Important Information and Instruction for Recipients and Public

1. *Appended, in the upcoming pages, is the 'Final Report', together with the Safety Recommendations, of investigation of Serious Incident of Boeing 777-368ER, Registration HZ-AK28, of Saudi Arabian Airlines Flight SVA- 806, occurred on 28 June 2023 at VGHS Airport, Dhaka, Bangladesh. The investigation has been conducted by the Aircraft Accident Investigation Committee of Bangladesh (AAIC-BD), pursuance to Section 19 of CA Act 2017.*

2. *The Head of the Aircraft Accident Investigation Committee of Bangladesh (AAIC-BD) designated himself as the Investigator-in-charge (IIC) by forming 'two-member' Aircraft Accident Investigation Team (AAIT), to conduct the investigation. Bangladesh is the State of Occurrence, hence the AAIC-BD has instituted, conducted the investigation and prepared this Final Report*

3. *Earlier, on 28 June 2023, the AAIC-BD had sent to all concerned, the 'Notification' of the Serious Incident, which was in conformity with Standard 4.1 of Annex 13 and thereafter, dispatched the 'Preliminary Report' on 26 July 2023, in conformity with Standard 7.4 of Annex 13.*

4. *In conformity with standard 6.3 of ICAO Annex 13, the AAIC-BD had sent, to all concerned, the draft Final Report on 15 March 2024 and requested to provide 'Comments' (if intended) on the draft Final Report within sixty (60) days from the date of the transmittal of correspondence. The AAIC-BD received comments from Boeing and these have been incorporated in the final report as per the provision of ICAO Annex 13.*

5. *The AAIC-BD is dispatching this 'Final Report' as per standard 6.5 of Annex 13.*

6. *This Final Report will soon be available in the website www.caab.gov.bd (Menu: AAIC-BD) for public view.*

7. *Soon the AAIC-BD will send the Safety Recommendations, listed in Subject Sub-Head 3.4 of this report, to applicable States/ Organizations for effective corrective actions. Also, please be informed that the 'Final Report' has been sent as an 'Attachment' to E-mail, as desirable within the context of Annex 13.*

23 June 2024

Head
Aircraft Accident Investigation Committee
Bangladesh

CONTACT DETAILS OF AIRCRAFT ACCIDENT INVESTIGATION COMMITTEE (AAIC-BD)

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FINAL REPORT

INVESTIGATION INTO SERIOUS INCIDENT OF BOEING 777-368ER, Registration HZ-AK28 OF SAUDI ARABIAN AIRLINES FLIGHT SVA 806, OCCURRED ON 28 JUNE 2023 AT VGHS AIRPORT, DHAKA, BANGLADESH

BOEING 777-368ER

THIS REPORT IS PREPARED BY
THE OFFICE OF THE AIRCRAFT ACCIDENT INVESTIGATION COMMITTEE OF BANGLADESH

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FOREWORD

This Serious Incident investigation of 'Runway Excursion' involving Saudia Flight SVA-806, aircraft type B777-368ER, Registration number HZ-AK28, occurred at VGHS airport on 28 June 2023, has been conducted by the Aircraft Accident Investigation Committee of Bangladesh (AAIC-BD), in accordance with Section 19 of the CA Act 2017 and in conformity with Annex 13 to the Chicago Convention on International Civil Aviation.

This 'Final Report' has been issued to project an updated status of the investigation on the aforementioned Serious Incident of the draft Final Report by incorporating the comments from states and organizations, as applicable. The Final Report has been compiled in accordance with the requirements of Section 6.4 of ICAO Annex 13. The information contained in this Final Report has been derived from the factual information and evidences so far gathered during the ongoing investigation of the occurrence.

On 28 June 2023, the Head of AAIC-BD received a phone call from VGHS, ATC about the 'Runway Excursion'. The occurrence took place while the aircraft was landing at Runway 14 of VGHS, Hazrat Shahjalal International Airport, Dhaka, Bangladesh. The information was later-on followed by a 'Mandatory Occurrence Report' (MOR) through an e-mail sent by the Operator, Saudia Airlines.

Following the occurrence, the Head of AAIC-BD, immediately formed a **'Go-team'** designating himself as the Leader with Member Operations of the AAIC-BD as the member of the **'Go-team'** to proceed to the site of occurrence with a minimum of delay and by the quickest means available. The AAIC-BD has taken all reasonable measures to protect the evidence and maintain safe custody of the aircraft and its contents for the period which was necessary for the purposes of investigation. This has been in pursuance to Standard 3.3 of Annex 13,

Meanwhile, the Head of AAIC-BD advised the Airport/Aerodrome authority on telephone for ensuring adequate protection of all evidences of the aircraft and its contents until the arrival of the 'Go-team' at the site of occurrence.

The Office of the AAIC-BD, issued formal 'Notification' on 28 June 2023 for the information of all concerned, National and International, as per standard 4.1 of Annex 13. This was followed by forming a two-member Aircraft Accident Investigation Team (AAIT) designated by the Head of the AAIC-BD through a 'Memorandum', to conduct full-length investigation. The two-member AAIT comprised of the Head of the AAIC-BD as the Investigator-in-Charge (IIC) and Member (Operations) of the AAIC-BD as the associated Member.

The AAIC-BD conceives that any Aircraft Accident Investigation and analysis thereof should focus on identifying the true underlying causes and/or contributing factors rather than indicating on some human omissions for the occurrence.

As per ICAO Annex 13, the sole objective of this investigation has been to prevent aircraft accidents and incidents. It was not the purpose of this activity to apportion blame or liability.

Head
Aircraft Accident Investigation Committee
Bangladesh

CONTACT DETAILS OF AIRCRAFT ACCIDENT INVESTIGATION COMMITTEE (AAIC-BD)

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List of Acronyms

Acronyms	Degrees
AAIC	Aircraft Accident Investigation Committee
AAIC-BD	Aircraft Accident Investigation Committee of Bangladesh
AAIT	Aircraft Accident Investigation Team of AAIC-BD
ACCREP	Accredited Representative
AME	Aircraft Maintenance Engineer
AGL	Above Ground Level
AIB	Aviation Investigation Bureau
ATC	Air Traffic Control
ATP	Airline Transport Pilot
ATPL	Airline Transport Pilots License
BECMG	Becoming
BKN	Broken
CAA	Civil Aviation Authority
CAAB	Civil Aviation Authority of Bangladesh
C	Celsius
CPL	Commercial Pilot License
CRM	Crew Resource Management
CVR	Cockpit Voice Recorder
DFDR	Digital Flight Recorder Data
DME	Distance Measuring Equipment
DH	Decision Height
EICAS	Engine Indicating and Crew Alerting System
FCTM	Flight Crew Training/Techniques Manual
FDC	Flight Deck Crew
FIR	Flight Instructor Rating
FDM	Flight Data Monitoring
ft	Feet
FSR	Flight Standard and Regulations
GACAR	General Authority of Civil Aviation Regulation (Saudi Arabia)
HMS	Health Monitoring System
hPa	Hectopascals
HZ	Haze
IAS	Indicated Air Speed
ICAO	International Civil Aviation Organization
IIC	Investigator-in-Charge
ILS	Instrument Landing System
IMC	Instrument meteorological conditions
IOE	Initial Operating Experience
LB	Pounds of thrust
m	Meters
MAT	Maintenance Access Terminal
METAR	Meteorological Aerodrome Report
N/A	Not Applicable
NDB	Non-Directional Beacon
NDT	Non-Destructive Test
NTSB	National Transportation Safety Board, USA.

NM	Nautical Miles
NTSC	National Transport Safety Center
OERK	King Khalid International Airport
KSA	Kingdom of Saudi Arabia
OVC	Overcast
PIC	Pilot-In-Command
PF	Pilot Flying
PM	Pilot Monitoring
PRESS	Pressure
PSI	Pounds per Square Inch
QNH	Pressure at sea level
RA	Radio Altimeter
REG	Registration
RWY	Runway
SBT	Scenario Based Training
SCT	Scattered
SIC	Second In Command
SOP	Standard Operating Procedures
SPECI	Special Weather Report
TAF	Terminal Area Forecast
TEMP	Temperature
TSRA	Thunder Storm - Rain
TWR	Air Traffic Control Tower
USA	United States of America
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VGHS	Hazrat Shahjalal Intl Airport
VOR	VHF Omnidirectional Radio Range
VIS	Visibility
WX	Weather

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4. APPENDICES	**4.1 Appendices**	4.1.1	Will be sequentially preserved in the Committee office file

1. TITLE

1.1 Composition of Title:

1.1.1 Name of the Operator	Saudi Arabian Airline
1.1.2 Name of the Manufacturer	Boeing
1.1.3 Model of the Aircraft	Boeing 777-368 ER
1.1.4 Aircraft Nationality	Kingdom of Saudi Arabia
1.1.5 Registration Marks of the Aircraft	HZ-AK28
1.1.6 Place of the Accident/ Serious Incident/ Investigable Incident	Hazrat Shah Jalal International Airport (VGHS), Dhaka, Bangladesh
1.1.7 Date of the Accident/ Serious Incident/ Investigable Incident	28 June 2023

2. SYNOPSIS

2.1 Brief description of Synopsis:

2.1.1 Notification of Accident/ Serious Incident/ Investigable Incident to national and foreign authorities	The Office of the Aircraft Accident Investigation Committee, Bangladesh notified all relevant Authorities and Agencies as per Standard 4.1 of ICAO Annex 13.
2.1.2 Identification of the Accident/ Serious Incident/ Investigable Incident Investigation Authority	Aircraft Accident Investigation Committee of Bangladesh (AAIC-BD).
2.1.3 Accredited Representation	(1) So far, two (2) Accredited Representatives from the States and Agencies, namely the The National Transport Safety Centre "NTSC" (former Aviation Investigation Bureau 'AIB' of the Kingdom of Saudi Arabia (KSA) and the National Transportation Safety Board (NTSB) of the United States of America (USA) have expressed their willingness to participate in the investigation by providing their details, as applicable, pursuant to Standard 4.6 of ICAO Annex 13. The AAIC-BD has included them to participate in the investigation, pursuant to Standard 4.10 of Annex 13. (2) While the ACCREP from the NTSB has been participating through E-mail from USA, the ACCREP from the NTSC, KSA accompanied by three (3) Advisors – one each from Flight operations, Airworthiness and FDR/CVR expertise, travelled to Dhaka, Bangladesh physically to participate in the investigation. (3) The NTSC Team arrived Dhaka on 05 July 2023 and participated in the investigation with the AAIT for consecutive three days and witnessed/ inspected all the relevant evidences those include the following: (a) The affected/damaged aircraft; (b) The VGHS Runway, especially the geographical location and places of the aircraft excursion areas; (c) The VGHS ATC tower and surrounded areas, structures and fittings of ATS/ NAV facilities; (d) The Photographs and Videos so far taken; (e) The ATC tape recordings/ transcripts; (f) The Statements of the witnesses so far collected.

	(4) Both AAIT and NTSC Team members discussed at length on various aspects of the investigation and mutually exchanged their views on the probable causes and contributing factors of the serious incident involving 'Runway Excursion'.
2.1.4 Organization of the Investigation?	Aircraft Accident Investigation Committee of Bangladesh (AAIC-BD).
2.1.5 Authority releasing the report	Aircraft Accident Investigation Committee of Bangladesh (AAIC-BD)
2.1.6 Date of publication or dispatch of report	The date of dispatch is 23 June 2024.
2.1.7 Brief resume of the circumstances leading to the Serious Incident	(1) The Saudia Airlines Flight SVA-806, Boeing 777-368 ER aircraft, Registration HZ-AK28 originated from Riadh (OERK), Kingdom of Saudi Arabia to land at Dhaka (VGHS), Bangladesh on 28 June 2023. (2) There were 383 passengers and 15 crew members on board. (3) The flight flew "ILS Rwy 14" approach at Dhaka (VGHS), Bangladesh (Figure-1) for a landing on runway 14 with the tower reporting marginal weather of a visibility of 1500 m in heavy rain and wind 240/15 Knots. (4) The autopilot was engaged in Approach mode on localizer and glide slope. With the autopilot engaged, the aircraft descended to 100 feet above 'Minima' (261 ft AGL) and the captain, (Pilot Monitoring 'PM') of the aircraft had visual contact with ground. At 261 ft, the PM reported approach lights in sight. Descending through 98 feet (Radio Altimeter- 'RA') the pilot flying (PF) disconnected the autopilot and began hand-flying the aircraft to touchdown. At that point, the wind was 205/08 Kts (extracted from the Digital Flight Recorder Data) and the aircraft was at intended IAS and sink rate; perfectly aligned with the runway centreline. (5) According to the statement of the flight crew, slight localizer fluctuation was observed, a left drift off the runway centreline began from 50 feet RA and continued unchecked as the aircraft touched down on the left main landing gear with a small angle of crab. Touchdown was estimated at about 500 feet from the threshold. (6) After touchdown, the aircraft rolled along the left half of the RW concrete surface, tangentially on the left half of the centerline, for about 1500 feet and gradually kept veering further left until the left main landing gear went approximately 10-15 feet away from the runway shoulder concrete surface into the muddy grass. (7) The aircraft then continued to roll down almost parallel to the runway left edge line with its left main gear remaining on the wet muddy grass for about 1500 – 1700 feet. During this time, the left main gear wheels overran on five (5) concrete cable laying iron made pit-covers, of each having dimension of about 6 ft x 6 ft and crashing about three (3) pit-covers and associated structures. Thereafter, the left main landing gear reverted back on the runway surface (Figure- 2). (8) The aircraft then rolled down the runway, back-tracked and was taxied to Parking Bay # 5 via the S1 taxi track.

3. BODY

3.1 Factual Information

3.1.1 History of the flight:

3.1.1.1 Flight number	SVA-806
3.1.1.2 Type of operation	International passenger/cargo operation
3.1.1.3 Last point of departure	King Khalid International Airport, Riyadh (OERK)
3.1.1.4 Time of departure (Local time or UTC)	2110 UTC, 27 June 2023
3.1.1.5 Point of intended landing	Hazrat Shah Jalal International Airport (VGHS), Dhaka, Bangladesh
3.1.1.6 Flight preparation	As per the Schedule, the aircraft was pre-flighted by the ground crew and visual check was carried out by the flight crew. There were no discrepancies/observations. The flight was a scheduled passenger carrying IFR flight that originated from King Khalid International Airport (OERK), Riyadh, Saudi Arabia
3.1.1.7 Description of the flight and events leading to the serious incident including reconstruction of the significant portion of the flight path, if appropriate.	(1) Saudi Arabian Airline Boeing 777-368ER, registration HZ-AK28, departed King Khalid International Airport (OERK), Riyadh, Saudi Arabia at 2110 UTC as a scheduled flight SVA 806, for Hazrat Shahjalal International Airport (VGHS), Dhaka, Bangladesh. There were 383 passengers and 15 crew members on board. The flight flew "ILS Rwy 14" approach for a landing on runway 14 with the tower reporting weather visibility of 1500 meter in heavy rain and wind 240/15 Kts. The aircraft descended to 100 feet above minimums when the captain who was pilot monitoring (PM) sighted ground in contact. By 261 ft the PM reported approach lights in sight. The autopilot was engaged in Approach mode on localizer and glide slope. Descending through 98 ft (RA), the pilot flying (PF) disconnected the autopilot and began hand-flying the aircraft to touchdown. At that point, the wind was 205/08 (extracted from the Digital Flight Recorder Data 'DFDR') and the aircraft was at target IAS and sink rate; perfectly aligned with the runway centerline. (2) According to the flight crew, slight localizer fluctuation was observed. Because of rain and wet runway surface landing conditions the flight crew increased the AUTOBRAKE selection from 3 to 4. The aircraft started a left drift from centerline from 50 feet RA and continued so, until the aircraft touched down on the left main landing gear. Touchdown was at about 500 feet from the threshold. According to the last admissible DFDR, the wind at 5 ft (RA) was 255/07 kts. (3) The left landing gear touchdown was on the left side of the centerline by approximately 11 meters, the autobrakes activated, engine reversers sequentially applied and the flare pitch was held up as is typical with a dry-runway landing technique. Normal nose wheel fly-down to the runway was applied. Almost instantly, aircraft weathervane into the wind. Flight surface-controls (ailerons, spoilers and rudder) functioned normally showing the PF making a significant left control wheel input (in the same direction of the cross-wind component) almost simultaneously with the touchdown. Starting from 10 feet RA, the PM gave six (6) repetitive verbal warnings, "CENTERLINE; CENTERLINE; CENTERLINE; CENTERLINE; CENTERLINE" and by the final "CENTERLINE" warning, the PIC took controls bringing the aircraft back to the centerline. However, the left main wheels had already exited the left edge of the runway and dug into the muddy-grass side with a 440 meters long shallow trench approximately 5 meters away perpendicular from the runway hard-surface. (4) Eight seconds after touchdown, the area channel of the CVR recorded impact sounds of the left main landing gear with runway-side manholes cover tops of cable laying pits. These were iron-sheets of 6 feet x 6 ft x 6 ft dimension. A total of 6 impact sounds were heard as the main left wheel tracked towards a temporary closed rapid exit taxiway "N1". Three of these manhole pits were scarred with uneven deep damage.

(5) As the captain brought the aircraft back to the centerline, he continued the landing roll to the end of the runway. During runway backtrack, two (2) 'EICAS STATUS MESSAGE' appeared – "TIRE PRESS" and "BRAKE TEMP". With no awareness of the runway excursion, the flight crew continued to taxi to stand number 5. At the stand and engines shutdown, the ground mechanics reported all the left main landing gear six (6) tires were torn and damaged with number 2-wheel hubs exposed and tire pressure depleted. The left landing gear assembly was covered with grass and mud (Figure- 3,4,5,6 and 7). The captain reported the event to the tower and consequently a runway sweep for runway safety was conducted. The operator grounded the aircraft and initiated mandated notifications. Passengers' disembarkation proceeded normally however without event awareness.

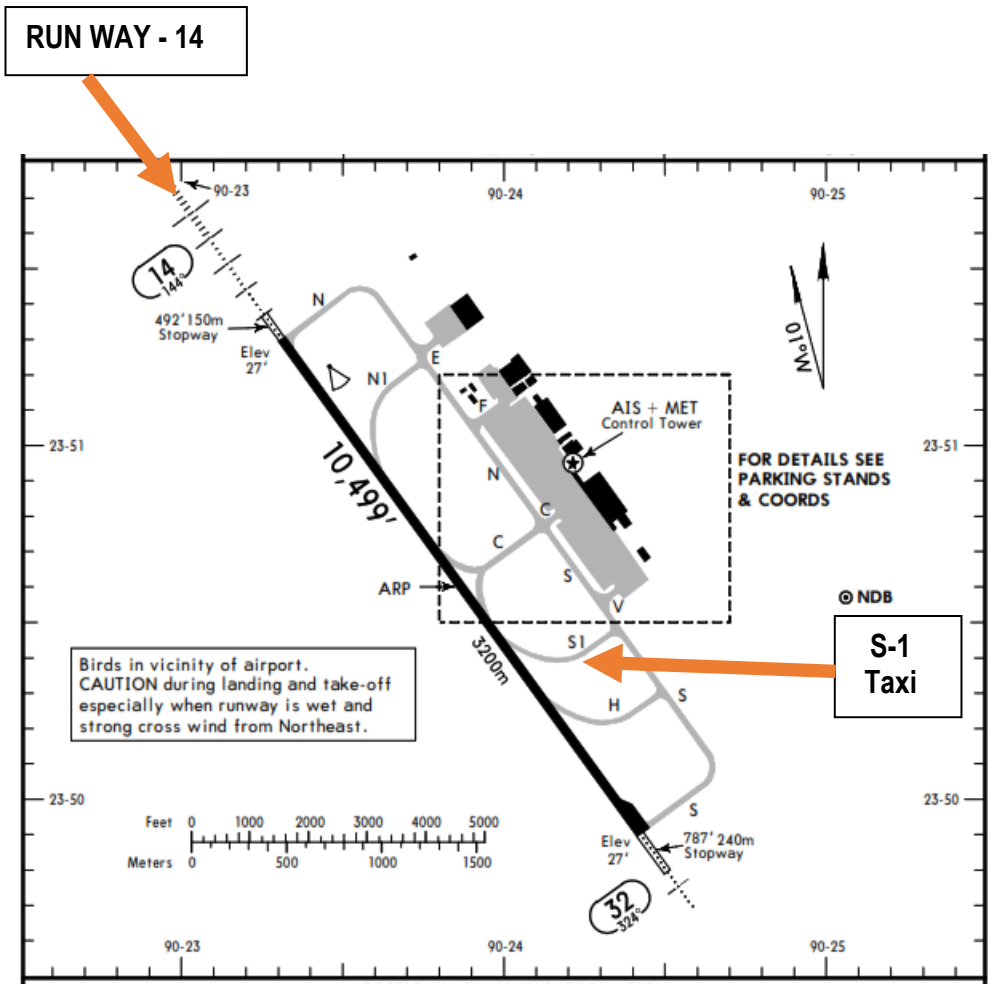


Figure- 1

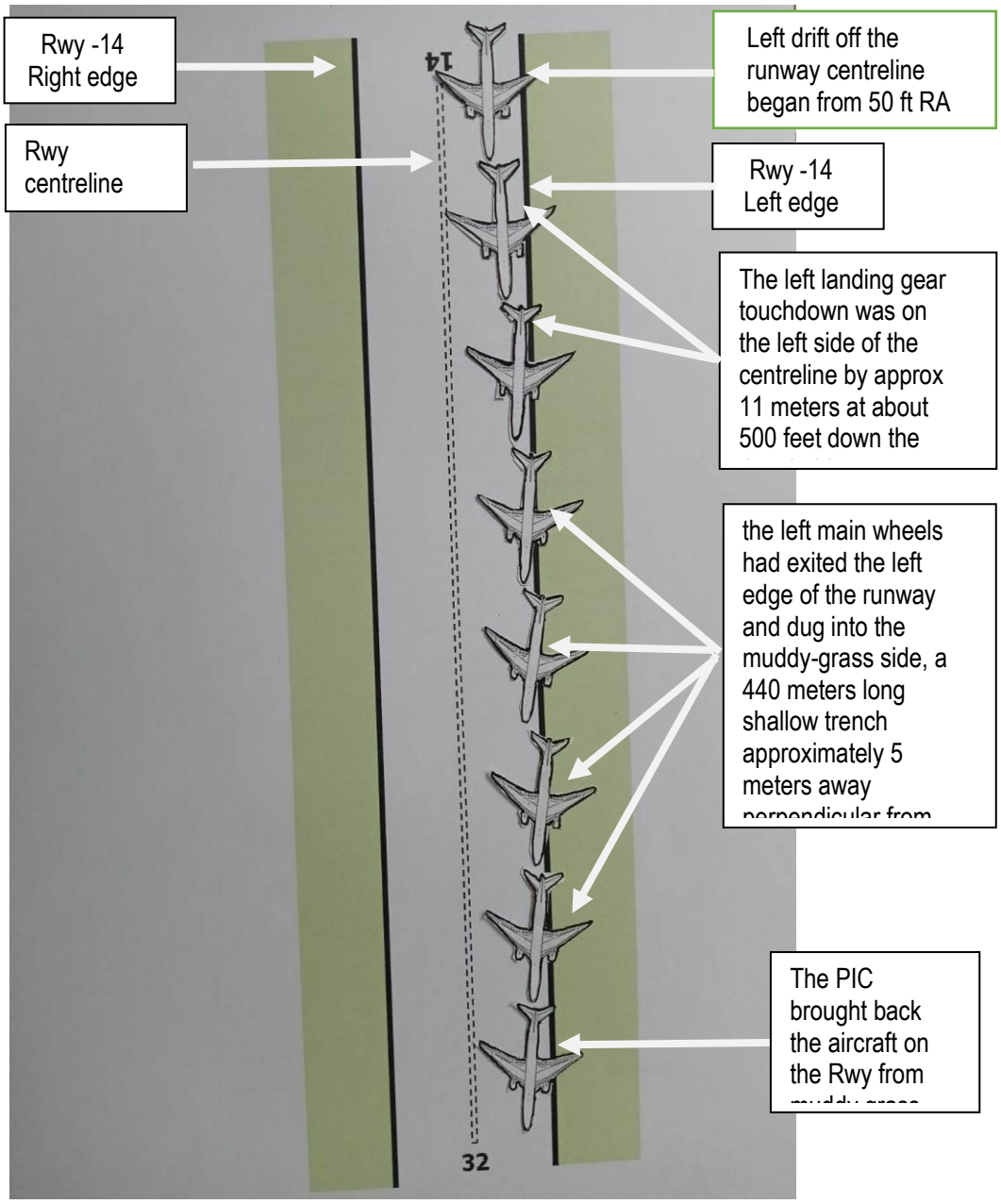
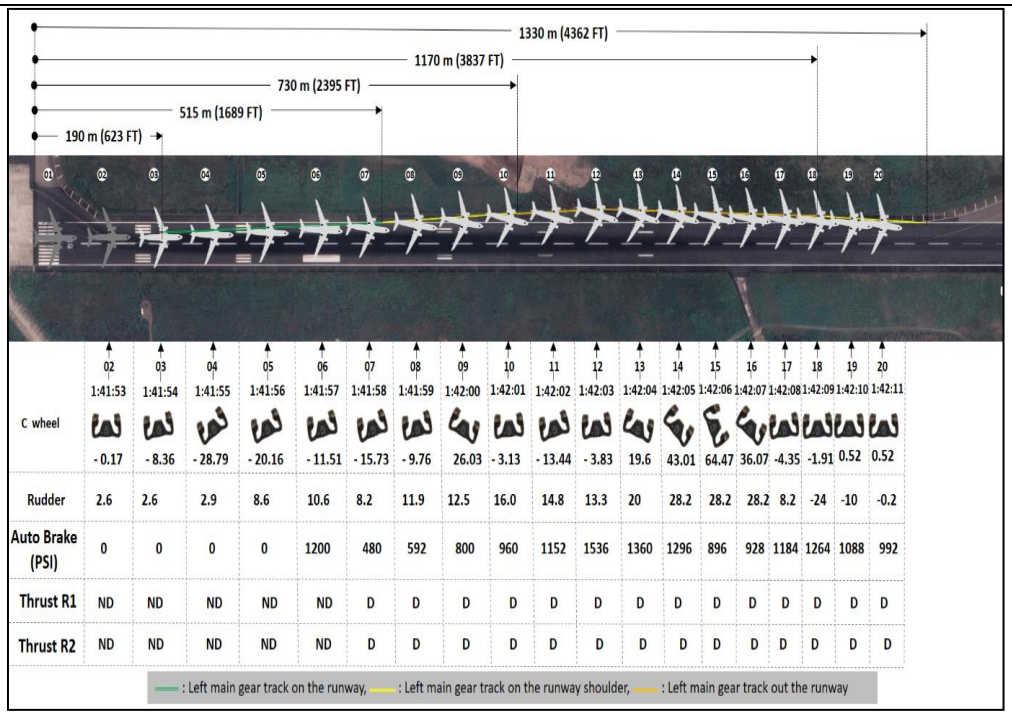


Figure- 2 The flight and events leading to the serious incident (Runway Excursion) including reconstruction of the significant portion



	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
	1:41:53	1:41:54	1:41:55	1:41:56	1:41:57	1:41:58	1:41:59	1:42:00	1:42:01	1:42:02	1:42:03	1:42:04	1:42:05	1:42:06	1:42:07	1:42:08	1:42:09	1:42:10	1:42:11
C wheel	-0.17	-8.36	-28.79	-20.16	-11.51	-15.73	-9.76	26.03	-3.13	-13.44	-3.83	19.6	43.01	64.47	36.07	-4.35	-1.91	0.52	0.52
Rudder	2.6	2.6	2.9	8.6	10.6	8.2	11.9	12.5	16.0	14.8	13.3	20	28.2	28.2	28.2	8.2	-24	-10	-0.2
Auto Brake (PSI)	0	0	0	0	1200	480	592	800	960	1152	1536	1360	1296	896	928	1184	1264	1088	992
Thrust R1	ND	ND	ND	ND	ND	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Thrust R2	ND	ND	ND	ND	ND	D	D	D	D	D	D	D	D	D	D	D	D	D	D

Figure 3
SVA806 landing excursion progression

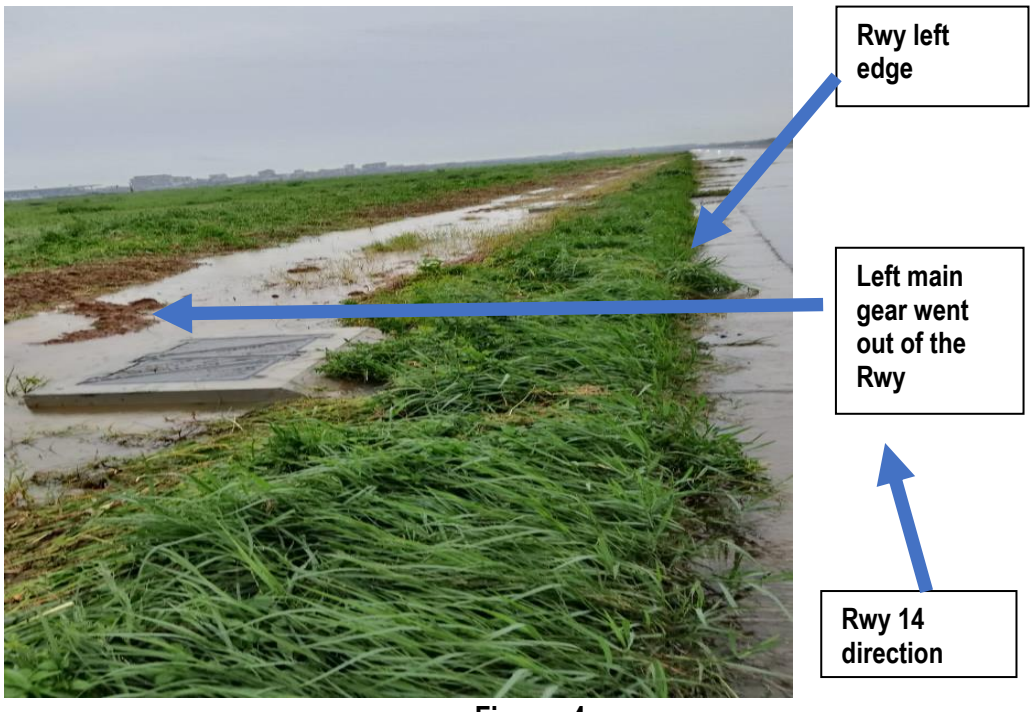


Figure- 4

Figure- 5

Figure- 6
Left landing gear condition, aft to forward view as the aircraft arrived at parking.

Figure-7
Left landing gear condition, forward to aft view after parking

3.1.1.8 Location (latitude, longitude, elevation)	N23°51.14' E090 ° 23.20'; Elevation: 27 Feet
3.1.1.9 Time of the accident/serious incident/ Investigable Incident (Local or UTC)	Serious incident, occurred at 0142 UTC
3.1.1.10 Whether day or night	Day

3.1.2 Injuries to Persons

Injuries	Crew	Passengers	Others
3.1.2.1 Fatal	No	No	No
3.1.2.2 Serious	No	No	No
3.1.2.3 Minor	No	No	No

3.1.3 Damage to Aircraft (Brief Description)

3.1.3.1 Destroyed	No
3.1.3.2 Substantially damaged	Aircraft inspection revealed damage to the Left Main Landing Gear assembly with following details: (1) 2 dents found identical in the opposite side at the left-hand inboard flap (Figure -8 and 9). (2) All the six tyres of the left main landing gear were found partially and/or completely torn and damaged with one wheel hub exposed. All wheels and wheel-well areas were full of grass and mud deposition. (Figure- 10) (3) Details of the damage: (1) Right hand aft harness connected to junction box torn, bracket displaced form clamp;

(2) Left hand aft harness connected to junction box bracket displaced from clamp;
(3) Steering actuator harness connected to junction box damaged;

(4) Aft left inboard flap (Figure -8 and 9) with 2 dents:

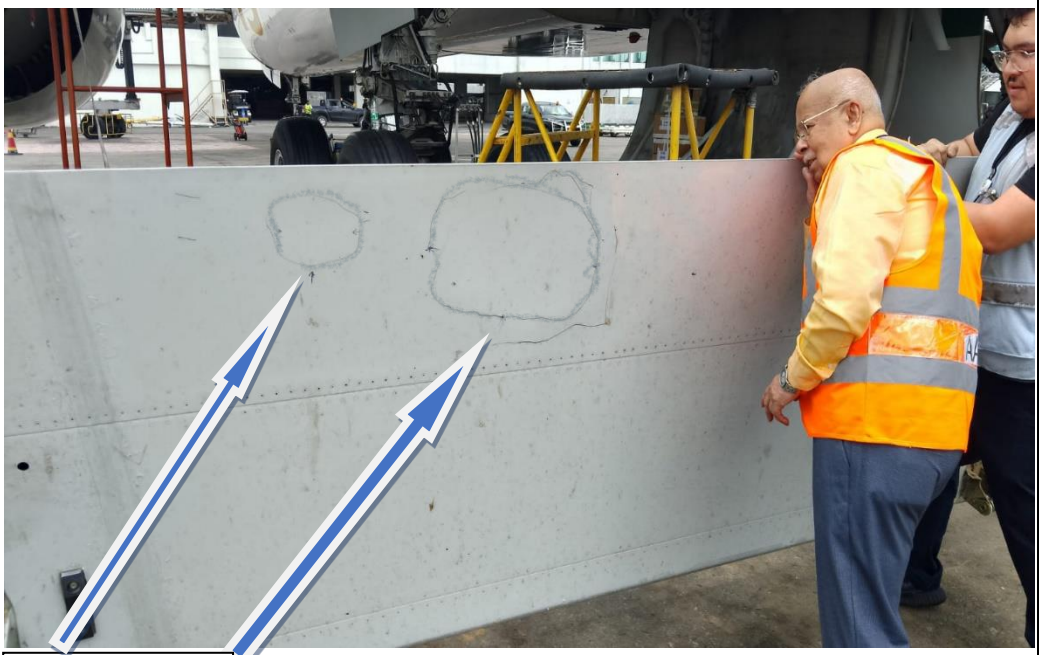
(a) # 1: dent width = 16.5-inch, length = 13.5-inch,
(b) # 2: dent width = 5.5-inch length = 5.6-inch,

(5) Wheel # 1 harness torn;
(6) Wheel # 10 harness torn;
(7) Right hand aft harness connected to junction box torn;
(8) Steering actuator harness connect to junction box torn;
(9) Brake temp compensation module damage;
(10) Wheel #10 speed sensor harness damage;
(11) Brake temp sensors damage;
(12) 2 dents found identical in the opposite side at the left-hand inboard flap dimensions: -

(a) L=12”
(b) W=10”
(c) In dent =0.04”
(d) Nearest fastener =5.5”
(e) Nearest edge=1”

(13) Damage to all electrical harnesses out of the forward junction box. (Figure -11)
(14) Damage to all electrical harnesses out of the aft junction box.
(15) Damage to all brake hydraulic lines brackets.
(16) Tires No. 1 & 2 burst.
(17) Tires No. 5, 6, & 9 damaged however not deflated.
(18) Damage to Steering Actuator electric harness.
(19) Damage to all Left-Hand brake assemblies. (Figure- 12)
(20) Damage to all Brake temperature sensors
(21) Damage to Inboard Flap Upper Surface with 2 dents beyond operational limits.
(22) Concrete cable laying iron made pit-covers tops broken (Figure- 13)

Figure- 8



Minor bend/damage to some degrees of the left inner flaps

Figure- 9

Tyres of the left main landing gear partially and/or completely torn and damaged

Figure-10

Figure 11
Electrical Harness pulled out

Figure 12
Damage to the Left-hand Brake Assemblies

3.1.3.3 Slightly Damaged	No

3.1.4 Other Damage:

3.1.4.1 Other Damage	Three (3) concrete cable laying iron made pit-covers and associated structures which, were located next to the runway edge line, were damaged and/or broken.

Figure- 13

3.1.5 Personnel information

3.1.5.1 Pertinent information concerning each of the flight crew members regarding age, validity of licenses, ratings, mandatory checks, flying experience (total and on type) and relevant information on duty time

(a) Pilot in command information

Age	60y 9m
License Class	ATP, No. D-1939, non-expiry
Date of issue	18 MAY 2022
Date of expiry	21 JUN 2025
English Language Proficiency (ELP)/expiry	6 permanents
Medical certificate class	Class 1 till 31-8-2023
Date of issue	02.FEB.2023
Date of expiry	25.AUG.2023
Date of joining the operator	14.FEB.2016
Nationality:	Malaysia
Ratings:	Current on B-777-300
Mandatory Checks:	Done on 16-05-2023
CRM training:	Done on 10-10-2022

Pilot in Command Flight Experience:

Total flying hours	23313.73
Total Commander Hours	18323.53
Total Multi Engine Hours as PIC	18323.53
Total hours on type	13154.75
Hours on type last 90 days	246.52
Hours on type last 28 days	71.19
Hours on type last 7 days	9.34
Hours on type last 24 hours	5.46
Rest period before flight	44h
Current Instrument Rating	B777
Date of last Simulator Training	FDC Recurrent Aug 2022FDC PC Feb 2023
Total Simulator Hours for the Past 12 Months	20

(b) First Officer (Copilot) Information

Age	50y10m
License Type and Class	CP
Nationality:	Saudi
ATPL No:	CP-25129; non-expiry
Date of issue	19.OCT.2022
Date of expiry	No expiry
English Language Proficiency (ELP)/Expiry	Level (4) expire 10.SEP.2025
Rating:	Current on B-777-300
Medical Examination	Class 1
Date of issue	08.DEC.2022
Date of Expiry:	25.DEC.2023
Date of joining the operator	29.JAN.2017

Mandatory Checks: Done on 03-06- 2023
Flying Experience (Total): 5300 Hours.
Flying Experience (On type): 1780 Hours.
Rest Period: More than 22 Hours
Instructor Rating: Not applicable
Management Post: Nil
Medical Status: Class-1 till: 12/12/2023
CRM training: Done on APR 2023

First Officer Flight (Copilot) Flight Experience
Flying experience - FO
Total flying hours 4198.21
Total Commander Hours 0
Total Multi Engine Hours as PIC 4198.21
Total hours on type 1750.21
Hours on type last 90 days 232.78
Hours on type last 28 days 58.10
Hours on type last 7 days 19.13
Hours on type last 24 hours 5.46
Rest period before flight 23h
Current Instrument Rating B777
Date of last Simulator Training FDC Recurrent July 2022
FDC PC JAN 2023

3.1.5.2 Brief statement of qualifications and experience of other crew members	N/A
3.1.5.3 Pertinent information regarding other personnel, such as air traffic services, maintenance, etc., when relevant	Not relevant to this investigation.

3.1.6 Aircraft information

Aircraft Type	Boeing 777-368ER	Registration	HZ-AK28
Aircraft S/N	42266	Flight number	SVA-806
Airplane Year of Manufacture:	23/Jul/2015	Type of Operation	Commercial Air Transport passengers and cargo
Landing Gear Type	Retractable -Tricycle	Name of the Owner	Saudi Arabian Airlines
Engines Types	GE 115B	Operator	Saudi Arabian Airlines
Engine Thrust	115 LB	Airworthiness Certificate Expiry date	25/Jun/2025
Max takeoff weight	352,441 kg	Total Flight Hours	5,701:13
MAX landing weight	251,290 Kg	Total Flight Cycles	5,479

Figure- 14
Boeing 777-368ER's overall sketch view

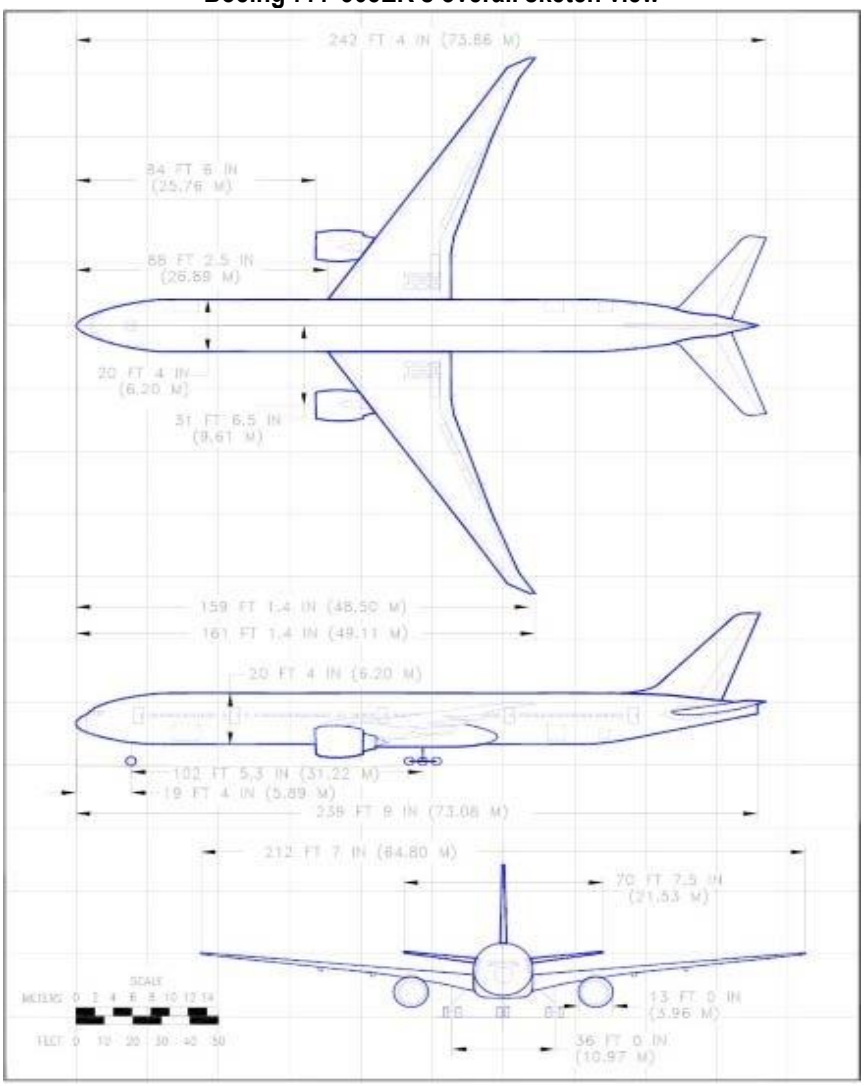


Figure- 14
"@Boeing. Used with permission".

3.1.6.1 Brief statement on airworthiness and maintenance of the aircraft (indication of deficiencies known prior to and during the flight to be included, if having any bearing on the accident)	Aircraft was airworthy. There was no technical defect detected prior to release for the flight from Riyad.
3.1.6.2 Brief statement on performance, if relevant, and whether the mass and centre of gravity were within the prescribed limits during the phase of operation related to the Accident/ Serious Incident/ Investigable Incident. (If not and if of any bearing on the Accident/ Serious Incident/ Investigable Incident give details.)	(1) Performance status was satisfactory; (2) Mass & Centre of Gravity were within limit;
3.1.6.3 Type of fuel used	Aviation Fuel JET A-1

3.1.7 Meteorological information of VGHS

3.1.7.1 Brief statement on the meteorological conditions appropriate to the circumstances including both forecast and actual conditions, and the availability of meteorological information to the crew	**(1) METAR:** SW: 160/04 knots; VIS: 3500 Meter; WX: Broken 900 feet; FEW CB 2500 feet; Overcast 9000 feet; QNH: 1005.9 millibars; Temperature: 26 Degrees C; Tempo: TS/RA; Humidity: 88%; **(2) SPECI:** 0150 for poor visibility; Surface wind 190/08 knots; Visibility 2500 in rain; Cloud: broken 800; Few: 2500; Overcast: 8000; Temperature: 26/24; QNH: 1006.6. **(3) WX Warning:** 27 June 2350 Z; For RA/TS/RA gusty wind, Low clouds & poor visibility; Extended up to 28 June 0320 UTC. **(4) Meteorological Information:** The weather data for VGHS area on 28 June 2023 was confirmed from multiple sources. **(5) Aerodrome forecasts:** TAF VGHS 272300Z 2800/2906 15008KT 3500 HZ SCT012 BKN100 TEMPO 2800/2810 18015KT 2000 RA/TSRA BKN008 FEW025CB OVC090 BECMG 2810/2812 16012KT 4000 HZ SCT015 BKN100= TAF VGHS 271700Z 2718/2824 15008KT 3500 HZ SCT012 BKN100 TEMPO 2718/2806 18015KT 2000 RA/TSRA BKN008 FEW025CB OVC090 BECMG 2806/2808 16012KT 4000 HZ SCT015 BKN100= **(6) Aviation Routine Weather Reports:** Meteorological conditions at VGHS were provided at intervals of one half-hour and were disseminated under Aerodrome Routine Meteorological Reports (METARs). A SPECI of significant meteorological conditions changes and poor visibility was issued at 0150 (the landing was at 0142 **(7) METAR Report:** This report was produced valid for the time of landing.

SW: 160/04 knots; VIS: 3500 Meter; WX: Broken 900 feet; FEW CB 2500 feet; Overcast 9000 feet; QNH: 1005.9 millibars; Temperature: 26 Degrees C; Tempo: TS/RA; Humidity: 88%.

(8) Aviation Selected Special Weather Report (SPECI):

Due to poor and deteriorating visibility, A SPECI was released at 0150.
"Surface wind 190/08 knots; Visibility 2500 in rain; Cloud: broken 800; Few: 2500; Overcast: 8000; Temperature: 26/24; QNH: 1006."6.

(9) Significant meteorological messages (WX Warning):

A significant weather report was issued on 2350 of 27 June alerting for rain, and thunderstorm (RA/TS). It also included gusty wind, low clouds and poor visibility. Report validity extended up to 0320 of 28 June.
It was noted that during daylight conditions the sky was obscured with moderate to heavy rain.

(10) **Meteorological Information Given by the Control Tower**

The control tower gave the weather information as shown in the table 2;

Time	Wind	Meteorological Visibility/ condition	SVA806 altitude	SVA806 distance to THR	Remarks
01:38	240/05	-/ Raining 2200 ft, 5.41 NM Cleared to land	1575 ft	3.85 NM	
01:40	240/15	1500 m Heavy rain			

Note: Touchdown was at 01:42
The control tower was equipped with two surface wind display systems. The first display provides instant wind speed and direction by sensors located at the top of the tower. The second display provides three-wind speed and direction values supplied from different sensors alongside the runway, two at each side of the runway and one on the middle. Wind speed and direction of the second display were the average speed and direction for the preceding 2 minutes. At the time of the landing wind speed and direction was not available out of sensors for RWY 14 threshold and middle.

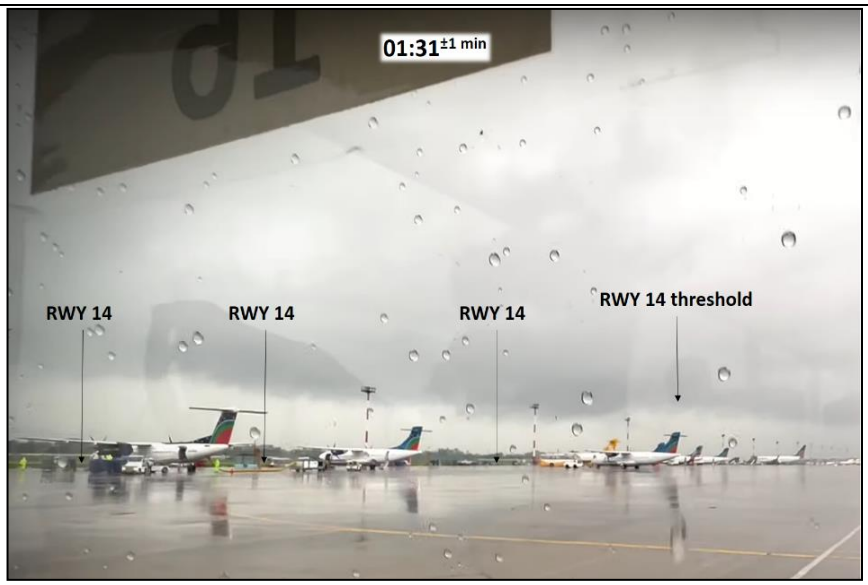


Figure- 15
Wet tarmac from recent rain. Locating sections of RWY 14 in the background are pointed out. This image was captured 11 minutes before landing.

Figure 16
Visibility and cloud coverage at about 21 minutes after landing

(7)

3.1.7.2 Natural light conditions at the time of the Accident/ Serious Incident/ Investigable Incident (sunlight, moonlight, twilight, etc.)?	During day

3.1.8 Aids to Navigation of VGHS

3.1.8.1 Pertinent information on navigation aids available, including landing aids such as	**NAV Aids:** VOR, DME & ILS were serviceable;

ILS, MLS, NDB, PAR, VOR, visual ground aids, etc., and their effectiveness at the time	**VGA:** Precision Approach Path Indicator Lights, Flashing Lights, Threshold Lights, Runway Edge Lights, Centreline Lights, Touchdown Zone Lights and Taxi Lights were available, ON and effective.

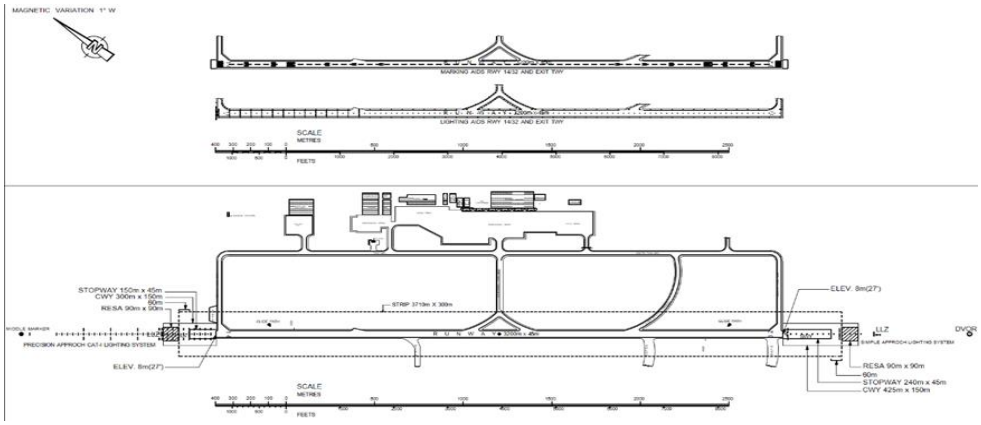
3.1.9 Communications.

3.1.9.1 Pertinent information on aeronautical mobile and fixed service communications and their effectiveness

VHF1, VHF2 communications, both were effective. Communication between flight crew and Air Traffic Control (ATC) units was retrieved. Table below presents context exchanged between the flight crew and the ATC.

Time	Action / Remarks
01:33	SVA806 contacted Dhaka Control Tower (TWR) passing 6000 feet descending to 4000 feet. The flight cleared to continue approach, and to report establishing localizer RWY 14. Further descent to 2000 feet and to expedite descend through 3000 feet
01:38	SVA806 reported establishing localizer RWY 14. Landing clearance given to land on RWY 14 with surface wind 240 degrees at 5 knots. The tower reported: "Raining on the field, runway surface is wet
01:39	Tower: Surface wind 240/15
01:40	Ground control gave departing traffic: Visibility 1500 meter and heavy rain.
01:42	TWR instructed SVA806 to vacate RWY 14 via TWY S1. The PIC replied "unable" expressing the need to use the full runway. Dhaka TWR approved and instructed the flight to vacate the runway via TWY C after backtrack.
01:44	Ground control made a general call to all traffic: "Moderate rain over the airfield"
01:45	TWR asked SVA806 flight crew if their backtrack was completed and received "still on the runway". TWR instructed the flight crew to contact ground control after vacating the runway
01:46	SVA806 vacated the runway and contacted ground control reporting its position. The controller instructed the flight to hold on TWY C
01:50	Ground control instructed SVA806 to join gate 5 and TWR reported light rain for the arrival traffic
02:02	SVA806 requested a separate frequency for ground control to communicate with and received a standby answer
02:04	SVA806 requested again a separate frequency and got directed to communicate on the current frequency. The PIC reported having grass on the left main wheel and suggested an inspection to be performed on the active runway
02:07	Ground control informed traffic on runway inspection progress
02:13	Ground control received a request from a departing traffic to use RWY 32 to avoid weather. The flight crew request was rejected, thus they requested to turn left after departure from RWY 14

3.1.10 Aerodrome Information

3.1.10.1 Pertinent information associated with the aerodrome, facilities and condition, or with the take-off or landing area if other than an aerodrome	**General:** Aerodrome facilities and associated conditions were normal. However, the runway surface was wet due to medium to heavy rain. Hazrat Shahjalal International Airport (VGHS) coordinates 23°50'36"N 090°23'52"E is located 20 Km North Dhaka city. The airport has an elevation of 27 ft. There is one asphalt runway: 14/32. The level of rescue and firefighting protection is of category 9.  **Figure- 17**

3.1.11 Flight Recorders

3.1.11.1 Location of the flight recorder installations in the aircraft, their condition on recovery and pertinent data available therefrom	The Digital Flight Data Recorder (DFDR) of the aircraft was located at the aft section of the aircraft. The investigating team recovered and removed the Flight Data Recorder (DFDR). The recorder was found in good condition. Data was successfully downloaded in its raw format and used to reconstruct critical landing and touchdown parameters. Additional advanced data extraction and animation was conducted at the National Transport Safety Center (NTSC) laboratory in Jeddah.
3.1.11.2 Location of the cockpit voice recorder installations in the aircraft, their condition on recovery and pertinent data available therefrom	The Cockpit Voice Recorder (CVR) of the aircraft was located at the aft section of the aircraft which has been recovered intact by the investigating team. The CVR was found in good condition. Data was successfully downloaded in its raw format and used to reconstruct critical landing and touchdown parameters. Additional advanced data extraction and animation was conducted at the National Transport Safety Center (NTSC) laboratory in Jeddah.

Recorders Details

Type	Cockpit voice Recorder figure. 18
Manufacture	Honeywell
Part number	980-6032-001
Serial number	CVR-01754

Type	Flight Data Recorders figure. 17
Manufacture	Honeywell
Part number	980-4750-009
Serial number	FDR-03833

Figure-18 FDR

Figure-19 CVR

3.1.12 Wreckage and impact information

3.1.12.1 General information on the site of the Accident/ Serious Incident/ Investigable Incident and the distribution pattern of the wreckage, detected material failures or component malfunctions. Details concerning the location and state of the different pieces of the wreckage are not normally required unless it is necessary to indicate a break-up of the aircraft prior to impact. Diagrams, charts and photographs may be included in this section

Left Outer tyres (Figure- 20)

Left Inner tyres

Point of left wheel getting into grass. Opposite direction of the landing (Figure- 21)

or attached in the appendices	Left wheel of the aircraft touched down and rolled on the concrete outside the left RW edge Centre line. (Towards Landing direction) 

Figure-22
Left wheel tyre marks on muddy grass

3.1.13 Medical and pathological information

3.1.13.1 Brief description of the results of the investigation undertaken and pertinent data available therefrom	Medical tests were not performed

3.1.14 Fire

3.1.14.1 If fire occurred, information on the nature of the occurrence, and of the firefighting equipment used and its effectiveness	There was no evidence of fire at any stage of the occurrence.

3.1.15 Survival aspects

3.1.15.1 Brief description of search, evacuation and rescue, location of crew and passengers in relation to injuries sustained, and failure of structures such as seats and seat-belt attachments	This landing runway excursion was survivable

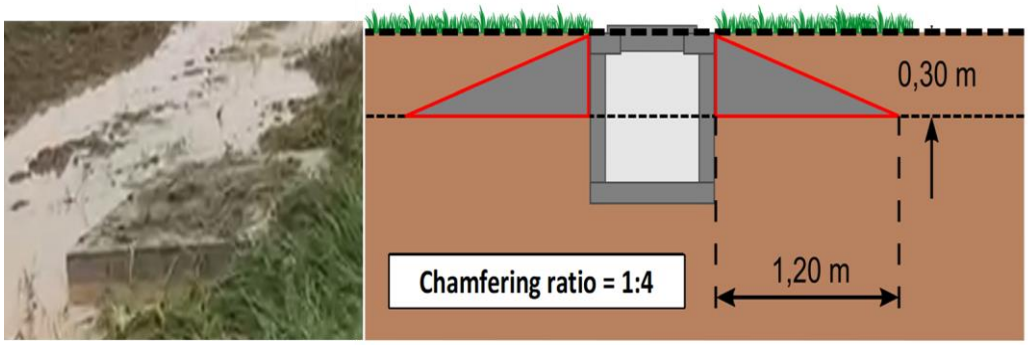
3.1.16 Tests and research

3.1.16.1 Brief statements regarding the results of tests and research	Several animations were created providing simplified visual grouping of landing performance data reinforcing excel sheet data spread.

3.1.17 Organizational and Management Information

3.1.17.1 Pertinent information concerning the organizations and their management involved in influencing the operation of the aircraft. The organizations include, for example: the operator; the air traffic services; airway, aerodrome and weather service agencies; and the regulatory authority. The information could include, but not be limited to, organizational structure and functions, resources, economic status, management policies and practices, and regulatory framework?	(1) Saudi Arabian Airline simulator training sessions and Crew Resource Management (CRM) training modules covers multiple situations assisting flight crew to recognize necessitating (demanding) situations for PIC flight control takeover and procedures to confirm "Relinquish" and "Flight Control Assertive Confirmation". (2) The captain and first officer basic flight training as well as line training records show satisfactory grading.

3.1.18 Additional information

3.1.18.1 Relevant information not already included in 3.1.1 to 3.17.1	(1) This investigation revealed that Boeing 777 Flight Crew Training Manual reference for Reverse Thrust and Crosswind (All Engines) directional control correction maneuver to regain runway centerline (see figure 20) is not covered by the operator's GACAR Part 142 training centers. This concern might be common with many other air carriers and perhaps corrective/prevention action can be embedded, revised or enhanced Safety Management System programs. (2) Bangladesh Aerodrome Advisory Circular Number 03 dated 10 March 2010, recommended aerodrome runway surface friction assessments: (a) Every 6 months if the Average number of movements on RWY per day is less than 150 (b) Every 3 months if the Average number of movements on RWY per day is 150 or more (3) Analysis of runway friction assessments provides accurate data on predictive braking action and is significant information to provide to the flight crew and meets Bangladesh safety regulations. (4) Previous Lateral Excursion occurrence, investigated by Bangladesh, recommended that, the aerodrome operator should consider locating and designing drains or any other underground electrical systems installation particularly for those to be installed with concrete encasement, manholes and handholds by chamfering or tapering design of the edge of those and/or locating those as far as practicable from the edge of runway. **(See Figure- 23).**  **Figure-23**

3.1.19 Useful or effective investigation techniques

3.1.19.1 When useful or effective investigation techniques have been used during the investigation, briefly indicate the reason for using these techniques and refer here to the main features as well as describing the results under the appropriate subheadings 3.1.1 to 3.18.1?	So far, no new useful or investigation technique has been merged at this stage of the investigation.

3.2 ANALYSIS

*[The following analysis has been made based on the information documented in **'Factual information'** and which is relevant to the '**Determination of Conclusions'** and **'Causes and/or Contributing Factors']***

The 'Analysis' of this Serious Incident' has been compiled through the assessment of the following subject areas:

3.2.1 Machine	**(1) Aircraft airworthiness and system operations:** (a) The aircraft was airworthy. There was no technical defect detected prior to release for the flight from Riyadh. Performance status was satisfactory. Mass & Centre of Gravity were within limit; (b) The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures. There was no evidence found of any airframe failure or system malfunction during airborne, at touchdown and subsequent rollout. Post-occurrence maintenance activity on the aircraft did not find any anomaly that would have affected the directional control of the aircraft, such as the nose wheel steering, brakes, engines, thrust reversers, spoilers, and speed brakes. (c) So far, no anomaly or abnormality was found or perceived with regard to machine/ Material.
3.2.2 Environment	**(1) Weather/ Environmental Factor:** (a) In this runway excursion, possible effects of heavy precipitation and reduced visibility were observed. Data extracted from the DFDR included magnetic heading; true track; pitch; indicated airspeed; vertical speed; N1 for right and left engines; aircraft flight control surfaces parameters; landing gear; ground spoilers; and autobrake settings, all have been integrated within the analysis. (b) Prior to touchdown, a small crosswind effect was verified by comparing magnetic heading to the true track course showing a less than 3° deviation. Consistency of the crosswind effect was observed during autopilot engagement and during the short-term hand-flying. (c) The last recorded DFDR wind direction and speed of 205/08 was made short of touchdown (5 feet RA). CVR recorded post-landing discussion between the PF and PM of poor and fluctuating slant visibility as the aircraft approached. (d) Instrument meteorological conditions (IMC) prevailed during the final approach; however, the decision to continue below DH met existing regulations; Note: Considering the above analysis of weather/ environment, the incident did not occur due to weather/ environmental factor.

3.2.3 *Man*

(1) Flight crew

(a) Human involvement for this serious incident was two flight crews, the PIC and the FO, who were rated and there was no evidence of their any disqualification associated with this occurrence. Both the flight crews were physically sound, well-rested and medically fit to operate the flight;

(b) Having taken into consideration that, all Boeing commercial jet aircraft are equipped with multiple stopping systems, such as spoilers / speed brakes, thrust reversers, and wheel brakes, it is essential that Boeing 777 operating crew must be conversant and habitual with each system most effectively, specifically when the landing is made on a slippery runway. Strict observance of handling techniques specified in the Aeroplane Flight Manual and/or Operations Manual is required (see figure 24):

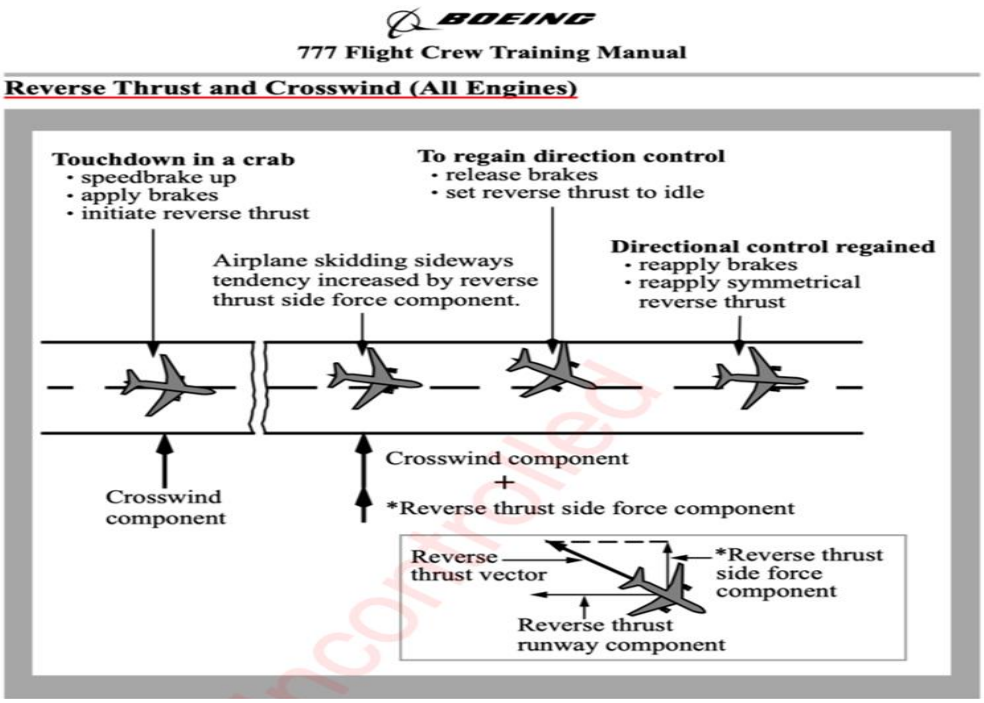


Figure- 24, Boeing FCTM landing on wet runway centreline correction manoeuvre
"@Boeing. Used with permission".

(c) The investigation analyses that the given guidance by Boeing in its B-777 FCTM with regard to restoring directional control during a landing rollout on a slippery runway with a crosswind was not efficiently applied. To this reference, the Boeing guidance is given below:

(1) "As the airplane starts to weathervane into the wind, the reverse thrust side force component adds to the crosswind component and drifts the airplane to the downwind side of the runway. Also, high braking forces reduced the capability of the tires. to corner. Guidance to correct back to the centreline: **"release the brakes and reduce reverse thrust to reverse idle"**. Releasing the brakes increases the tire-cornering capability and contributes to maintaining or regaining directional control. Setting reverse idle reduces the reverse thrust side force component without the requirement to go through a full reverser actuation cycle. Use rudder pedal steering and differential braking as required, to prevent over correcting past the runway centreline. When directional control is regained and the airplane is correcting toward the runway centreline, apply maximum

braking and symmetrical reverse thrust to stop the airplane. Essentially, Boeing recommends disconnecting the autobrakes and releasing brake pressure to regain directional control."

(d) Without flight crew situational awareness, none of the above was actioned or perhaps applied too late, otherwise loss of directional control would certainly be anticipated. Lack of or late awareness combined with lack of knowledge of the Boeing FCTM negated effective decision making. The one manoeuvre not considered was a rejected/balked landing. This was evident soon after the initial touchdown while positioned on the left edge, away from the runway centreline.

(e) Again, CVR playback had the flight crew action-post the runway lateral excursion, during taxi with a runway backtrack and the described gusty condition on touchdown. The possibility that the crew were not provided existing weather conditions, which cannot be ruled out. Gust, by definition, is considered as a discontinuous and instantaneous change of the wind, which evidence suggests to have been predominant at the time. Improper, inadequate inflight centreline compensation and no flight crew excursion awareness or corrective technique implementation are determined as the most influencing factors shared by both pilots.

(f) Checking the aircraft's Maintenance Access Terminal (MAT) part of a Health Monitoring System (HMS) the previous flight history indicated no Anti-Skid or Auto Brake system failures. Inspecting both the left-hand (L/H) and right-hand (R/H) main landing gears (12) tires showed no signs of flat spots or hydroplaning. Once the aircraft was restored to normal condition, further checking of the antiskid system passed the test.

(g) Suspect "Dynamic";" Reverted Rubber" and "Viscous" types of hydroplaning were considered against the post occurrence observed surface condition of the runway detecting runway grooving, thick grass (only at the outside left sloped-edge of the runway possibly forming water puddles slowing drainage). Depth and type of contaminants on the runway surface was only eyeballed with no likelihood as a factor.

(h) The captain's training records showed relevant entries by an Initial Operating Experience (IOE) instructor with crosswind landings (and taxiing observing undershooting turns). When interviewed, the captain's knowledge with the procedure for tight turns on the runway in relation to the main landing gears was inaccurate. Inspecting the relatively short captain's (PM) training record with operator, revealed related grading remarks. There were only two such instances, both are reproduced:

(1) Not aware of aircraft wheel geometry when making 180° tight turns on runway;
(2) Slow response with situation awareness

[Note both observations were cleared by the time the PF has completed his line training.]

(i) The First Officer (PF) training record had a normal and clear of related concern remarks:

(j) Of more concern was the flight crew lack of awareness of when the aircraft veered off the left edge of the runway. It is confirmed that PIC's (PM) late "I have control" takeover from the First Officer (PF) occurred beyond that point.

3.3 Conclusions

*[Listed in the following sections are the **findings, causes and/or contributing factors** established in the investigation. The list of causes and/or contributing factors include both the immediate and the deeper systemic causes and/or contributing factors]*

3.3.1 Findings

3.3.1.1 Aircraft airworthiness and system operations	The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures. There was no evidence found of any airframe failure or system malfunction during airborne, at touchdown and subsequent rollout. Post-occurrence maintenance activity on the aircraft did not find any anomaly that would have affected the directional control of the aircraft, such as the nose wheel steering, brakes, engines, thrust reversers, spoilers, and speed brakes.
3.3.1.2 Flight Crew	(1) Captain and first officer were properly licensed and adequately rested prior to the flight; (2) The Pilot in Command flight training record reflected on delayed or slowed reaction to situation awareness; (3) Critical remarks and decisions by flight crew during the approach up to 98 feet (RA) was in accordance to company SOP; (4) Instrument meteorological conditions (IMC) prevailed during the final approach; however, the decision to continue below DH met existing regulations; (5) Although the aircraft was properly and functionally authorized for Autoland the PF decision to disconnect the autopilot at 98 (RA) feet "AGL" deviated from Boeing and company accepted practice; (6) There was insufficient height available to allow for Autopilot disconnect and transition into hand flying; (7) The Pilot in Command (PM) and First Officer Pilot Flying (PF) actions from CVR recordings indicated knowledge and understanding of aircraft handling on wet and slippery runway was inadequate, specifically Boeing FCTM – 'Landing Wet Runway Centreline Correction Manoeuvre'; (8) Touchdown to the left of the centreline was within runway boundary; however, observed flight control actions by PF aggravated and directly contributed to an immediate veer-off the left edge off the runway; (9) Repetitive "Centreline" deviation verbal warnings called for immediate aircraft flight control takeover; however, this action was critically delayed contributing to the excursion; and, (10) The flight crew lacked awareness of the excursion.
3.3.1.3 Weather	**This report was produced valid for the time of landing**. (1) SW: 160/04 knots; (2) VIS: 3500 Meter; (3) WX: Broken 900 feet; FEW CB 2500 feet; Overcast 9000 feet; (4) QNH: 1005.9 millibars; (5) Temperature: 26 Degrees C; Tempo: (6) TS/RA; Humidity: 88%;

	(7) Aviation Selected Special Weather Report (SPECI): (a) Due to poor and deteriorating visibility, A SPECI was released at 0150. (b) "Surface wind 190/08 knots; Visibility 2500 in rain; Cloud: broken 800; Few: 2500; Overcast: 8000; Temperature: 26/24; QNH: 1006."6.
3.3.1.4 Air Traffic Services and Airport Facilities	(1) The approach/approach radar and local controllers were properly licensed and correctly rated to provide the service; (2) The local air traffic controller gave weather information to the limit of equipment availability; (3) All aerodrome approach aids and lighting facilities were operating normally at the time of the occurrence; (4) The airport was equipped with anemometers well distributed to provide wind information; however, some were not commissioned at the time of the incident; (5) No evidence suggests significant runway surface conditions had a serious degradation effect on loss of directional control at the landing; and, (6) No record of Airport Operations runway friction tests nor navigation aid calibration were made available, normally updated and monitored. Historical data for both are mandated by investigation authorities.
3.3.1.5 Survivability	This occurrence was avoidable. Numerous unchamfered runway left-edge located cable laying pits (as reported in a previous investigation) escalated impact risk, possibility affecting survivability margins. Passengers and flight crew disembarked safely.

3.3.2 Causes

3.3.2.1 Probable Cause	The probable cause of this serious incident of runway excursion was the captain's delay in mandated action of taking over flight controls from the pilot flying inappropriate/aggravating response to an off-centreline wet/slippery runway landing.

3.3.3 Contributing Factors

3.3.3.1 Contributing Factor	Contributing factor was the deteriorating changing weather of medium to heavy rain and crosswind conditions during landing. Damage to the aircraft and escalated safety risk was attributed by un-chamfered ground Cable Laying manholes.

3.4 Safety Recommendations

3.4.1. Safety Recommendations	**(1) Saudi Arabian Airlines, KSA should:** (a) Conduct Scenario Based Training (SBT) at critical phase of flight with the purpose of Managing Risk: (1) "Crew performance inaccurate"; and, (2) "Inaccurate information to crew". (b) Introduce and/or design a 'Line Oriented Flight Training Simulator Modules' to cover wider scenarios exceeding the basic required flying skills (such as runway centreline alignment and effective crosswind handling with associated cross-wind) emphasizing: (1) Flight crew communication, management and leadership; and, (2) Effective decision making and technique for rejecting a landing soon after initial touchdown. (c) Utilize Flight Data Monitoring (FDM) to monitor and collect data of real-time landings on wet/slippery runways analysing thresholds of concern. **(2) VGHS Aerodrome Authority, Bangladesh should ensure:** (a) That, the ATC provide accurate and timely reporting of ambient weather conditions, especially wind strength, direction and variation, runway surface state and braking action; (b) To resolve mitigating the risk presented by the proximity of the cable-laying manholes to the runway edge (ICAO Annex 14; and, ICAO Doc 9981 PANSADR or ICAO Doc 9859 SMM; and, (c) To resolve, in the similar manner, the AAIG-BD's safety recommendation- "D" of 24/07/2018 report (Thai Airways B-777 runway excursion to the Wester side of the runway), this time by taking mitigating the risk presented by the proximity of the cable-laying manholes to the 'Eastern side' of the runway edge (ICAO Annex 14; and, ICAO Doc 9981 PANSADR or ICAO Doc 9859 SMM).

4. APPENDICES

All evidences, data recordings, documents, photographs etc. have been systematically stored in file.

End