

FINAL
KNKT.14.01.02.04

KOMITE NASIONAL KESELAMATAN TRANSPORTASI

Runway Incursion Investigation Report

**PT. Sriwijaya Air
Boeing 737-300; PK-CKL
Juanda International Airport Surabaya
Republic of Indonesia
27 January 2014**



KOMITE NASIONAL KESELAMATAN TRANSPORTASI
REPUBLIC OF INDONESIA
2014



This final 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 final report consists of factual information collected until the final report published. This report includes analysis and conclusion.

Readers are advised that the KNKT investigates for the sole purpose of enhancing aviation safety. Consequently, the KNKT reports are confined to matters of safety significance and may be misleading if used for any other purpose.

As the KNKT believes that safety information is of greatest value if it is passed on for the use of others, readers are encouraged to copy or reprint for further distribution, acknowledging the KNKT as the source.

When the KNKT makes recommendations as a result of its investigations or research, safety is its primary consideration.

However, the KNKT fully recognizes that the implementation of recommendations arising from its investigations will in some cases incur a cost to the industry.

Readers should note that the information in KNKT reports and recommendations is provided to promote aviation safety. In no case is it intended to imply blame or liability.

TABLE OF CONTENTS

TABLE OF CONTENTS	i
TABLE OF FIGURES	iii
ABBREVIATION AND DEFINITION	v
INTRODUCTION	vii
1 FACTUAL INFORMATION	1
1.1 History of the Flight	1
1.2 Injuries to Persons	2
1.3 Damage to Aircraft	3
1.4 Other Damage.....	3
1.5 Personnel Information	3
1.5.1 Pilot in Command.....	3
1.5.2 Second in Command	4
1.6 Aircraft Information	4
1.7 Meteorological Information.....	5
1.8 Aids to Navigation.....	6
1.9 Communications.....	7
1.9.1.1 Air Traffic Control Transcription	7
1.10 Aerodrome Information.....	8
1.10.1 Aerodrome layout.....	9
1.10.2 Taxiway Condition.....	10
1.10.3 Runway Condition.....	11
1.11 Flight Recorders	11
1.11.1 Flight Data Recorder	11
1.11.2 Cockpit Voice Recorder	16
1.12 Wreckage and Impact Information	17
1.13 Medical and Pathological Information	17
1.14 Fire.....	17
1.15 Survival Aspects	17
1.16 Tests and Research	17
1.17 Organizational and Management Information.....	18
1.17.1 PT. Sriwijaya Air.....	18
1.17.2 AirNav Indonesia Branch Office Surabaya.....	19
1.17.3 Angkasa Pura I, Juanda International Airport.....	21

1.18	Additional Information	22
1.18.1	Interview with the Aircraft Operator	22
1.18.2	Interview with the Airport SMS, QM CS Manager	22
1.18.3	Hazard Occurrence Report	22
1.18.4	Safety Management System (SMS)	23
1.18.5	CASR SMS sub part 7 Safety Risk Management	24
1.18.6	ICAO Annex 19 sub chapter 7. Surveillance obligations	25
1.18.7	Visual Illusion	25
1.18.8	Skills and Decision Making	25
1.19	Useful or Effective Investigation Techniques	26
2	ANALYSIS.....	27
2.1	Runway Identification by the Pilots on Final Approach	27
2.2	Decision to Land.....	29
2.3	Handling of Hazard Report.....	29
3	FINDINGS.....	31
3.1	Findings	31
3.2	Contributing Factors	32
4	SAFETY ACTION	33
4.1	PT. Sriwijaya Air	33
4.2	Angkasa Pura I, Juanda International Airport	33
4.3	AirNav Indonesia Branch Office Surabaya	33
5	SAFETY RECOMMENDATIONS	34
5.1	PT. Sriwijaya Air	34
5.2	AirNav Indonesia Branch Office Surabaya	34
5.3	Angkasa Pura I, Juanda International Airport	34
5.4	Directorate General of Civil Aviation (DGCA)	35
6	APPENDICES.....	36
6.1	Hazard Occurrence Report of Singapore Airlines Pilot	36
6.2	Juanda International Airport, PT. Angkasa Pura I.....	37
6.3	AirNav Indonesia Branch Office Surabaya Comments.....	38

TABLE OF FIGURES

Figure 1: The flight track as recorded on the FDR data and superimposed to Google Earth..	2
Figure 2: The satellite weather image on Surabaya area at 0100 UTC	5
Figure 3: VOR/DME approach procedure runway 28 Juanda Airport.....	6
Figure 4: The picture from approximate 500 feet of final approach course VOR/DME runway 28.....	7
Figure 5: The aircraft flight and on SP2 taxiway trajectory revealed from the FDR plotted to Google earth.....	8
Figure 6: Aerodrome chart	9
Figure 7: The centre line marking on the runway 28 covered by rubber (yellow box).....	11
Figure 8: The FDR graph data on final approach.....	12
Figure 9: The FDR graph data on short final up to landing	13
Figure 10: Shows the aircraft heading changed from 283° to 277° at approximate 500 feet	16
Figure 11: Touchdown marks on taxiway SP2.....	17
Figure 12: The Dispatch Release form.....	18
Figure 13: The organization chart of AirNav Indonesia Branch Office Surabaya.....	19
Figure 14: SMS Organizational Chart of Juanda Airport.....	21

ABBREVIATION AND DEFINITION

AOC	:	Air Operator Certificate
ATC	:	Air Traffic Control
ATIS	:	Aerodrome Terminal Information Services
ATPL	:	Air Transport Pilot License
ATS	:	Air Traffic Service
BMKG	:	<i>Badan Meterologi Klimatologi dan Geofisika</i> (Metrological Climatology and Geophysical Agency)
°C	:	Degrees Celsius
CASR	:	Civil Aviation Safety Regulation
CPL	:	Commercial Pilot License
CRM	:	Crew Resources Management
CSN	:	Cycles Since New
CVR	:	Cockpit Voice Recorder
DGCA	:	Directorate General of Civil Aviation
DME	:	Distance Measuring Equipment
GPWS	:	Ground Proximity Warning System
FCTM	:	Flight Crew Training Manual
FDR	:	Flight Data Recorder
ft	:	Feet
ICAO	:	International Civil Aviation Organization
In Hg	:	Inch Hydrargyrum
Kg	:	Kilogram(s)
Km	:	Kilometer(s)
kts	:	Knots (nm/hours)
mbs	:	Millibars
MDA	:	Minimum Descend Altitude
mHz	:	Mega Hertz
Mm	:	Millimeter(s)
Nm	:	Nautical mile(s)
NOTAM	:	Notice to Airman
KNKT	:	<i>Komite Nasional KeselamatanTransportasi</i>
LPPNPI / AirNav	:	<i>Lembaga Penyelenggara Pelayanan Navigasi Penerbangan Indonesia (Indonesia AirNav)</i>
PF	:	Pilot Flying

PIC	:	Pilot in Command
PM	:	Pilot Monitoring
QNH	:	Height above mean sea level based on local station pressure
S/N	:	Serial Number
SIC	:	Second in Command
SMS	:	Safety Management System
SOP	:	Standard Operating Procedure
TSN	:	Time since New
UTC	:	Universal Time Coordinate
VMC	:	Visual Meteorological Condition
VOR	:	Very High Frequency Omni Directional Range
VORLOC	:	Very High Frequency Omni Directional Range Localizer

INTRODUCTION

SYNOPSIS

On 27 January 2014, a Boeing 737-300 registration PK-CKL was being operated by PT. Sriwijaya Air on schedule passenger flight from Sepinggan Airport, Balikpapan (BPN / WALL) to Juanda International Airport, Surabaya (SUB / WARR). The aircraft departed from Balikpapan at 0109 UTC. The Pilot in Command (PIC) acted as Pilot Monitoring (PM) and the Second in Command (SIC) acted as Pilot Flying (PF).

Prior to the flight both pilots did not receive information of the current NOTAM (Notice to Airmen) for Juanda International Airport either from Balikpapan or Jakarta flight operation office. On the day of this serious incident, there was a NOTAM regarding to the status of taxiway SP2 that was closed due to work in progress of scrubbing, overlay and paving shoulder and was valid from 1 to 30 January 2014.

The pilot conducted the VOR/DME approach for runway 28. During the interview the PM stated that the weather was hazy and at 600 feet, both pilots saw the darker and shinier object on the surrounding area which they assumed as the runway. The pilots flew toward the object and raised some question to the controller regarding to the several objects on the runway.

The aircraft flew at low altitude below 50 feet over the taxiway SP2 up to touch down for approximately 29 seconds.

There was hazard report from a pilot reported the possibility of mistaking taxiway for runway during conducting a VOR/DME approach runway 28, which was received 30 days before this occurrence.

No one injured and no damage to the aircraft in this serious incident.

The investigation concluded that the contributing factors of this serious incident were as follow;

- The environment of the airport and the condition of the taxiway approach created an illusion that the SP2 taxiway appeared brighter than the active runway for pilot on the final approach.
- The absence of the operator SOP related to the requirement for go around on uncertain condition and the NOTAM information which might became the short term memory have made the pilot elected to continue landing following uncertain condition prior to land.

Prior to issue this final investigation report, the KNKT had been informed of safety actions resulting of the internal investigation by the operators concerning to operational safety related to this occurrence.

Included in this final report, the KNKT issued several safety recommendations to PT. Sriwijaya Air, PT. Angkasa Pura I, Airnav Indonesia of Surabaya and Directorate General of Civil Aviation to address the safety issues identified in this final report.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 27 January 2014, a Boeing 737-300 registration PK-CKL was being operated by PT. Sriwijaya Air on schedule passenger flight from Sepinggan Airport, Balikpapan (BPN / WALL) to Juanda International Airport, Surabaya (SUB / WARR). On board in this flight were 155 persons consist of 2 pilots, 4 Flight Attendants and 149 passengers.

This flight was on second day of three days flight schedule for the crew. On the first day the crew flew from CGK – JOG – BPN – TRK. On the second day the crew flew from TRK to BPN and the PIC acted as PF. In this flight the Pilot in Command (PIC) acted as Pilot Monitoring (PM) and the Second in Command (SIC) acted as Pilot Flying (PF).

Prior to departure, both pilots tried to get current NOTAM (Notice to Airmen) for Juanda International Airport either from Jakarta or Balikpapan flight operation offices and they did not get such current NOTAM and or related information. On the day of this occurrence, there was a NOTAM regarding to the status of taxiway SP2 that was closed due to work in progress of scrubbing, overlay and paving shoulder and valid from 1 to 30 January 2014.

The aircraft departed from Balikpapan at 0109 UTC¹. The flight from departure until commence for approach was uneventful and there was no aircraft system abnormality reported or recorded prior to the occurrence.

During descend below 10,000 feet the flight was vectored by Surabaya Approach controller for VOR/DME approach runway 28 with several of weather avoidances as requested by the pilot.

At 1,000 feet, while the aircraft established the final approach course of the VOR/DME runway 28, the Surabaya Approach controller transferred the communication to Juanda Tower controller. Then the Juanda Tower controller had given a landing clearance to the pilot.

Based on the interview, the PM stated that the weather was hazy and while on final approach at 600 feet which was approaching the Minimum Descend Altitude (MDA) of 460 feet, both pilots saw the darker and shinier object on the surrounding area which they assumed as the runway. The aircraft was flown toward that object and furthermore both pilots were uncertain to what the objects they seen such as, chequer boards on the assumed runway.

The Flight Data Recorder (FDR) recorded that after passed 50 feet, the aircraft altitude was up and down over the object where the pilot believed as the runway for approximately 29 seconds.

The ATC ground base recorder recorded, when the aircraft at about on short final and prior to touch down, there were some discussions amongst the pilot and Juanda

¹ 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 Bali is Waktu Indonesia Tengah (WITA) is UTC + 8 hours.

Tower controller concerning to those above particular objects. The pilot raised some questions concerning to their confusions to the objects on the runway. Furthermore, the pilot asked whether there was a threshold displaced on the runway, and the Juanda Tower controller stated there was nothing and the runway was normal.

While having conversations with the pilots, Juanda Tower controller saw that the aircraft was about to land on the taxiway SP2 and instructed the pilot to go-around, the pilot replied that the aircraft already touched down.

At 0228 UTC the aircraft touched down on the taxiway SP2 at about the intersections of taxiway S3 and stopped prior to the taxiway S1. After evaluation and clarification performed the Juanda Tower controller instructed the pilot to taxi to apron.

The aircraft taxied to apron via taxiway S1, crosses the runway and park on stand number 13.

No one injured in this serious incident and no damage to the aircraft or other damage reported.



Figure 1: The flight track as recorded on the FDR data and superimposed to Google Earth

1.2 Injuries to Persons

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	-	-	-	-
Serious	-	-	-	-
Minor/None	6	149	155	-
TOTAL	6	149	155	-

1.3 Damage to Aircraft

An observation found that there was no damage with the aircraft.

1.4 Other Damage

An observation found also that there was no other damage to property and/or the environment.

1.5 Personnel Information

1.5.1 Pilot in Command

Gender	: Male
Age	: 60 years
Nationality	: Indonesia
Marital status	: Married
Date of joining company	: 2010
License	: ATPL
Date of issue	: 06 April 1987
Aircraft type rating	: B737-200/-300/-400/-500
Instrument rating	: B737-200/-300/-400/-500
Medical certificate	: First Class
Last of medical	: 12 December 2013
Validity	: 12 June 2014
Medical limitation	: Holder shall wear lenses that correct for distant vision and possess glasses that correct for near vision
Last line check	: 6 December 2013
Last proficiency check	: 2 December 2013
Flying experience	
Total hours	: 23.247 hours
Total on type	: 785 hours
Last 90 days	: 67 hours 19 minutes
Last 60 days	: 60 hours 35 minutes
Last 24 hours	: 5 hours 9 minutes
This flight	: 1 hours 19 minutes

1.5.2 Second in Command

Gender	: Male
Age	: 40 years
Nationality	: Indonesia
Marital status	: Married
Date of joining company	: 24 January 2011
License	: CPL
Date of issue	: 15 September 2008
Aircraft type rating	: B737-200/-300/-400/-500
Instrument rating	: B737-200/-300/-400/-500
Medical certificate	: First Class
Last of medical	: 16 January 2014
Validity	: 16 July 2014
Medical limitation	: Holder shall wear corrective lenses
Last line check	: 5 December 2013
Last proficiency check	: 14 October 2013
Flying experience	
Total hours	: 369 hours 52 minutes
Total on type	: 369 hours 52 minutes
Last 90 days	: 213 hours 42 minutes
Last 60 days	: 156 hours 10 minutes
Last 24 hours	: 5 hours 9 minutes
This flight	: 1 hours 19 minutes

1.6 Aircraft Information

Registration Mark	: PK-CKL
Manufacturer	: Boeing Company
Country of Manufacturer	: United States of America
Type/ Model	: B737-300
Serial Number	: 26293
Year of manufacture	: 22 October 1993
Certificate of Airworthiness	
Issued	: 25 October 2013
Validity	: 24 October 2014

Category	: Passenger
Limitations	: None
Certificate of Registration	
Issued	: 20 September 2013
Validity	: 19 September 2014
Time Since New	: 55,151 hours 11 minutes
Cycles Since New	: 33,605 cycle
Last Major Check	: C03-Check at 28 June 2013
Last Minor Check	: A03-Check at 21 October 2013

1.7 Meteorological Information

The weather reported on the Aerodrome Terminal Information Services (ATIS) at 0100 UTC was as follow:

Wind	: 290 / 12 knots
Visibility	: 9 km
Weather	: Haze
QNH	: 1011

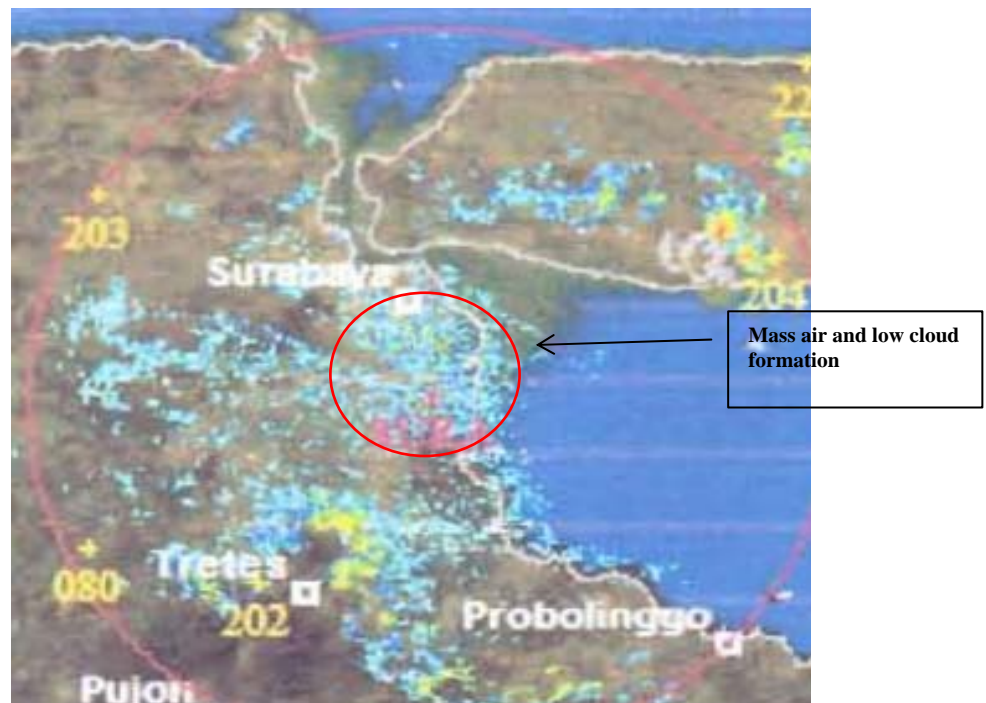
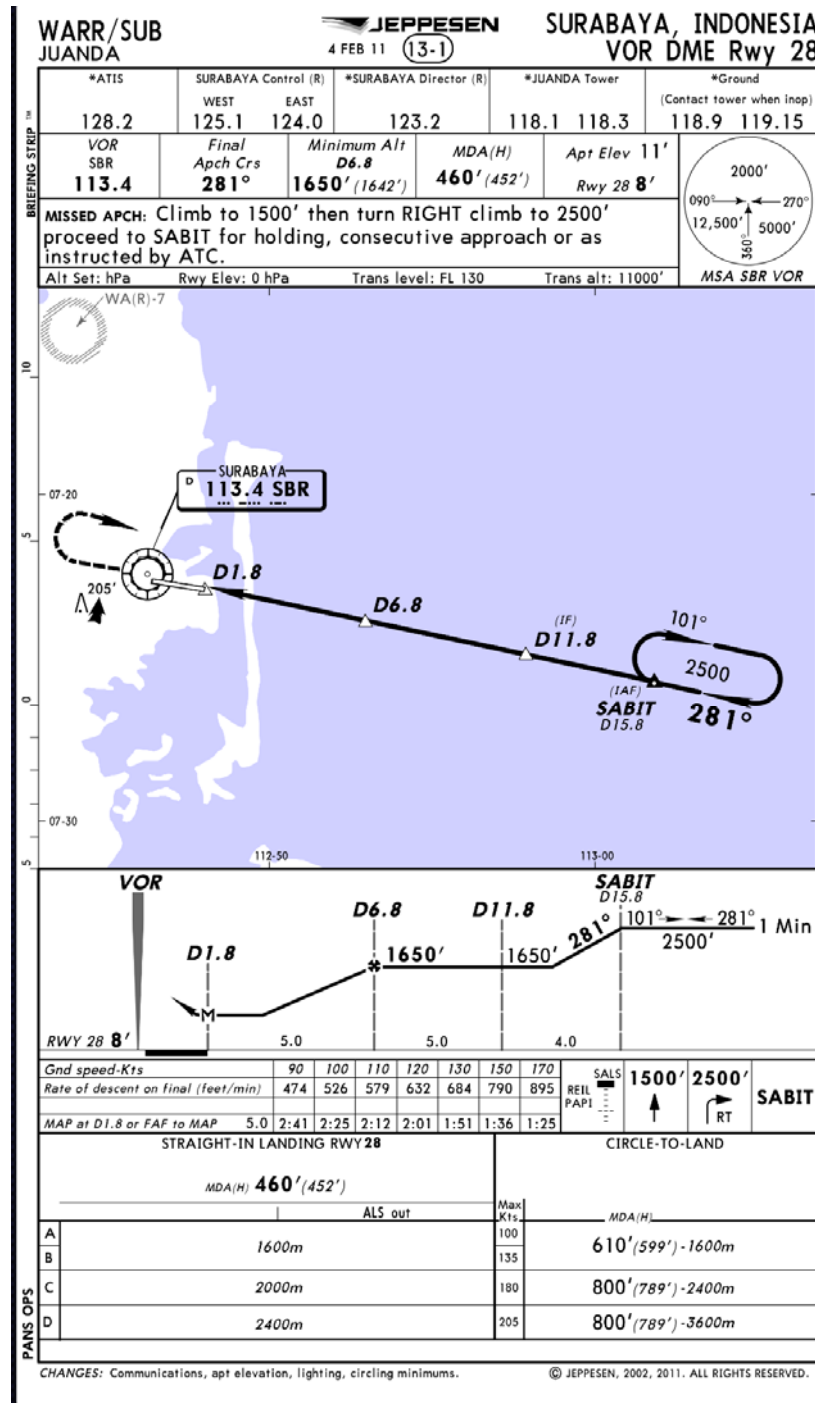


Figure 2: The satellite weather image on Surabaya area at 0100 UTC

1.8 Aids to Navigation

The current approach procedure of the VOR/DME Runway 28 Juanda Airport shows the lateral approach profile of 281° and the MDA of 460 feet as shown in the figure 3 below:



Copyright © Jeppesen Reprinted with permission of Jeppesen (A Boeing Company)

Figure 3: VOR/DME approach procedure runway 28 Juanda Airport

The VOR/DME ground-based navigation aids, aerodrome visual ground aids and on-board navigation aids were serviceable and operated normally.

The figure below was taken from 500 feet by a B 737 pilot while performing VOR/DME approach runway 28 Juanda Airport, two days after the serious incident.

At the time of taking this picture, the visibility reported was greater than at the time of the serious incident and the picture showed that the SP2 taxi way was darkest and shiniest in surrounding area than the active runway 28.

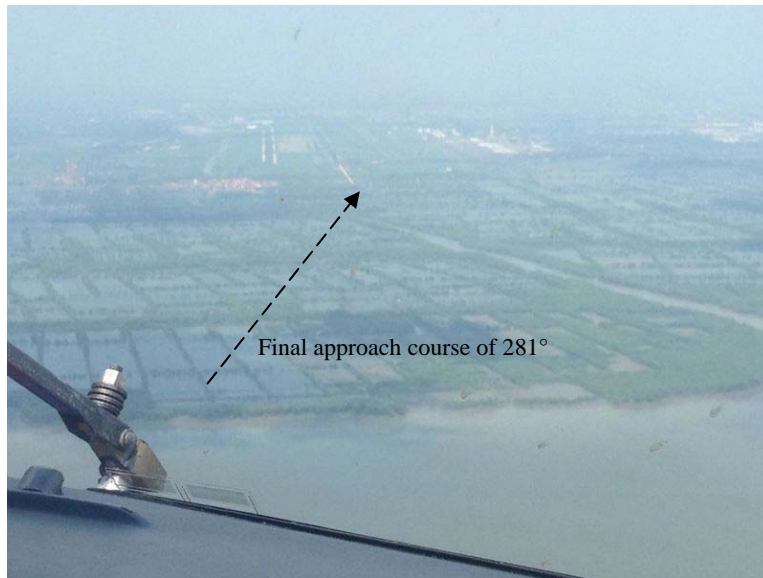


Figure 4: The picture from approximate 500 feet of final approach course VOR/DME runway 28

1.9 Communications

The quality of communication between pilot and controller was good and performed normally as recorded by Air Traffic Control (ATC) ground base recorder at Juanda International Airport.

1.9.1.1 Air Traffic Control Transcription

The pilots and Juanda Tower controller conversations as recorded on the ground base recorder of the Juanda International Airport were as follows:

02.27.41: The pilot raised question related to objects seen on the runway

02.27.47: The controller reconfirmed the question.

02.27.49: Aircraft GPWS “THIRTY”

02.27.51: The controller asked whether the object as the pilot questioning was an animal.

02.27.55: The pilot reconfirmed whether any displace threshold.

02.27.59: The controller asked the pilot whether the pilot would make a go around

02.28.02: The pilot replied that they would continue approach.

02.28.07: The controller instructed the pilot to go around

02.28.12: The controller stated that the aircraft was on taxiway and instructed to go around.

02.28.13: The pilot replied that they had landed.

02.28 56: The controller instructed the pilot to hold position.

02.29.00: The pilot acknowledged holding position.

Based on the FDR data aircraft touch down at 02.28.08 UTC.



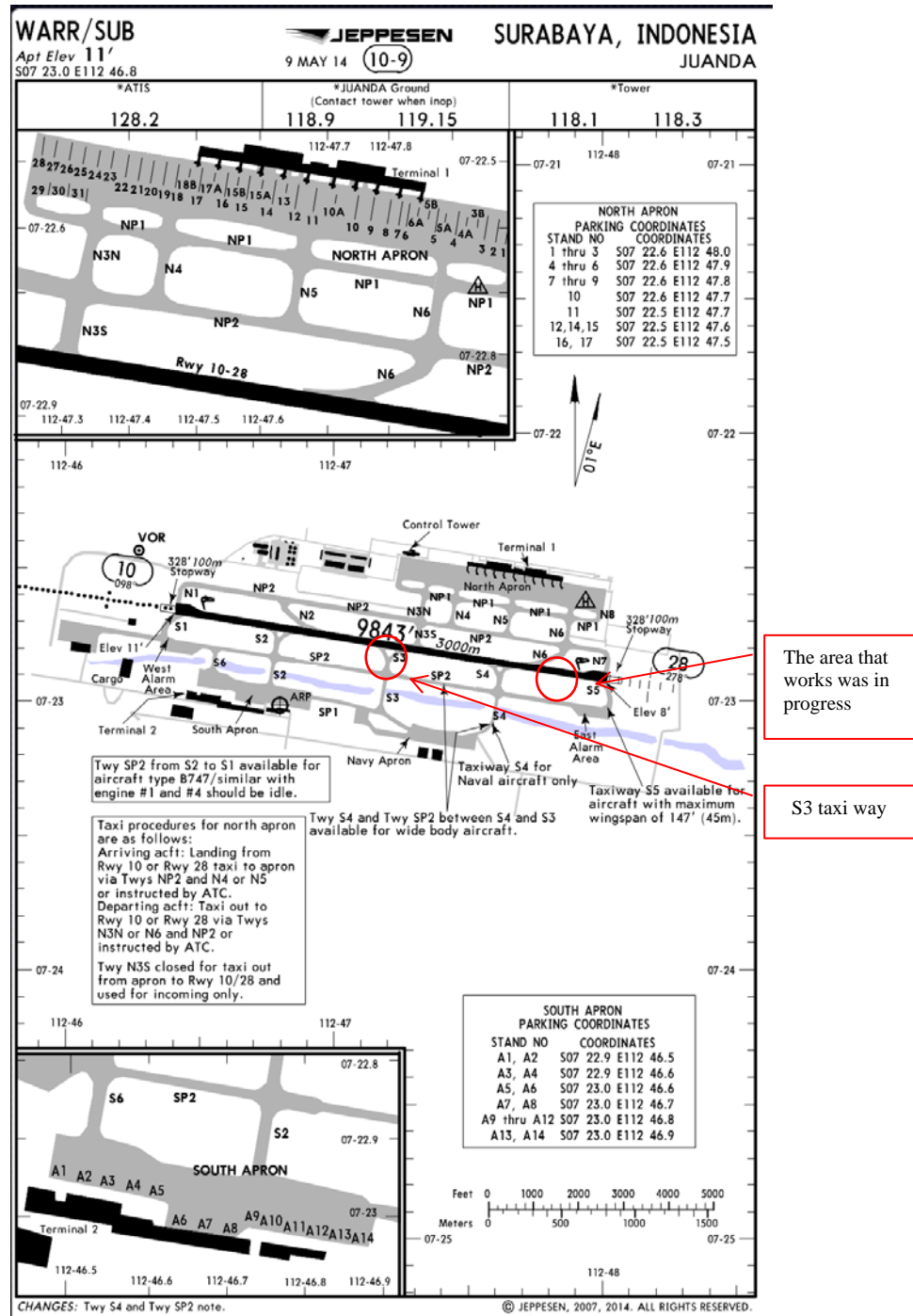
Figure 5: The aircraft flight and on SP2 taxiway trajectory revealed from the FDR plotted to Google earth

1.10 Aerodrome Information

Airport Name	: Juanda Airport
Airport Identification	: WARR
Airport Operator	: PT. AngkasaPura I
Coordinate	: S 07 23.0 E 112. 4.8
Elevation	: 10 feet
Runway Direction	: 10-28 098° - 278°
Runway Length	: 3000 meters
Runway Width	: 45 Meters
Surface	: Asphalt

1.10.1 Aerodrome layout

The airport layout shows the runway 28-10, SP2, S3 taxiway and the area of the work in progress on SP2.



Copyright © Jeppesen Reprinted with permission of Jeppesen (A Boeing Company)

Figure 6: Aerodrome chart

1.10.2 Taxiway Condition

The taxiway SP2 was on progress of scrubbing, overlay and paving shoulder. At the time of the occurrence, there was several of heavy equipment present around the taxiway SP2. The taxi way was closed and was published in the NOTAM as shown below:

NOTAM

GG WARRADPS/060725 WARR YNYX/

(A0030/14NOTAMNQ) WAAF/QMXLC/IV/M/A/000/999/0722S11247E005

A) WARR

B) 1401070100

C) 1401302359.

E) TWY SP2 BTN INTERSECTION S3 – S4 AND S4 – S5 CLSD DUE TO WIP FOR SCRUBBING, OVERLAY AND PAVING SHOULDER.

GG WARRDPS/ 090957 WRRR YNYX

(A0155/14-NOTAMR A 0030/14Q) WAAF / QMXLC / IV / M / A / 000 / 999 / 0722S11247E005

A) WARR

B) 1401290957

C) 1402282359

D) TWY SP2 BTN INTERSECTION S4 – S5 CLSD DUE TO WIP FOR SCRUBBING OVERLAY AND PAVING SHOULDER)

These above NOTAMS informing that the taxiway SP2 between intersection S3 and S4, and intersection S4 and S5 were closed due to there was work in progress of scrubbing, overlay and paving shoulder. The NOTAMS were valid from 1 to 30 January 2014.

1.10.3 Runway Condition

The observation on the runway 28 found that the centreline markings were covered by rubber deposit and not clearly visible.



Figure 7: The centre line marking on the runway 28 covered by rubber (yellow box)

1.11 Flight Recorders

1.11.1 Flight Data Recorder

The aircraft was equipped with Flight Data Recorder (FDR) which was recovered after the serious incident and taken to KNKT facility. Detail of the FDR was as follows:

Manufacturer : SUNDTRAND
Type/Model : UFDR
Part Number : 980-4100-DXUN
Serial Number : 9406

The investigation collected, read out and pointed all the relevant data, both from the graphic and tabular data from approximate of aircraft altitude 1,000 feet until the aircraft rolled on the surface.

PK-CKL Boeing 737-3Q8

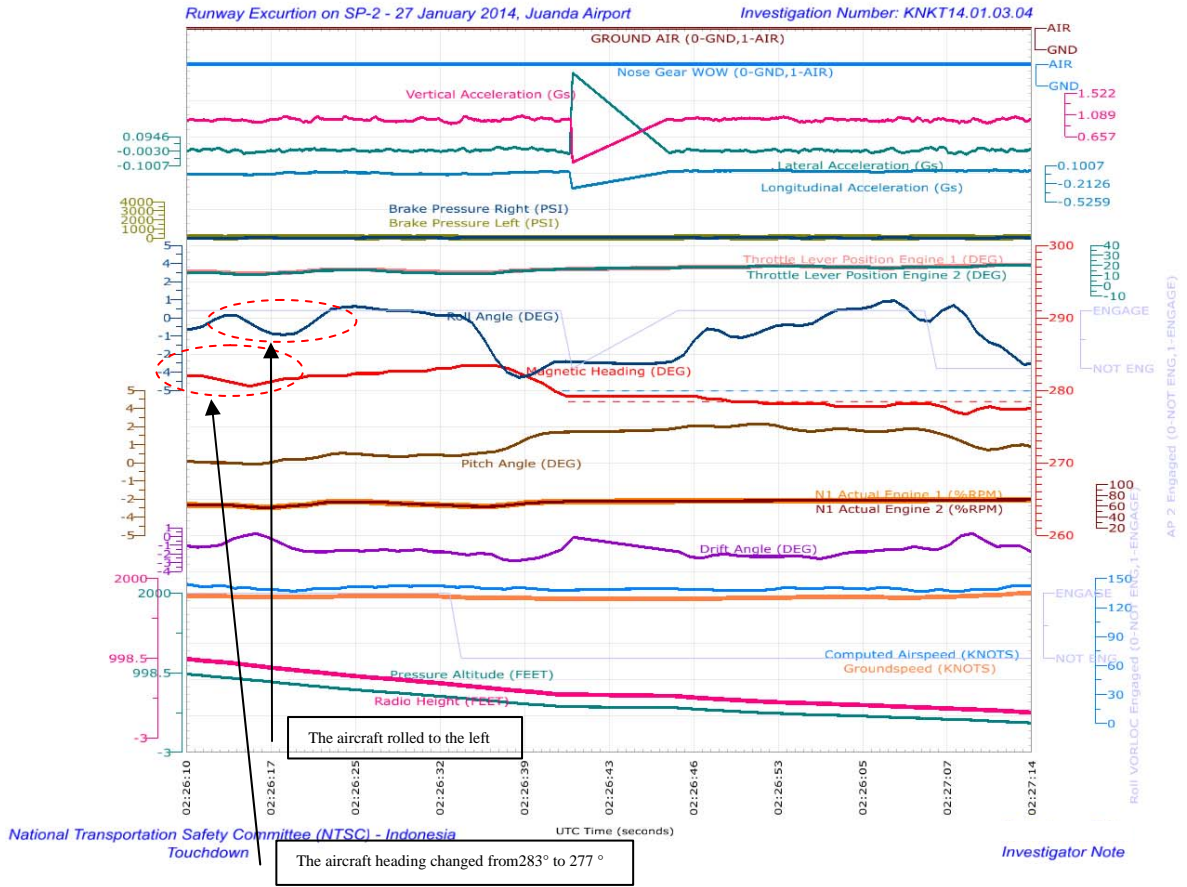


Figure 8: The FDR graph data on final approach

PK-CKL Boeing 737-3Q8

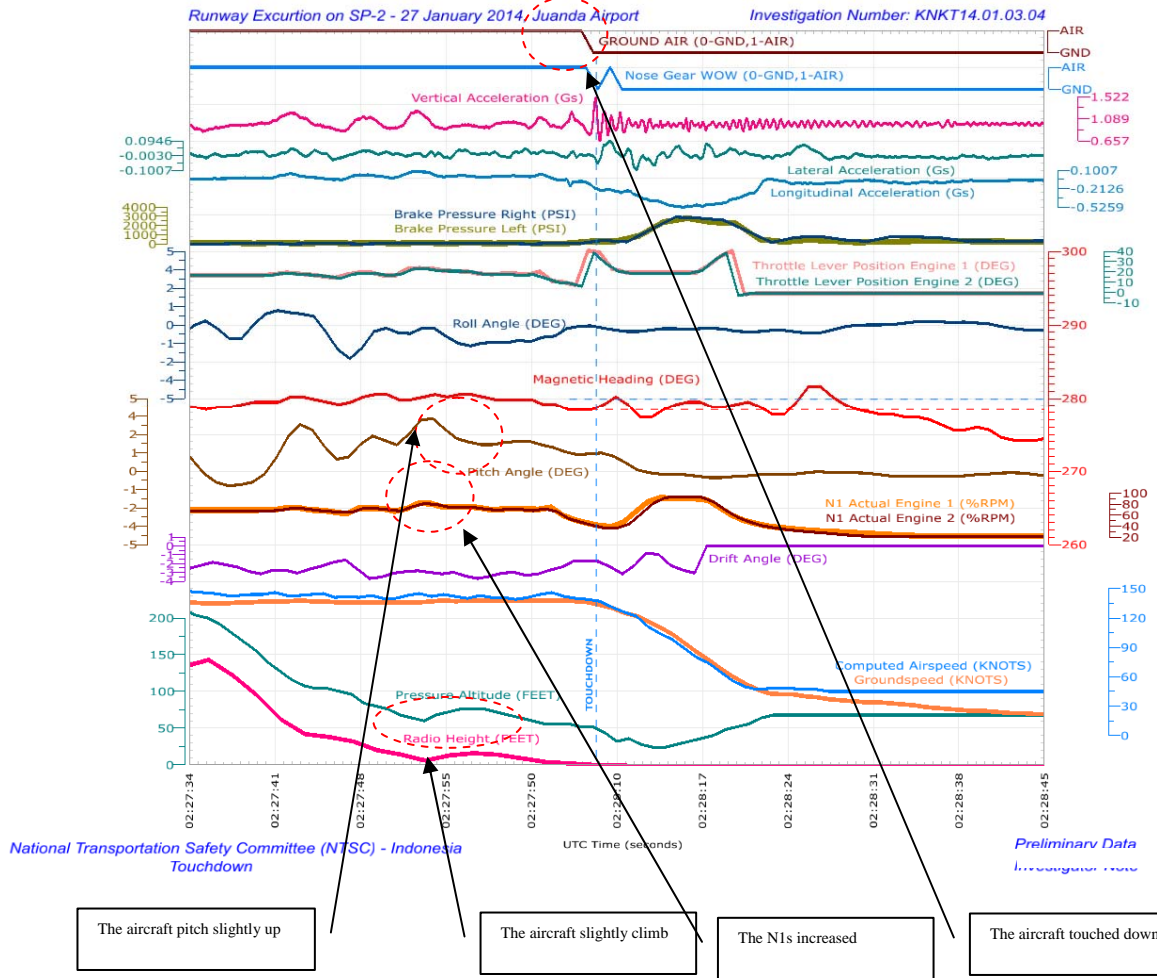


Figure 9: The FDR graph data on short final up to landing

The excerpt of flight events recorded by the FDR from 966 feet down to 376 feet of Radio Height shown in red boxes on the table below:

Table 1: The FDR tabulated data from 700 feet up to 376 feet radio altitude

UTC Time (seconds)	Pressure Altitude (FEET)	Radio Height (FEET)	AIR-GND	Magnetic Heading (DEG)	Vertical Speed (FEET/MIN)	Drift Angle (DEG)	Roll Angle (DEG)	AP2 Eng-Not Eng	AT Eng-noteng	L/G down-not down	Flap Position (DEG)	Glide Slope Deviation (Dots)	VORLOC Engd-not Engd
	976		AIR	281,953	-840	-1	-1	Eng	Eng	down		-2,768	Eng
2:26:12	964	966	AIR	281,953	-840	-1	-1	Eng	Eng	down	39,902	-2,768	Eng
2:26:32	704	686	AIR	283,008	-720	-2	0	Eng	Eng	down	39,902	-2,768	Eng
	692		AIR	283,008	-720	-2	0	Eng	Eng	down		-2,768	Eng
	680	656	AIR	283,359	-840	-2	0	Eng	Eng	down	39,902	-2,768	noEng
	664		AIR	283,359	-840	-2	0	Eng	Eng	down		-2,768	noEng
2:26:36	652	628	AIR	283,359	-720	-2	-1	Eng	Eng	down	39,902	-2,768	noEng
	640		AIR	283,359	-840	-3	-3	Eng	Eng	down		-2,768	noEng
	624	599	AIR	283,008	-840	-3	-4	Eng	Eng	down	39,902	-2,768	noEng
	612		AIR	282,305	-720	-3	-4	Eng	Eng	down		-2,768	noEng
2:26:40	600	575	AIR	281,602	-600	-2	-4	Eng	Eng	down	39,902	-2,768	noEng
2:27:00	456	411	AIR	277,734	-360	-2	1	Eng	Eng	down	39,902	-2,768	noEng
2:27:01	448		AIR	277,734	-360	-2	1	Eng	Eng	down		-2,768	noEng
2:27:02	444	399	AIR	277,734	-360	-1	1	Eng	noEng	down	39,902	-2,768	noEng
2:27:03	436		AIR	278,086	-360	-1	1	Eng	noEng	down		-2,768	noEng
2:27:04	432	387	AIR	278,086	-240	-1	1	Eng	noEng	down	39,902	-2,768	noEng
	428		AIR	278,086	-240	-1	0	Eng	noEng	down		-2,768	noEng
2:27:06	424	376	AIR	278,086	-360	-1	0	noEng	noEng	down	39,902	-2,768	noEng

- At 02:26:32 The VORLOC mode disengaged at 656 feet RA as shown in the red boxes while aircraft was on the landing configuration with the auto pilot engaged and the heading was 283°.
- At 02:26:40 at altitude 575 feet the aircraft rolled 4° to the left while the auto pilot engaged.
- At 02:27:02 the aircraft altitude was 399 feet and the heading 277°.
- At 02:27:06 the aircraft altitude was 376 feet and the auto pilot disengaged while the heading was steady at 278° and maintained up to 143 feet of radio altitude.

Further data of the FDR from 143 feet of radio altitude up to landing roll were shown on the following table. The significant information were identify in red boxes.

Table 2: The FDR data from aircraft altitude 143 feet of radio altitude up to landing roll

UTC Time (seconds)	Pressure Altitude (FEET)	Radio Height (FEET)	GROUND AIR (0-GND,1-AIR)	Magnetic Heading (DEG)	Pitch Angle (DEG)	Wind Direction (DEG)	Wind Speed (KNOTS)	Vertical Speed (FEET/MIN)	Drift Angle (DEG)	Roll Angle (DEG)	AP2 Eng - noEng	AT Eng-noEng	All LG Dw-noDw	Flap Position (DEG)	Glideslope Deviation (Dots)	N1 Actual Engine 1 (%RPM)	N1 Actual Engine 2 (%RPM)	Computed Airspeed (KNOTS)	Throttle Lever Position Engine 1 (DEG)	Throttle Lever Position Engine 2 (DEG)	Brake Pressure Left (PSI)	Brake Pressure Right (PSI)
	204		AIR	278,79	1			-360	-2	1	noEng	noEng			-2,77	68,875	67,625	147	16,809	16,315		0
2:27:36	200	143	AIR	278,44	0	298,83		-360	-2	1	noEng	noEng	Dw	39,90	-2,77	68,875	67,625	146	16,809	16,315	110	0
	192		AIR	278,79	-1			-600	-2	0	noEng	noEng	Dw		-2,77	68,875	67,5	145	16,809	16,315		0
	180	122	AIR	278,79	-1		14	-720	-2	-1	noEng	noEng	Dw	39,90	-2,77	68,875	67,5	143	16,809	16,315	110	
	168		AIR	279,14	-1			-720	-3	-2	noEng	noEng	Dw	39,90	-2,77	68,875	67,375	143	16,809	16,315		55
2:27:40	156	95	AIR	279,49	-1	305,16		-840	-3	0	noEng	noEng	Dw	39,90	-2,77	69	67,375	144	16,809	16,315	55	
	140		AIR	279,49	-1			-840	-3	2	noEng	noEng	Dw	39,90	-2,77	69,375	67,375	144	16,809	16,315		55
	128	62	AIR	279,49	0		13	-720	-3	0	noEng	noEng	Dw	39,90	-2,77	69,625	68,875	146	17,798	18,292	110	
	116		AIR	280,2	3			-600	-3	0	noEng	noEng	Dw	39,90	-2,77	73,125	72,375	143	19,281	18,292		0
2:27:44	108	42	AIR	280,2	4	310,78		-360	-3	2	noEng	noEng	Dw	39,90	-2,77	73,375	71,75	143	18,292	17,304	55	
	104		AIR	279,84	3			-120	-2	0	noEng	noEng	Dw	39,90	-2,77	69,375	68,75	144	17,304	16,809		55
	104	38	AIR	279,49	1		12	-120	-2	1	noEng	noEng	Dw	39,90	-2,77	68,625	67	145	15,82	15,326	110	
	100		AIR	279,14	0			-240	-2	-2	noEng	noEng	Dw	39,90	-2,77	65,5	65,25	141	14,337	13,843		55
2:27:48	96	32	AIR	279,49	0	305,86		-480	-3	-4	noEng	noEng	Dw	39,90	-2,77	62,375	65,5	142	17,304	17,798	55	
	84		AIR	280,2	2			-480	-4	-2	noEng	noEng	Dw	39,90	-2,77	72,625	73	141	19,281	18,787		0
	80	20	AIR	280,55	4		12	-240	-4	1	noEng	noEng	Dw	39,90	-2,77	72,625	72	143	19,281	18,292	110	
	76		AIR	280,55	2			-360	-3	0	noEng	noEng	Dw	39,90	-2,77	72,125	69,875	140	16,809	16,315		55
2:27:52	68	14	AIR	279,84	1	316,41		-360	-3	-1	noEng	noEng	Dw	39,90	-2,77	67,125	67,5	140	16,315	17,798	55	
	64		AIR	279,84	2			-240	-3	-1	noEng	noEng	Dw	39,90	-2,77	71,875	75,375	143	22,742	22,742		55
	60	6	AIR	280,2	5		12	120	-3	0	noEng	noEng	Dw	39,90	-2,77	81,625	81	145	23,731	23,236	110	
	68		AIR	280,55	4			360	-3	0	noEng	noEng	Dw	39,90	-2,77	81	79,25	142	23,236	21,259		55
2:27:56	72	13	AIR	280,2	2	315,7		240	-3	-1	noEng	noEng	Dw	39,90	-2,77	74,875	74,375	144	21,259	20,764	55	
	76		AIR	280,55	2			120	-3	-2	noEng	noEng	Dw	39,90	-2,77	74,875	74,25	142	20,764	20,764		55
	76	16	AIR	280,55	2		12	0	-4	-1	noEng	noEng	Dw	39,90	-2,77	75,5	74,375	140	20,27	19,775	110	
	76		AIR	280,2	2			-120	-3	-1	noEng	noEng	Dw	39,90	-2,77	73,625	71	143	18,292	17,304		55
2:27:00	72	14	AIR	279,84	1	322,73		-240	-3	-1	noEng	noEng	Dw	39,90	-2,77	69,875	69,125	141	17,798	17,304	55	
	68		AIR	279,84	2			-240	-3	-1	noEng	noEng	Dw	39,90	-2,77	70,875	70,625	141	18,292	17,304		55
	64	9	AIR	279,84	2		11	-240	-3	-2	noEng	noEng	Dw	39,90	-2,77	71,5	70,375	139	18,292	16,809	110	
	60		AIR	279,84	1			-240	-3	0	noEng	noEng	Dw	39,90	-2,77	70,75	68,125	141	17,304	17,304		0
2:28:04	56	4	AIR	279,14	2	322,03		-120	-3	-2	noEng	noEng	Dw	39,90	-2,77	70,5	71,5	144	20,27	13,843	55	
	56		AIR	279,14	1			0	-2	0	noEng	noEng	Dw	39,90	-2,77	74,375	66,25	146	11,371	9,8877		55
	56	2	AIR	278,44	1		11	-120	-2	-1	noEng	noEng	Dw	39,90	-2,77	59,125	53,25	142	9,8877	8,8989	55	
	52		AIR	278,44	1			-120	-2	0	noEng	noEng	Dw	39,90	-2,77	51,125	47	140	7,4158	5,9326		55
2:28:08	52	0	GND	278,44	1	309,38		-240	-2	0	noEng	noEng	Dw	39,90	-2,77	45,625	41,125	139	40,54	38,562	275	
	44		GND	279,14	1			-600	-2	0	noEng	noEng	Dw	39,90	-2,77	41	36,25	137	38,562	28,18		385
	32	0	GND	280,2	2		10	-240	-3	0	noEng	noEng	Dw	39,90	-2,77	38,875	36,75	131	23,236	20,764	275	
	36		GND	279,14	0			-120	-2	0	noEng	noEng	Dw	39,90	-2,77	47,25	44	126	19,775	18,787		220
2:28:12	28	-3	GND	277,38	0	311,48		-360	-1	-1	noEng	noEng	Dw	39,90	-2,77	66	62,875	122	19,281	18,787	880	
	24		GND	277,38	0			-120	-1	0	noEng	noEng	Dw	39,90	-2,77	83,75	81,625	111	19,281	18,787		1595
	24	-3	GND	278,44	0		6	120	-2	0	noEng	noEng	Dw	39,90	-2,77	91,375	91,75	104	19,281	18,787	2365	
	28		GND	279,14	0			240	-3	0	noEng	noEng	Dw	39,90	-2,77	90,75	93,75	98	19,281	18,787		2915
2:28:16	32	-3	GND	279,49	0	310,78		240	-3	0	noEng	noEng	Dw	39,90	-2,77	90,25	93	89	19,281	18,787	2805	
	36		GND	279,49	0			240	0	0	noEng	noEng	Dw	39,90	-2,77	89,875	92,375	80	19,281	21,259		2805
	40	-3	GND	278,79	-1		16	360	0	0	noEng	noEng	Dw	39,90	-2,77	87,25	84	74	26,202	31,146	2365	
	48		GND	278,79	0			360	0	0	noEng	noEng	Dw	39,90	-2,77	73,375	68,875	65	35,101	38,562		2585

- At 02:27:39 the aircraft altitude was 42 feet, the rate of descend decreases to approximately 350 ft/min.
- At 02:27:48 the aircraft altitude was 32 feet, the wing was level and both N-1 indicated between 62 – 65 %.
- At between 02:27:52 - 02:27:58 the aircraft altitude was 14 feet down to 6 feet an up to 16 feet, vertical speed changed from negative (descend) to positive (climb) and both N-1 indicated approximately 67% raised up to 81%.
- The interval between aircraft reached 50 feet until touched down was approximately 29 seconds
- 02:28:08 the aircraft touched down.



Figure 10: Shows the aircraft heading changed from 283° to 277° at approximate 500 feet

1.11.2 Cockpit Voice Recorder

The aircraft was equipped with Cockpit Voice Recorder (CVR) which was recovered after this serious incident and taken to KNKT facility. The CVR shall contain 30 minutes. In this serious incident the CVR has been overwritten due to electrical was powered to the aircraft. As such, the CVR did not record the conversation covering the 30 minutes prior and up to the aircraft touchdown.

Detail of the CVR was as follows:

Manufacturer : SUNDSTRAND
Type/Model : AV557C
Part Number : 980-6005-076
Serial Number : 13382

1.12 Wreckage and Impact Information



Figure 11: Touchdown marks on taxiway SP2

1.13 Medical and Pathological Information

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

1.14 Fire

There was no evidence of fire.

1.15 Survival Aspects

The passengers disembarked normally at parking stand number 13. No one injured in this serious incident.

1.16 Tests and Research

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

1.17 Organizational and Management Information

1.17.1 PT. Sriwijaya Air


Aircraft Operator : PT. Sriwijaya Air
 Address : Jl. Pangeran Jayakarta No. 68C Jakarta
 Certificates Number : AOC /121-035
 Operator Designator : SJY

The operator structure of organization is referred to CASR 121 and specified in the AOC/OPSPEC which valid to 10 November 2014.

The Crew Resources Management (CRM) is part of the operator's Operation Training Manual whereas as from management explanation respects to the CRM, stated that the initial and recurrent trainings had been conducted by the third parties as well as the syllabus was also referred to the third party methods. The Company Policy stated that the recurrent of CRM performs for all flight crew annually and includes discussion of the practices of Perception and Situational Awareness.

The Situational Awareness contains several of Critical Elements such as, confusion, complacency etc. while the Perception includes discussion of how to eliminate the probably failures on object identification.

The operator Flight Operation has function to provide all flight crew with the relevant information such as weather information, NOTAM and aircraft documents prior to dispatch. On the day of occurrence, the dispatch release form indicated that the NOTAM was not included as part of the information provided to the pilots (red circle).


DISPATCH RELEASE

A. AIR CRAFT							
Aircraft Registration : <u>OK-CKL</u>				Date : <u>27 January 2014</u>			
Aircraft Type : <input type="checkbox"/> B 737 - 200		<input checked="" type="checkbox"/> (Other) <u>B737-300</u>		Time : <u>01.00 Z</u>			
Type Of Operation : <input checked="" type="checkbox"/> IFR		<input type="checkbox"/> VFR		Expiry : <u>07.00 Z</u>			
B. FLIGHT ROUTING							
FLIGHT NO	SECTOR	ALTERNATE	EST. TOW	EST. ZFW	REQ. BLOCK FUEL	FUEL ON BOARD	
SJ-233	WARR	WADD	102,0 Lbs	105,0 Lbs	17,300 Lbs	19,000 Lbs	
C. AIR CREW							
NO.	N A M E	POSITION	CHECK : DISPATCH BRIEFING :		A/C DOCUMENT	VALIDITY	
1.	[REDACTED]	PIC	<input checked="" type="checkbox"/> Operational Flight Planning		C of A	24 Oct 14	
2.	[REDACTED]	F/O	<input checked="" type="checkbox"/> ATC Flight Plan		C of R	19 Sep 14	
4.	[REDACTED]	FA-1	<input checked="" type="checkbox"/> Weather Report / Forecast		Radio Permitt	20 Oct 14	
5.	[REDACTED]	FA-2	<input type="checkbox"/> NOTAM		A/C Weight & Balance	20 Oct 14	
6.	[REDACTED]	FA-3	Remarks :				
7.	[REDACTED]	FA-4					
8.	[REDACTED]	FA-5					
Prepared By : Dispatcher-in-Charge [REDACTED]			I, the under signed, certify that I have satisfied my self that all data and information described above are correct and met the Provisions of Civil Aviation Safety Regulations.			Pilot-in-Command : [REDACTED]	

Distribution : 1. Pilot-in-Command-Original
 2. Station of Destination-Yellow
 3. Dispatcher-in-Charge-Pink
 Reference : Com Section 5.4
 Form No: SA/02-02

Figure 12: The Dispatch Release form

1.17.2 AirNav Indonesia Branch Office Surabaya

The AirNav structure organization and the job description are stated in the letter of AirNav Indonesia number: PER.004/ LPPNPI/X/2013, subject *Organisasi dan Tata Kerja Perum Lembaga Penyelenggara Pelayanan Navigasi Penerbangan Indonesia (LPPNPI) kantor Cabang Medan, Palembang, Surabaya, Denpasar, Balikpapan*, dated 3 October 2013.

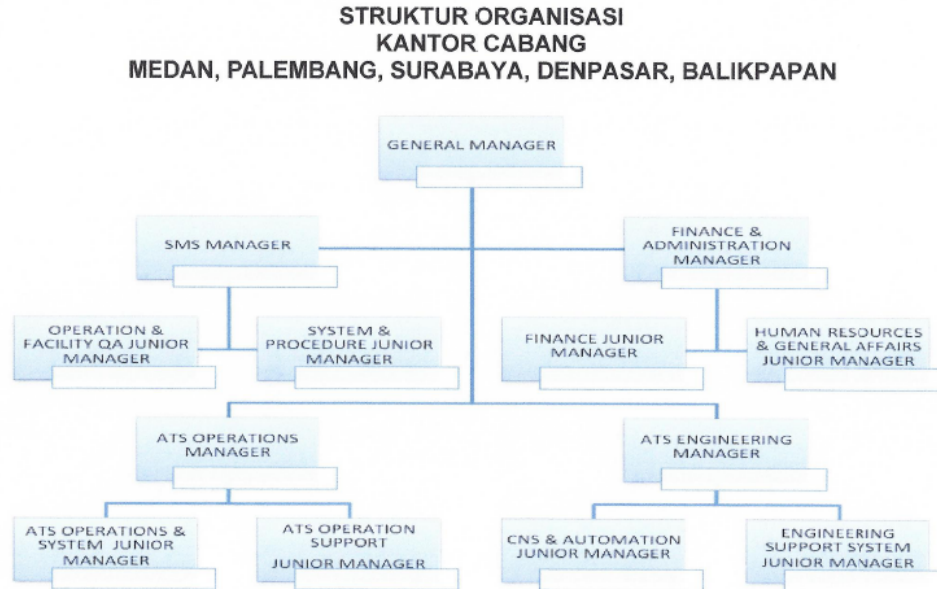


Figure 13: The organization chart of AirNav Indonesia Branch Office Surabaya

One of the organization departments is Safety Management System (SMS)², led by a manager accountable to the General Manager, which has a function in performing the Safety Management System at AirNav Indonesia Branch Office Surabaya.

The general of responsibility and policies of the SMS unit are mentioned in the letter of structure organization section 6 article 13, 14 and 15 as follow;

Chapter 6 Safety Management System Manager

Article 8

Safety Management System Manager assisted by

- a. Operation & facility quality assurance junior manager, and*
- b. System & procedure junior manager.*

Article 13

General Manager, manager and junior manager in all Air Navigation Indonesia offices should understand and has to follow the guidance, and should responsible to serve the reports and improvement suggestions to their leaders in timely manner.

2. Safety management system (SMS) is a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

Article 14

All the reports received by General Manager, Manager and Junior manager should be used as reference of development for further comprehensive report, as well as giving the right direction to the staffs.

Article 15

This particular report, should be sent to leader and copy the other related units within the organization.

On December 2013, AirNav Indonesia branch Surabaya and Angkasa Pura I Juanda Airport, received email related to a hazard report from Singapore Airlines pilot, with subject "Possibility of Lining up With Wrong Runway (SUB)".

On 2 January 2014, the SMS manager of AirNav Indonesia Branch Office Surabaya replied through email to Singapore Airlines representatives and commented on the hazard that has been reported. The summary of the AirNav SMS manager were:

"it as very unlikely that a pilot would land on the taxiway as there were several conditiosn that may prevent for such occurrence. The conditions are:

- (1) During an IFR flight, pilot should follow instrument approach procedure as stated in the AIP,*
- (2) During an VFR flight pilot should follow the VFR rules, which include visual references which different to the taxiway. The marking on the runway are:*
 - a. Runway designated sign in significant size which not available on the taxiway;*
 - b. Runway has touch down zone markers;*
 - c. The color of the runway lights are different to the taxiway lights;*
 - d. On the beginning of the runway, installed special runway lights;*
 - e. The width of the runway was 45 meters, while the taxiway was 30 meters;*
 - f. The centreline mark of the runway different with the taxiway.*

Based on these conditions, the AirNav Branch Surabaya could not understand the reason of such hazard has been reported. However, if the reason of the possible of missalligned to the runway was due to blurred runway marking, that would be the responsibility of airport management."

1.17.3 Angkasa Pura I, Juanda International Airport

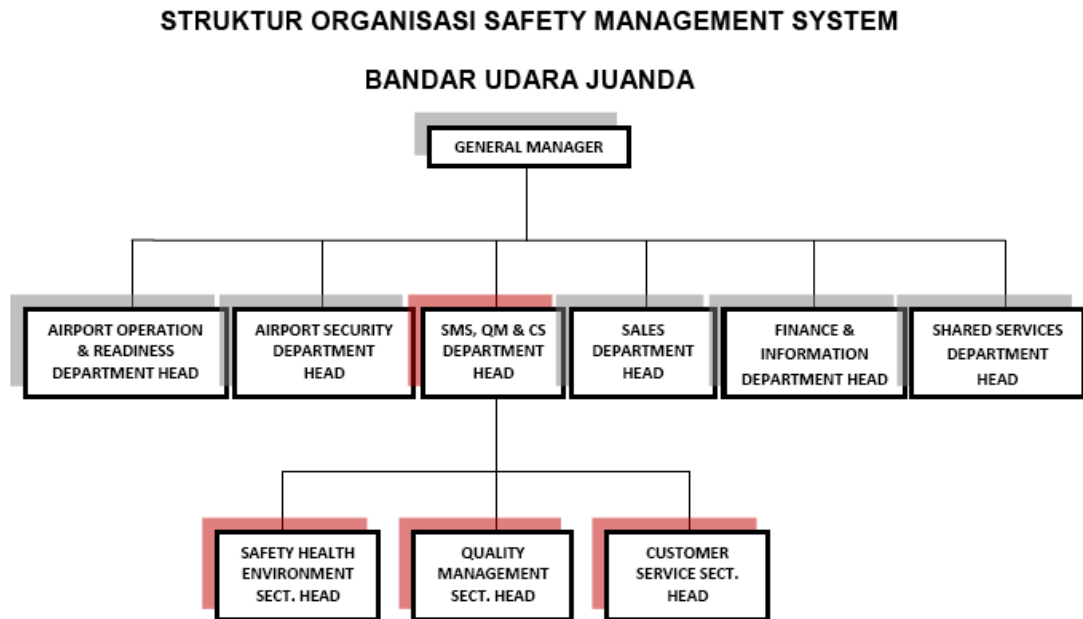


Figure 14: SMS Organizational Chart of Juanda Airport

One of the organization departments is the Safety Management System (SMS, QM and CS Department) that led by the Head of Department and accountable to the General Manager.

Sub chapter 5.43 of the Aerodrome Manual hazard identification and risk assesment, generally described the function of SMS QM CS department were as follow:

- a. The hazard report should align with the procedure described on chapter V SMS Manual.
- b. Corporate inspection performs at least once a year or as required by the circumstances.
- c. The audit performs at least once a year or as required by the circumstances.

The risk analysis is an assesment process of probability and consequence of the hazards which should be recognized and ranked of priority.

1.18 Additional Information

1.18.1 Interview with the Aircraft Operator

The investigation has conducted interview to the flight crew and the Quality Safety and Security policy maker and highlighted some statements as follow:

- The PM (Pilot Monitoring) stated that at 600 feet and approaching the Minimum Descend Altitude (MDA), he saw the taxiway SP2 and decided to continue the approach. Furthermore, he also saw the chequer board which he recognized as a board normally placed on a closed runway or taxiway.
- The PF (Pilot Flying) stated that when approaching the MDA at about 600 feet, he saw a darker and shiner object on the surrounding area then disengaged VOR/LOC mode and changed to HEADING mode and flew the aircraft toward the object as he assumed as the active runway.
- The PF explained on the day of the occurrence, he made phone call to the family and asked the condition for his child who was sick since one day before he left home for this flight schedule. He felt that he was mentally affected by this family condition furthermore he tried to improve his awareness more than the normal.
- An observation and discussion with the Quality Safety and Security department officers, noted that, there was no a specific statement in the operator manuals explaining, that whenever uncertain situation arises between the pilots or to any condition outside the flight deck takes place at a critical situation such as, approach to land, a go around should be executed.

1.18.2 Interview with the Airport SMS, QM CS Manager

The SMS QM CS department has a function to encourages the people including the management personnel to be aware and prioritize the safety, policies and procedures in identifying and managing of hazards to be analysed for the issuance and activation of mitigations to minimize and/ or remove the hazard in the future.

1.18.3 Hazard Occurrence Report

On 9 May 2014, the investigation received copy of hazard report issued by a Singapore Airlines pilot subject: Possibility of Mistaking Taxiway for Runway (SUB) which stated as follow:

HAZARD OCCURRENCE REPORT (Singapore Airlines Pilot) 12/2013

Title: Possibility of Mistaking Taxiway for Runway (SUB)

Summary of Hazards:

- *When conducting a VOR approach into SUB on Rwy28, there is a real possibility of lining up on the southern taxiway (SP2) instead of runway 28.*
- *In hazy conditions, from far you can mistake the taxiway for the runway as it appears brighter than the runway.*
- *Also, the offset from the VOR to the runway is only 3 degrees and couple with the PAPI being unserviceable on Rwy 28 will even mislead the crew even more.*

Suggested Corrective Action:

Do not disengage the autopilot too early during approach until you have positively identified the runway in use.

1.18.4 Safety Management System (SMS)

The Safety Management System (SMS) is a management system which encourages the people to aware with safety, policies and procedures by identifying the hazard, assessing the risk and mitigate to acceptable level.

Indonesia PKPS on Safety Management System (CASR)

Indonesia *Peraturan Keselamatan Penerbangan Sipil* (PKPS / CASR) on Safety Management System.

Sub-part 7: *Manajemen resiko keselamatan*

a. Umum

- (1) Penyedia jasa harus membuat dan menyimpan Safety Data Collection And Processing Sistem (SDCPS) yang tersedia untuk identifikasi hazard dan analisis, penilaian dan mitigasi resiko keselamatan.*
- (2) SDCPS penyedia jasa harus mengikutsertakan metode reaktif, proaktif dan prediktif dari koleksi data keselamatan.*

b. Identifikasi hazard

- (1) Penyedia jasa harus membuat suatu cara formal untuk secara efektif mengumpulkan, mencatat, bertindak dan mengambil umpan balik dari hazard pada operasi, yang mengkombinasikan metode reaktif, proaktif dan prediktif dari pengumpulan data keselamatan. Cara formal dari pengumpulan data keselamatan harus mengikutsertakan sistem pelaporan wajib, sukarela dan rahasia.*
- (2) Proses identifikasi hazard harus mengikutsertakan langkah-langkah berikut:*
 - (a) Pelaporan hazard, kejadian atau concern keselamatan;*
 - (b) Pengumpulan dan penyimpanan data keselamatan;*
 - (c) Analisis data keselamatan; dan*
 - (d) Distribusi informasi keselamatan yang telah disaring dari data keselamatan.*

c. Manajemen resiko

- (1) Penyedia jasa harus membuat dan memelihara proses manajemen resiko formal yang menjamin analisis, penilaian dan mitigasi resiko dari konsekuensi hazard sampai pada tingkatan yang dapat diterima.*
- (2) Resiko dari konsekuensi setiap hazard yang diidentifikasi melalui proses identifikasi hazard seperti yang dijelaskan pada bagian 7.2 harus dianalisa berkenaan dengan kemungkinan dan kerumitan suatu kejadian, dan dinilai untuk mengetahui batasannya.*
- (3) Organisasi harus mendefinisikan tingkatan manajemen dengan kewenangan*

untuk membuat keputusan batasan resiko keselamatan.

- (4) *Organisasi harus mendefinisikan kendali keselamatan untuk setiap resiko yang dinilai sebagai berada didalam batasan .*

Sub-part 7: Safety Risk Management

a. General

- (1) The services provider shall established and saved Safety Data Collection and Processing System (SDCPS) available to identify hazard and analysis, assess and mitigate safety risk.
- (2) SDCPS of the service provider shall include method of reactive, proactive and predictive from the collected safety data.

b. Hazard identification

- (1) service provider shall established effective formal method to collect, record, act and take feedback from operation hazard, combined with method of reactive, proactive and predictive of the safety data collection. The formal method of the data collection shall include mandatory, voluntary and confidential reporting.
- (2) Hazard identification process shall include the following steps
 - (a) hazard reporting, occurrence or safety concern;
 - (b) collecting and preserving safety data;
 - (c) safety data analysis; and
 - (d) safety information distribution of selected safety data.

c. Risk Management

- (1) Service provider shall established and maintain formal risk management process to ensure analysis, assessment and risk mitigation of hazard consequences to an acceptable level.
- (2) The risk of any identified hazard through hazard collecting stated in 7.2 shall be analyzed in relation to the possibility and complexity of an occurrence, and assess its limit.
- (3) Organization shall assigned management level authorized to take decision of certain level of risk assessment.
- (4) Organization shall defined safety control to all risk which assessed within the limit

1.18.5 CASR SMS sub part 7 Safety Risk Management

a. *General*

- (1) *The service provider shall develop and maintain a process that ensures that hazards associated with its aviation products or services are identified and mitigation of safety risk*
- (2) *Hazard identification shall be based on a combination of reactive, proactive*

and predictive methods of safety data collection

b. Hazard Identification

The service provider shall develop and maintain a process that ensures analysis, assessment and control of the safety risks associated with identified hazards, by combining of reactive, proactive and predictive methods of the safety data collected. The way of the collecting the safety data should include the mandatory and voluntary report.

1.18.6 ICAO Annex 19 sub chapter 7. Surveillance obligations

The State shall implement documented surveillance processes, by defining and planning inspections, audits, and monitoring activities on a continuous basis, to proactively assure that aviation licence, certificate, authorization and/or approval holders continue to meet the established requirements. This includes the surveillance of personnel designated by the Authority to perform safety oversight functions on its behalf.

1.18.7 Visual Illusion

The references related to human perception and illusion taken from Human Factor in Flight by Frank H Hawkins, 1987 page 107-108 and 123 are as follows:

The Visual perception involves the eyes, the balancing mechanism of the ear (the vestibular apparatus) and brain. It is also influenced by past experience.The perception is greatly influenced by what we have come to believe about the properties of the object we are viewing and also what we expect the properties to be by the time we have to respond to them.

Some of the components involved in visual illusion are Eye, Brain, experience + memory store, pilot action and aircraft response.

The most general and effective protective measure against visual illusions is to supplements visual cues with information from other sources, particularly when experience and education indicate that illusion may be expected. Prior recognition of the situation should be reflected in inclusion of the item in routine crew briefing, initiated by the captain on the flight deck this is an area where input from other flight deck crew members can also be useful. Planning can then be made for the protective use of radio aids, radar attitude displays, radio altimeter, distance measuring equipment (DME), inertial and other navigation systems, visual glide slope aids (e.g. VASIS) and so on, to back up basic visual information.

Illusion, various other kinds of illusion has been identified. Brightness contrast sometimes creates an illusion. For example, a bright back ground or surround makes the centre area appear darker and vice versa.

1.18.8 Skills and Decision Making

The skills are abilities that are learned, usually through training, to achieve a desired outcome.

Two basic classifications of skills are;

The perceptual-motor skill; which involve an interaction between perception and voluntary movement.

Perceptual motor skills are;

- Taught during initial and recurrent training
- Required to fly aircraft in normal and emergency situation.

The cognitive skill; which involve mental processes such as comprehension, judgment, memory and reasoning.

Cognitive skills are;

- More complex than perceptual-motor skills.
- Related to learning and recall
- Involved in gaining and maintaining situational awareness and in decision making
- Used when speaking, listening and understanding.

Decision making in safety critical and time constrained situations largely relies on flight crews following a predetermined course of action, typically encapsulated in Standard Operating Procedures. If a crew is uncertain about an aspect of flight operations, with the potential to compromise safety, then where possible the most prudent course of action is to operate in a way that allows time to adequately assess the situation and act accordingly. This aspect of decision making can be incorporated into Crew Resource Management (CRM) training. Conducting a go-around would have enabled them to ensure the immediate safety of the aircraft and then, with more time on hand, to resolve the uncertainty concerning the suitability of the runway.

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 ANALYSIS

The analysis part of this Final Report will discuss the relevant issues resulting in the landing on taxiway involving a Boeing 737-300 aircraft registered PK-CKL at Juanda International Airport of Surabaya on 27 January 2014.

The investigation determined that there were no issues with the aircraft and all systems related to this occurrence.

The analysis will therefore focus on the following issues:

- Runway identification by the pilots on final approach.
- Decision to land.

2.1 Runway Identification by the Pilots on Final Approach

Based on the interview, both pilots had stated that when conducting the VOR/DME approach runway 28, the weather was hazy and when approaching the MDA, both pilots saw a darker and shinier object on the surrounding area which they assumed as the runway.

The hazy conditions on final approach degraded the visual cues available to the crew to identify the landing runway. In such a situation, the salience of the areas of white concrete on each side of the taxiway may have captured their attention, even though such a feature is not associated with standard runway markings. The runway marking on the runway 28 has blurred by the rubber deposit.

The investigation also examined on a photograph which was taken from approximate 500 feet by another Boeing 737 pilot of operator's who was conducting VOR/DME approach runway 28, two days after the occurrence in a greater visibility. The photograph showed that the taxi way SP2 was more visible from that position as the taxiway shoulder were brighter and made the taxiway appeared darker and shinier compared to the active runway 28.

Frank H Hawkins, in the Human Factor in Flight stated that: *brightness contrast sometimes creates an illusion. For example, a bright back ground or surround makes the centre area appear darker and vice versa.* On the day of the occurrence the taxiway SP2 was on progress of paving shoulder while the shoulder was being concreted. The concreted shoulder created a bright surround of the taxiway and made the taxiway appeared darker.

Hawkins also stated: *"some of the components involved in visual illusion are eye, brain, experience, memory store, pilot action and aircraft response."*

The investigation found that the pilots did not receive or read any NOTAM of Juanda Airport which contained the information of taxiway SP2 was closed as it was in the process of scrubbing, overlay and paving shoulder. If the flight crews have been informed and were aware of the condition of taxiway SP2, the information would have been stored in the pilot's memory and could have been recalled as necessary. Hence, it might have helped the pilot's accuracy in identifying the correct object in the low visibility and or marginal weather conditions.

The possibility of this occurrence has been reported by Singapore Airline pilot through an internal company hazard report that there was a real possibility of lining up on the southern taxiway (SP2) instead of runway 28 and the possibility may increase in hazy condition as the SP2 taxiway appears brighter than the runway. The hazard report had been officially submitted to AirNav Indonesia Branch Office Surabaya.

The most general and effective protective measure against visual illusions is to supplement visual cues with information from other sources. Planning can then be made for the protective use of radio aids, radar attitude displays, radio altimeter, distance measuring equipment (DME), inertial and other navigation systems, visual glide slope aids (e.g. VASIS) and so on, to back up basic visual information.

The Singapore Airline pilot also suggested that: *pilots should not disengage the autopilot too early during approach until they had positively identified the runway in use.*

The flight events recorded by the FDR from approximate 700 feet up to 376 feet revealed some significant information as follows;

- At 02:26:32 recorded that VORLOC mode that has captured of 281° was disengaged at 656 feet Radio Height and the aircraft flew on a the heading 283°.
- At 02:26:40 and aircraft altitude was 575 feet, the aircraft rolled to the left at 4° and flew on an average heading between 277° - 278° followed by disengagement of the auto pilot at 376 feet and continued the approach with the existing heading until 6 feet.

At the time PF flew towards the object which they believed as runway when approaching the MDA, this was most likely due to the absence of the information of the NOTAM relating to SP2 taxi way, and the absence of using relevant of other navigation aids as reference for those particular approach condition.

Refer to the conditions above it was most likely that the condition of the environment has created a visual illusion to the pilots that the SP2 taxiway appeared as the runway, even though such a feature was not associated with standard runway markings. The pilot flew toward the SP2 taxiway which they believed as the active runway.

The investigation concluded that the condition of the runway and its environment has made visual illusion to the pilots. Combination of the absence of the information of the NOTAM relating to SP2 taxi way, and the absence of using relevant of other navigation aids as another reference led the pilots selected the SP2 taxi way to land the aircraft.

2.2 Decision to Land

The FDR recorded that after passed 50 feet, the rate of descend decreased, engine power increased, the aircraft altitude was up and down. The time interval between aircraft reached 50 feet until touched down was approximately 29 seconds. This can be concluded that the aircraft flew at low altitude over the area where the pilot believed as the runway.

The conversations between pilots and controller can be summarized that while on short final, the pilots saw objects on the area where they believed as the runway, however the controller has reinsured that the runway was normal.

The aforesaid conversations indicated that the crew was uncertain to the condition of the runway, and the conversation occurred while the aircraft flew over the area where the pilot believed as the runway. During this uncertainty the pilot delayed the touchdown for approximately 29 seconds.

This delay on touchdown was consistent with the indications of the marks of the main wheel touchdown as well as the FDR recorded at position near the intersection S3.

In such a situation, the safest course of action would have been for the crew to initiate a go-around, and then further analyse the situation when the flight was stabilised and there was time for a thorough appraisal.

The decision making at a critical phase of flight, and when time is limited, must rely on the crew following standard operating procedures. In this serious incident, the investigation could not found the operator's manuals which described that if such uncertainty or confusions either between the pilots or with the condition outside the flight deck, a go around shall be initiated.

The PF decision to continue landing was most likely contributed by the absence of the spatial information related to the requirement for go around on uncertain condition and the NOTAM information which would became the short term memory to cope such unexpected condition.

2.3 Handling of Hazard Report

The airport management and air traffic management offices received a hazard report contain information of possible line up to the wrong runway during the approach runway 28 in Juanda Airport Surabaya.

The report described that during performed VOR approach runway 28, the taxiway appeared brighter than the runway and possible for line up to the wrong runway.

This hazard report has clearly stated the reason of the possibility of line up to the wrong runway. However, the AirNav considered that the occurrence was very unlikely based on several parameter. The PKPS of Safety Management System required to process all hazard reported to be assess and mitigated to an acceptable level.

The difference between pilot report and the AirNav responses indicated that there was different perception of the pilot and controller vision to the hazard. The controller might not able to assess the hazard as the pilot. However, the controller did not assess the hazard thoroughly that might be conducted by consulting to the pilot or the operator who reported the hazard or to any pilot.

The investigation has not received information of the response of the airport management to the hazard reported.

This most likely that the SMS as stated in the PKPS, has not been fully implemented by AirNav branch office Surabaya and Angkasa Pura I Juanda Airport.

3 FINDINGS

3.1 Findings

According to factual information during the investigation, the National Transportation Safety Committee founded any initial findings as follows:

1. The aircraft was airworthy prior to this occurrence.
2. All crew have valid licenses and medical certificates.
3. The aircraft was operated under a correct weight and balance envelope.
4. On board in this flight were 155 persons consist of 2 pilots, 4 Flight Attendants and 149 passengers. No one injured in this serious incident.
5. The aircraft departed from Balikpapan at 0109 UTC. The Pilot in Command (PIC) acted as Pilot Monitoring (PM) and the Second in Command (SIC) acted as Pilot Flying (PF). The flight from the departure until commence for approach was uneventful and there was no abnormality reported or recorded prior to the occurrence
6. The PF stated that he was mentally affected by the condition of family issue.
7. Prior to departure, both pilots did not provide with NOTAM for Juanda Airport either from Jakarta or Balikpapan operation offices.
8. There was a NOTAM regarding to the status of taxiway SP2 that was closed due to work in progress of scrubbing, overlay and paving shoulder and valid from 1 to 30 January 2014.
9. During the interview the PM stated that the weather was hazy, and at 600 feet approaching the MDA, the pilots saw darker and shinier object on the surrounding area which they assumed as the runway.
10. The photograph taken two days after the occurrence, by another pilot, from approximate 500 feet, in a greater visibility, showed that the taxi way SP2 appeared darker and shinier than the runway 28.
11. There was a hazard report from other operator pilot related to the hazard of the possibility of approach to the south taxiway.
12. The pilots changed the VORLOC mode into a HEADING mode of the autopilot and flew toward the object they assured as the active runway.
13. On short final until prior to touch down, the pilots were confused that they saw several objects on the runway and discussed with the controller.
14. The aircraft flew at low altitude over the taxiway SP2 for approximately 29 seconds prior to touch down.
15. The Juanda Tower controller saw the aircraft was about to land on the taxiway SP2 and instructed the pilot to go around, the pilot replied that the aircraft already touched down.
16. At 0228 UTC the aircraft touched down on the taxiway SP2 at about the intersections of taxiway S3.
17. The investigation could not found the operator's manuals which described that if

un-certainty or confusions either between the pilots or condition outside the flight deck, a go around shall be initiated.

18. Observation on the runway, found that the runway centrelines marks were blurred by rubber deposit.
19. The SMS organization of the ATS and Airport Services provider were not in accordance to CASR SMS subpart 7.

3.2 Contributing Factors³

The environment of the airport and the condition of the taxiway approach created an illusion that the SP2 taxiway appeared brighter than the active runway for pilot on the final approach.

The pilots changed the lateral navigation mode from captured VORLOC mode to heading mode.

The decision to continue landing was most likely contributed by the absence of the spatial information related to the requirement for go-around on uncertain condition and the NOTAM information which would become the short term memory to cope such unexpected condition.

³ Contributing factors is defined as events that might cause the occurrence. In the case that the event did not occur then the accident might not happen or result in a less severe occurrence

4 SAFETY ACTION

At the time of issuing this final investigation report, the KNKT had been informed of safety actions resulting from the internal investigation of the operators concerning to operational safety related to this occurrence.

The following operator's safety actions were as follow:

4.1 PT. Sriwijaya Air

PT Sriwijaya Air (Quality Safety and Security department) recommends the operation department that:

- To review and improve crew resources management training (CRM Training);
- To review Standard Crew briefing including review NOTAM, approach and airport plate, giving special attention on Go Around/ Miss-Approach Procedure on the re-current training, proficiency check and Simulator Training;
- To improve pilot awareness of scanning between inside and outside condition after visual reference are established on final approach;
- To conduct and complete annual line check;
- To remind to all pilot to review the stabilized approach procedure on chapter 5 of Boeing 737-300/ 400/500 FCTM.

4.2 Angkasa Pura I, Juanda International Airport

Juanda Airport Service Authority issued safety actions that reminding the aircraft operators to be aware of the possibility of miss-leading of runway identification in hazy weather, and also informing that there was a work in progress on the shoulder of taxi way SP2.

4.3 AirNav Indonesia Branch Office Surabaya

AirNav Indonesia throughout the ATIS broadcasted additional information to the aircraft operators concerning to aware a possibility of miss-leading of runway identification in hazy weather,

5 SAFETY RECOMMENDATIONS

Base on the examination of the factual data, analysis and the relevant findings that contributed to this serious incident were the pilot visual illusion as the result of the environment condition that have made the taxiway appeared brighter than the runway. The pilots continued the approach to the object which they believed as the active runway. The pilots were uncertain of the runway and flew at low level for 29 seconds prior to land, which might cause by the absence of the operator SOP related to the requirement for go around on uncertain condition and the NOTAM information.

These KNKT recommendations are based on the findings of this investigation. However the operator or the involved parties shall consider that the condition possibly extends to other pilot and or in certain cases to the other similar organization.

The KNKT considered that the safety actions issued by the related operators as result of this occurrence were relevant for the improvement, however KNKT considers to issue additional recommendations on specific area to;

5.1 PT. Sriwijaya Air

- a. To review the pilot CRM recurrent training on the subject of Visual Illusion in combining with decision making process in a critical situation included examples and practices.
- b. To review the modification of the current SOP, to include information for the pilot the requirement for go around whenever uncertain condition occurs at critical phase.
- c. To ensure that the pilot familiar to the current NOTAM and shall be included in the dispatch briefing.

5.2 AirNav Indonesia Branch Office Surabaya

There was a hazard report relating to the possibility of misalignment to the taxiway which was received 30 days before this serious incident.

The SMS Manual was not in accordance to CASR SMS subpart 7. As such, KNKT recommend that:

- a. To ensure that the SMS manual and procedure should refer to the detail content of CASR SMS subpart 7.
- b. The SMS implementation should refer to CASR SMS especially for the Safety Risk management.

5.3 Angkasa Pura I, Juanda International Airport

1. The investigation found that the runway centre lines marks blurred, covered by the rubber deposit KNKT recommends reviewing the current of rubber deposit removal schedule to ensure that the centerline marks appear clearly.
2. The Aerodrome Manual Sub chapter 5.43 Hazard identification and risk assesment was not in accordance to CASR SMS subpart 7. As such, KNKT recommends that:

- a. To ensure that Aerodrome Manual Sub chapter 5.43 should refer to the detail contain of CASR SMS subpart 7.
- b. The SMS implementation should refer to CASR SMS especially for the Safety Risk management.

5.4 Directorate General of Civil Aviation (DGCA)

Refer to the ICAO Annex 19 sub chapter 7, the DGCA shall implement documented surveillance processes, by defining and planning inspections, audits, and monitoring activities on a continuous basis. Therefore the KNKT recommends proactively assure the oversight and ensure that the recommendations issued in this final report were implemented correctly.

6 APPENDICES

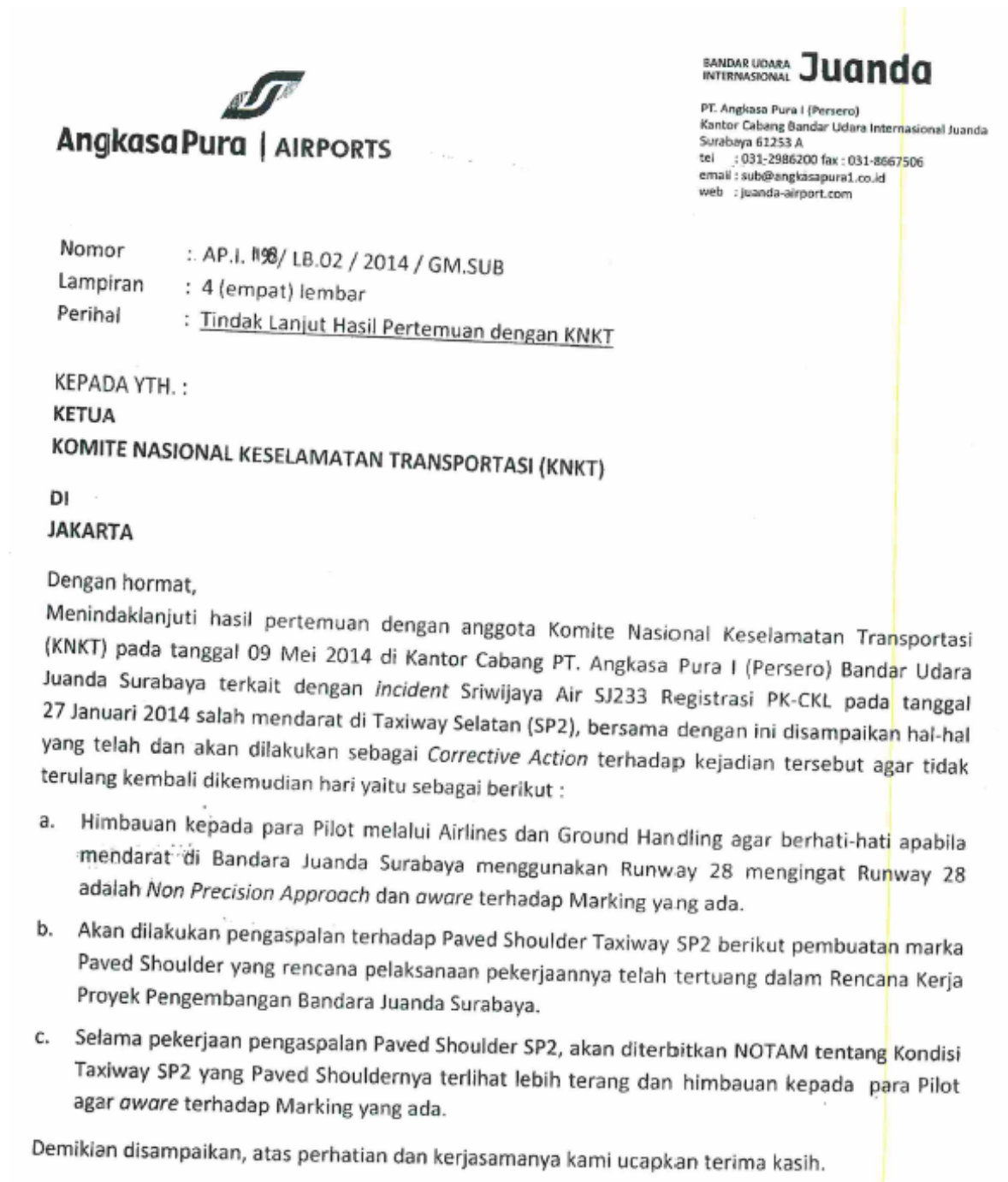
6.1 Hazard Occurrence Report of Singapore Airlines Pilot

The hazard occurrence reported by Singapore Airlines pilot on December 2013 and sent to Juanda International Airport authority.

SINGAPORE AIRLINES 		HZR OCCURRENCE REPORT	
OR DETAILS			
OR Reference Number :	OR_SIA_HZR_13_0171	Occurrence Date :	12/2013
		Report Type :	HZR
OR Status :	Open	Flight Date :	
OR Title :	Possibility Of Lining Up With Wrong Rwy (SUB)		
OR Summary :	A330 STO SQ930 SIN-SUB		
GENERAL INFORMATION			
Date Hazard Identified :	12/2013		
Type of Hazard :	Flight Operations	Other Type of Hazard :	
The Reporter :	Pilot	Other Reporter :	
Rank/Grade :	Captain	Other Rank/Grade :	
Location Of Hazard :	Surabaya (WARR)		
Weather Condition :	Others	Other Weather Condition :	Hazy
Intensity :			
Light Conditions :	Day		
FLIGHT INFORMATION (FOR AIRCRAFT RELATED HAZARD)			
Flight No :	SQ 0930	Sector :	SIN - SUB
Aircraft Type :	A330-300	A/C Registration :	9V- STO
Visibility :			
Turbulence :			
DETAILS OF HAZARD			
Title :	Possibility Of Lining Up With Wrong Rwy (SUB)		
Summary of Hazard :	<p>When conducting a VOR approach into SUB on Rwy28, there is a real possibility of lining up on the southern taxiway (SP2) instead of runway 28.</p> <p>In hazy conditions, from far you can mistake the taxiway for the runway as it appears brighter than the runway.</p> <p>Also, the offset from the VOR to the runway is only 3 degrees and couple with the PAPI being unserviceable on Rwy 28 will even mislead the crew even more.</p>		
Suggested Corrective Action :	Do not disengaged the autopilot too early during approach until you have positively identified the runway in use.		

6.2 Juanda International Airport, PT. Angkasa Pura I

The Juanda International Airport issued a letter and categorized as their safety action.



6.3 AirNav Indonesia Branch Office Surabaya Comments

No	Halaman	Subyek Temuan	Saran Perbaikan	Penjelasan	Tanggapan KNKT
1.	i	Table of Content Point : 1.17.2 PT.AirNav Indonesia	•AirNav Indonesia Branch Office Surabaya	<ul style="list-style-type: none"> • Merujuk PER.013/LPPNPI/X1/2013 dan PER.004/LPPNPI/X/2013 yang dimaksud adalah AirNav Indonesia Kantor Cabang Surabaya. • AirNav Indonesia, merupakan Brand Image dari Perusahaan Negara berbadan hukum Perum (Perum Lembaga Penyelenggara Pelayanan Navigasi Penerbangan Indonesia) berkantor pusat di Jakarta. • AirNav Indonesia Kantor Cabang Surabaya merupakan salah satu dari 7 (tujuh) Kantor Cabang Perum LPPNPI, dan membawahi 3 (tiga) Distrik yaitu Yogyakarta, Solo dan Semarang. 	<i>Seluruh saran perbaikan dari PT. Airnav Indonesia menjadi AirNav Indonesia Branch Office Surabaya di terima dan telah di revisi pada isi chapter final report.</i>
	ii	Point : 4.3 AirNav Indonesia, Juanda International Airport	AirNav Indonesia Branch Office Surabaya	<ul style="list-style-type: none"> • Jenis pelayanan AirNav Indonesia diatur dalam UU No.1 Tahun 2009 tentang Penerbangan Bab XII, dan AirNav Indonesia (Perum LPPNPI) merupakan amanah Pasal 271 UU No. 1 Tahun 2009. 	<i>Saran perbaikan dari PT. Airnav Indonesia menjadi AirNav Indonesia Branch Office Surabaya di terima dan telah di revisi pada isi chapter final</i>

No	Halaman	Subyek Temuan	Saran Perbaikan	Penjelasan	Tanggapan KNKT
				<ul style="list-style-type: none"> Tugas dan Fungsi AirNav Indonesia Kantor Cabang Surabaya dijabarkan dalam ER.004/LPPNPI/X/2013 Pasal 3 dan 4. 	<i>report.</i>
	iii	Point : 5.2 AirNav Indonesia, Juanda International Airport	AirNav Indonesia Branch Office Surabaya	<ul style="list-style-type: none"> Jenis pelayanan AirNav Indonesia diatur dalam UU No.1 Tahun 2009 tentang Penerbangan Bab XII, dan AirNav Indonesia (Per= LPPNPI) merupakan amanah Pasal 271 UU No. 1 Tahun 2009. Tugas dan Fungsi AirNav Indonesia Kantor Cabang Surabaya dijabarkan dalam ER.004/LPPNPI/X/2013 Pasal 3 dan 4. 	<i>Saran perbaikan dari PT. Airnav Indonesia menjadi AirNav Indonesia Branch Office Surabaya di terima dan telah di revisi pada isi chapter final report.</i>
2.	6	Point: 1.8 Aids to Navigation. Figure3: VOR/DME approach procedure runway 28 Juanda Airport. (Menggunakan Chart yang diterbitkan Jeppesen).	•AirNav Indonesia Branch Office Surabaya	<ul style="list-style-type: none"> Laporan KNKT merupakan produk negara Indonesia, sebaiknya acuan referensinya juga terbitan negara. (AIP Indonesia). SOP AirNav Indonesia Kantor Cabang Surabaya saat ini sedang dalam prosesupdating. 	<i>Mempertimbangkan bahwa approach chart yang digunakan operater (PT. Sriwijaya. Air) adalah Jeppesen dan hal ini sudah dituangkan di dalam Company Operation Manual (COM), untuk itu KNKT memutuskan tetap menggunakan jeppesen pada final report ini.</i>

No	Halaman	Subyek Temuan	Saran Perbaikan	Penjelasan	Tanggapan KNKT
3.	10	Point: 1.10.1 Aerodrome layout. Figure 6: Aerodrome chart. (Menggunakan Chart yang diterbitkan Jeppesen)	AIP INDONESIA (VOL.II) AERODRO E CHART – ICAO WARR AD 2.24-1 SURABAYA/Jua nda	<ul style="list-style-type: none"> • Laporan KNKT merupakan produk negara Indonesia, sebaiknya acuanreferensinya juga terbitan negara. (AIP Indonesia). • Aerodrome chart Surabaya/Juanda saat ini dalam proses updating denganperubahan /penambahan Taxiway N5S (Rapid Exit Taxiway). 	<i>Mempertimbangkan bahwa approach chart yang digunakan operater (PT. Sriwijaya. Air) adalah Jeppesen dan hal ini sudah dituangkan di dalam Company Operation Manual (COM), untuk itu KNKT memutuskan tetap menggunakan jeppessen pada final report ini.</i>
4.	19	Point : 1.17.2 PT. AirNav Indonesia	AirNav Indonesia Branch Office Surabaya	<ul style="list-style-type: none"> • Merujuk PER.013/LPPNPI/X1/2013 dan PER.004/LPPNPI/X/2013 yang dimaksud adalah AirNav Indonesia Kantor Cabang Surabaya. • AirNav Indonesia, merupakan Branch Image dari Perusahaan Negara berbadan hukum Perum (Perum Lembaga Penyelenggara Pelayanan Navigasi Penerbangan Indonesia) berkantor pusat di Jakarta. • AirNav Indonesia Kantor Cabang Surabaya merupakan salah satu dari 7 (tujuh) Kantor Cabang Penult LPPNPI, dan membawahi 3 (tiga) Distrik yaitu Yogyakarta, Solo dan Semarang. 	<i>Saran perbaikan dari PT. Airnav Indonesia menjadi AirNav Indonesia Branch Office Surabaya di terima dan telah di revisi pada isi chapter final report.</i>

No	Halaman	Subyek Temuan	Saran Perbaikan	Penjelasan	Tanggapan KNKT
5.	20	Paragraf 1: , which has a function in performing	Safety Management System at AirNav Indonesia Branch Office Surabaya.	<ul style="list-style-type: none"> • Sesuai PP No.77 Tahun 2012 Tentang Perum LPPNPI, telah terjadi pemisahan kewenangan dan tanggung jawab pelayan navigasi penerbangan dari PT. Angkasa Pura I (Persero) kepada Perum LPPNPI. • SMS AirNav Indonesia Kantor Cabang Surabaya berwenang menjaga keandalan fasilitas dan prosedur navigasi penerbangan bukan pada fasilitas bandar udara. 	<i>Saran perbaikan dari PT. Airnav Indonesia menjadi AirNav Indonesia Branch Office Surabaya di terima dan telah di revisi pada isi chapter final report.</i>
6.	23	The Safety Management System at Juanda international airport Point: 1.18.5 CASR SMS sub part		<ul style="list-style-type: none"> • SMS AirNav Indonesia Kantor Cabang Surabaya telah melakukan Safety Risk Management setelah mendapatkan tembusan e-mail perihal hazard yang dilaporkan oleh SIA terkait "<i>possibility Of mistaking taxiway for runway</i>" diantaranya adalah : <ul style="list-style-type: none"> a. Segera mengingatkan SMS, QM & CS Department Head PT. Angkasa Pura I (Persero) Bandara Juanda untuk menanggapi laporan SIAdan mengarnbil langkah-langkah pencegahan terkait hazard di fasilitas bandar udara yang menjadi kewenangannya. 	<i>Hal ini di kategorikan sebagai tindakan perbaikan (safety action) yang telah menjadi bagian safety action yang dilakukan operator bandara yang kami masukkan ke dalam Chapter 4 dan 6 pada final report ini.</i>

No	Halaman	Subyek Temuan	Saran Perbaikan	Penjelasan	Tanggapan KNKT
				<p>b. Untuk mengantisipasi kejadian salah mendarat di Taxiway tersebut, SMS AirNav Indonesia Kantor Cabang Surabaya telah memberlakukan prosedur GNSS Aproach Rwy 28 yang lebih presisi dalam intercepting final course Rwy 28.</p> <p>c. SMS AirNav Indonesia Kantor Cabang Surabaya telah menyelenggarakan sosialisasi implementasi RNAV (GNSS) Approach Procedure Rwy 28 pada tanggal 23-25 April 2014 dengan instruktur dari AirNav Indonesia Kantor Pusat.</p>	

No	Halaman	Subyek Temuan	Saran Perbaikan	Penjelasan	Tanggapan KNKT
7.	26	Point : 2.1 Paragraf :6 The investigation found that the pilots did not receive or read any NOTAM of Juanda.....		<ul style="list-style-type: none"> • Penerbitan dan distribusi NOTAM telah dilakukan oleh AirNav Indonesia Kantor Cabang Surabaya sesuai prosedur. <p>SOP Rangtika : 3.2.5. Pendistribusian NOTAM</p> <p>α NOTAM yang diterirna dari NOF hams disampaikan oleh petugas Aerodrome AIS Unit Bandar Udara Juanda Surabaya kepada unit-unit kerja terkait, antara li</p> <ul style="list-style-type: none"> • Pendistribusian kepada unit Internal : <ol style="list-style-type: none"> 1. Unit TOWER/APP 2. Unit ATS terkait lainnya. • Pendistribusian kepada unit Eksternal: <ol style="list-style-type: none"> 1. Airlines 2. Bandara terkait. <p>b. Bila pendistribusian NOTAM tidak dapat dilakukan dengan menggunakan fasilitas jaringan komunikasi karena suatu alasan, maka NOTAM tsb. harus segera disampaikan oleh petugas Aerodrome MS</p>	<i>Hal ini di kategorikan sebagai tindakan perbaikan (safety action) yang telah menjadi bagian safety action yang dilakukan operator bandara yang kami masukkan ke dalam Chapter 4 dan 6 pada final report ini.</i>

No	Halaman	Subyek Temuan	Saran Perbaikan	Penjelasan	Tanggapan KNKT
				<p>Unit Cabang Surabaya kepada unit-unit terkait, <i>tertulis</i>;</p> <p>c. Pada saat publikasi NOTAM harus ditunda karena alasan teknis (NOF malfunction), konsep NOTAM tsb. pada kesempatan pertama di distribusikan ke unit kerja terkait yang membutuhkan (Unit ATS dan Penyelenggara Bandar Udara) <i>melalui telepon atau fax. atm fasilitas komunikasi lain yang dapat dpertanggung jawabkan.</i></p> <ul style="list-style-type: none"> • NOTAM: A0030/14 NOTAMNQ Valid from 7 to 30 January 2014. (Draft Report hal. 11) 	
8.	27	<p>Paragraf : 1AirNav of Juanda International Airport.</p>	<p>AirNav Indonesia Branch Office Surabaya.</p>	<ul style="list-style-type: none"> • Jenis pelayanan. AirNav Indonesia diatur dalam UU No.1 Tahun 2009 tentang Penerbangan Bab XII, dan AirNav Indonesia (Perum LPPNPI) merupakan amanah Pasal 271 UU No. 1 Tahun 2009. • Tugas dan Fungsi AirNav Indonesia Kantor Cabang Surabaya dijabarkan dalam 	<p><i>Saran perbaikan dari PT. Airnav Indonesia menjadi AirNav Indonesia Branch Office Surabaya di terima dan telah di revisi pada isi chapter final report.</i></p>

No	Halaman	Subyek Temuan	Saran Perbaikan	Penjelasan	Tanggapan KNKT
				PER.004/LPPNPI/X/2013 Pasal 3 dan 4.	
9.	30	19. The SMS organization of the ATS.....were not in accordance to CASR SMS subpart 7		<ul style="list-style-type: none"> • SMS AirNav Indonesia Kantor Cabang Surabaya telah melakukan Safety Risk Management setelah mendapatkan terbusan e-mail perihal hazard yang dilaporkan oleh SIA terkait "<i>possibility of mistaking taxiway for runway</i>" diantaranya adalah : <ul style="list-style-type: none"> a. Segera mengingatkan SMS, QM & CS Department Head PT. Angkasa Pura 1 (Persero Bandara Juanda untuk menanggapi laporan SIAdan mengambil langkah-langkah pencegahan terkait hazard di fasilitas bandar udara yang menjadi kewenangannya. b. Untuk mengantisipasi kejadian salah mendarat di Taxiway tersebut, SMS AirNav Indonesia Kantor Cabang Surabaya telah memberlakukan prosedur GNSS Aproach Rwy 28 yang lebih presisi dalam intercepting final course Rwy 28. c. SMS AirNav Indonesia Kantor Cabang Surabaya telah menyelenggarakan sosialisasi implementasi RNAV (GNSS 	<ul style="list-style-type: none"> •

No	Halaman	Subyek Temuan	Saran Perbaikan	Penjelasan	Tanggapan KNKT
				<p>Approach Procedure Rwy 28 pada tanggal 23-24 April 2014 dengan instruktur dan AirNav Indonesia Kantor Pusat.</p> <ul style="list-style-type: none"> • Hazard report SIA dikirimkan kepada SMS, QM & CS Department PT. Angkasa Pura I (Persero) Bandara Juanda, cq. Sdr. Panut dan Sdr. Tbnu Wahyudi. (copy email terlampir) 	

No	Halaman	Subyek Temuan	Saran Perbaikan	Penjelasan	Tanggapan KNKT
10.	31	Point 4.3 AirNav Indonesia, Juanda International Airport	AirNav Indonesia Branch Office Surabaya.	<ul style="list-style-type: none"> Ref. No. 1 	<i>Saran perbaikan dari PT. Airnav Indonesia menjadi AirNav Indonesia Branch Office Surabaya di terima dan telah di revisi pada isi chapter final report.</i>
		AirNav Indonesia throughout the ATIS broadcasted additional information to the e aircraft operators concerning to aware a possibility of miss-leading of runway identification in hazy weather,		<ul style="list-style-type: none"> Informasi tersebut telah ditindaklanjuti dengan penerbitan NOTAM dan di broadcast melalui ATIS pada saat <i>runway in used</i> RWY28. 	

No	Halaman	Subyek Temuan	Saran Perbaikan	Penjelasan	Tanggapan KNKT
11.	32	5.SAFETY RECOMMENDATIO NS Point 5.2 AirNav Indonesia, Juanda International Airport	AirNav Indonesia Branch Office Surabaya.	<ul style="list-style-type: none"> • Hazard report SIA dikirimkan kepada SMS, QM & CS Department PT. Angkasa Pura I (Persero) Bandara Juanda, cq. Sdr. Panut dan Sdr. Ibnu Wahyudi. (copy e-mail terlampir) • SMS AirNav Indonesia Kantor Cabang Surabaya telah melakukan Safety Risk Management terhadap hazard yang dilaporkan oleh SIA terkait “<i>possibility of mistaking taxiway far runway</i>” diantaranya adalah : Segera mengingatkan SMS, QM & CS Department Head PT. Angkasa Pura I (Persero) Bandara Juanda untuk menanggapi laporan SIA dan mengambil langkah-langkah pencegahan terkait hazard di fasilitas bandar udara yang menjadi kewenangannya. 	<i>Saran perbaikan dari PT. Airnav Indonesia menjadi AirNav Indonesia Branch Office Surabaya di terima dan telah di revisi pada isi chapter final report.</i>