Preliminary Safety Investigation Report

AAIU
Air Accident Investigation Unit

SERIOUS INCIDENT
A320 NEO
AT BRUSSELS AIRPORT
ON 05 FEBRUARY 2026

Ref.:
AAIU-2026-02-05-01
Status:
Preliminary
Issue date:
06 March 2026

ABOUT THIS REPORT

General	
What?	A safety investigation report is a technical document that reflects the views of the investigation team on the circumstances that led to the accident or serious incident and is conducted in accordance with Annex 13 to the Convention on International Civil Aviation and Regulation (EU) No 996/2010. In line with Annex 13, Recommendation 5.4.6, when an accident or incident draws heightened public attention, the investigation authority should publish a written preliminary report within thirty days of the accident or incident. **This preliminary report presents the factual information collected during the initial phase of the investigation and outlines the sequence of events leading up to the occurrence. The information provided may be incomplete and is subject to change. Additional relevant facts may emerge that are not yet reflected here.** **No analysis is included in this preliminary report, and it should not be interpreted as indicating conclusions or identifying causal or contributing factors. These elements and any possible errors identified in this report will be addressed in the final safety investigation report, expected within 12 months.** All AAIU reports are de-identified. On the basis that gender-specific language can lead to the identification of individuals, a policy has been adopted of using gender-neutral language in our safety investigation reports. In the report writing process, care is taken to ensure context and meaning are not lost.
Objective	**The sole objective of safety investigations is the determination of the causes, and to define safety recommendations in order to prevent future accidents and incidents. It is not the purpose of this investigation to apportion blame or liability.** In particular, Article 17-3 of Regulation (EU) 996/2010 stipulates that the safety recommendations made in this report do not constitute any suspicion of guilt or responsibility.
Investigation authority	The Air Accident Investigation Unit of Belgium (AAIU for the rest of this publication). It is the Belgian permanent national civil aviation safety investigation authority as defined in Article 4 of Regulation (EU) No 996/2010 and established in accordance with the Royal Decree of 26 December 2022. This unit is part of the Federal Public Service Mobility and Transport and is functionally independent from the Belgian Civil Aviation Authority and other interested parties.

INTRODUCTION

Occurrence class	Serious Incident
Occurrence category	Navigation errors (NAV)
Date and time[1]	Thursday 05 February 2026 21:04 UTC
Location	Airport of Brussels, taxiway E1
Aircraft	Airbus A320-251N
Aircraft category	Fixed wing - Large aeroplane (MTOW > 5700 kg)
Location of departure	Airport of Brussels, Belgium (ICAO-code : EBBR)
Planned destination	Airport of Copenhagen/Kastrup, Denmark (ICAO-code : EKCH)
Type of operation	Commercial Air Transport - International - Pax
Phase of flight	Takeoff
Injuries	None
Aircraft damage	No damage

What happened

On the evening of 5 February 2026, SAS flight SAS43M was cleared for take-off from runway 07R at Brussels Airport but mistakenly aligned itself with taxiway E1 instead.
The Airbus A320neo began accelerating down the taxiway, reaching a speed of 100 knots before the flight crew recognized the misalignment.
The pilots aborted the take-off and brought the aircraft to a stop near the intersection of taxiways V1 and C1.

Classification of the occurrence

This type of occurrence is hazardous because the aircraft begins its take-off from a location not designed or approved for that purpose. Doing so creates a risk of collision with other aircraft, vehicles, personnel, or obstacles. In addition, the aircraft may overrun the end of the taxiway if it is too short to get airborne or if the take-off is rejected.
Because these circumstances indicate a high probability of an accident, the event was classified as a **Serious Incident** in accordance with ICAO Annex 13.
Moreover, an aborted take-off from a taxiway is explicitly included in the *List of examples of serious incidents* in the Annex to Regulation (EU) No 996/2010.

[1] All time data in this report are indicated in UTC, unless otherwise specified

The investigation

The Air Accident Investigation Unit (AAIU) was notified by the airport authorities at 21:35. As no injuries or aircraft damage were reported, it was decided not to travel to the scene immediately; however, instructions were issued to preserve all evidence. Data collection began in parallel, and contact was made with the relevant stakeholders.
An investigator visited the site the following morning to conduct the initial assessment and to secure both flight recorders.

In accordance with ICAO Annex 13 and Article 9 (2) of Regulation (EU) No 996/2010, the following involved States were notified the same day:

- State of Operator and Registration: Sweden, represented by Statens haverikommission (SHK)
- State of Manufacturer and Design: France, represented by the Bureau d'enquêtes et d'Analyses pour la sécurité de l'aviation civile (BEA)

as well as to the following international organisations

- International Civil Aviation Organization (ICAO)
- European Union Aviation Safety Agency (EASA)

These states promptly appointed an Accredited Representative to participate in the investigation, supported by technical advisors from the operator, Scandinavian Airlines (SAS), and from Airbus. EASA also appointed a technical advisor.

Later on, an Accredited Representative from the Norwegian Safety Investigation Authority (NSIA) has also been added as the State of nationality of the flight crew. They will assist with the transcription of the CVR.

Furthermore, the investigators are receiving excellent cooperation from the operator SAS, the safety departments of Brussels Airport and the air navigation service provider (ANSP) skeyes, as well as from several individual experts.

TABLE OF CONTENTS

1. HISTORY OF EVENTS

The following narrative is derived from witness interviews with the flight crew and the involved air traffic control officers, and is supported by flight data, radar information, imagery and communication recordings. All times are indicated in UTC. The times from multiple sources are synchronized against the radar timeline to establish an exact sequence of events.

The flight crew began their duty period that day with flight SAS10C from Oslo to Copenhagen, operated with an Airbus A320neo. The aircraft departed Oslo 35 minutes late due to a slot restriction, leaving at 15:02 and arriving in Copenhagen at 16:36, compared to the scheduled arrival time of 16:15. After parking, passengers disembarked, and the flight crew transitioned to the incident aircraft for the onward sector to Brussels. A cabin crew change also took place at this point.

Preparations for flight SAS69X to Brussels were completed, and the aircraft commenced taxiing from the gate at 17:38 (scheduled departure 17:17). Due to winter conditions, de-icing was required, and due to additional delays by snow clearing of the de-icing pad and ATC slot restrictions, take-off eventually occurred at 18:44.

At 18:48, a new CTOT (Calculated Take-Off Time[2]) of 20:48 was assigned for the next rotation, SAS43M from Brussels back to Copenhagen, originally scheduled to depart at 19:30.
The flight to Brussels proceeded without abnormalities. The aircraft landed on Runway 07L at 20:01 (scheduled arrival 18:50) and arrived at the stand 147 at 20:06, leaving just 42 minutes turnaround time to comply with the ATC restriction. At 20:22, an updated CTOT of 21:00 was issued for flight SAS43M.

Henceforth, all times are expressed in hours:minutes:seconds.

Reportedly, boarding for the return flight proved challenging due to a high number of passengers carrying substantial amounts of cabin baggage. Several announcements were made via the PA system requesting passengers to expedite the boarding process.

At 20:38:08 the take-off briefing is performed. The expected taxi route is also briefly reviewed by the captain. Translated from Norwegian: "from 147 backwards with the nose in direction east, then onto one of these two taxiways leading out, Romeo 4 or Sierra, and then southbound on the Inner. After that, Charlie 6, which we have calculated for in case we are in a hurry. But I expect full runway since we have a slot." The crew had already identified the configuration of

[2] Calculated Take Off Time (CTOT) - The time provided by the Central Flow Management Unit (CFMU), taking into account the European Civil Aviation Conference (ECAC) ATC flow situation, that an aircraft has been calculated to take off. The CTOT, also known as the ATFM (Air Traffic Flow Management) slot, has a tolerance of – 5 to +10 minutes. (Skybrary)

RWY 07L and 07R as a potential threat during the arrival and approach briefing on the previous flight. Mention was made to stop and ask when in doubt during taxi.

Pushback for SAS43M was completed at 20:56:03. Engine #2 was started at 20:56:34. Although a single engine taxi was initially planned, the crew decided to start the second engine earlier to give the cabin crew additional time to complete their take-off preparations while the aircraft remained stationary. The cabin crew had asked for and received permission to perform briefing of overwing exit passengers during pushback in order to reach the slot.

At 20:58:26, the crew contacted Brussels Tower and reported ready to taxi. They were issued taxi instructions via taxiways Inner and Z to the holding point near the threshold of Runway 07R.

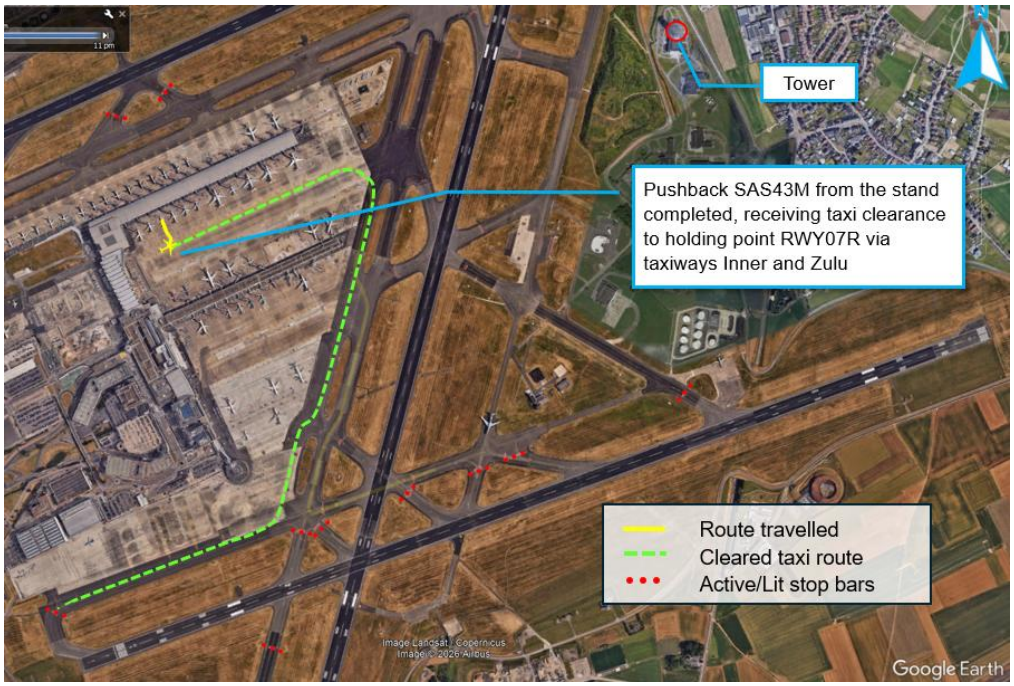

Figure 1 : 20:58:26 pushback complete and crew reports ready to taxi

The aircraft began taxiing at 20:58:38. The captain acted as pilot flying (PF), the first officer as pilot monitoring (PM).

At 20:59:46, an Airbus A350 operating as ETH751 commenced its take-off roll from position H on Runway 07R. This was the final departure from Runway 07R prior to SAS43M. At that moment, SAS43M was still taxiing on taxiway R4, between Apron 1 South and Apron 2 North.

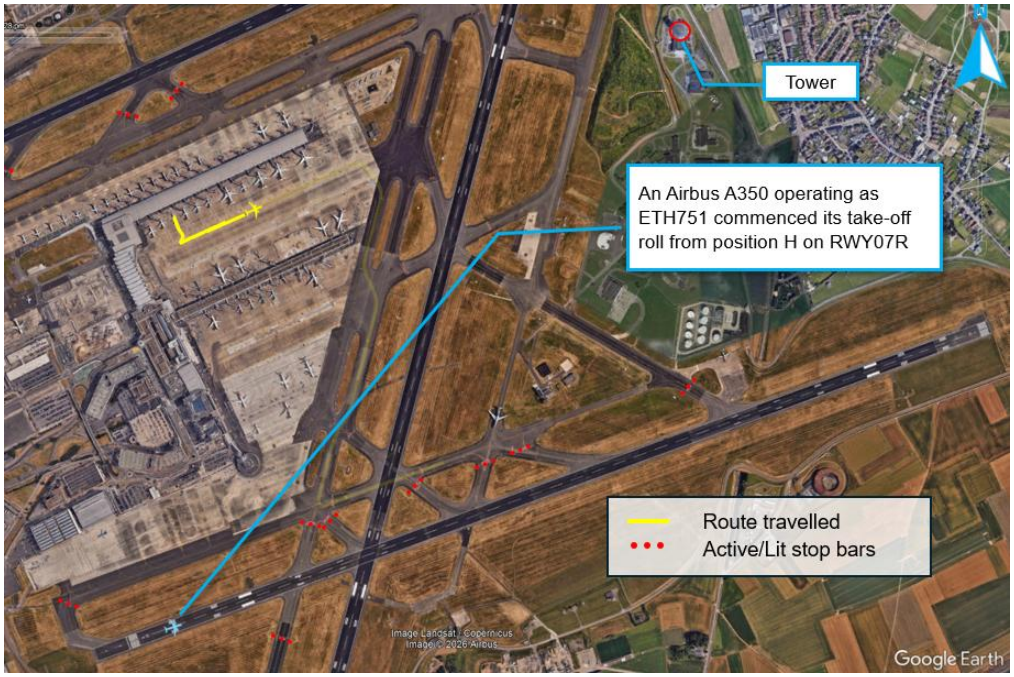

Figure 2 : 20:59:46 last departure from RWY07R before SAS43M

At 21:00:11 during taxi, the cabin crew notified the flight crew that they were ready for departure. This was followed by the execution of the taxi checklist at 21:00:43. The flight crew then discussed the possibility of requesting the intersection departure from Runway 07R to save time. Shortly thereafter, at 21:01:09, Brussels Tower independently proposed this option by asking, "Scandinavian 43M able C6?". Following the crew's confirmation, ATC issued a revised taxi clearance routing the aircraft via taxiway Outer toward intersection C6.

Figure 3: 21:01:09 New taxi clearance to C6

At 21:02:05, when the aircraft just entered taxiway Outer 9, the flight crew received the instruction "Line up and wait." At that time, the red stop bar at holding point C6 was extinguished. The captain remarked in the cockpit, "And then the red line disappeared."

Figure 4 : 21:02:05 Line-up clearance, stop bar at C6 extinguishes

At 21:02:52, roughly 45 seconds later, the aircraft had entered Outer 10, which the crew apparently mistook for Taxiway C6. The captain stated, "We are at Charlie six and we are cleared to enter. Entering active - clear left," and the first officer responded, "Clear right."

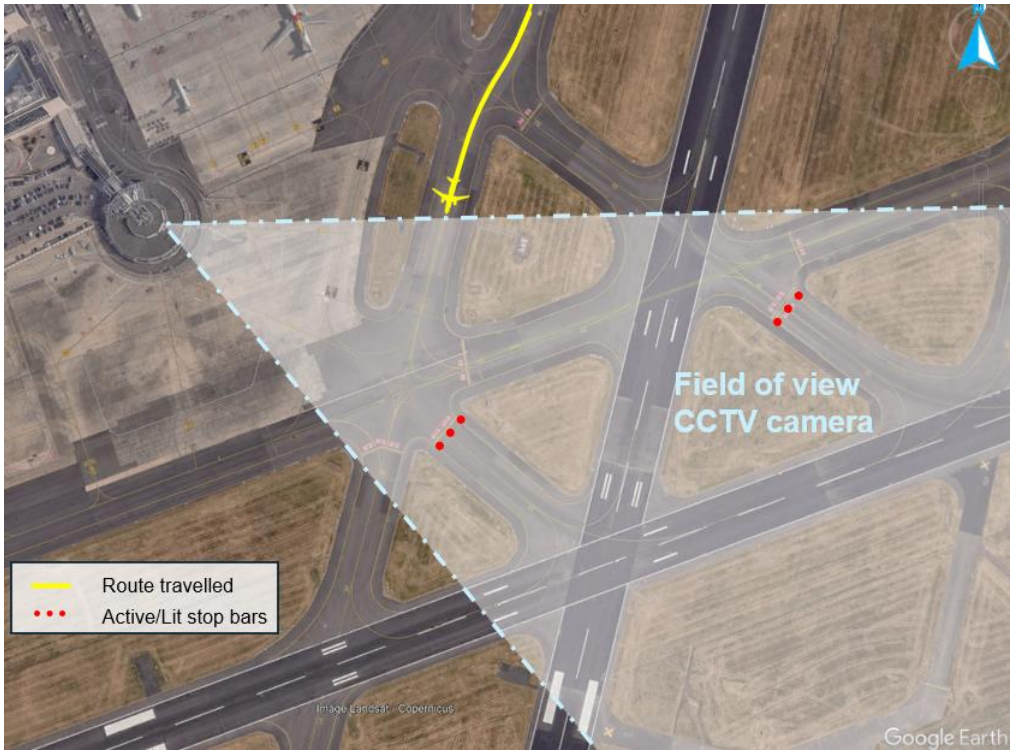

Figure 5 : 21:02:52, SAS43M still on taxiway Outer 10, starting line-up checklist

The captain then prompted the first officer to proceed with the line-up checklist, while the groundspeed decreased from 15 to 10 knots:

First officer: "Take-off runway"
Captain: "Charlie six…..runway zero seven right"
First officer: Pause… "Euh…. yes. TCAS"
First officer: "TCAS"
Captain: "TA/RA"
First officer: "Packs one and two"
Captain: "Off"
First officer: "Complete"

A left turn toward Taxiway E1 was just initiated when, at 21:03:16, the crew received the take-off clearance. At that moment, the aircraft was on a heading of 186° (while the Outer Taxiway follows a heading of 194°).

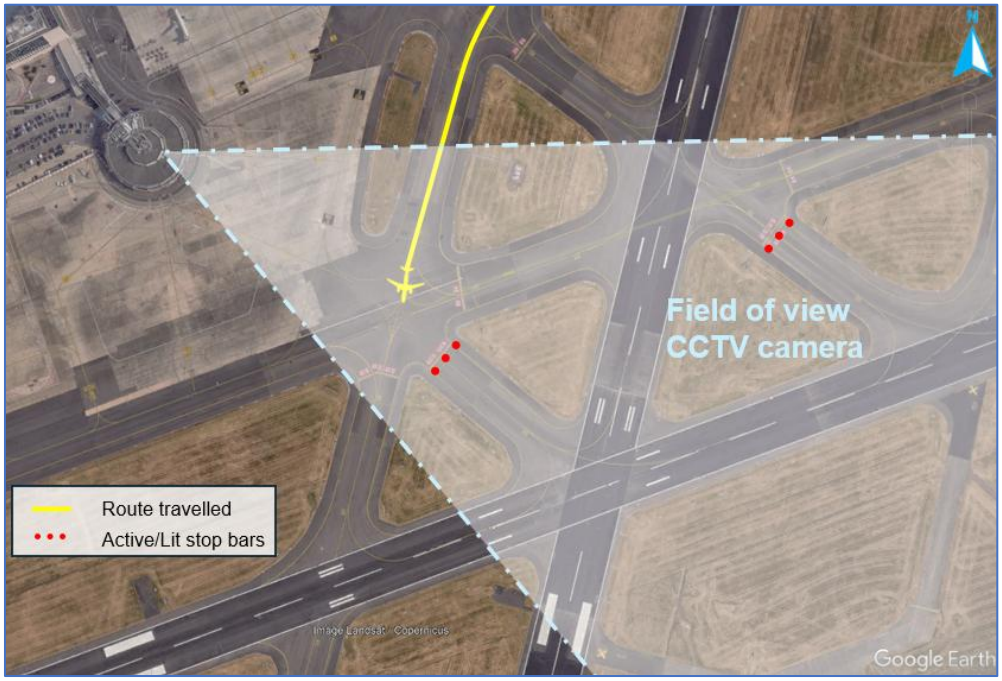

Figure 6 : SAS43M at 21:03:16 when receiving take-off clearance

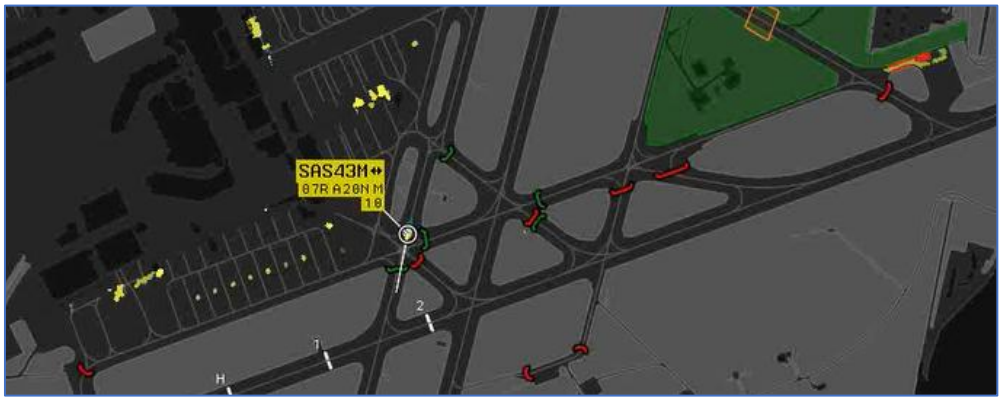

Figure 7 : extract of ground radar screen at take-off clearance.
White vector is a representation of heading and groundspeed.

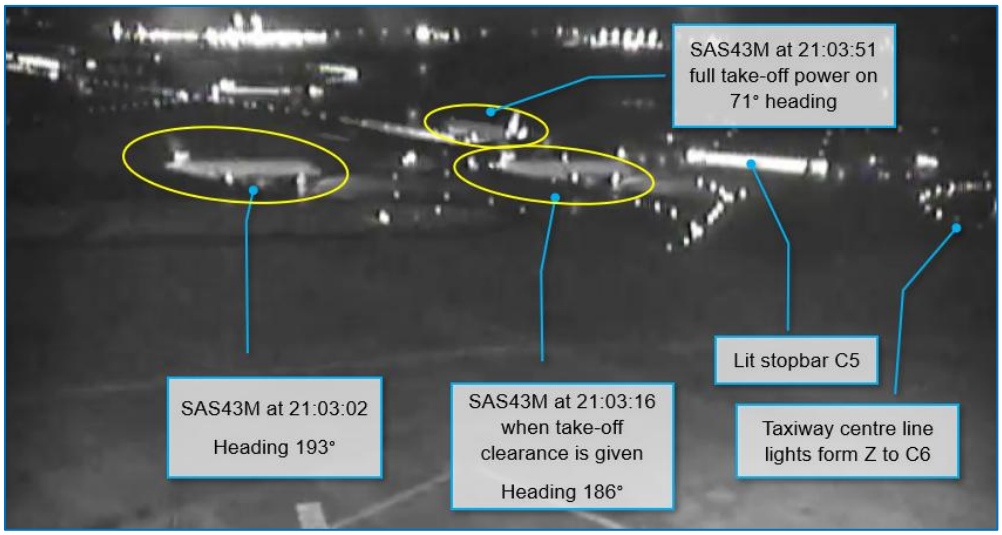

Figure 8 : composite image of CCTV recordings

At 21:03:40, the captain asked the first officer whether the crew was ready for take-off, and the first officer confirmed readiness. At that moment, the CCTV recording shows the landing light being switched on, while the aircraft was still rolling at a groundspeed of 3 knots and completing its alignment.

At 21:03:47, the turn was completed, and the aircraft established a steady heading of 070°. The thrust levers were advanced to the FLEX detent. At 21:03:51, full FLEX thrust was set, the aircraft was accelerating, and the captain announced the FMA indications: "MAN FLEX – SRS – AUTOTHRUST BLUE", to which the first officer responded, "Checked, thrust set."

The first officer continued monitoring the instruments while the captain looked outside.

At 21:04:02, the aircraft passed 100 kt IAS. The first officer made the "100 knots" callout, a critical crosscheck that verifies both pilots' airspeed indications are consistent and signals the transition from the low speed to the high speed regime. The captain, having observed that the forward view appeared increasingly narrow, did not respond immediately.

The first officer later reported finding it unusual that the captain did not respond in accordance with SOPs, as normally expected. The first officer looked outside and immediately recognized that the aircraft was not on a runway. The first officer stated, "No, this is wrong," and subsequently issued the command, "Stop, stop, stop, stop." The captain initiated the stop almost immediately.

At 21:04:09, the thrust levers were moved to full reverse, and braking was applied. At this moment, the aircraft had reached 127 kt IAS. Observing the end of the taxiway and a fence approaching, the first officer instructed a right turn.

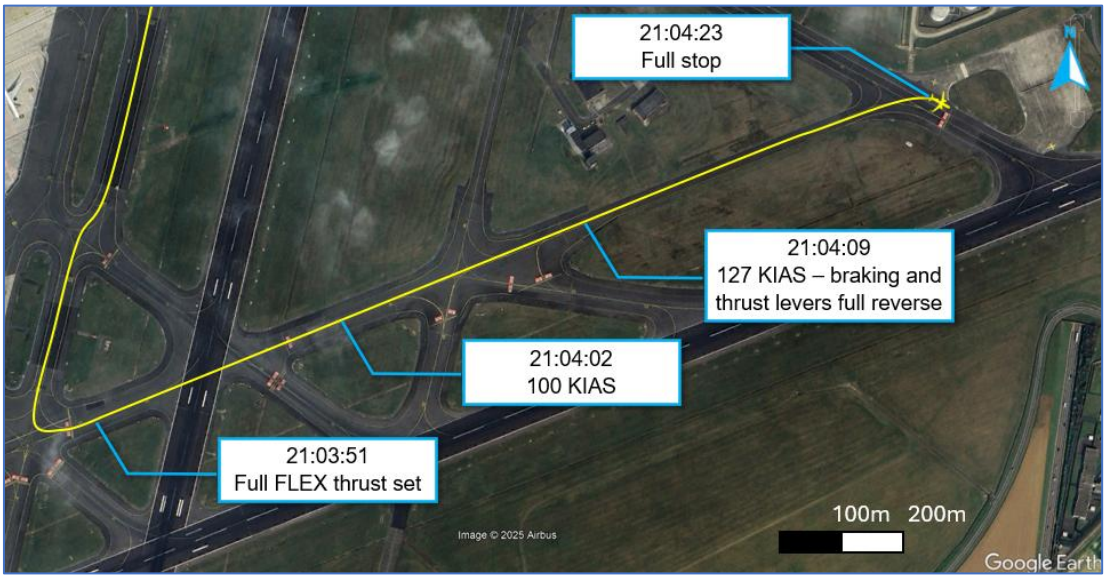

Figure 9 :different stages of the attempted take-off

At 21:04:15, the ATCO observed that an aborted take-off was being initiated but chose not to intervene immediately, as the flight crew was already occupied and communication was not considered a priority at that moment

The aircraft came to a stop at 21:04:23 on a piece of tarmac next to taxiway C1. The engines were set to idle, and the parking brake was applied.

At 21:04:26, the ATCO realised the aircraft's position and that the aborted take-off had occurred from a taxiway.

At 21:04:30, Brussels Tower transmitted, "Scandinavian 43M?"
The first officer responded, "We are OK, but something went very wrong, stand-by."

The Airport Rescue and Firefighting Service (ARFF) was alerted by ATC at 21:04:48, and the first crash tender arrived on scene 5 minutes later.
Communications were switched to another (spare) frequency to not interfere with normal operations.

Upon arrival, it was quickly established that the aircraft had not struck any object and that no injuries had occurred among passengers or crew. The brake temperatures were subsequently checked by the firefighters using thermal imaging.

The initial intention of the flight crew was to taxi the aircraft back to the gate. However, following consultation between the crew, airport operations, and the ARFF, it was decided that the passengers would be disembarked on site and the aircraft would be towed. Although no impact had taken place, the nose landing gear was positioned immediately in front of the runway guard lights (wigwags) left of the stop bar at C1 (see also Figure 11), which required removal prior to towing.

Passengers disembarked via mobile stairs provided by the ARFF. A bus with approximately 50 seats was arranged to transport the passengers back to the terminal, which had to be done in three rides. The last passenger disembarked the aircraft at 23:13, and the crew disembarked at 23:37. The towing operation commenced at 00:46, and the aircraft arrived at stand 354 at 01:06, where a service check was carried out the following day.

2. ADDITIONAL FACTUAL INFORMATION

2.1 Persons on board

Passengers:	152
Flight crew:	2
Cabin crew:	4

2.2 Final stop position

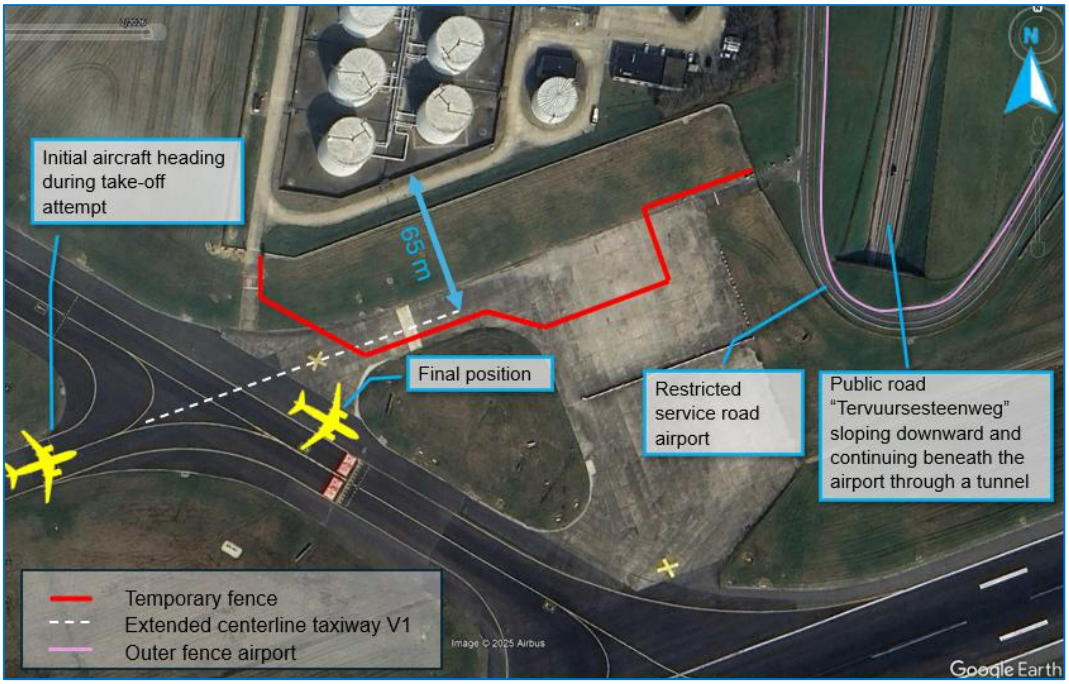

Figure 10: sketch of the final position of the aircraft

After initiating a right turn, the aircraft eventually came to a stop on a section of asphalt pavement adjacent to the taxiway edge at the intersection of taxiways V1 and C1, on a heading of 120°, with the nose gear coming to rest a few meters away from the runway guard lights. Behind taxiway V1 was tarmac P5, which was fenced off due to planned construction works. At a distance of 65 meters from the centerline of this taxiway is the airport's fuel station.

Figure 11 : Photo taken from behind, a couple of minutes after the incident (source: Brussels Airport Company)

Figure 12 : Frontal photo (source : Brussels Airport Company)

Figure 13 : View on P5 from V1-C1 intersection, taken the day after (source: AAIU)

2.3 Flight crew information

Table 1 : Licence and ratings

Rank	Captain	First officer
Age	56	26
Nationality	Norwegian	Norwegian
License	ATPL(A)	CPL(A)
Current ratings	A320 Also acts as a line training captain (LTC)	A320 (Co-pilot only)
Medical certificate	Class 1 issued 12 November 2025	Class 1 issued 10 July 2025
Last OPC/LPC date	OPC: 16 January 2026 LPC: 26 September 2025	OPC: 16 January 2026 LPC: 21 September 2025

Table 2 : Declared experience

	Captain	First Officer
Total FH for this operator	15089:45	956:05
Total FH on the type	3135:23	956:05
FH previous 90 days	178:37	193:01
FH previous 30 days	84:44	45:05

Table 3 : Duty and rest time

		Captain	First Officer
Monday 02 February	Duty on - off	No duty	10:45–19:47 4 flights
Tuesday 03 February	Duty on - off	07:05-19:00 4 flights	No duty
Wednesday 04 February	Duty on - off	17:54-00:00 2 flights	No duty
Thursday 05 February	Rest period prior to duty	14:10	52:13
	Duty on	14:10	14:10
	Duty time up to incident	07:04	07:04
	Flight hours up to incident	04:09	04:09

2.4 Aircraft information

2.4.1 General information

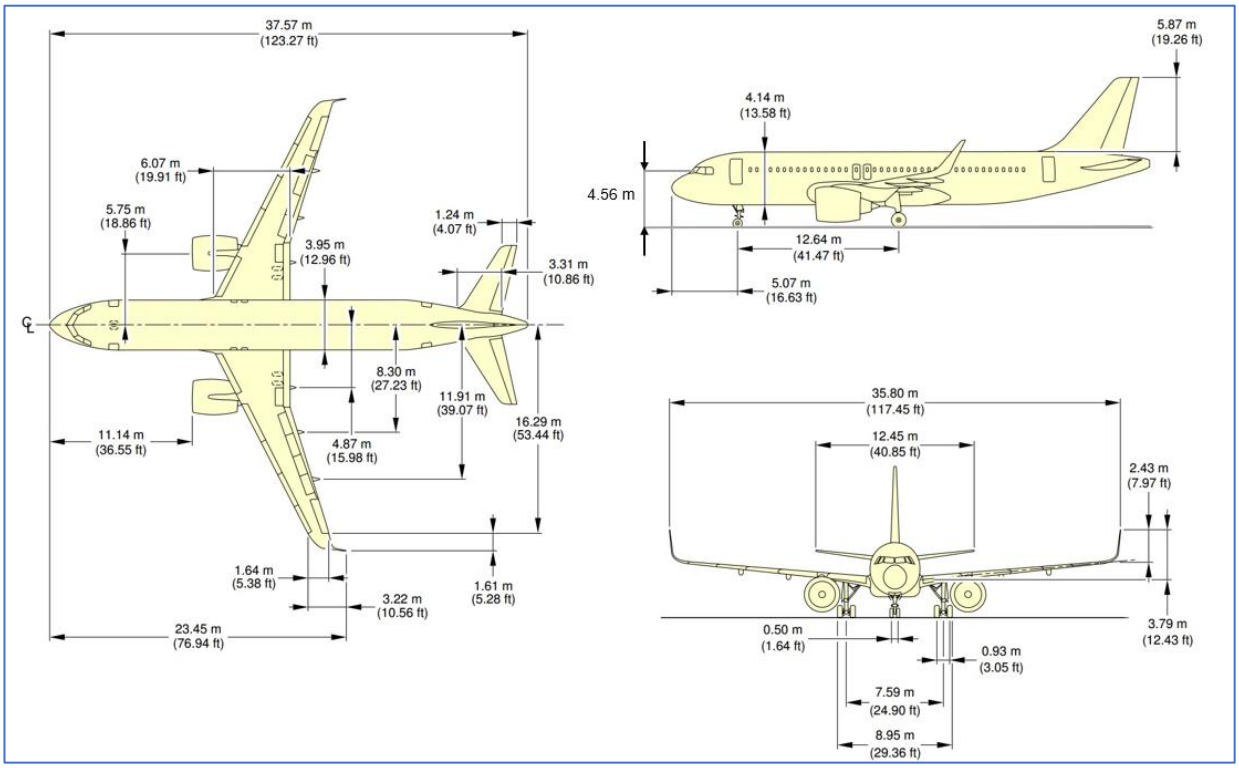

Figure 14 : 3-view of the A320neo with principal dimensions

2.4.2 This aircraft

Table 4 : Airframe data

Model	A320-251N (commercial designation: A320 NEO)
Manufacturer	Airbus S.A.S.
Serial number	8494
Entry into service	2018
Registration	Registered by the Swedish Transport Agency since 18/12/2018
Airworthiness	Initial certificate of Airworthiness issued by the Swedish Transport Agency on 23/11/2018 Airworthiness Review Certificate (ARC), second extension issued by DK.CAMO.SOO1, NO.CAMO.0200, SE.CAMO.S001 on 06/08/2025, valid until 30/08/2026.
Total airframe time	17595:41 FH (flight hours) / 11249 FC (flight cycles)
MTOW	77 000 kg

Table 5 : Engine data

	Engine #1	Engine #2
Type	dual-spool, axial-flow, high-bypass turbofan	
Model	CFMI LEAP-1A26	
Manufacturer	CFM International SA	
Serial numbers	ESN 598799	ESN 599784
Total flight hours / cycles	17595:41 FH / 11249 FC	9975:23 FH / 6473 FC
Time since last shop visit	Since new	7259:02 FH / 4732 FC
Time on aircraft	Same since last shop visit	Same since last shop visit

The aircraft is equipped with a Takeoff Surveillance (TOS) function, specifically the TOS1 version, which is standard on A320neo aircraft. However, it is not equipped with TOS2. In addition to the capabilities of TOS1, TOS2 also verifies that the aircraft is positioned on the intended runway and that the expected take-off performance - based on the data entered into the FMS by the crew - is compatible with the available runway distance.

The aircraft is likewise not equipped with the optional Airbus Runway Overrun Prevention System (ROPS), nor with RAAS (Runway Awareness and Advisory System), a system offered by Honeywell.

2.4.3 Load and performance for this flight

Take-off weight:	63720 kg
Stab trim position:	0.8 down
Configuration:	CONF 1+ F
Thrust:	Flex 61° C
V1:	132 kt
VR:	134 kt
V2:	137 kt

2.5 Meteorological conditions

2.5.1 Synoptic situation

A high-pressure system over Scandinavia and a complex low-pressure area near the Bay of Biscay had been producing a southeasterly flow of continental air over the region. Associated with this low, an active occluded front moved in from France during the early morning. In the afternoon and evening, this was followed by an unstable maritime airmass that arrived from the southwest.

That evening was cloudy.

2.5.2 History of rainfall

Total precipitation for the whole day at Brussels Airport was 0.56 mm. This measurable precipitation fell between 11:18 – 15:43 UTC. Last visible light rain (small raindrops not sufficient to give any rise on the sensor), was observed at 17:50 and reported as "-RA" in the METAR issued at that time. Taxiways and runways were still wet at the time of the incident.

2.5.3 ATIS

The ATIS (Automatic Terminal Information Service) reported the runway condition for both the arrival and departure runways as wet, with a code of 5/5/5.

Departure ATIS at 20:20:

Brussels National, departure C, 2020, RWY 07R for departures, RWY 07R RWY Surface condition at 1552, wet, RWY condition code 555, RWY 07L for arrivals, transition level 65, ATC clearance via datalink not available, wind 100 degrees 6 knots, visibility 10 km or more, clouds BKN at 3500 ft, Temperature 7, Dew point 5, QNH 986, NOSIG, confirm departure C on first contact.

Departure ATIS at 20:50:

Brussels National, departure D, 2050, RWY 07R for departures, RWY 07R RWY Surface condition at 1552, wet, RWY condition code 555, RWY 07L for arrivals, transition level 65, ATC clearance via datalink not available, wind 100 degrees 6 knots, visibility 10 km or more, clouds few at 3200 ft, broken at 4800 ft, Temperature 7, Dew point 5, QNH 986, NOSIG, confirm departure D on first contact.

2.5.4 METAR

Both the METARs issued at 20:50 and 21:20 gave the following conditions:

11005KT 9999 FEW032 BKN048 07/05 Q0986 NOSIG=

Average wind direction and speed:	110° 5 kt
Visibility and sky condition:	Visibility of 10 km or more Few clouds at 3200 ft AGL Broken at 4800 ft AGL
Temperature	07°C
Dew point	05°C
Altimeter (QNH)	986 hPa
Trend forecast	No significant change

2.5.5 Natural light conditions

Sunset occurred at 16:41, followed by the end of civil twilight at 17:16. At the time of the event, the Moon was in a waning gibbous phase with 85.9% illumination; however, it was still approximately 3 degrees below the horizon.

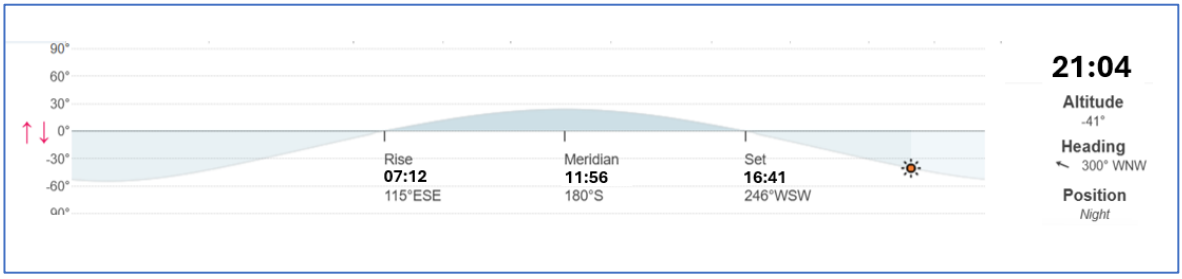

Figure 15 : position of the sun

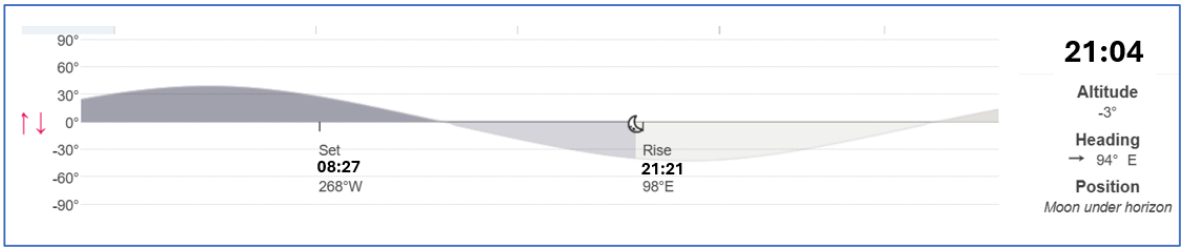

Figure 16 : position of the moon

2.6 Aids to navigation

For airport ground navigation, the crew made use of a LIDO ground chart displayed on a tablet.

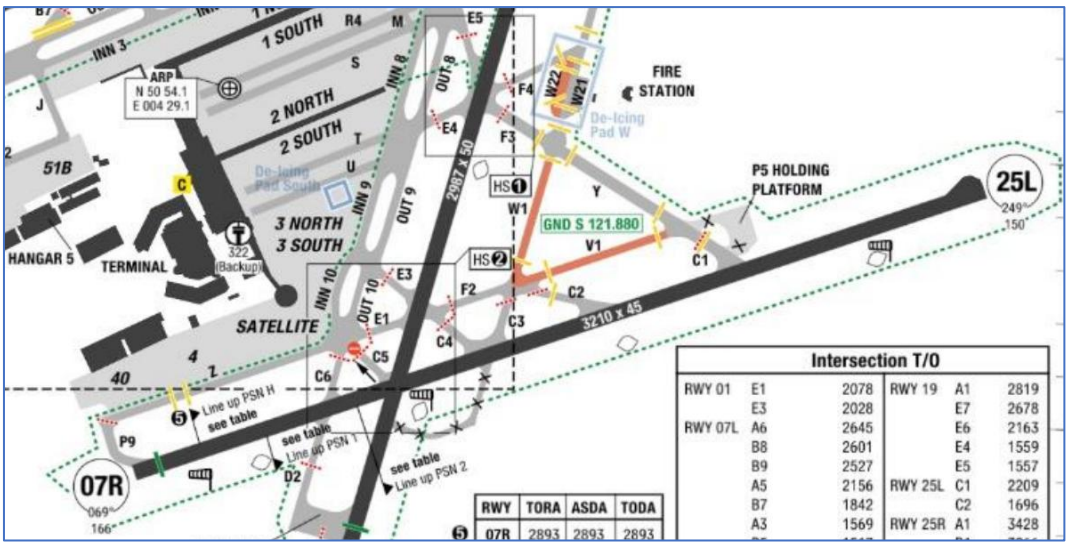

Figure 17 : extract of the ground chart used (source: LIDO – Lufthansa Systems)

The Airport Moving Map (AMM)-functionality— which displays the aircraft's exact position in real time — was not integrated into the application being used.

2.7 Communication

Brussels Ground and Brussels Tower were combined on a single frequency (120.780 MHz) at the time of the incident. Below is the exchange of transmissions between ATC and SAS43M from the start of taxi:

Start time (UTC)	End time (UTC)	Station	Transmission
20:58:26	20:58:28	FO SAS43M	Scandinavian 43M, request taxi
20:58:29	20:58:34	ATC	Scandinavian 43M, taxi Inner, Zulu, holding point runway 07R, QNH 986
20:58:35	20:58:40	FO SAS43M	Inner, Zulu, holding point runway 07R and QNH 986, Scandinavian 43M
21:01:09	21:01:11	ATC	Scandinavian 43M able C6?
21:01:12	21:01:16	FO SAS43M	Affirm, we are ready and able C6, Scandinavian 43M
21:01:17	21:01:21	ATC	Scandinavian 43M, copied, then you can switch to outer, C6, holding runway 07R
21:01:22	21:01:26	FO SAS43M	Switch outer, C6, holding runway 07R, Scandinavian 43M
21:02:05	21:02:08	ATC	Scandinavian 43M, C6, line up and wait runway 07R
21:02:09	21:02:12	FO SAS43M	C6, line up and wait 07R, Scandinavian 43M

A complete transcript of all transmissions from the take-off clearance for SAS43M onward:

Start time (UTC)	End time (UTC)	Station	Transmission
21:03:16	21:03:25	ATC	Scandinavian 43M, now more than 3 minutes behind Airbus 350 heavy from full runway length, wind 100 degrees 5 knots runway 07R, cleared for take-off
21:03:26	21:03:29	FO SAS43M	07R, cleared for take-off, Scandinavian 43M
21:03:30	21:03:33	Vueling 8985	Ground, Vueling 8985 ready to taxi
21:03:33	21:03:35	ATC	Vueling 8985, able C6?
21:03:36	21:03:38	Vueling 8985	We are able C6, Vueling 898
21:03:39	21:03:44	ATC	Vueling 8985, taxi Outer, C6, holding point runway 07R, QNH 986
21:03:46	21:03:56	Vueling 8985	Taxi via Outer, C6, to holding point runway 07R, QNH 986, Vueling 8985
21:03:58	21:04:00	OO-ETB	OO-ETB, ready for tow
21:04:01	21:04:05	ATC	OO-ETB, tow on Sierra, hold abeam gate 157R
21:04:07	21:04:10	OO-ETB	Tow on Sierra, hold abeam stand 157R, OO-ETB
21:04:22	21:04:26	THY1NB	Turkish One November Bravo, runway vacated
21:04:30	21:04:31	ATC	Scandinavian 43M?
21:04:31	21:04:36	FO SAS43M	Scandinavian 43M, we are OK, but something went very wrong, stand-by

2.8 Aerodrome information

The airport is located 6.5 nautical miles (12 km) northeast of the city of Brussels. The aerodrome reference point (ARP) is positioned at coordinates 50°54'05''N, 004°29'04''E and has an elevation of 175 ft (54 m) AMSL.

It is managed by Brussels Airport Company (BAC), which is an EASA-certified airport operator.

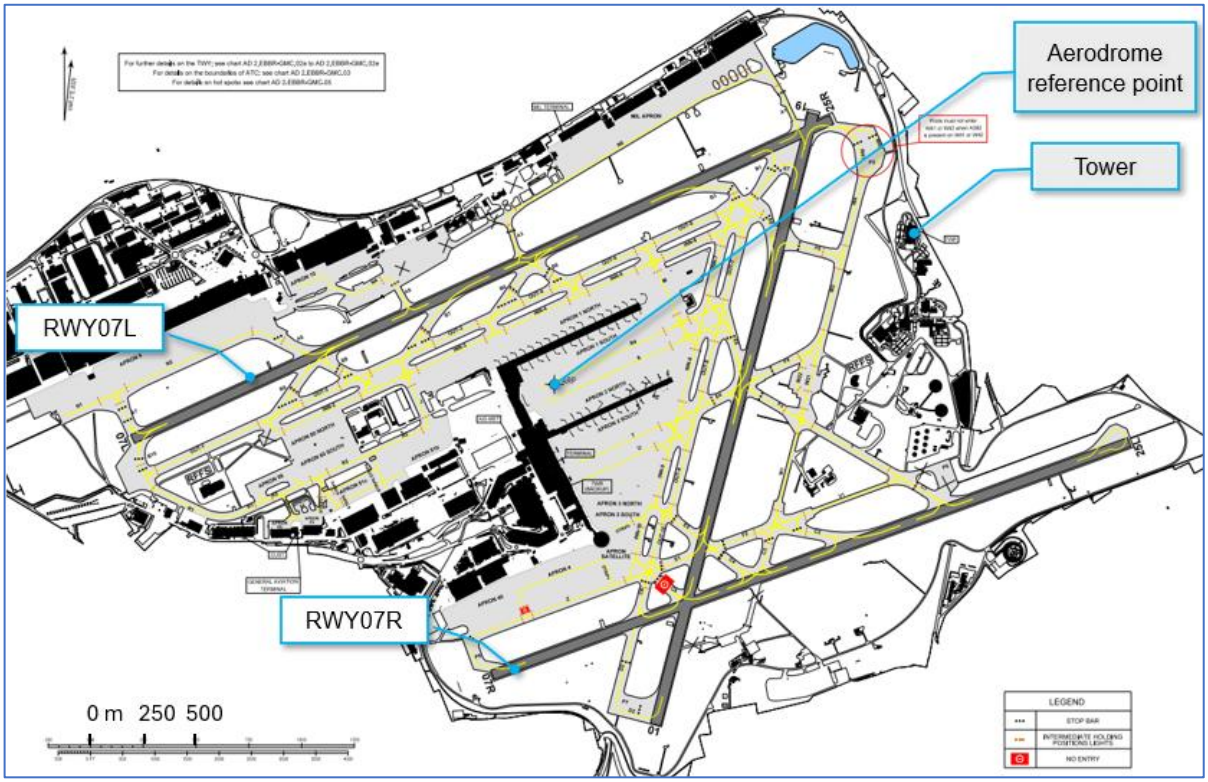

Figure 18 : Aerodrome ground movement chart – ICAO (annotations by AAIU Belgium)

2.8.1 Use of runways

The airport has three runways that can be used in both directions, all ICAO Code 4 (more than 1800 m in length). For environmental reasons, the federal authorities have defined a Preferential Runway System (PRS). This system provides the runways to be used by ATC according to the time of day and the day of the week when certain conditions are met. This system primarily involve runway 25R and 25L.

But if the tailwind or crosswind becomes too strong, the runway configuration is changed. Other factors that may require a change in runway configuration include reports of runway contamination or reduced friction, excessive winds or wind shear causing go-arounds, expected thunderstorms, ongoing runway works, or visibility and/or ceiling falling below specified minima.

When tailwind exceeds 7 knots (gusts included) or crosswind exceeds 20 knots (gusts included), the PRS prescribes that aircraft should no longer take off or land on the preferential runways:

- in strong easterly or north easterly winds, air traffic controllers must then activate an alternative configuration (runways 07L/R and/or 01);
- in strong southerly winds, runway 19 will be put into service.

A runway change is a complex operation that takes at least 30 minutes. It is therefore necessary to plan and anticipate. In addition, a runway change cannot take place during peak traffic periods. It is therefore possible that a runway change is implemented up to two hours before wind conditions actually become unfavourable, or that a return to the preferential configuration is delayed as long as weather forecasts do not indicate a stable change in wind conditions.

From Wednesday 4 February at 10:23, runways 07L and 07R were used for departures and runway 07L for arrivals due to the prevailing wind conditions. The runway configuration reverted to the PRS on Friday 6 February at 10:33.

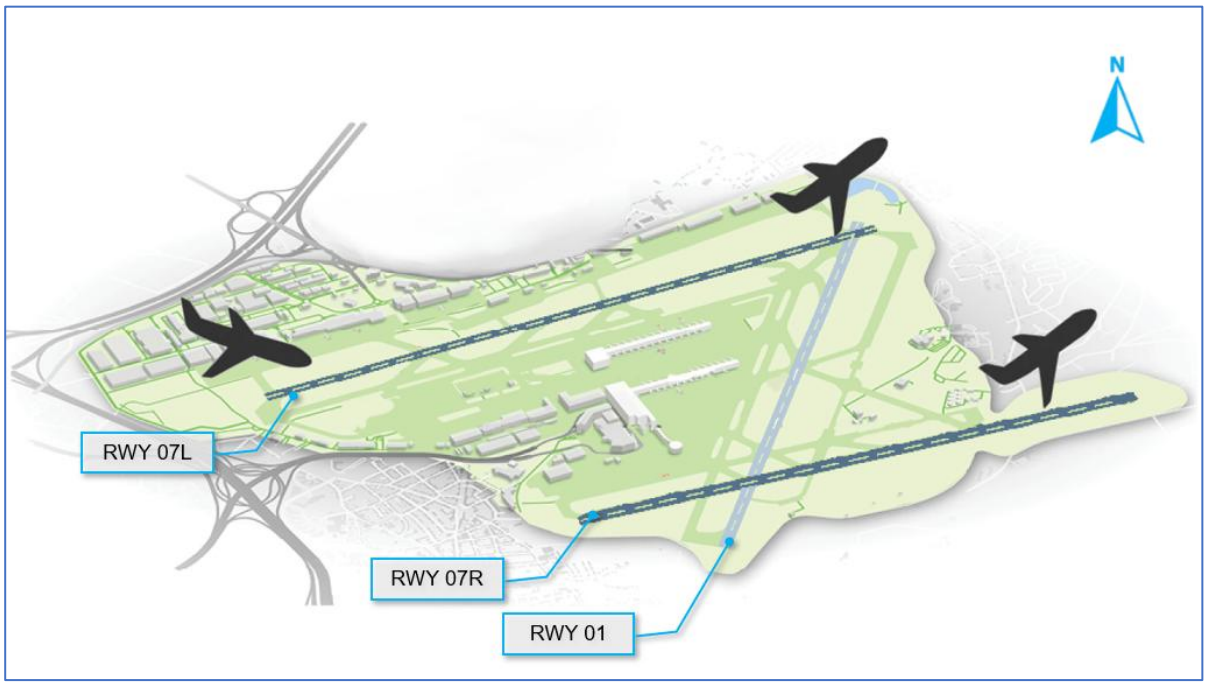

Figure 19 : runway configuration at the moment of the incident (RWY 07L for arrivals and departures, RWY 07R for departures)

2.8.2 Radio navigation and landing aids

RWY 25L and 25R are equipped with ILS CAT III, RWY 01/19 with ILS CAT I.
RWY 07L and RWY 07R have no ILS.

2.8.3 Hot spots

An Aerodrome Ground Movement Chart indicating hot spots has also been published. Hot spots are defined in ICAO Doc 9870, *Manual on the Prevention of Runway Incursions*, as *"a location on an aerodrome movement area with a history or potential risk of collision or runway incursion, where heightened attention by pilots or vehicle drivers is necessary."*

The intersection involving Outer 10, E1, C5, and C6 has been identified and depicted as a hot spot. This designation reflects its longstanding status as a complex taxiway–runway junction requiring increased vigilance.

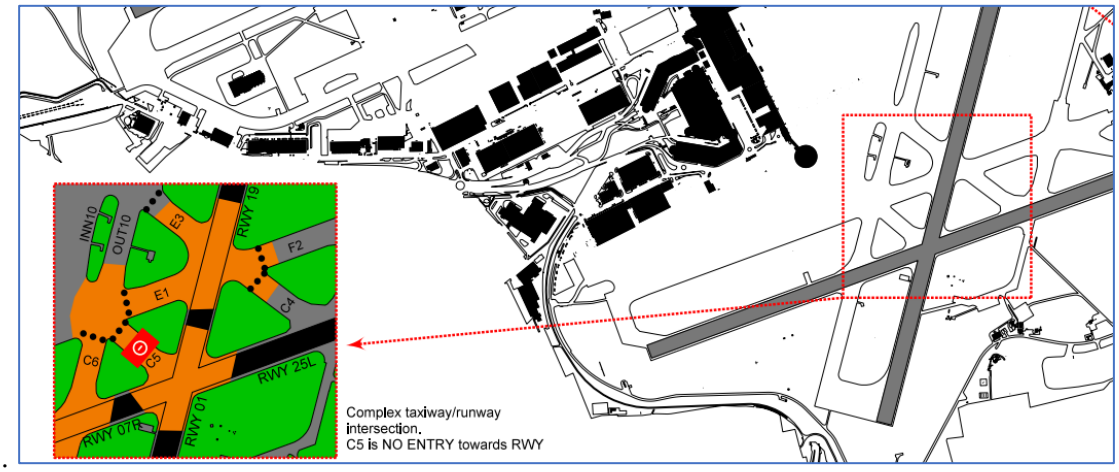

Figure 20 : extract of AIP Hot spots chart (reference AD 2.EBBR-GMC.05)

This hot spot is also marked on the LIDO chart used (see paragraph 2.6 of this report), where it is identified as HS 2.

2.8.4 Characteristics runway 07R

Threshold elevation:	166 ft (51 m) AMSL
True bearing:	069.89°
Dimensions:	3210 m x 45 m
Slope:	-0.15%

In order to reduce the taxi procedure, ATC may, with a visibility of 2 km or more and subject to pilot's acceptance, authorize take-off from one of the intersections below. Aircraft requiring full length for departure shall advise at the latest when requesting taxi clearance.

Table 6 : declared distances from RWY 07R

From	Take-off run available (TORA) (m)
Line-up position H (heavy)	2893
Line-up position 1	2624
C6 intersection	2405
Line-up position 2	2344
C4 intersection	180
C3 intersection	1790

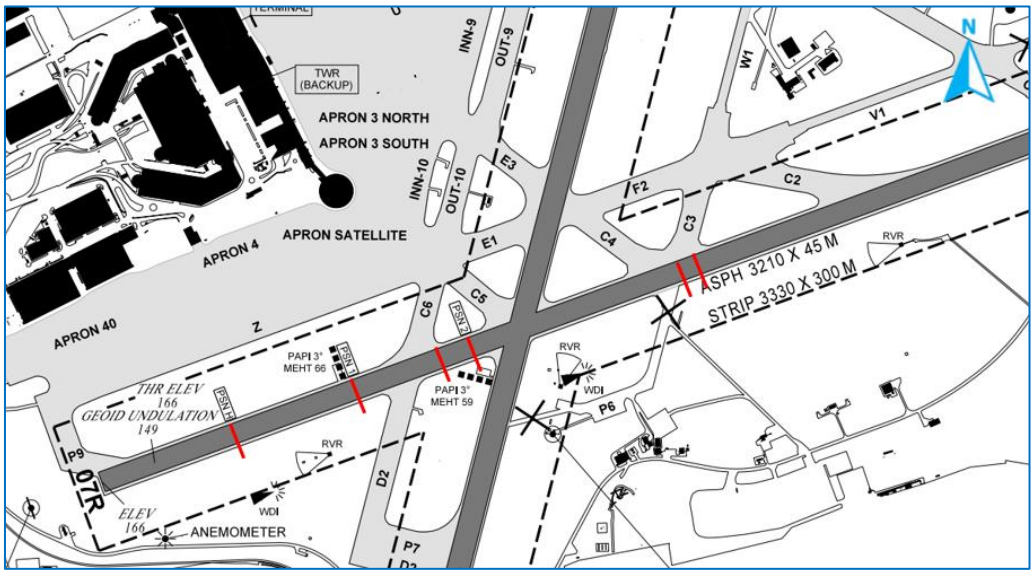

Figure 21 : the different take-off positions on RWY07R

Runway 07R is situated several meters higher than its surroundings. From Outer 10 toward the intersection with C6, the taxiway rises by approximately five meters.

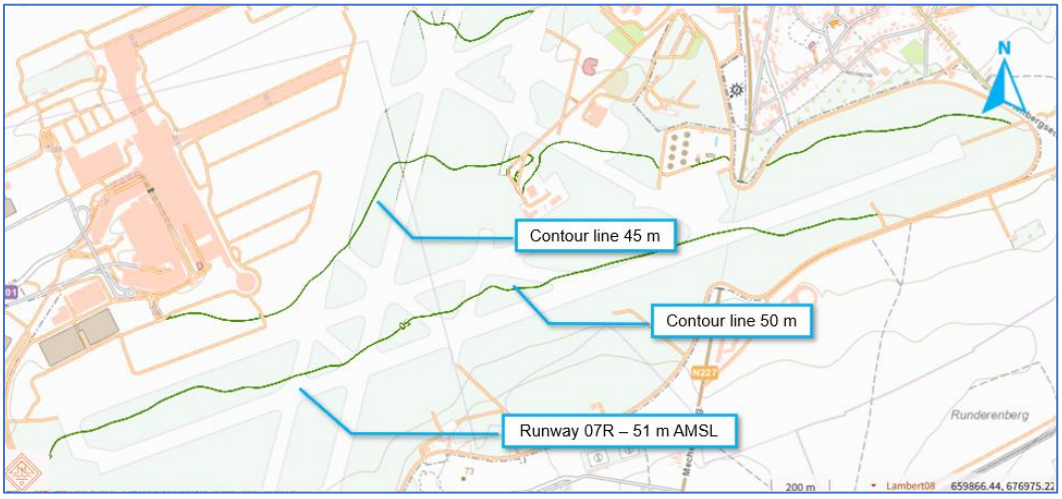

Figure 22 : Extract of topographic map showing contour lines showing height difference between RWY07R and its surroundings

2.8.5 Published width taxiways

E1: 29 m
F2 30 m
V1 18 m

2.8.6 Markings and signs

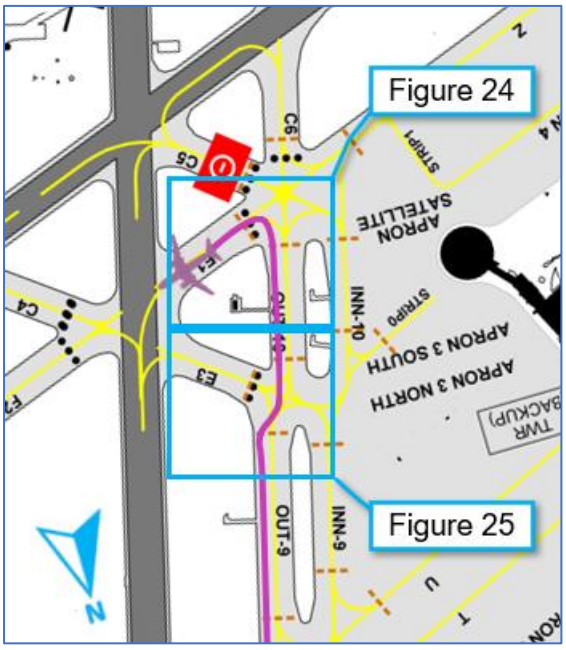

Figure 23 : Indication of the locations of the close-ups shown in Figures 24 and 25, with the magenta line depicting the aircraft's flight path

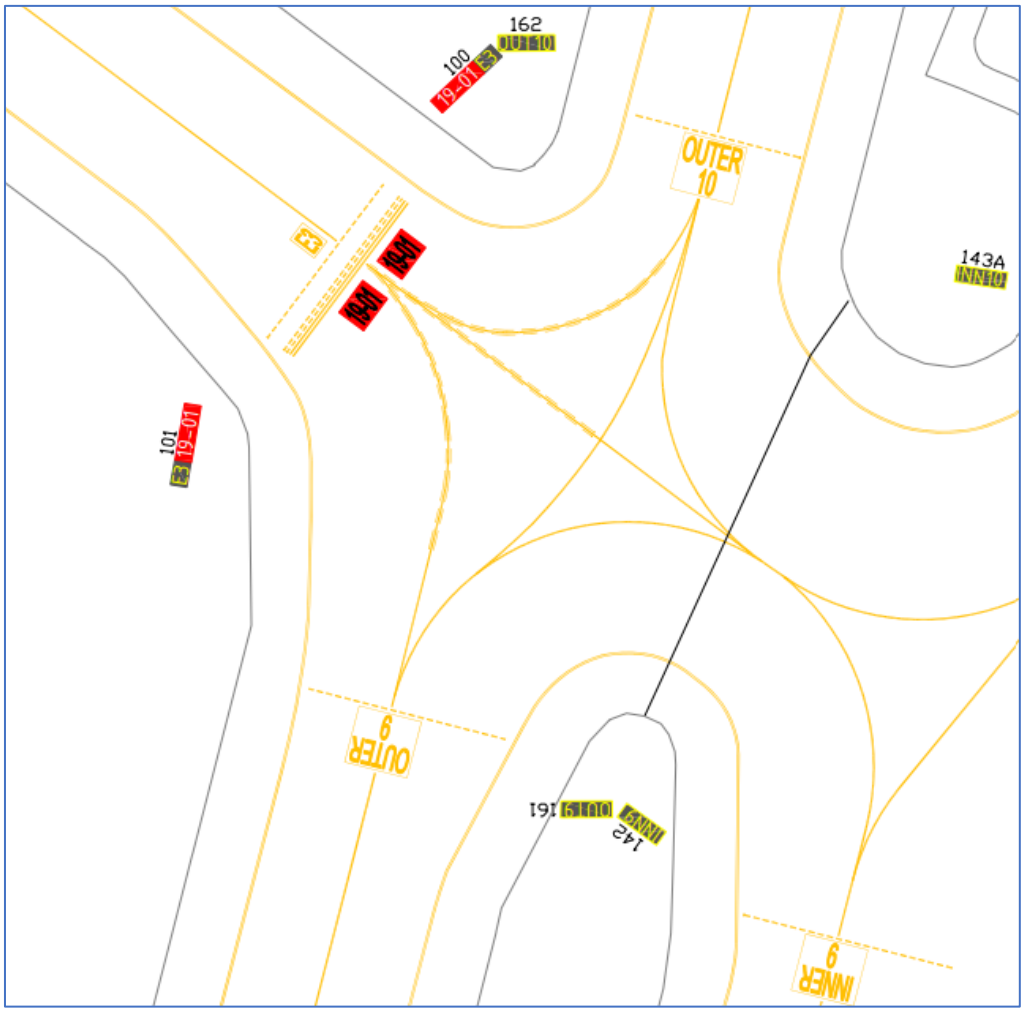

Figure 24 : indication of the signs and painted markings at intersection Outer 9 -Outer 10 – E3

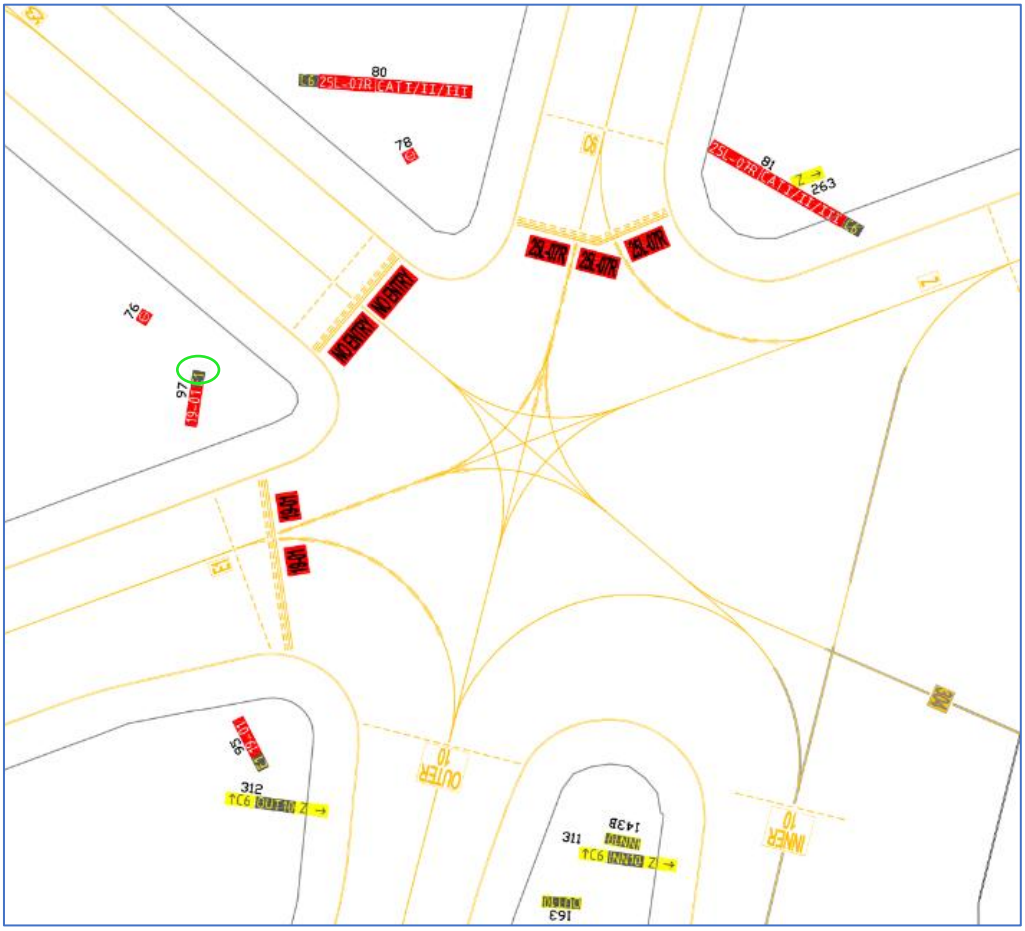

Figure 25 : indication of the signs (green encircled) and painted markings at intersection Outer 10-E1-C5-C6. The light of the information sign "E1"- highlighted in green - was not operational at the time of the event.

2.8.7 Lights

The aerodrome lighting system can be controlled through various brightness levels.

Table 7 : brightness and control steps aerodrome lighting

Brightness steps	Control steps	
	Runways	Taxiways
	5 step regulator	3 step regulator
1%	1	
3%	2	
10%	3	1
30%	4	2
100%	5	3

The last manipulation of the TWY lights was around 16:37 when all TWY lights were turned on at intensity level 1, the lowest level which is reportedly standard practice during clear weather conditions.

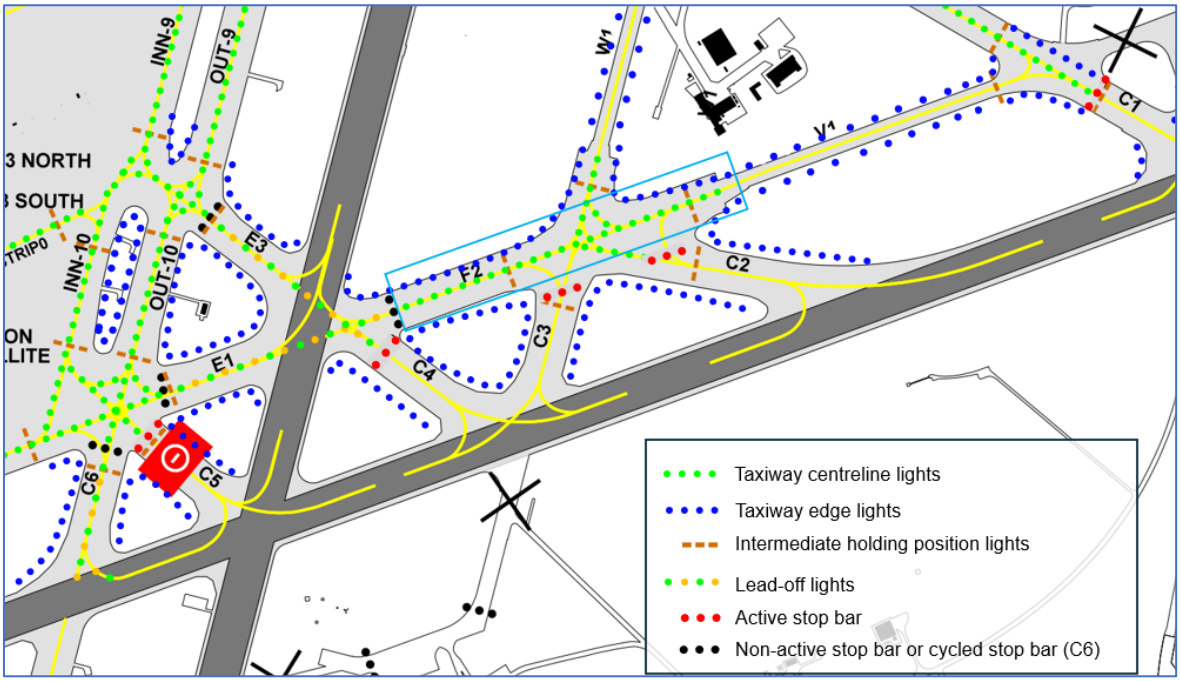

Figure 26 : sketch reflecting the situation of the taxiway centreline markings and active lights at time of the event (runway lights not included). All lights are LED except for taxiway F2 (highlighted in blue), which are halogen.

2.9 Air navigation services

2.9.1 General

Air navigation and traffic services for the civil airspace for which the Belgian State is responsible are provided by skeyes, an autonomous public company created in October 1998.
Its zone of activities extends from ground level to flight level (FL) 245 (8,000 meter) for Belgium and between FL 135 / FL 165 and FL 245 (from 4417 / 4722 to 7465 meter) for the Grand-Duchy of Luxembourg.

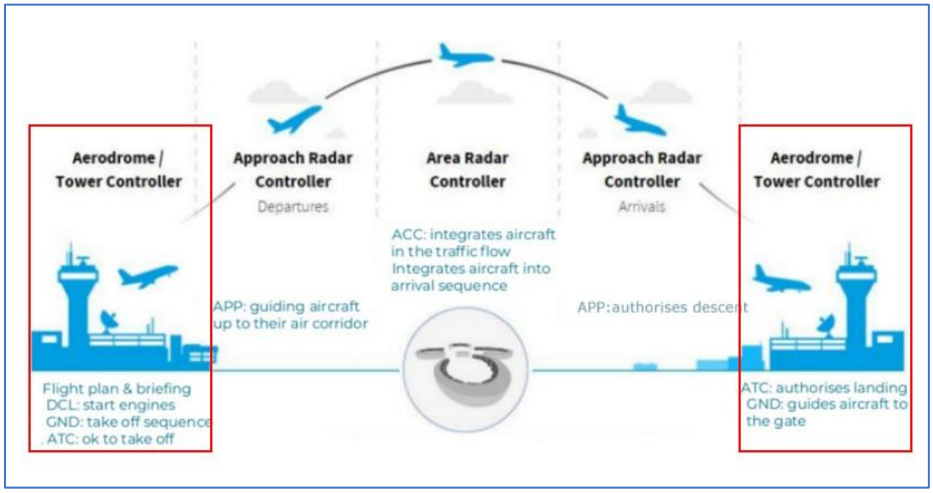

Figure 27 : Overview of ATC units managing an aircraft from departure to arrival

The air traffic services they deliver are divided into distinct areas of responsibility based on the particular phase of flight they oversee. The airport's immediate surroundings are managed by tower controllers, who operate from a control tower located on or near the aerodrome.

The Brussels Airport control tower is located at 50°54'28.53"N, 4°30'31.69"E, positioned to the northeast of the airport. Its operational (visual) control room sits 60 meters above ground level and provides a full 360° view, enabling controllers to observe approaching aircraft and monitor runway and taxiway movements.

The operational control room has a diameter of 18 m and comprises 12 working positions.

Every working position is equipped with 5 screens which display:

1. the flight plan data;
2. the ground radar image, indicating and identifying all the airport's taxiways, runways, vehicles and aircraft.
3. the image of the 'air' radar, which gives the position and identification of approaching aircraft;

4. the meteorological information and applications
5. the camera system.

Figure 28 : View from the Brussels control tower showing several working positions; the Departure Clearance position is located on the right. (Source: skeyes)

Three distinct functions ensure a safe departure from the departure gate right up to take-off:

- Departure Clearance delivery (DCL): The controller in this position coordinates both with Eurocontrol's Central Flow Management Unit (CFMU), which oversees air traffic flow across Europe, and with skeyes' en-route control centre (CANAC 2) to issue departure clearances. Their main task is to ensure each aircraft receives the correct route and take-off slot.

- Ground control: the 'ground' controller is responsible for the airport "movement" areas. These include all taxiways, holding areas, and some manoeuvring areas or intersections where aircraft arrive after having left the runway or the departure gates. Aircraft and vehicles changing their position within these movement areas, are required to have clearance from the ground controller.

- Air control: the 'air' controller is in charge of the movements on the runways as well as of air traffic in the vicinity of the airport. They clear aircraft for take-off or landing, thereby ensuring that the assigned runway is clear for the foreseen manoeuvre.

  Regarding the traffic in the air, the air controller is responsible for managing a controlled airspace called "CTR" that covers the airport and in which he ensures the safety of the approaching or departing aircraft by giving the pilots adequate instructions.

  The working positions for air control are divided into three sections, each containing two positions, depending on the runway configuration in use:
  - AIR 25R
  - AIR 25L
  - AIR 01

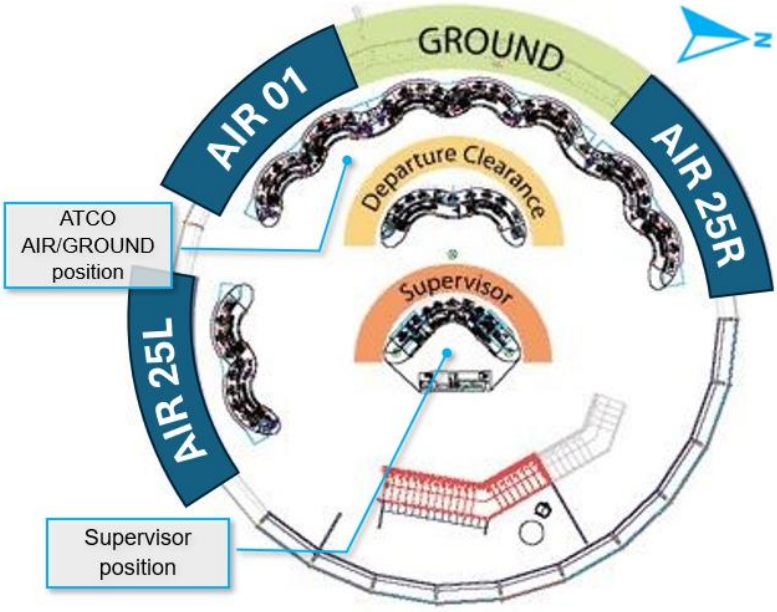

Figure 29 : Floor plan Brussels Tower

2.9.2 Safety nets

The Airport Movement System (AMS), an in-house developed IT-application, calculates the speeds and trajectories and anticipates the movements on the ground and in the air in the approach phase that might generate possible conflicts on the runways as well as in their vicinity, based on the ground radar.

The following safety nets, which generate an alarm, have currently been implemented in the AMS:

- Departure from the wrong runway
- Stop bar crossed
- Stop bar cycled with pending Departure or Arrival
- Departure or Arrival with runway not clear
- Departure or Arrival with intersecting runway not clear

They AMS is part of a larger whole of airport control equipment known as A-SMGCS (Advanced-Surveillance Movement Guidance and Control System).

2.9.3 Stop bars

A stop bar is a row of red, unidirectional, steady-burning in-pavement lights installed across the full width of a taxiway at a runway holding position. Aircraft or vehicles may proceed only when they have received ATC clearance and the stop bar lights have been switched off.

At Brussels Airport, only the stop bars at entry points of runways active for landing and/or take-off are illuminated continuously; those for runways not in use remain unlit. Individual stop bars cannot be activated separately. When a clearance to enter a runway is issued, the corresponding stop bar is manually switched off and then automatically re-illuminates after 89 seconds or automatically when an aircraft/vehicle crossed the stop bar.

2.9.4 Personnel information

The staffing of the air traffic control positions complied with the provisions of the Brussels Tower (EBBR TWR) operations manual, which prescribes three personnel for the night shift from 20:00 to 06:00 (duration of 10 hours).

These three staff members were present in the control tower at the time of the occurrence: two Air Traffic Control Officers (ATCO's) and one supervisor.

At the start of the shift, the ground (GND) and AIR frequencies were each staffed by an ATCO, as had been the case earlier that day. The Delivery position was manned by the Supervisor. Around 20:36, the Supervisor decided to "collapse" (combine) the GND and AIR frequencies, assigning both to a single ATCO. The other ATCO was allowed to take a break.

Table 8 : Personnel information ATCO's

Function	AIR/GND control	Controller taking break	Supervisor
Age	34	33	41
Nationality	Belgian	Dutch	Belgian
Year license obtained	2018	2022	2010
Start working tower sectors	2019	2023	2012
Ratings	APS[3] ADC/SUR[4]	APS ADC/SUR	APS ADC/SUR

[3] APS: Approach Control Surveillance
[4] Aerodrome Control (ADC) with Aerodrome Control Surveillance (SUR) endorsement

Table 9 : Duty roster ATCO's last 72 hours

	AIR/GND control	Controller taking break	Supervisor
Monday 02 February	Off	20:00 – 06:00	09:45 – 17:15
Tuesday 03 February	06:45-14:15	Off	20:00 – 06:00
Wednesday 04 February	05:45-13:15	07:00 – 14:30 (All shift training HF[5]/TRM[6])	Off
Thursday 05 February	20:00 – 06:00	20:00 – 06:00	20:00 – 06:00

At the time of the incident the ATCO combining the AIR/GND had the following traffic on the frequency:

- Flight SAS43M, the aircraft considered in this investigation
- Flight BCS3QL, a Boeing 757 taxiing from the cargo apron 9 for a departure from runway 07L
- Flight THY1NB, an Airbus A321 just landed on runway 07L
- An Embraer E195 from TUI Fly taxiing between 2 stands
- Flight VLG8985, an Airbus A320 taxiing on taxiway R4 for a departure from runway 07R
- Flight DHK455, a Boeing 767 landed at 20:52 on runway 07L and taxiing to the cargo apron 9.
- Flight BOX118, a Boeing 777, landed on 07L at 21:00 and taxiing to the apron.

The previous flight ETH751 took-off from runway 07R and was handed over to 'Brussels Departure' (staffed by CANAC2) about 3 minutes before.

2.10 Recorded information

2.10.1 Flight recorders

The aircraft was equipped with two FA2100 flight recorders (flight data recorder (FDR) and cockpit voice recorder (CVR)), manufactured by Acron Aviation (USA) (formerly L3 Harris). Both recorders were fully operational and successfully captured data.
The CVR contained over 2 hours of audio recordings across four channels, all in good quality. Under the supervision of the AAIU, the data acquisition was conducted in Le Bourget, France using the infrastructure of the Bureau d'enquêtes et d'Analyses pour la sécurité de l'aviation civile (BEA).

[5] HF: Human Factors
[6] TRM: Team Resource Management

2.10.2 Other recordings

Additional data was retrieved from the Quick Access Recorder, provided by the operator, as well as from ambient voice recordings from the control tower, ground surveillance radar, and CCTV footage.

2.11 Information on operator

Scandinavian Airlines (SAS) is the flag carrier of Denmark, Norway, and Sweden, founded on 1 August 1946 and headquartered in Solna, Stockholm County, Sweden. The airline operates major hubs in each of these countries, located in Copenhagen, Oslo, and Stockholm. SAS handles a significant share of domestic air travel across the Nordic region and also provides international routes throughout Europe, North America, and select destinations in Asia.
It operates under the Air Operator Certificate (AOC) SCA.AOC.001E, which authorizes the company to conduct commercial air transport operations under European aviation rules.

SAS currently has a fleet of +130 aircraft including Airbus A319, A320, A320neo, A321neo, A330-300, and A350-900 aircraft, as well as Embraer E195.

3. IMMEDIATE SAFETY ACTIONS TAKEN

By the operator

Scandinavian Airlines (SAS) has already initiated the process of acquiring Airport Moving Map (AMM) functionality, which displays the aircraft's real-time position on high-precision airport maps and enhances pilots' positional and situational awareness during ground operations

AAIU Belgium supports this initiative.

4. NEXT STEPS OF THE INVESTIGATION

4.1 Further focus

The validation and analysis of the parameters, as well as the analysis of the occurrence as a whole, are still ongoing.

The scope and depth of the investigation will also be further defined.

In the continued analysis, the following areas will receive particular focus:

- the actions, workload, training, communication and working environment of both the flight crew and the air traffic controller officers;
- air traffic control (ATC) procedures;
- the Operator's procedures;
- the aerodrome layout, including available lighting and signage;
- the performance of the A-SMGCS system, including its reliability, associated procedures, effectiveness of the existing safety nets and ATC training;
- and the potential use of additional on-board or ground-based systems that could help prevent similar occurrences

4.2 Timings

The AAIU will issue a final report at the conclusion of an investigation, which includes a comprehensive analysis and details the contributing and contextual factors, safety issues, and other findings. It will also provide an overview of any additional safety actions taken, planned, or officially recommended by the investigation authority.
This process may take up to 12 months.

However, throughout the investigation, the investigators will continue to work closely with all relevant stakeholders. If, at any point during the investigation, they identify safety-critical information, they will immediately notify and advise the relevant parties so that safety action can be taken where appropriate.

In accordance with Annex 13 of the Convention on International Civil Aviation and Regulation (EU) n° 996/2010, the sole objective of the investigation and the reports produced is the determination of the causes, and define recommendations in order to prevent future accidents and incidents. It is not the purpose of the Air Accident Investigation Unit to apportion any blame or liability.

Air Accident Investigation Unit (Belgium)
Federal Public Service
Mobility and Transport
City Atrium
Rue du Progrès 56
1210 Brussels
Phone: +32 2 277 33 44

info.aaiu@mobilit.fgov.be
www.aaiu.belgium.be