masamba and Makassar were reported in normal operation.

The operator visual flight chart which was normally used for visual flight guidance by the pilots on the area is shown on the following figure.



Figure 3: Operator visual flight chart

1.9 Communications

The communications between Air Traffic Services (ATS) and the pilots were recorded by Cockpit Voice Recorder (CVR) in good quality recording.

1.10 Aerodrome Information

Airport Name	: Andi Jemma Airport
Airport Identification	: WAFM
Airport Operator	: DGCA
Coordinate	: 2°33'35''S 120°19'50''E
Elevation	: 122 feet/ 37.2 meters
Runway Direction	: 02-20
Runway Length	: 900 m
Runway Width	: 23 m
Surface	: Asphalt

1.11 Flight Recorders

The aircraft was not equipped with a flight data recorder (FDR). It was not required by current Indonesian aviation regulations. The aircraft equipped with a Cockpit Voice Recorder (CVR).

Manufacturer : L3 Communication

Type/Model : FA2100

Part Number : 2100-1020-00

Serial Number : 000802149

On 6 October 2015 the CVR was recovered from the accident site and was handover from BASARNAS to KNKT.

On 8 October 2015 the CVR was successfully downloaded at KNKT recorder facility. The CVR does not record the real time of the flight, therefore the time used on the transcription referred to takeoff time provided by the Andi Jemma AFIS.

The CVR contained two hours of good quality recording data and approximately fifth teen minutes CVR transcription prior to the end of recording are as follow:

Time (UTC)	From	To	Description
06:36	P2	Ujung Pandang Info	Informing that PK-BRM reached 8000 feet and requested Squawk Number
	Ujung Info	Pilot	Ujung given the Squawk Number of A5616
06:37	P1	P2	Suggesting a possibility to fly direct to Barru
	P2	P1	The P2 confirming yes we can, as yesterday P2 also flew the route.
06:38	P1	P2	The P1 confirming by asking "really?" while expressing it would be better rather than we turn that way.
	P2	P1	Expressing sorry and it was right and re suggesting direct to route was okay.
	P1	P2	P1 accepted to direct the flight
	P2	P1	Re offering an alternative track just for awhile
06:39	P1	P2	P1 Accepted the offering from P2.

Time (UTC)	From	To	Description
	P1	P2	Asking to confirm the Squawk number given from Ujung Info, and the P2 answered that yes given already by Ujung Info.
06:47	P2	P1	Expressing that we were still far, it was 109 nm from Makassar and acknowledged by P1
06:50	P1	P2	Expressing that P1 wanted to climb the aircraft and the recording ended.

1.12 Wreckage and Impact Information

The wreckage was found on top of Bajaja Mount, Dusun Gamaru, Desa Ulusalu, Kabupaten Luwu, South Sulawesi on the coordinate of 3° 25' 52.80" S, 120° 4' 12.10" E with elevation 7,734 feet AMSL.

Based on the observation of the accident site area, the aircraft direction was between 250° - 255° toward the impact point.



Figure 4: The collapsed trees show and the aircraft direction



Figure 5: Some aircraft wreckages found on the accident site

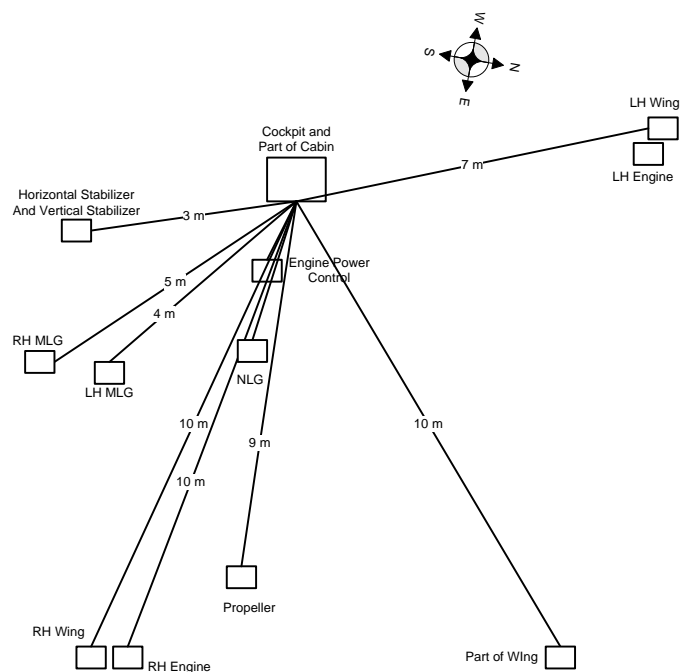


Figure 6: The illustration of the wreckage distribution diagram

1.13 Medical and Pathological Information

The occupants consisted of seven adults, one child and two infants were fatally injured and recovered from the accident site on 6 October 2015 and evacuated to Bhayangkara Hospital in Makassar for identification purposes.

On 7 October 2015 all victims have been successfully identified by Indonesian Disaster Victim Identification (DVI) Team.

1.14 Fire

There was no indication of in-flight fire and the fuselage wreckage was destroyed by post impact fire.

1.15 Survival Aspects

At 0742 UTC the Ujung Pandang ATS operation coordinator contacted the SAR Agency about the lost contact of PK-BRM, then The emergency operation search and rescue team was assembled

Since the lost contact reported, the SAR Agency did not receive any crashed signal from the aircraft ELT.

1.16 Tests and Research

This part will be completed if considered required for the investigation.

1.17 Organizational and Management Information

Aircraft Owner	:	PT. Aviastar Mandiri
Address	:	Komplek Puri Sentra Niaga. Jl. Wiraloka Blok D 60-61 Kalimalang, Jakarta 13620.
Aircraft Operator	:	PT Aviastar Mandiri
Address	:	Komplek Puri Sentra Niaga. Jl. Wiraloka Blok D 60-61 Kalimalang, Jakarta 13620.
Certificate Number	:	AOC 135-029

1.17.1 Flight operation

PT Aviastar Mandiri had seven DHC-6 aircraft which two aircraft operated on Sulawesi, two operated on Kalimantan, two operated on Maluku and one operated on Papua. In general operation the flights are following the VFR flight and some of the aircraft are approved for IFR. Some of the DHC-6 equipped with TWAS and some with EGPWS.

According to the management statement, some of the DHC-6 pilot had been informed to the TWAS and EGPWS operation by briefing while some other had not been given.

The Flight following performed by using High Frequency (HF) radio communication and it covers for Java and Kalimantan only.

1.18 Additional Information

The investigation is continuing and will include details of the following:

- Operation procedures
- Flight crew training
- Recorded CVR information
- Human Factors related aspects.

KNKT plans to complete the investigation within 12 months since the day of the occurrence. 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

According to factual information during the investigation, the initial findings and listed as follows:

1. The aircraft was airworthy prior to the occurrence and was operated within the weight and balance envelope.
2. The aircraft certified for both IFR-VFR flight. The aircraft was not equipped with a flight data recorder.
3. All crew has valid licenses and medical certificates.
4. The accident flight was the 6th sector from Masamba (WAFM) to Makassar (WAAA).
5. The PIC acted as Pilot Flying while the SIC acted as pilot monitoring.
6. According to the flight plan filled up at Andi Jemma Airport Briefing Office, the flight was planned to be conduct under VFR with cruising altitude of 8,000 feet and direct route from Masamba to Makassar.
7. The aircraft departed Masamba at 0625 UTC (1425 LT) and estimated time of arrival Makassar at 0739 UTC.
8. The satellite image published by BMKG at 0700 UTC showed that there was partial cloud formation at about 60 Nm from Masamba on the direct track from to Makassar.
9. The communications between Air Traffic Services (ATS) and the pilots were recorded by Cockpit Voice Recorder (CVR) in good quality recording.
10. At 0633 UTC, the Ujung Pandang Info informed to the pilot to report when reaching 8,000 feet and was acknowledged by the pilot.
11. At 0636 UTC the pilot informed to Ujung Pandang Info that the aircraft had reached 8,000 feet.
12. At 0637 UTC, the PIC offering to the SIC to fly direct to Barru and the copilot agreed while explaining that he flew the direct route previously. Few second later the SIC suggested not to fly direct for the time being.
13. The CVR did not record any aural of terrain warning prior to the impact.
14. At 0649 UTC, the PIC told to SIC that wanted to climb and the CVR stopped recording.
15. The SAR Agency did not receive any crashed signal from the aircraft ELT.
16. On 5 October 2015 wreckage was found on the coordinate of 3° 25' 52.80" S, 120° 4' 12.10" E with elevation of 7734 ft AMSL.
17. All 10 occupants were fatally injured and the aircraft was destroyed by impact force and post impact fire.
18. Flight following of the operator was performed by High Frequency (HF) radio communication which covered Java and Kalimantan area.

3 SAFETY ACTION

At the time of issuing this preliminary report, the KNKT had been informed several safety actions taken by the air operator resulting from this occurrence. The safety actions were as follows:

1. Publishing alert safety notice number 22/SE/DZ-FS135/X/2015 on 06 October 2015 which emphasized several aspect for pilots as follows:
 - To maintain flight track as describes on the flight plan;
 - To maintain visual condition when flying on mountainous area even when believe able to fly on safe altitude;
2. Completing the Makassar base station with HF radio as flight following facility.
3. Revision of the “Line Pilot Check Procedure” to include complete instructor comment.
4. Briefing to all DHC6-300 pilots which include enforcement of the implementation of company Route Guidance, VFR flight rules, and TAWS compliance.

4 SAFETY RECOMMENDATIONS

According to factual information and the findings, the investigation considered that there was safety issue related to VFR flight and the TAWS. Therefore the Komite Nasional Keselamatan Transportasi (KNKT) considers that the safety action taken by the operator was relevant to improve the condition in order to prevent similar occurrence. In addition KNKT issues the safety recommendations to;

4.1 PT. Aviastar Mandiri

To ensure that the terrain collision prevention system (TAWS or EGPWS) are installed and functioning properly according to the operational requirement specification.

4.2 Directorate General Civil Aviation

To ensure the recommendations addressed to PT. Aviastar Mandiri issued in this preliminary report is well implemented.