AIRCRAFT SERIOUS INCIDENT REPORT SI 08/17

SERIOUS INCIDENT INVOLVING HORNBILL SKYWAYS AIRCRAFT, SUPER KING AIR B200GT, REGISTRATION 9M-WSK AT KUCHING INTERNATIONAL AIRPORT, SARAWAK ON THE 24 SEPTEMBER 2017

AIR ACCIDENT INVESTIGATION BUREAU
MINISTRY OF TRANSPORT MALAYSIA

AIR ACCIDENT INVESTIGATION BUREAU

MALAYSIA

SERIOUS INCIDENT REPORT NO.: SI 08/17

OPERATOR	: HORNBILL SKYWAYS SDN. BHD.
AIRCRAFT TYPE	: SUPER KING AIR B200GT
NATIONALITY	: MALAYSIAN
REGISTRATION	: 9M-WSK
PLACE OF INCIDENT	: KUCHING INTERNATIONAL AIRPORT, KUCHING, SARAWAK
DATE AND TIME	: 24 SEPTEMBER 2017 APPROXIMATELY AT 1805 HOURS (LT)

All times in this report are Local Time (LT) (UTC + 8 hours).

This investigation is carried out to determine the circumstances and causes of the serious incident with a view to the preservation of life, property and the avoidance of accidents and incidents in the future and not for the purpose of apportioning blame or liability (Civil Aviation Regulations 2016, Malaysia).

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APPENDICES

A. ABBREVIATIONS

A/P	:	Autopilot
AAIB	:	Air Accident Investigation Bureau
AFRS	:	Airfield Fire and Rescue Service
AGL	:	Above Ground Level
AMSL	:	Above Mean Sea Level
ATC	:	Air Traffic Control
ATIS	:	Automatic Terminal Information System
ATPL	:	Airline Transport Pilot's License
Bhd.	:	Berhad
BSKU	:	Biro Siasatan Kemalangan Udara
CG	:	Centre of Gravity
CMV	:	Converted Meteorological Visibility
CPL	:	Commercial Pilot's License
CRM	:	Crew Resource Management
CRS	:	Certificate of Release to Service
CSMM	:	Corporate Safety Management Manual
CSO	:	Corporate Safety Oversight
DA	:	Decision Altitude
DCAM	:	Department of Civil Aviation Malaysia
DME	:	Distance Measuring Equipment

E & M	:	Engineering and Maintenance
FCOM	:	Flight Crew Operations Manual
FCTM	:	Flight Crew Training Manual
FDP	:	Flight Duty Period
FDR	:	Flight Data Recorder
ft	:	Feet
fpm	:	Feet Per Minute
GA	:	Go-Around
HSSB	:	Hornbill Skyways Sdn. Bhd.
ICC	:	In-charge Crew
ILS	:	Instrument Landing System
IOE	:	Initial Operating Experience
ITCZ	:	Inter Tropical Convergent Zone
kg	:	Kilograms
km	:	Kilometres
kts	:	Knots
KCH	:	Kuching
LT	:	Local Time
m	:	Metres
MAC	:	Mean Aerodynamic Chord
MAHB	:	Malaysia Airports Holdings Berhad
MDA	:	Minimum Descent Altitude

MDA/H	:	Minimum Descent Altitude/Height
MHz	:	Megahertz
MIH	:	Manual Inflation Handle
MR	:	Maintenance Report
Nm	:	Nautical Miles
OM	:	Operations Manual
PA	:	Passenger Address
PAPI	:	Precision Approach Path Indicator
PF	:	Pilot Flying
PM	:	Pilot Monitoring
QRH	:	Quick Reference Handbook
RVR	:	Runway Visual Range
RA	:	Radio Altitude
SEP	:	Safety Emergency Procedure
Sdn.	:	Sendirian
SMS	:	Safety Management System
SPECI	:	Special Weather Report
TEM	:	Threat and Error Management
TOGA	:	Take Off Go-Around Mode
TRE	:	Type Rating Examiner
TRI	:	Type Rating Instructor
WQAR	:	Wireless Quick Access Recorder

YD : Yaw Damp

B. GLOSSARY

CMV : Converted Meteorological Visibility is a values equivalent to RVR which is derived from meteorological visibility. It is converted using specific mathematical formula that is based on the available approach and runway lightings, as well as daylight or night hours.

Drift Angle : Angle between aircraft heading and the track.

FTL : Flight Time Limitation scheme is a flight and duty time limitation that is developed by the regulatory authority and FTL is intended to prevent the daily and cumulative effects of fatigue among the crew members.

Go-around : Aborted landing of an aircraft that is in final approach.

RVR : Runway Visual Range is the distance over which the pilot of an aircraft on the centreline of the runway can see the runway surface markings or the lights delineating the runway or identifying its centreline. RVR is normally expressed in feet or meters.

Transmissometer: An instrument for measuring the extinction coefficient of the atmosphere, and for the determination of visual range. It operates by sending a narrow, collimated beam of energy (usually a laser) through the propagation medium.

The measured visibility is given in the Runway Visual Range (RVR) values.

Wave-off : Similar to a go-around, a wave-off is normally performed below the minimum descent altitude or height (MDA/H) or at a height close to the ground.

INTRODUCTION

The Air Accident Investigation Bureau of Malaysia.

The Air Accident Investigation Bureau (AAIB) is the air accident and serious incident investigation authority in Malaysia and is responsible to the Minister of Transport. Its mission is to promote aviation safety through the conduct of independent and objective investigations into air accidents and serious incidents.

The AAIB conducts investigations in accordance with Annex 13 to the Convention of the International Civil Aviation and the Civil Aviation Regulations 2016 of Malaysia (CARM).

In carrying out these investigations, the AAIB will adhere to ICAO's stated objective, which is as follows:

"The sole objective of the investigation of an accident or incident shall be the prevention of accidents and incidents. It is not the purpose of this activity to apportion blame or liability."

Accordingly, it is appropriate that the AAIB's reports should not be used to assign fault or blame or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

SYNOPSIS

On 24 September 2017, at 1605 LT, a Hornbill Skyways Sdn. Bhd. (HSSB) Super King Air, B200GT registration 9M-WSK was performing a non-scheduled communication flight from Mukah Airfield (WBGK) to Kuching International Airport (WBGG), Sarawak with 4 passengers and 3 crew on board. Upon landing on runway 25 at Kuching International Airport, the aircraft experienced runway excursion to the right of the runway pavement. The weather was cloudy and heavy downpour with cross-wind from the left during the final phase of the landing and also during landing roll.

The aircraft travelled approximately 600 meters on the soft ground parallel to the runway before coming to a stop parallel to the runway heading of 255 degrees. The nose gear collapsed just before the aircraft came to a complete halt position.

All the passengers and crew were safely evacuated from the aircraft using the Airstair Entrance Door. No injuries were reported however the aircraft sustained damages to the nose gear assembly and also the lower fuselage aft of the nose gear as a result of the runway excursion. The runway was closed for approximately 6 hours to allow recovery of the aircraft from the occurrence site to the Hornbill hangar.

Two (2) investigators from the AAIB were sent to Kuching on 25 September 2017 and investigation begun at the accident site on the same day.

The investigation was led by Investigation-in-Charge, Capt Dato' Yahaya bin Abdul Rahman. The investigation was assisted by three Hornbill Skyways Sdn. Bhd. (HSSB) personnels as an expert on the aircraft type.

1. FACTUAL INFORMATION

1.1 History of the Flight

1.1.1 On 24 September 2017, a Malaysia registered fixed-wing aircraft, Super King Air B200GT, registration 9M-WSK, was operating a non-scheduled passenger flight. The flight departed Kuching International Airport (WBGG), Sarawak at 0740 LT to Mukah Airfield (WBGK) with 7 persons on board. It arrived Mukah Airfield at 0825 LT and the flight was uneventful.

1.1.2 After securing the aircraft, the crews proceeded to Mandarin Hotel in Mukah Town for lay over as the tentative departure was at 1630 LT. At 1500 LT after checking out from the hotel, they proceeded to the airport for a standby duty. The passengers arrived at the airport at about 1710 LT. All the passengers boarded the aircraft and the crews performed a short briefing. The Pilot-In-Command as pilot monitoring (PM) occupied the left hand seat and the co-pilot as pilot flying (PF) occupied the right hand seat. The weather at Mukah Airfield was fine and Visual Meteorological Condition (VMC), and the weather at Kuching Aerodrome was reported to be fine as well and VMC. Engine start up procedure carried out by the crew and take off brief was done satisfactorily. The flight controls were handed to the copilot as the PF for the sector from Mukah to Kuching.

1.1.3 Static take-off technique was adopted by PF for the take-off runway 26. The aircraft take-off safely on runway 26 and the departure time was 1727 LT with the same 4 passengers and 3 crew on board. The fuel remaining during start-up was 1900 pounds and the aircraft climbed to Flight Level 160 as requested.

1.1.4 During the cruise, the PM obtained weather information from Kuching ATIS (0830 UTC), amongst others were ILS runway 25 in use, surface wind 080/03, 8 Kilometer visibility and QNH 1009.

1.1.5 While decending for IDSAG way-point, Kuching Radar reported raining over the runway with visibility of 7 Kilometers. The PM apprehensive about the latest weather information and counter-checked the weather using company HF frequency. He was informed of the slight rain over the airfield and decided to continue the flight as they were satisfied on the overall conditions and observed the flight was still VMC.

1.1.6 At this juncture, the landing brief on instrument landing and missed approach procedure was carried out by the crews.

1.1.7 At ENREX way-point, the flight had established the ILS Localizer normally. Kuching Director (Approach Radar) instructed the crews to transfer the frequency to Kuching Tower of 118.1 KHz. Upon established with Kuching Tower, they were informed that the surface wind of 170/10 knots cleared to land on runway 25.

1.1.8 PM advised the PF that the cross-wind was 10 knots from the left and acknowledged by the PF. At the same time, the PF asked the PM whether he could hand over the controls if he encountered difficulty in handling the aircraft later on. PM agreed and advised him to adhere with the handingover controls procedure. The PM noticed that the PF was still maintaining his composure.

1.1.9 The PF called for Approach Flaps at one dot below Glide Path and Landing Gears were lowered at about 1800 feet on pressure altitude (PA). At approximately 1500 feet on PA during the approach, the PM claimed that he was able to see the runway lights and approach lights clearly. Full Flaps were lowered at 1000 feet on PA upon request by PF. The aircraft was configured to land with the co-pilot (PF) still on the controls.

1.1.10 At 500 feet on PA call-out, PM noticed that the AP and YD was disengaged. PM acknowledged that by saying ‘stabilized’ after conforming that the approach was stabilized and normal. PM advised the PF that the Vref speed was 100 knots, but due to the cross-wind component, he advised PF to maintain 105 knots for the approach which was concurred by PF.

1.1.11 At approximately 300 feet on PA, PF made a request to the PM to take over control of the aircraft. The handing over control procedure was observed and the PF now was the Pilot-In-Command, whereby the co-pilot assumed the responsibility of PM. (Form this time onward the PF was the PIC and the PM was the Co-Pilot)

1.1.12 PF continued the approach and admitted that the weather condition was raining with reduced forward visibility but rather smooth without significant turbulene. Forward speed was maintained round the target speed of 105 knots throughout the final approach.

1.1.13 Approach to land was normal until 10 feet call-out, whereby the PF started to reduce both engine power and started to flare the aircraft. At this moment, rain intensity increased and obscured the forward visibility even though the wipers were at high speed setting. Moments later, the PF realised that the aircraft made contact and rolled on the runway. The PM said ‘lights sir, lights sir’ when he noticed a row of lights approaching towards the aircraft from the

right at an angle of about 10 to 15 degrees. PF applied maximum left rudder in order to manoeuvre the aircraft back to centre of the runway, however, the action failed and the aircraft continued its direction to the grass parallel with the runway. The aircraft came to a complete stop on the soft ground parallel to the runway in between Taxiway A1 and A2 (closer to Taxiway A1) with both the engines still running.

1.1.14 The engines were immediately shut down and there was no sign of smoke or fire. All the occupants were safe and not injured. Radio-call was made by the PM for assistance. Approximately at 1807 LT, Kuching Airport AFRS arrived at the scene. All occupants disembarked the aircraft through the aircraft Airstair Entrance Door unassisted. There was no post accident fire and the aircraft sustained substantial damage especially at the nose-wheel assembly.

1.2 Injuries to Persons

No injuries were recorded on any of the passengers or crews on board or any civilian outside the aircraft.

1.3 Damage to Aircraft

1.3.1 Initial inspection found that the fuselage nose section area between Station Number 14 and 94 was severely damaged. The nose radome which housed the weather radar was deformed and distorted due to impact with the ground. The nose landing gear attachment bolts were found broken with the support structure badly damaged due to the nose landing gear collapsing. The nose landing gear doors were found totally damaged and detached from their attachment fittings. The forward fuselage section area skin had signs of wrinkling and buckling thus causing difficulty in opening up the side access panels to gain access to the forward avionics compartment. Both the pitot probes located near the radome were also found damaged.

1.3.2 The left propeller assembly blades were found bent and deformed due to the engine sudden stoppage upon impact with the ground. The left engine nose cowl had traces of mud and soil got into the engine intake. The right propeller assembly blades also suffered similar damage where all the blades bent and deformed. The right engine also had traces of mud and soil got into the engine intake. There was no visible sign of fuel or oil leak from both engines.

1.3.3 The left and right main landing gear assemblies including wheels and brakes were all covered by mud. There was no visible sign of fuel leak at the main landing gear wheel well area. Both the left and right wing section also had no signs of fuel leak from the wing tank access panels. Visual inspection carried out on the aft fuselage section found normal except the rudder was deflected

to the right due to the nose landing gear collapsed and detached from its attachment mount. Through special detailed structural inspection is required to determine the extent of the damage.

1.4 Other Damages

One of the runway edge light cover on the right-hand side of the runway near A1 intersection was damaged by the aircraft wheel.There were minor damages to the runway surface around the areas where the aircraft exited the runway and also where the aircraft was subsequently towed from its final stopping position to General Aviation Apron of Kuching International Airport.

1.5 Personnel Information

1.5.1 Captain

The Captain is male and he is 56 years old. He held a Commercial Pilot's License with Instrument Rating (CPL/IR) that was issued on 11 August 1988 by the Department of Civil Aviation, Malaysia. The validity of the CPL/IR License, ratings and flying hours are listed in the following table:

Subjects	Details
Age	56 years old
Medical Valid until	28 February 2018
Total Hours	8,904:17
Total Hours on Type	1,736:50
Command Hours on Type	1,732:33
Last LPC	17 June 2017
Last Line Check	20 May 2017
Last Instrument Rating Renewal	02 March 2017
Hours in last 28 days	25:40 (excludes the incident sortie)
Rest Hours Prior to Incident	8:55

The Captain served as a senior officer and pilot in the Royal Malaysia Police (RMP) until his optional retirement. After his retirement, he joined Hornbill Skyway Sdn. Bhd. on the 01 December 2010 as a contract pilot.

The B200GT Type Rating Training for this Captain was completed in accordance with the Type Rating Training Program developed by HSSB. The training program comprises the following:

a. Type Rating Training (Type Techincal & Flying Phases).
b. Type Rating Endorsement Check (LPC) – 1 Sortie.
c. Line Operations Flight Training (LOFT) – 3 Sectors.
d. Line Check (LC) – 1 Sector.
e. Safety Emergency Procedures (SEP).
f. Dangerous Goods Awareness.

The Captain completed all the above requirements and was cleared on-line on the 28 December 2010.

1.5.2 Co-Pilot

The Co-pilot is a First Officer. He is a male and he is 32 years old. He held a Commercial Pilot's License (CPL) that was issued on 05 October 2011 by the Department of Civil Aviation, Malaysia.The validity of the CPL/IR License, ratings and flying hours are listed in the following table:

Subjects	Details
Age	32 years old
Medical Valid until	28 February 2018
Total Hours	735:21
Hours on Type	565:20
Command Hours on Type	0
Last LPC	30 September 2016
Last Line Check	12 April 2017
Last Instrument Rating Renewal	27 November 2016
Hours in last 28 days	5:00 (excludes the incident sortie)
Rest Hours Prior to Incident	8:55

1.5.3 Air Traffic Controllers at Kuching Control Tower

The officers on duty in Control Tower were Tower Supervisor, Aerodrome Controller, Surface movement Controller and Tower flight Data. All the Controllers held the required valid licenses and had experience to perform their functions at their respective work positions.

1.6 **Aircraft Information** - Aircraft status as of 24 September 2017

1.6.1 Construction and Serial Number

The Super King Air B200GT aircraft (9M-WSK) was constructed in June 2007 with serial number BY-8.

1.6.2 Ownership and Registration

The aircraft is owned by Hornbill Skyways Sdn. Bhd... It was initially registered in Malaysia as 9M-WSK on the 18 June 2010.

1.6.3 Certicate of Registration and Validity

The present Certificate of Registration in replacement of the initial Certificate, is issued for the period from 07 April 2017 to 06 April 2020 with Certicate Number AR/17/115.

1.6.3 Certificate of Airworthiness

DCAM issued the Certificate of Airworthiness No. M.1248 for the validity period from 27 September 2016 to 14 October 2017.

1.6.4 Aircraft Total Flight Hours and Landings

According to aircraft Technical Records, the aircraft had accumulated a total of 2,442:18 flight hours and 2,339 landings.

1.6.5 Engines Type and Part & Serial Number/Cycles/Hours

According to aircraft Technical Records, the aircraft is fitted with two Pratt & Whitney PT6A-52 Engines (engine 1 and engine 2).

Engine 1

Part Number (PN)	:	3072554-01
Serial number (SN)	:	PCE-RX0012
Cycles since New (CSN)	:	2,315
Time (Hours) Since New (TSN)	:	2,442:18

Engine 2

Part Number (PN)	:	3072554-01
Serial Number (SN)	:	PCE-RX0016
Cycles since New (CSN)	:	2,243

Time (Hours) Since New (TSN) : 2,442:18

1.6.6 Seating Configuration

The aircraft is configured with 2 pilot seats, 6 passenger seats and 1 toilet seat.

1.6.7 Weight and Balance & Fuel Balance from Mukah to Kuching

The Maximum Take-off Weight (MTOW) and the Maximum Landing Weight (MLW) allowable for the aircraft is 12,500 lbs.

Based on completed Weight and Balance Sheet, the total fuel balance before start-up was 1,900 lbs., the total fuel balance at take-off was 1,810 lbs. (after minus 90 lbs required for start-up, taxi and take-off) and the total fuel balance during landing at Kuching Airport was 1,300 lbs.

The calculated aircraft weight during take-off was 11,812.2 lbs. with Centre of Gravity (CG) at 188.964 in. aft of Datum.

The calculated aircraft weight during landing was 11,302.2 lbs with CG of 189.2 in. aft of Datum.

The Zero Fuel Weight then was 10,002.2 lbs with CG of 190.117 in. aft of Datum.

The CG range for that flight sector was between 188.964 in. and 189.2 in. aft of Datum, which was within the aircraft Weight and Balance CG Limitation of 181 in. to 196.4 in. aft of Datum.

The aircraft weight at the time of incident at Kuching Airport was approximately 11,337.2 lbs with a total fuel balance of about 1,335 lbs. inside the two main fuel tanks.

1.6.8 Deferred Item

Based on the aircraft Technical Records, there was no deferred item during the time of incident.

1.6.9 Maintenance History

Aircrat Type	Beechcraft SKA B200GT
Serial No.	BY-08
Engine Model	Pratt & Whitney PT6A-52

Propeller Model	Hartzell HC-E4N-3G
Date of Incident	24 September 2017

These were the maintenance tasks accomplished on the aircraft 1 year prior to the incident based on the aircraft technical records.

1.6.10 Major Checks

a. Phase 1 Inspection and Engine Minor Inspection carried out on 21 Oct 2016 at 2237:44 aircraft hours.

b. Phase 2 Inspections Engine Minor Inspection carried out on 15 Sept 2017 at 2435:30 aircraft hours.

1.6.11 Major Components

a. Oxygen cylinder and regulator assembly replaced on 21 Dec 2016 at 2296:04 aircraft hours due for hydrostatic test and overhaul.

b. Left starter generator replaced on 31 Jan 2017 at 2313:42 aircraft hours due for overhaul.

c. De-ice distribution valve replaced on 29 March 2017 at 2327:49 aircraft hours due to surface deice system unserviceable.

d. Right main landing gear actuator replaced on 7 April 2017 at 2327:49 aircraft hours due to hydraulic leak.

e. Left and right propeller tachometer generator replaced on 24 July 2017 at 2412:33 aircraft hours due for replacement.

f. Right propeller assembly sent out for repair on 21 Aug 2017 at 2419:00 aircraft hours at ST Aerospace Singapore due for slip ring replacement.

1.7 Meteorological Information

Information from meteorological station revealed that bad weather has occurred at LTAB Kuching from 6pm to 7pm, Sept. 24 Sept. 2017. The radar echoes indicated that the formation of active cloud clusters in the event that satellite images show small active clouds. The duty officer also predicted lightning / rain storm and strong gusty winds of 34 knots at the time.

METAR WBGG 240930Z 08003KT 7000 FEW015CB SCT020 BKN300 31/25 Q1007 NOSIG RMK F05 R68 1CB NE+SE z A/R

METAR WBGG 241000Z 12007KT 060V170 2000+TSRA FEW015CB SCT020 BKN150 30/25 Q1008 TEMPO 2000 TSRA RMK F95 P-33.3 R71 1CB SE+S tlo SE-S

WBGG 240500Z 2406/2506 13005KT 8000 FEW020 BKN150 TEMPO 2406/2410 4000 TSRA FEW015CB SCT020

SPECI WBGG 241008Z 16013G34KT 120V210 0500 +TSRA FEW015CB SCT020 BKN150 26/23 Q1008 TEMPO 1000 TSRA RMK F95 2CB NE+SES tlo NE+SE-S l NE+SE-S

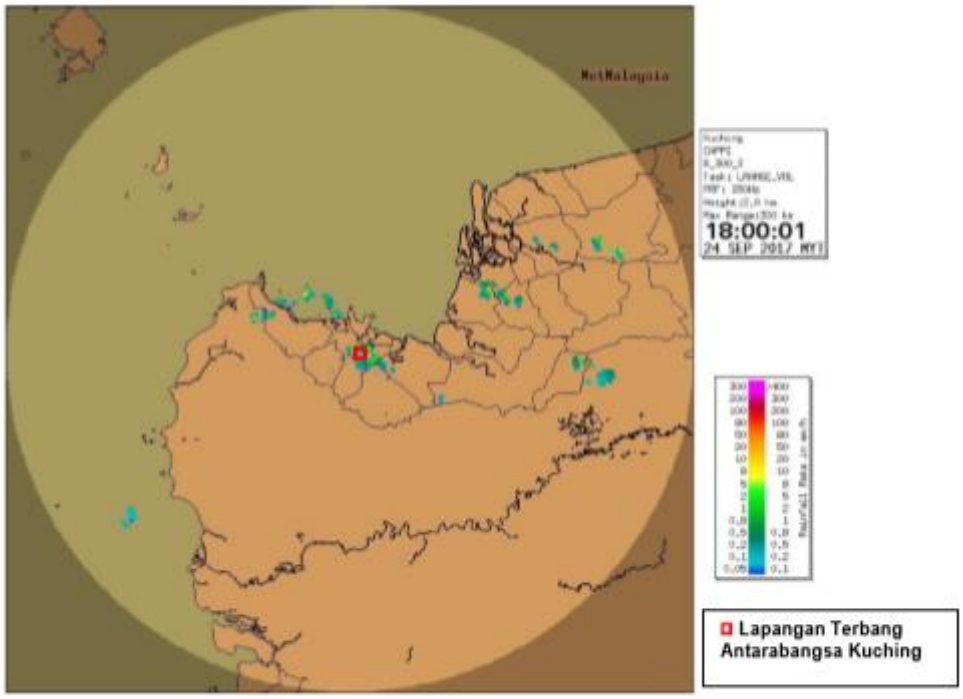


Figure 1: Radar echoes at 1800 LT indicated active patches of clouds formation above Kuching Airport

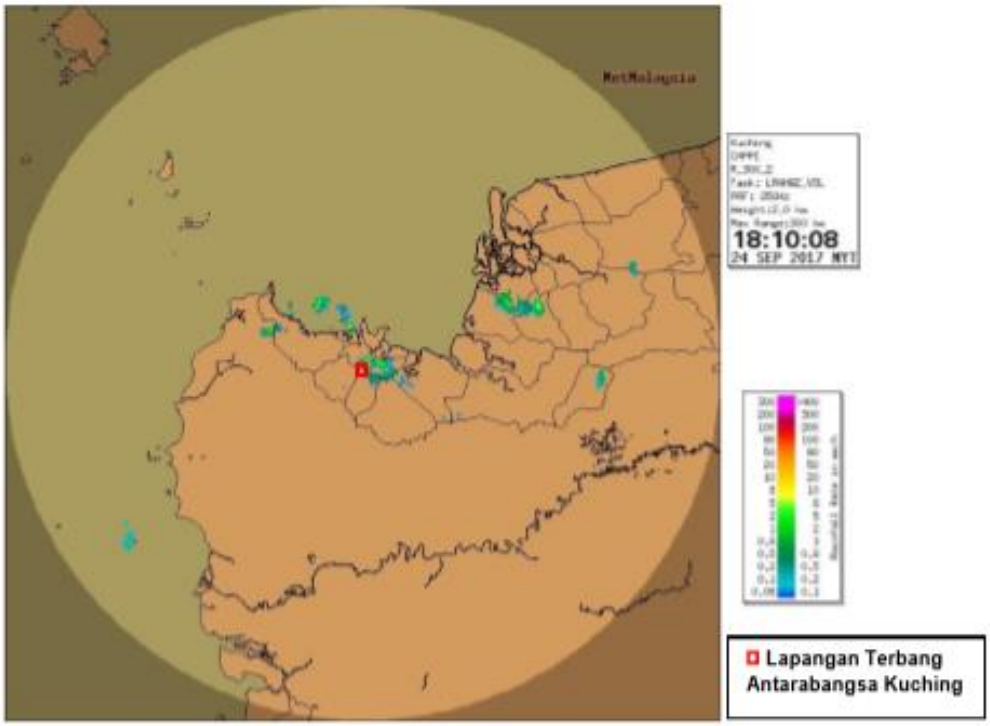


Figure 2: Radar echoes at 1810 LT indicated active patches of clouds formation above Kuching Airport

1.8 Radio Navigation and Landing Aids

Kuching International Airport is equipped with DVOR/DME (VKG 114.5 MHz CH 92X), ILS/LLZ (IKG 110.3 MHz), GP/DME (335 MHz CH 40X) and NDB (AN 402 KHz). All the aids are on 24 hours operations.

1.9 Communication

Flight 9M-WSK was in communication with Kuching Director (Approach Radar) on frequency 120.2 MHz prior to being transferred to Kuching Tower on frequency 118.1 MHz approximately at 1755 LT.

24 hours operations of Radar monitored Air Traffic Services are provided within Kuching Flight Information Region (FIR). They are available on frequencies of 134.5 MHz and 120.2 MHz.

1.10 Aerodrome Information

Kuching International Airport provides 24 hours operations daily. It has a single runway (Runway 07/25). Runway 25 is a precision approach runway

equipped with an Instrument Landing System (ILS), while Runway 07 is a non-precision approach runway.

1.10.1 Runway 25 Approach and Runway Lighting and Marking

The lighting system of Runway 25 includes CAT 1 High Intensity Approach Lights, Precision Approach Path Indicator (PAPI), runway threshold green lights, runway edge white/yellow lights, runway end red lights, Turn Pad Edge Blue Lights and Wingbar Green Lights

The markings of Runway 25 comprise of Runway Designation marking in the form of runway number - 25, Threshold marking, Touchdown Zone marking, Runway Centerline, Aiming Point marking, Side Stripe and Turn Pad marking.

1.11 Flight Recorders

1.11.1 Cockpit Voice Recorder (CVR)

The aircraft was equipped with one Fairchild A2100/L3 Communications Corp. Recorder with Serial Number: 000454782 and Part Number: 21001010-00.

1.11.2 Flight Data Recorder (FDR)

The aircraft is not installed with any Flight Data Recorder.

1.12 Impact Information

The aircraft stopped on the grass area parallel to Runway 25 in between Taxiway A1 and A2 (closer to Taxiway A1).

During the on-site inspection and assessment, only a few photographs were taken with focus on the aircraft at grass area. There was no visible aircraft tyre mark or trace indicating the touchdown point and the landing roll till the runway edge where the incursion to the grass area took place. The tyre traces and marks could have been washed away due to heavy precipitation during landing or the landing was carried out smoothly without any abnormal impact or hard braking leaving no visible trace or mark.

Images

The four images below show the condition of the aircraft after the incident.

Figure 3

Figure 4

Figure 5

Figure 6

1.13 Medical Information

All the passengers and crews were not sent for medical examination by any medical officer at any hospital in Kuching immediately following the incident as they were found in good and normal physical as well as mental condition. None of them had any slightest form of visible injury or suffered any form of minor bodily injury or impairment during the incident or evacuation procedures.

1.14 Fire

There was no fire being reported, nor did the investigation reveal any evidence of fire during and after the incident.

1.15 Survival Aspects – Search and Rescue (SAR)

All the passengers and crews survived the incident without any bodily injuries or fatalities.

As the incident took place within the perimeter of the aerodrome and all the passengers as well as crews were accounted for and well, there was not necessity for any specific SAR operations except the recovery operations which resulted about six hours of airport closure. The incident was survivable.

1.16 Tests and Research

To be incorporated in the Final report. (If any)

1.17 Organization and Management information

The HSSB Organization and Flight Operations Organization Structures were in conformance with DCA requirements.

2 ANALYSIS

2.1 General

2.1.1 The Captain and First Officer had valid pilot's licence and qualified in accordance with applicable Regulations and Operator's requirements. They had been active in flying.

2.1.2 The Captain and First Officer had valid Medical Certificates and were medically fit to perform the flight.

2.1.3 The Flight Duty Period (FDP) and Rest Period that were provided for the pilots prior to their duty were in accordance with the Flight and Duty Time Limitation Scheme in company's Operations Manual Part A approved by Department of Civil Aviaton Malaysia.

2.1.4 The Air Traffic Controller who was on duty and handled 9M-WSK was qualified and had experience to perform the required function.

2.1.5 The aircraft was properly certificated, equipped and maintained in accordance with the regulations and approved procedures. The aircraft did not have any technical problem or deferred technical defect during the flight and also the time of incident.

2.1.6 Based on the post incident on-site inspections on the aircraft performed by the company's engineering team, there were no signs of any system failure/malfunction or other defects that might have contributed towards the incident.

2.1.7 On-site post incident inspection on the runway for probable touch-down point to the point of runway excursion did not reveal any tyre marks or skid marks. This could be due to the effect of rain and wet runway surface. Based on this situation, there is insufficient evidence to indicate that the aircraft had experienced hard landing or skidding.

2.1.8 Based on weather reports, the weather conditions at Kuching International Airport prior to and during the incident were from moderate to bad. Initially, there were light rains and left crosswinds which intensified progressively and eventually developed into heavy rains with strong left cross-winds as well as low visibility over the runway by approximately 1800 local time. There was no windshear reported by any party or encountered by any aircraft prior to the incident.

2.2 Safety and Operational Considerations

2.2.1 The investigation team conducted analysis of the evidence that were presented to determine the causal and contributory factors related to the incident. The following safety and operational factors were considered:

2.2.2 Awareness of the prevailing weather conditions.

2.2.3 Risk assessment and evaluation with regards to making an approach during an approaching and intensifying weather condition over the airfield.

2.2.4 Crosswind landing techniques and procedures.

2.2.5 Flight crew's reaction to sudden loss or reduction in visibility while approaching the runway (below MDA/DA) or seconds before flaring for landing.

2.2.6 Pilot Monitoring assertiveness level and standard callouts.

2.2.7 Absence of runway centerline lights at Kuching International Airport that has higher exposure to inclement weather conditions.

2.2.8 Possibility of aquaplaning due to possible standing water on runway.

2.2.9 Training and effective application of RVR information by ATC and flight crews.

2.2.10 Airworthiness state of aircraft.

2.3 Aircraft's touchdown point on the runway:

There was no visible aircraft tyre mark or trace indicating the touchdown point and the landing roll on the runway except the point and marks of right runway excursion to the grass area. This could be due to the fact of soft landing on wet runway surface during heavy rain.

2.4 Awareness of the prevailing weather conditions by flight crews:

2.4.1 During start-up at Mukah Airport, the weather condition at Kuching International Airport then was reported to be fine and VMC. The flight crews had no information that an adverse weather condition was due to take place approximately at 1800 local time over Kuching Airport. The aircraft departed Mukah Airport at 1727 local time.

2.4.2 During cruise and in preparation for descent and approach at Kuching Airport, the PM obtained weather information from Kuching ATIS (*transmitted since 0830 UTC i.e. 1630 local time which was outdated by about 1 hour 15 minutes*), transmitting information ILS runway 25 in use, surface wind 080/03 knots, 8 Kilometers visibility and QNH 1009.

2.4.3 While decending towards IDSAG way-point, Kuching Radar reported that it was raining over the runway with visibility of 7 Kilometers. The PM noted the latest weather information and counter-checked with company Operations Room using HF. He was also informed that there was slight rain over the airfield. The flight was continued as they were satisfied with the overall weather conditions and observed that the flight was still in VMC. At this juncture, the briefing for instrument approach for landing and missed-approach procedure was carried out between the flight crews.

2.4.4 Upon established on Localizer of runway 25 and contact with Kuching Tower, they were informed that there was moderate rain over the airfield with surface wind of 170/10 knots and surface visibility of 5000 meters. There was no deteriorating weather conditions alert from any party then and the flight crews also did not anticipate any adverve weather condition ahead.

2.4.5 After establishing the Localizer and during the approach, the flight crews were aware of 10 knots cross-wind from the left. They did not anticipate any difficulty in the approach and landing based on the weather conditions then as the flight was still in VMC. While descending through approximately 1,500 feet on pressure altitude, the PM claimed that he was still able to see the approach lights and runway lights clearly. The PF was also aware that it was raining with reduced visibility and the wind speed was steady without significant turbulence. There was no mention of RVR from any party.

2.4.6 The approach for landing was continued with no indication of any hesitation from the flight crews and the aircraft was progressively configured to land based on standard procedures.

2.4.7 The aircraft was ‘stabilized’ while descending through 500 feet on pressure altitude and the speed was maintained at 5 knots above Vref due to considerable left cross-wind and possible turbulent condition. The moderate weather information obtained from ATCs earlier and the acceptable current weather condition as well as forward visibility during the final phase of approach led them to believe that there was no considerable threat to the landing and no necessity for early visual goaround. The flight was continued up to flaring point in moderate rain

condition.

2.4.8 While flaring for landing at approximately 10 feet above the runway, the rainfall intensity suddenly increased tremendously and obscured the forward visibility totally even though the windshield wipers were at high speed setting. Actually, the flaring and touchdown was conducted into intensifying adverse weather condition which happened over the relevant portion of the runway from the flaring point onwards. The PF was abruptly caught is such an unexpected intense situation with no better option but just held on to the control and continued with the touchdown with no forward visibility for directional control or corection. The loss of forward visibility and sudden increase of crosswind of about 34 knots from the left as reported definately contributed to this runway excursion incident. The flight crews did not assess and anticipate accurately the severity of such adverse weather condition which was due to take place at that time.

2.4.9 Operating in the region that falls within the Inter Tropical Convergent Zone (ITCZ) can be challenging in terms of the weather system that often involves thunderstorm activities and heavy rains. Having the knowledge of the local weather phenomena is a crucial element of flight operations aimed at recognizing and managing the potential threats that are associated with it. It is equally important that the operating crews are provided with the latest weather updates and trend information to enable the crew to conduct a proper and timely evaluation of the current and potential threats.

2.5 Risk assessment, evaluation and decision making method:

2.5.1 In deciding whether it is acceptable to commence an approach in marginal or reduced visibility condition, the flight crew should consider reference and compare the actual weather presented to them against the minimum published visibility or RVR in the charts.

2.5.2 There was no confirmation and discussion of available RVR by the flight crews. The approach and landing was continued and executed just by visual contact with the approach and runway lights without proper and correct reference of available RVR until landing.

2.5.3 Over the last 20 minutes or so, the weather was actually building up and intensifying progressively with light to moderate rain, increasing wind velocity and reducing visibility.

2.5.4 The flight crews had no further briefing or discussion for the necessity of going around or diversion in situations of sudden deterioration of weather condition when below MDA/DA, failure to maintain runway centerline or losing visual reference due to heavy rain. The visual condition during the final phase of approach indicated to them that there was no threat for their continued approach and landing. The crews appeared to be only relying on one aspect of the weather criteria which was the available visibility in their decision.

2.5.5 From the CVR, the cockpit environment appeared to be condusive for effective communication between crew members. There was no sign of hostility or power gradient that could hamper open communication.

2.5.6 It was evident that the flight crew did not use adequate risk management strategy in identifying all the potential threats that were related to the approach and landing in reduced visibility, strong crosswind, heavy rain and thunderstorm conditions. The potential threat of wind shear, microburst, turbulence, or sudden drop in visibility during the approach, or landing on the runway potentially contaminated by standing water were also not totally considered.

2.6 Crosswind landing technique and procedure:

2.6.1 As the aircraft was not equipped with FDR, therefore, there was no information available pertaining the flight profile of the aircraft during the final phase of approach, landing and until the stopping point of excursion.

2.6.2 The aircraft Flight Manual and the Standard Operating Procedure (SOP) contained in Operations Manual Part B have not outlined any specific procedure or technique for crosswind approach and landing. However, the pilots are trained and advised to adopt the ‘De-Crab’ or ‘Sideslip’ basic handling techniques accordingly.

a) De-Crab Technique:

On final approach, a crab angle is established with wings level to maintain the desired track. Just prior to touchdown while flaring the airplane, downwind rudder is applied to eliminate the crab and align the airplane with the runway centerline. As rudder is applied, the up-wind wing sweeps forward developing roll. Hold wings level with simultaneous application of aileron control into wind. The touchdown is made with cross controls and both gear touching down simultaneously. Throughout the touchdown phase, upwind aileron application is utilized to keep the wings level.

b) Sideslip Technique:

The initial phase of the approach to landing is flown using the crab method to correct for drift. Prior to the flare, the airplane centerline is aligned on or parallel to the runway centerline. Downwind rudder is used to align the longitudinal axis to the desired track as aileron is used to lower the wing into the wind to prevent drift. A steady sideslip is established with opposite rudder and low wing into the wind to hold the desired course. Touchdown is accomplished with the upwind wheels touching just before the downwind wheels.

2.6.3 The demonstrated maximum crosswind limit for this aircraft is 20 knots and the crosswind during the approach phase was only about 10 knots from the left. However, the left crosswind as reported actually increased to about 34 knots (not known to pilots during flight) during the final phase of flaring and landing. The sudden loss of forward visibility and runway reference as well as the crosswind exceeding the demonstrated limit certainly were the main contributing factors to this runway excursion incident.

2.6.4 The PF immediately applied full left rudder in trying to correct the runway excursion in response to the call-out 'lights sir, lights sir' by PM. However, the corrective force could not stop the aircraft from runway excursion but only managed to align the aircraft heading almost to the runway heading.

2.7 Flight Crew's response to sudden reduction in visibility while approaching the runway below MDA/DA or flaring and landing:

2.7.1 Reduction in visibility

A sudden reduction in forward visibility and increase of left crosswind speed during flaring for landing was not anticipated by the pilots.

The crew mentioned that they could continuously see the approach and runway lights during approach until flaring for landing. The windshields wipers were set at high speed.

The reduction in visibility from around flaring point onwards was contributed by the sudden increase in the intensity of rain which made it totally unable to identify forward visual references.

The unexpected loss of forward references resulted in positional and directional uncertainty to the flight crews.

2.7.2 Preparedness for go-around

Approach and landing incidents/accidents are often avoidable with a proper and timely decision to go-around. Therefore, preparation for go-around is an important defence for preventing an undesired state of the aircraft upon landing.

Flight crew must always be go-around minded until it can be made certain that the aircraft is at the correct configuration and will remain within the confines of the runway both laterally and longitudinally for the landing.

In this incident, the PF mentioned that he did not consider going around as the aircraft was being flared for landing touchdown at the height of only about 5 to 10 feet above the runway. There was no visible and positive reference for a safe go-around (balked landing procedure) at that altitude in full landing configuration.

In order to be go-around prepared or go-around minded, it is essential that applicable briefings, standard calls, task sharing and cross checking activities are carried out diligently as per established procedures. This is an important factor as no two approaches are the same in terms of executing the published approach and go-around procedures, as well as the potential threats surrounding the airport, the weather, aircraft and the operating crew.

Missed-approach or go-around maneuvers for this aircraft that were practised in the simulator or during OPC/LPC in actual aircraft are normally executed from MDA/DA or visually not below 100 feet above ground level (runway), while on line flying this could be done from a range of approach altitudes until touchdown.

There is not much emphasis given to performing a go-around from below MDA/DA in unfavourable weather conditions or in any abnormal situations.

The standard callouts as stipulated in the aircraft SOP only applicable to normal approach callouts. However, there is no standard callouts for any abnormalities during flight or approach for landing.

Based on CVR, the standard callouts between pilots during the approach and landing phase were not practiced fully.

The flight crew must be aware that although the 'landing' was to be executed, due consideration must be given to the unpredictable effect of heavy rain, strong wind and thunderstorm on the prajectory of aircraft approaching the runway, or any other reason that could prevent a safe landing, and to take appropriate actions that would provide a safe outcome.

Balked landing procedure as stipulated in the aircraft Checklist is applicable to this low level go-around. However, due to no forward reference, aircraft just above the runway in full landing configuration at landing speed, the PF left with no other safer option except to continue with the landing.

2.8 Windshields wipers:

2.8.1 The wipers were set at HIGH speed.

2.8.2 Even though the wipers were intended to clear the windshields for better forward visibility, the flight crew must be aware of the possibility of rapid reduction in visibility due to sudden increase of rainfall intensity.

2.9 Workload:

2.9.1 Based on CVR, the communication between pilots was minimal which suggested that they were not in any stressful or increased workload situation.

2.9.2 The interview conducted on pilots also suggested that the overall flight condition, the approach for landing was normal with no additional workload.

2.10 PM assertiveness level and standard calls:

1.10.1 Based on CVR and interview, during the last phase of approach, the PF only made one comment 'strong wind' and then handed the control over to the Captain. The next non-standard call by PM was 'lights sir, lights sir' after the aircraft had landed and was rolling towards the right side of runway, which resulted in runway excursion.

2.10.2 The handing over and taking over process was completed smoothly as the aircraft was in 'stabilized condition'. The taking over pilot (Captain) who continued as PF until landing was TRI and also experienced Flight Instructor. The completion of this process at that altitude was common to the Captain and that situation did not suggest any possible factor in contributing to the incident.

2.10.3 There was no assertive or abnormal call by any flight crew from the initial approach point. The available information suggested that the flight was normal without any constraint of unfavourable weather and the aircraft was configured progressively for landing.

2.11 Evacuation procedure:

2.11.1 After the unexpected departure from the paved surface of the runway, the aircraft continued its direction onto the right grass area. It came to a complete stop on the soft ground parallel to the runway in between Taxiway A1 and A2 (closer to Taxiway A1).

2.11.2 The Captain carried out full engines shut down and radio-call was made by the PM to Kuching Tower for assistance immediately. It was raining heavily and there was no sign of fire inside or outside the aircraft. There was also no other imminent danger to the aircraft or its occupants. Therefore, there was no urgency for immediate evacuation and all the three crews and four passengers remained in the aircraft until the arrival of Kuching Airport AFRS personnel at approximately 1807 local time.

2.11.3 All the crews and passengers exited the aircraft unassisted through the aircraft Airstair Entrance Door which was opened and lowered by the flight assistant.

2.11.4 The crews and passengers were later transported to Hornbill Skyways Hangar building at Kuching Airport using vehicle provided by airport authority.

2.11.5 No injury was reported on anyone of the crews and passengers or any civilian outside the aircraft.

2.12 Absence of runway centerline lights at Kuching Airport which has higher exposure to inclement weather conditions:

2.12.1 Kuching Airport runway is not equipped with centerline lights. The unavailability of runway centerline lights is common among domestic stations in Malaysia.

2.12.2 Although runway centerline lights is not a requirement as per ICAO Annex 14 Aerodromes Standards for Category 1 Airport, the availability of the runway centerline lights is certainly beneficial when operating in marginal visibility in heavy rain, mist, fog or haze which are common types of precipitation in this region, especially at night.

2.12.3 Airports including Kuching International Airport that have higher exposure to inclement weather conditions based on the meteorological and risk factor studies of the regional weather phenomenon should be given highest consideration to the installation of runway centerline lighting.

2.13 Airworthiness state of aircraft:

2.13.1 There was no evidence to suggest that the aircraft deviated from the intended track on the runway resulting in runway excursion being caused by any aircraft system or part malfunction/failure.

2.13.2 There was no deferred technical defect or any system malfunction found during flight from departure at Mukah Airport until landing at Kuching International Airport.

2.13.3 Possibility of aquaplaning due to standing water:

a. The light and moderate rain water prior to landing was insufficient to result in standing water.

b. There was no evidence to suggest possible occurrence of aquaplaning following landing of the incident aircraft. This was further supported by the absence of tyre or skid mark on the runway.
c. The conditions mentioned eliminate aquaplaning as a contributory factor to this incident.

2.14 Training and effective application of RVR equipment:

2.14.1 Training on the operational use of the wind/runway visual range (WRVR) equipment which comprises of wind and RVR readouts, was provided to Meteorology Department and ATC personnel at Kuching International Airport by the system provider when it was installed. The syllabus consisted of basic system description, instructions on how to interpret the displayed data, and the information to be transmitted to the pilots pertaining to the current visibility including any significant changes in the visibility or RVR.

2.14.2 Apart from the RVR reading, ATC also did not consistently provide information on the precipitation levels and the tower observed visibility to the pilots prior to or during the approach until flaring for landing.

2.14.3 After establishing contact with Kuching Tower, the aircraft only received information on wind conditions and surface visibility once. After that, there was no mention of the changes in the RVR, rain intensity, wind condition and observed surface visibility by the ATC throughout the approach until landing.

2.14.4 The ICAO Document 4444 Air Traffic Management Part 6.6.5 (e) outlines the reporting of visibility and RVR values to the pilots on approach to land. Such reporting commitment shall be completed as follows : *During final approach, the following information shall be transmitted without delay: changes in observed RVR value(s), in accordance with the reported scale in use, or change in the visibility representative of the direction of approach and landing.*

2.14.5 Single transmission of surface wind and visibility information by ATC without information on the type of precipitation or tower observation of the current visibility may not be sufficient to create the full picture of the actual environmental condition prevailing and the severity of the weather during the approach and landing.

2.15 Disabled aircraft removal:

2.15.1 Malaysia Airports Holdings Berhad Kuching (MAB) has the Airport Disabled Aircraft Removal Plan (ADARP).

2.15.2 As the disabled aircraft was obstructing the runway causing the closure of runway operations, therefore, a decision was made to hoist the aircraft off the ground using mechanical crane and transport it to the General Aviation Apron adjacent to Hornbill Skyways Hangar.

2.15.3 This recovery operation was successfully completed with the assistance from MAB and AFRS. The aircraft was being supported on jacks pending further investigation. The task was completed at 0200 local time on the 25th September 2017.

3 CONCLUSION

3.1 Findings

3.1.1 The flight crews were licensed and qualified for the flight in accordance with applicable regulations.

3.1.2 The flight crews held valid medical certificates and were medically fit to operate the flight.

3.1.3 The flight crews were provided with adequate rest and their flight duty times were in compliance with the Flight Time Limitation Scheme established by HSSB and approved by the DCA Malaysia.

3.1.4 The aircraft was properly certificated, equipped and maintained in accordance with applicable regulations and HSSB's requirements.

3.1.5 The weather information extracted by the flight crews from Kuching ATIS was not current. ATIS was broadcasting weather reports that were outdated by more than 1 hour.

3.1.6 Although ATC Kuching provided surface wind condition and visibility to the pilots, the information that were provided were not consistent with the weather changes. Hence, the pilots were not fully aware of the rapidly changing weather condition in the area over the runway.

3.1.7 Despite the moderate weather conditions reported by ATC Kuching, flight crews decided to continue the approach without performing a proper risk assessment to determine the potential threats associated with the moderate and shortly after to heavy rain over the runway. The crews appeared to be just concerned over the available visibility to continue the approach for landing rather than the multiple risks of making an approach and landing in the face of likely reduced visibility, strong cross-winds and heavy rain or thunderstorm.

3.1.8 At about 10 ft AGL, while flaring for landing, the intensity of the precipitation had increased rapidly such that the PF suddenly had no visual reference and lost sight of the runway centreline to detect the actual heading and position of aircraft over the runway

3.1.9 The PF held on the control and landed the aircraft without forward visual reference but confirmed by the feel of tyre contact with surface. Immediately after touchdown, the PF was still uncertain of the aircraft position and heading

on the runway as the aircraft was landing into intense precipitation with very strong left crosswind which was beyond demonstrated limit.

3.1.10 The PF did not take immediate corrective action to regain the runway centreline as he was unaware of the significant deviation or heading change due to the reduced visibility landing. The aircraft departed the runway in a matter of seconds after touchdown, which did not give time for the PF to recognize and react accordingly to maintain the aircraft on the paved portion of the runway.

3.1.11 Realizing the aircraft was heading toward the right runway edge lights, the PM called out 'lights sir, lights sir' meaning deviation from the centerline. The call was understood by the PF and he immediately applied full left rudder to avoid runway excursion, however, the aircraft did not respond fully and it continued rolling onto the grass area. It stopped with the nose almost aligned with the runway heading.

3.1.12 The PF did not execute a go-around or wave-off at that moment as he was caught at such low height, in full landing configuration and most likely startled by the sudden reduction in forward visibility. In addition, the possibility of performing a go-around or wave-off in the event of failure of seeing the runway and maintaining runway centerline was not anticipated or discussed earlier.

3.1.13 During the runway excursion, the right main wheel entered the grass area first followed by the left main wheel unchecked. The nose and main wheels dragged into the soft ground and stopped completely after about 600 Meters roll. The nose wheel assembly, nose fuselage area and both the proper assembly blades damaged substantially.

3.2 Probable Cause

3.2.1 Sudden Increase in the intensity of rain while flaring to land resulted in the significant reduction of the PF visual reference. Without the visual contact with runway centerline, the PF was not able to detect the lateral movement or heading change of the aircraft, therefore, the PF was unable to correct the displacement away from the runway centerline. The drift was also compounded by the sudden increase of strong crosswind from the left.

3.2.2 The PF had likely lost his positional and directional awareness with reference to the runway due to the degraded visibility, hence, he did not exert sufficient and timely rudder application to regain the runway centerline before departing the paved portion of the runway.

3.3 Contributory Factors

3.3.1 Intensity of rain and wind speeds were increasing over the airfield throughout the approach and landing.

3.3.2 Inadequate risk assessment on the prevailing weather conditions made by the flight crews through the established TEM briefing.

3.3.3 Lack of alertness in recognizing the abnormal situation and assertiveness by the PM in getting the attention of the PF to the developing and impending deviation from centerline.

3.3.4 Currently, there is no standard callout in OM (B) in regards to calling out for runway centerline deviation.

4. SAFETY RECOMMENDATIONS

4.1.1 HSSB to coach the flight crews that were involved in using their best judgment, knowledge and experience in relation to identifying and managing potential risks relating to takeoff, approach and landing in heavy rain, strong winds and thunderstorm. HSSB is to develop a syllabus for remedial training and assessment with emphasis on crosswind takeoff and landings, including go-around and wave-off practices both in manual and autopilot mode as applicable.

4.1.2 HSSB to emphasized CRM knowledge to ensure that all flight crews conduct thorough evaluation of the potential risks and hazards that are associated with the flight. Having identified the applicable risks, flight crews should discuss their expectations and develop a shared mental model of the situation at hand, including any required mitigation to properly and proactively address the threats identified. In this respect, HSSB is to ensure that the flight crews that were involved are subjected to remedial training in CRM, with specific emphasis on the effective employment of Threat Error Management principals during pre-departure and arrival briefings. Elements relating to situational awareness, critical thinking, decision making and communication should be included in the training program. The communication module should highlight the need to be assertive and to

voice out clearly of any developing or impending safety deficiencies that require immediate action by the PF.

4.1.3 HSSB, Flight Operations to identify and provide information to flight crews with regards to local weather phenomenon and other potential risks that are specific to selected airports through OM (C) or other suitable means. Having an enhanced knowledge of the local weather phenomenon would be beneficial in ensuring safe aircraft operations in the dynamic and often challenging meteorological conditions.

4.1.4 HSSB, Flight crew training program should be expanded to include goaround manoeuvres below DA/MDA or close to the runway that are potentially caused by:

a) Loss of sufficient visual reference.
b) Aircraft is no longer assured of landing within the confines of the runway.
c) Runway becomes unusable due to presence of obstacles or other foreign objects.
d) Loss of required runway lightings.
e) Unstable approaches.
f) Any other reasons that are deemed necessary.

4.1.5 ATC Kuching shall review the procedure in providing latest visibility information to the pilots, the information that were provided were not consistent with the weather changes. Hence, the pilots were not fully aware of the rapidly changing weather condition in the area over the runway.

4.1.6 DCA Malaysia to consider installation of runway centerline lights at airports without centerline light that are frequently exposed to risk of adverse weather condition. The necessity can be identified by having risk assessment evaluation.

Investigator-in-Charge
Air Accident Investigation Bureau Malaysia
15 October 2017

APPENDIX A

AIRFIELD LAYOUT WITH APPROXIMATE LAST AIRCRAFT POSITION

AERODROME/HELIPORT CHART – ICAO

01° 29' 07" N
110° 20' 42" E

ELEV 23 m

TWR	118.1, 121.70
APP	120.2, 123.85
ACC	134.5, 125.35
SMC	121.9
ATIS	128.4

KUCHING/ KUCHING INTERNATIONAL AIRPORT

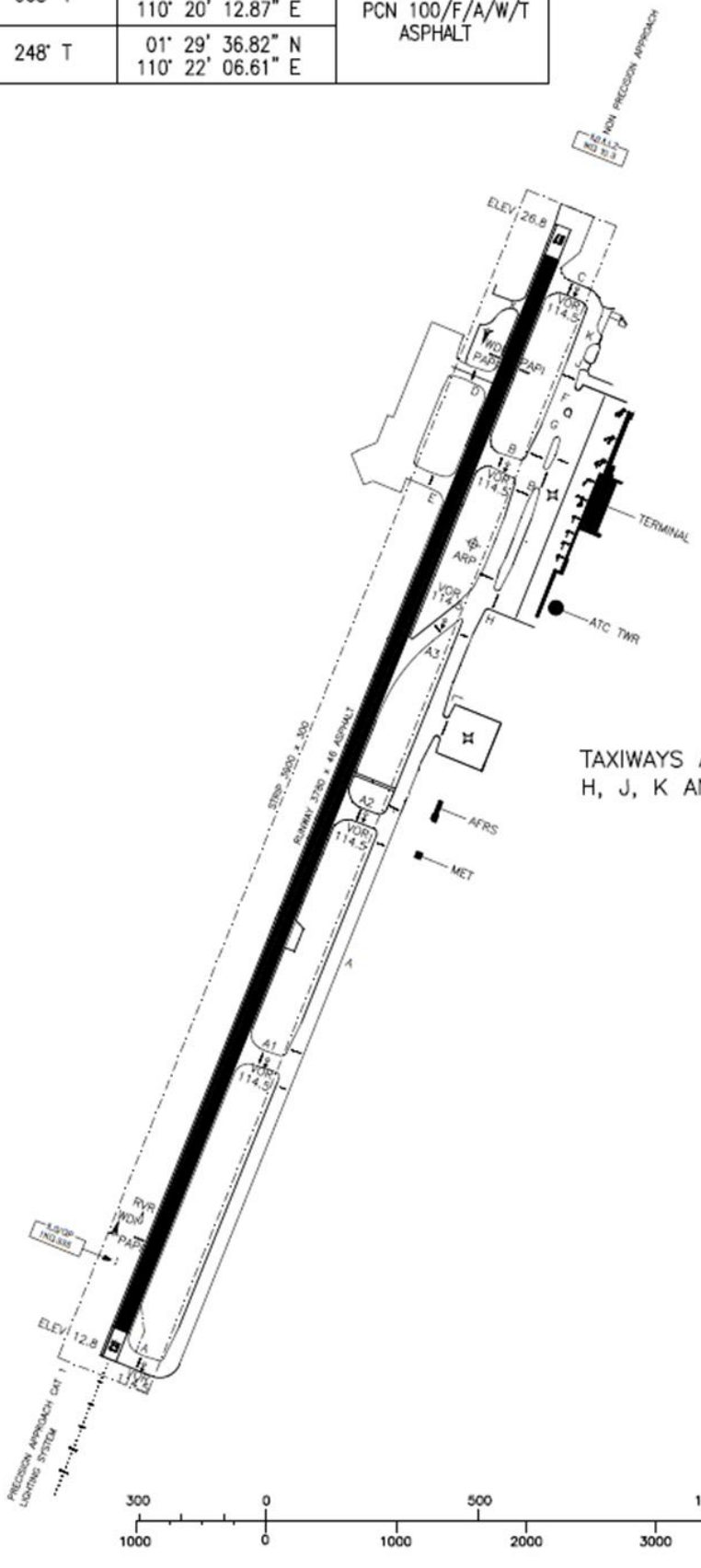
RWY	DIRECTION	THR	BEARING STRENGTH
07	068° T	01° 28' 51.63" N 110° 20' 12.87" E	PCN 100/F/A/W/T ASPHALT
25	248° T	01° 29' 36.82" N 110° 22' 06.61" E	

ELEVATIONS AND DIMENSIONS IN METRES BEARINGS ARE MAGNETIC

N

VAR 00° 33' 00" E (2015)

ANNUAL RATE OF CHANGE –2' E



TAXIWAYS A, A1, A2, A3, B, C, D, E, F, G, H, J, K AND L 23 m WIDE

300 0 500 1000 metres

1000 0 1000 2000 3000 feet

LEGEND	
CONCRETE STRUCTURE	
VOR	

APPENDIX B

AIRCRAFT WHEEL MARKS

APPENDIX B, FIGURE 1
RUNWAY VIEW DURING SHORT FINAL

APPENDIX B, FIGURE 2
WHEELS MARKS ON THE GRASS

APPENDIX B, FIGURE 3
WHEELS MARKS ENTERING GRASS

APPENDIX B, FIGURE 4
AC STOPPED NEAR A2 INTERSECTION

APPENDIX C

PICTURES OF AIRCRAFT DAMAGE AFTERMATH OF THE INCIDENT

APPENDIX C, FIGURE 1
VIEW OF THE COCKPIT AREAS

APPENDIX C, FIGURE 2
Port and starboard propellar

APPENDIX C, FIGURE 3
Port undercarriage

APPENDIX C, FIGURE 4
Starboard undercarriage

APPENDIX C,FIGURE 5
Damaged nose wheel assembly

APPENDIX C, FIGURE 6
Nose compartment