FINAL REPORT No.4-02/3-17 (4-18)

OF THE AIRCRAFT SERIOUS INCIDENT LOSS OF SEPARATION AFTER DEPARTURE BETWEEN THE NORWEGIAN AIR SHUTTLE AIRCRAFT Boeing B738, registration LNN-II and Air Baltic Bombardier DH8D, registration YL-BBT, at Riga FIR, TMA on November 23, 2017

9. Air Traffic Controller's time-table, November, 2017.
10. APP Controller's logging time in ATRACC, working and rest time schedule on 23.11.2017.
11. TWR Controller's logging time in ATRACC, working and rest time schedule on 31.08.2013
12. ATS occurrence Reporting Form
13. Aircraft flight plans
14. METAR_ATIS airport Riga. 23.11.2017; 08:50-10:50 Z.
15. Tower Controller workload.
16. Copy of Local Instruction No114.
17. ATC Occurrence Preliminary Report

Abbreviations

ATCC - Air Traffic Control Centre

ATRACC- ATC System for Riga Area Control Centre Guidance and Control System

ACFT - Aircraft

ATC - Air Traffic Control

UTC - Universal Time Coordinated

AoR - Area of Responsibility

CWP- Controller Working Position

NM - Nautical mile

ACFT-aircraft

Ft - Feet

FIR - Flight Information Region

ATS - Air Traffic Services

STCA - Short-Term Conflict Alert

CTR- Control Zone

FL - Flight Level

SID – Standard Instrument Departure

GMC- Ground Movement Control

TMA-Terminal Control Area

TODA- Take-off distance available

ASDA Accelerate-stop distance available

TORA- Take-off run available

Synopsis

Unless stated otherwise the time in this Report is UTC

On Thursday 23 November 2017 the Norwegian Air Shuttle, Boeing 738, aircraft call sign NAX-8MT taking-off from runway 18 of Riga International Airport suffered an air proximity with Air Baltic DHC-8-402, aircraft call sign BTI-1F5 which was taking off from the same runway 18.

Norwegian Air Shuttle, Boeing 738 took it departure from Riga International (EVRA) to Stockholm/Arlanda, (ESSA) as well as AirBaltic DHC-8-402, took it departure from Riga International (EVRA) to Stockholm/Arlanda, (ESSA) too after Boeing 738.

Norwegian Air Shuttle, Boeing 738 was cleared to take off and was flying according to SID (Standard Instrument Departure) procedure to **LAPSA4E** climbing to 4000FT, behind it followed DHC-8-402, flight BTI4YE with the intention of departing from the same cross with TWY E to the same route.

When both aircraft were airborne horizontal distance continued to decrease and infringement of separation rules occurred, according to the radar data the closest proximity was **2.6** Nautical Miles (NM) horizontally and **700** ft vertically, respectively. The minima for the separation of aircraft were 3 NM horizontally and 1,000 ft vertically. The incident occurred in the Riga FIR Class C airspace, airspace type TMA. The TAIIB classified the occurrence as a serious incident and initiated an investigation.

Notification

One day after the occurrence on Friday, November 24, 2017 the Transport Accident Investigation Bureau (TAIIB) was advised by the Safety Management Department of Air Navigation Service Provider (ANSP) the State Joint Stock Company „Latvijas gaisa satiksme" (LGS) with ATC Occurrence Preliminary Report according to REGULATION (EU) 2015/1018 of 29 June 2015 laying down a list classifying occurrences in civil aviation to be mandatorily reported according to Regulation (EU) No 376/2014 of the European Parliament and of the Council that an occurrence had taken place (separation minima infringement) in Riga Flight Information Region (FIR), class C airspace on Thursday, November 23, 2017 at 07:10 UTC between a scheduled flight of Norwegian Air Shuttle, Boeing 738, aircraft call sign NAX-8MT and Air Baltic DHC-8-402, aircraft call sign BTI-1F5 after departure from Riga International airport (EVRA).

Investigation

TAIIB Authorities classified the occurrence as a serious incident and initiated an investigation under the provisions of Annex 13 to the Convention on International Civil Aviation (Chicago 1944) and the REGULATION (EU) No 996/2010 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation, as well as forwarded request to air traffic service provider LGS for providing any relevant available information regarding to the incident and personnel data of controller involved in the serious incident.

1. Factual information

1.1. Sequence of events before take off.

According to FPL both aircraft shall follow after departure by SID chart Riga (**WEST direction**) RWY18 to LAPSA of Area Navigation Route Y130 Standard initial climb is 4000 ft for aircraft, unless otherwise instructed by ATC.

```
DFU424 221407
FF EVRAZPZX EVRRZDZX EVRRZQZX
221407 EUCHZMFP
(FPL-NAX8MT-IS
-B738/M-SADGHIJ1RWXY/L
-EVRA0955
-N0435F340 LAPSA Y130 MILTA M870 NEKET N616 XILAN
-ESSA0057 ESKN
-PBN/A1B1C1D1L1O1S2T1 DOF/171123 REG/LNNII EET/ESAA0026 SEL/APHM
CODE/47945C RVR/200 ORGN/EKBICPUF)
DFU832 221806
FF EVRAZPZX EVRRZDZX EVRRZQZX
221806 EUCHZMFP
(FPL-BTI1F5-IS
-DH8D/M-SDGLORY/S
-EVRA1005
-N0354F240 LAPSA DCT LATEG/N0354F240 DCT NEBSI L870 XILAN
-ESSA0046 ESKN
-PBN/B2B3B4D2D3S1S2 NAV/ABAS SBAS DOF/171123 REG/YLBBT EET/EETT0019
ESAA0033 CODE/502C96 RVR/300 OPR/BTI ORGN/EVRABTIO PER/C RMK/PHONE
CTC:  0037167788426)
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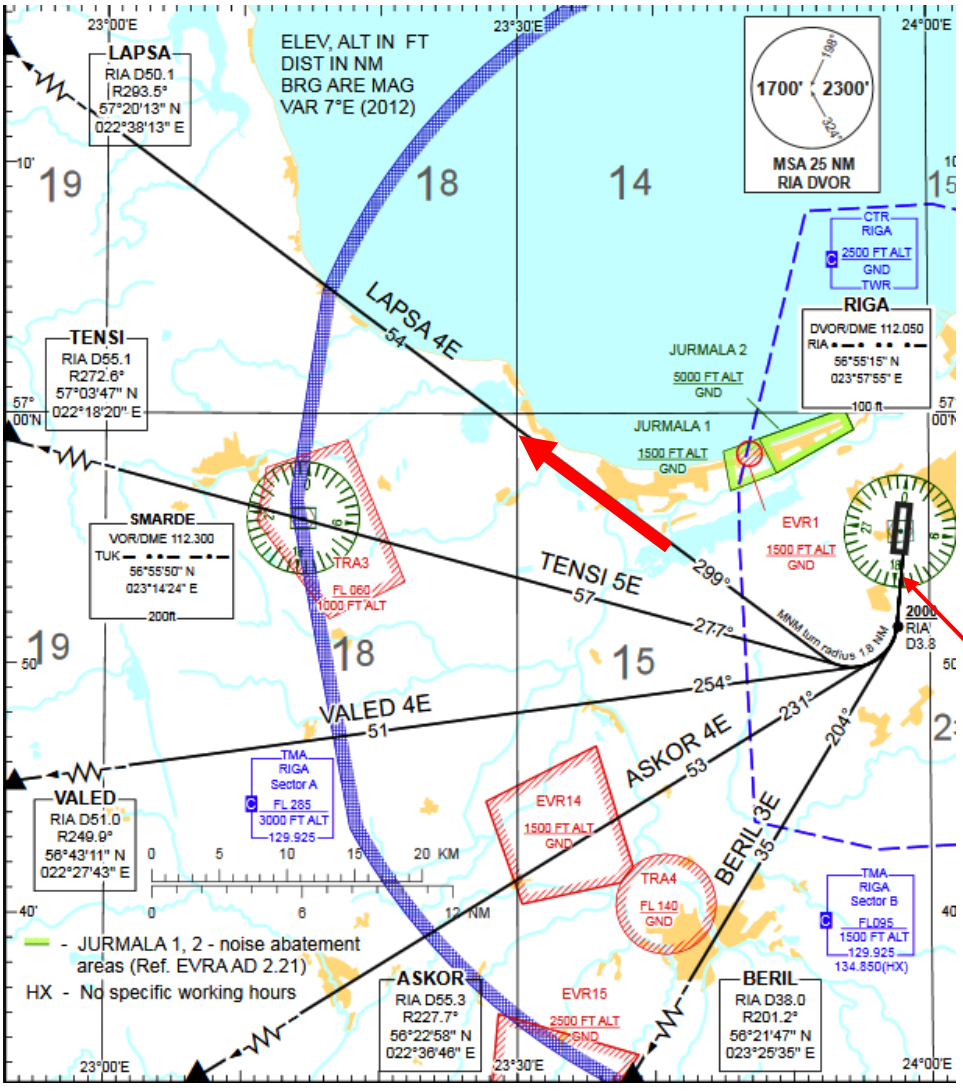


1. Initial climb clearance **4000 FT** unless otherwise is instructed by TWR;

2. Contact **APP not later than passing 1500 ft** after take-off;

3. Contact APP on 129.925 unless other frequency assigned by TWR

4. MAX IAS 250 kt below FL 100;

5. If unable to comply SID contact ATC.

Climb straight ahead on TR 178°. Not before 3.8 DME RIA at or above 2000 FT turn right (MNM turn radius 1.8 NM). Establish TR 299°. Proceed to LAPSA.

Figure 1. Standard departure chart Instrument (SID) Riga (**WEST direction**) RWY 18

ATC clearance shall be obtained from RIGA GROUND or RIGA TOWER before take-off.

AirBaltic DHC-8-402

At **09:46:32:** The pilot of AirBaltic DHC-8-402 established radio contact with the Ground Controller (GMC) on frequency 118,8MHz: "Riga "Ground" Good day Air Baltic 1 Foxtrot 5 information "Z" ready copy clearance Arlanda".

At **09:46:38:** The Controller GMC: "Air Baltic 1 Foxtrot 5 "Ground" Hello cleared to Arlanda "LAPSA 4E" departure squawk 4331."

At **09:46:48:** The Pilot Air Baltic: "Arlanda "LAPSA 4E" 4331 Air Baltic 1 Foxtrot 5.

At **09:46:52:** Controller GMC: "1 Foxtrot 5. Correct".

At **10:01:39:** Pilot Air Baltic: "Ground" Air Baltic 1 Foxtrot 5 request start up and push back.

At **10:01:46:** Controller GMC declared: Air Baltic 1 Foxtrot 5 push back and start up is approved QNH 1012."
At **10:01:51:** The pilot of Air Baltic: "QNH 1012 start up and push back approved Air Baltic 1 Foxtrot 5".

Norvegian NAX-8MT

At **10:03:20:** The pilot of NAX-8MT:"Ground" Nor Shuttle 8 Mike Hotel stand 108 request start up."
At **10:03:20:** Controller GMC: "Nor Shuttle 8 Mike Tango start up is approved QNH 1012

At **10:03:31:** The pilot of NAX-8MT: "1012 startup approved. Nor Shuttle 8 Mike Tango."

At **10:05:57:** The pilot of NAX-8MT: "Ground" Nor Shuttle 8 Mike Tango request taxi".

At **10:06:01:** The Controller GMC: "Nor Shuttle 8 Mike Tango taxi to holding point 18 via "Foxtrot"," Golf"."

At **10:06:05:** The pilot of NAX-8MT confirmed: "Holding point 18 via Foxtrot and Golf. Any chance via" Echo" 8 Mike Tango?".

At **10:06:10 The** Controller GMC declared: **"Foxtrot'," Echo".**

The pilot of NAX-8MT confirmed:" Foxtrot'," Echo" thanks".

Norvegian NAX-8MT and AirBaltic DHC-8-402

At **10:06:20:** The pilot of Air Baltic: "Ground" Air Baltic 1 Foxtrot 5 taxi?".

At **10:06:25:** Controller GMC instructed: "Air Baltic 1 Foxtrot 5 taxi to holding point runway18 via "Foxtrot"," Golf"."

At **10:06:31:** The pilot of Air Baltic confirmed: "Holding point 18 via "Foxtrot"," Golf". Air Baltic 1 Foxtrot 5."
At **10:07:55:** Controller GMC instructed NAX-8MT:"Nor Shuttle 8 Mike Tango **on "Echo" contact "Tower" 118,1. Bye**."

At **10:08:09:** The pilot of Air Baltic declared: "**1 Foxtrot 5 ready via" Echo**"."

At **10:08:13:** Controller GMC instructed BTI-1F5: "1 Foxtrot 5 taxi via" Echo". **Contact "Tower" Visu labu."**

From that moment both aircraft were transmitted under AoR of Tower (TWR) Controller on frequency 118,1MHz.

Figure 2. Situation on ground before departure at 10:07:56 UTC

1.2. Sequence of events with Tower Controller

At **10:08:12:** The pilot of NAX-8MT contacted TWR AND declared: "'Tower" Nor Shuttle 8 Mike Tango we are ready" Echo"".

Figure 3. Situation on ground before departure at 10:08:12 UTC **TWY E (Echo)**

At **10:08:19:** The Tower Controller gave instruction: "Nor Shuttle 8 Mike Tango Riga 'Tower" hello wind 150 degrees 17 knots runway 18 cleared for take-off".

At **10:08:26:** The crew of NAX-8MT confirmed: "Cleared for take-off. 8 Mike Tango".

At **10:08:28:** The pilot of Air Baltic: 'Tower" good day Air Baltic 1 Foxtrot 5 via" Echo" in sequence".

At **10:08:33:** The Tower Controller instructed: "Air Baltic 1 Foxtrot 5 Riga 'Tower" hello **behind departing Norwegian company line up runway 18 and wait behind".**

At **10:08:41:** The pilot of Air Baltic confirmed: "Line up and wait behind Norwegian, runway 18 via" Echo", Air Baltic 1 Foxtrot 5"**.**

At **10:08:53:** The pilot of NAX-8MT declared: "Nor Shuttle 8 Mike Tango confirm cleared for take-off".

At **10:08:57:** The Tower Controller instructed: "Affirm cleared for take-off runway 18**".**

At **10:08:59:** The pilot of NAX-8MT confirmed: "Cleared for take-off, rolling … (unreadable)".

Figure 4. NAX-8MT cleared for take-off and started rolling.

At **10:10:11:** The Tower Controller gave clearance for Air Baltic: "Air Baltic 1 Foxtrot 5 wind 160 degrees 14 knots runway 18 cleared for take-off".

At **10:10:18:** The pilot of Air Baltic confirmed: "Runway 18 cleared for take-off. Air Baltic 1 Foxtrot 5".

At **10:11:19:** The Tower Controller: "Air Baltic 1 Foxtrot 5."

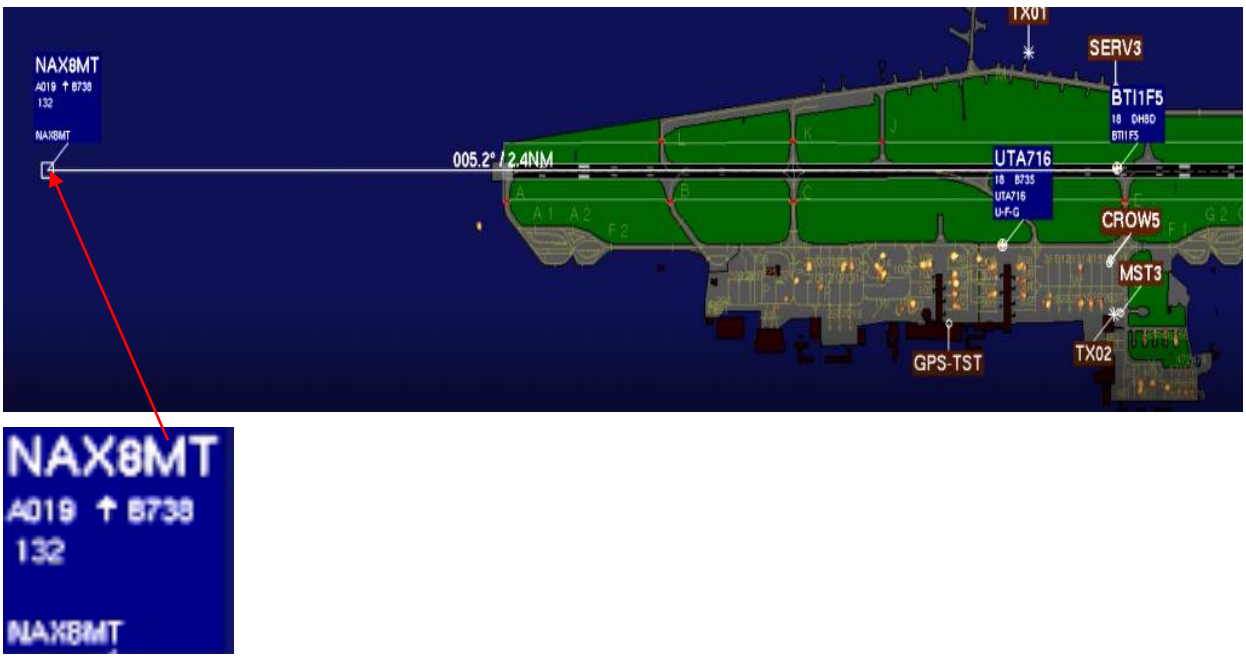


Figure 5. Air Baltic 1 Foxtrot 5 cleared for take-off and started rolling.

According to recordings of SMGCS take-of clearance for aircraft “Air Baltic 1 Foxtrot 5” actually was issued when the aircraft was at line up position of the runway-in-use “18” intersection with TWY E. Preceding departing aircraft Boeing 738 had crossed the end of RWY in use, crossing altitude **1900ft** and had passed a point of **2.4 NM** from the line up position of succeeding departing aircraft DHC-8-402.

1.3. Sequence of events with Approach Controller

At **10:10:01:** The pilot of NAX-8MT contacted APP controller on frequency 129.925MHz and declared: “Approach Good Morning Nor Shuttle 8 Mike Tango **900 feet climbing 4000**.”

At **10:10:08:** The Tower Controller: “Nor Shuttle 8 Mike Tango hello Riga radar contact climb flight level 280 no speed restrictions.”

At **10:10:14:** The pilot of NAX-8MT confirmed clearance: “Climb flight level 280 no speed Nor Shuttle 8 Mike Tango.”

At **10:10:30:** The APP Controller: “Nor Shuttle 8 Mike Tango turn right direct RUTEK”

At **10:10:34:** The crew of NAX-8MT confirmed: “Right for RUTEK Nor Shuttle 8 Mike Tango.”

At **10: 11:10 and at 10:11:17:** **T**he APP controller tried to establish contact with crew of air Baltic: “Baltic 1 Foxtrot 5.”

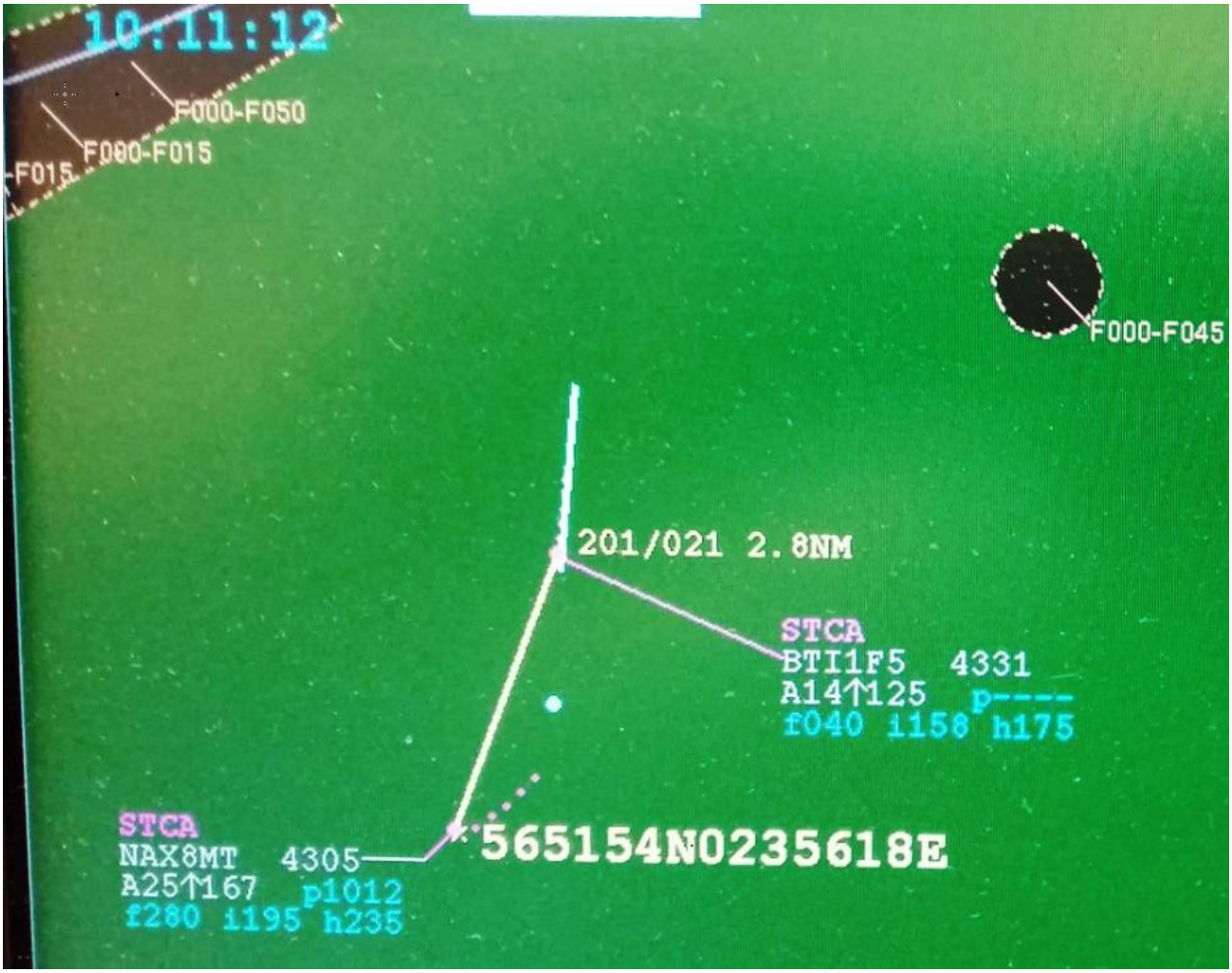


Figure 6. STCA warning signal switched on

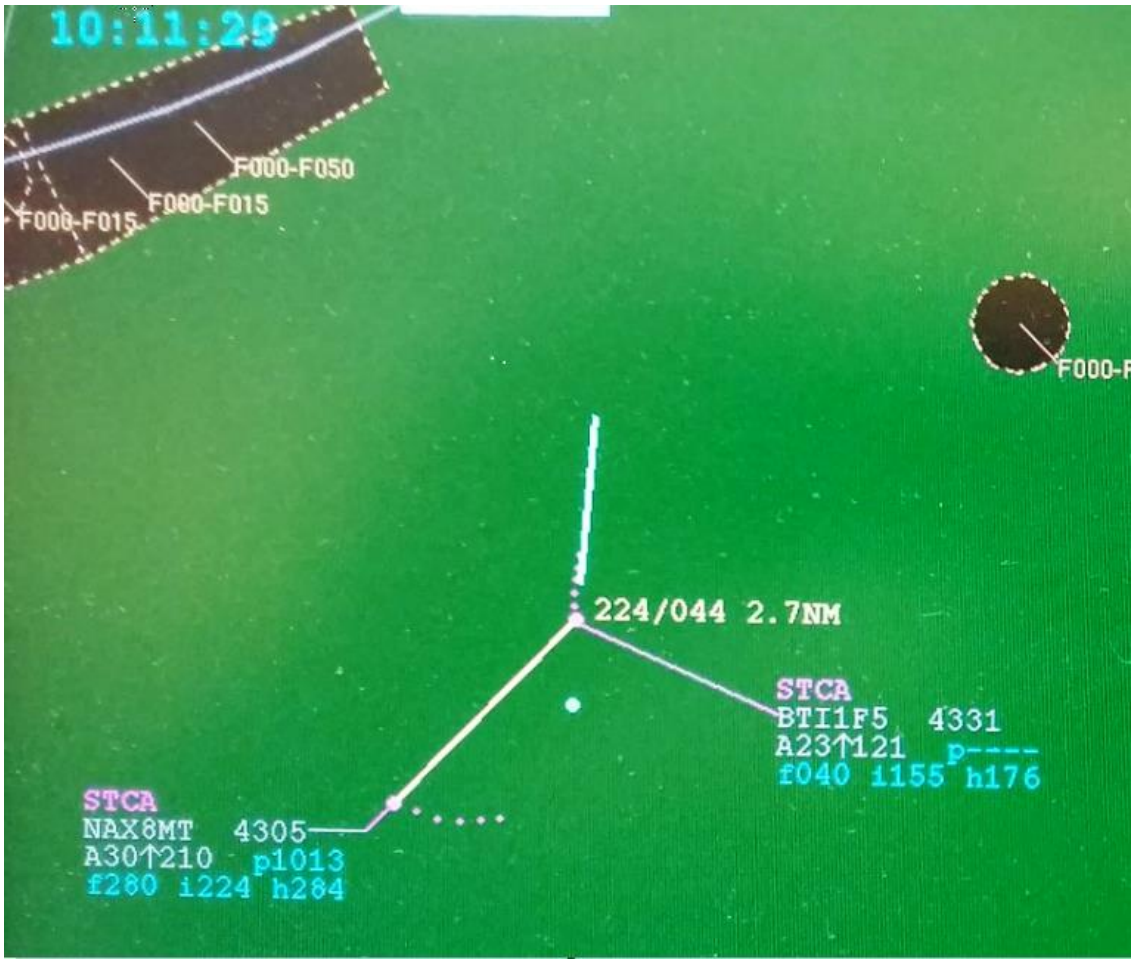


Figure 7. STCA an alert of a potential or actual infringement of separation minima.

Figure 8. Traffic situation, horizontal distance between aircraft 2.6NM

Figure 9. Radar picture –min. horizontal distance 2.6NM, vertical 700ft.

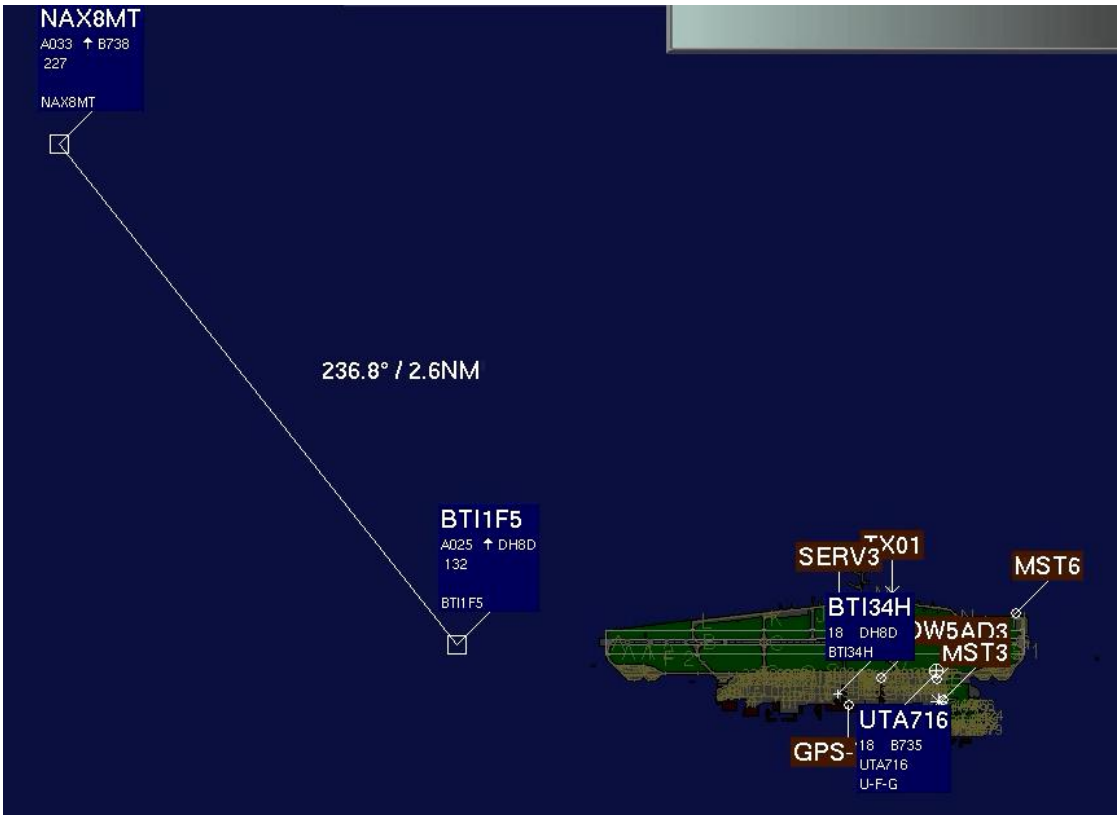


Figure 10. Traffic situation, horizontal distance between aircraft 2.6NM

At **10:11:31:** The crew responded: "Riga Air Baltic 1 Foxtrot 5 passing 2600."

The crew of Air Baltic had **first contact with APP controller** when passing 2600ft.

At **10:11:36:** The APP Controller gave instruction: "Stop at 2500 turn left 170."

Figure 11. At **10:11:42:** The crew responded: "Left 170 **already 2900**. Air Baltic 1 Foxtrot 5."

Separation standards were infringed between aircraft. Minimal horizontal separation between aircraft was **2.6NM**, vertical **700ft**.

At **10:11:46:** The APP Controller gave instruction: "1 Foxtrot 5 roger left turn 170 and continue climb level 240 now."

At **10:11:54:** The air Baltic crew confirmed: "Turn left 170 climbing flight level 240 Baltic 1 Foxtrot 5"

At **10:12:09:** The APP Controller gave instruction: **"**1 Foxtrot 5 now clear of traffic right turn to NEBSI.**"**

At **10:12:14:** The air Baltic crew confirmed: **"**Right to NEBSI. Baltic 1 Foxtrot 5.**"**

1.4. Injuries to persons

There were no injuries.

1.3. Damage to aircraft

Not damage occurred.

1.4. Other damage

Objects other than aircraft not damaged.

1.5. Personnel information

RIGA Approach controller:

Male, 29 years old

Ratings: All necessary ratings were valid (Rating Certificate to Air Traffic Controller Licence valid);

Medical Certificate Class 3- valid.

He had reported for duty at 09:29:55 hrs and had been at his working position for 40 (fourty) minutes when the occurrence happened.

RIGA Tower controller:

Male, 27 years old

Ratings: All necessary ratings were valid (Rating Certificate to Air Traffic Controller Licence valid);

Medical Certificate Class 3- valid.

He had reported for duty at 09:06:43 hrs and had been at his working position for 1 hour 3 minutes when the occurrence happened.

1.6. Aircraft information

Aircraft type – Boeing 738, owner of aircraft- Norvegian Air Shuttle.

Aircraft type – Bombardier DHC-8-402, owner of aircraft – AirBaltic.

1.7. Meteorological information

ATIS REPORTS

2017-11-23 08:50:10	ARRDEP RIGA-ATIS INFO W TIME: 0850 EXP ILS APCH RWY: 18 RWY SFC: WET BR. ACTION: FIRST PART GOOD FRICTION: 95 SECOND PART GOOD FRICTION: 95 THIRD PART GOOD FRICTION: 95 TWY SFC: PARTLY COV WITH WET SN TL: 65 WIND: 170 DEG, 16 KT VISIBILITY: TDZ 10 KM OR MORE CLD OVC 500 FT AIR. TEMP: 1 DP. TEMP: 0 QNH: 1012 TREND: TREND BECMG CLD OVC 300 FT END OF INFO W
2017-11-23 08:54:39	ARRDEP RIGA-ATIS INFO X TIME: 0854 EXP ILS APCH RWY: 18 RWY SFC: WET BR. ACTION: FIRST PART GOOD FRICTION: 95 SECOND PART GOOD FRICTION: 95 THIRD PART GOOD FRICTION: 95 TWY SFC: PARTLY COV WITH WET SN TL: 65 WIND: 160 DEG, 13 KT GUSTING TO 23 KT VISIBILITY: TDZ 10 KM OR MORE CLD OVC 500 FT AIR. TEMP: 1 DP. TEMP: 0 QNH: 1012 END OF INFO X
2017-11-23 08:56:43	ARRDEP RIGA-ATIS INFO Y TIME: 0855 EXP ILS APCH RWY: 18 RWY SFC: WET BR. ACTION: FIRST PART GOOD FRICTION: 95 SECOND PART GOOD

	FRICTION: 95 THIRD PART GOOD FRICTION: 95 TWY SFC: PARTLY COV WITH WET SN TL: 65 WIND: 160 DEG, 15 KT VISIBILITY: TDZ 10 KM OR MORE CLD OVC 500 FT AIR. TEMP: 1 DP. TEMP: 0 QNH: 1012 END OF INFO Y
2017-11-23 09:20:10	ARRDEP RIGA-ATIS INFO Z TIME: 0920 EXP ILS APCH RWY: 18 RWY SFC: WET BR. ACTION: FIRST PART GOOD FRICTION: 95 SECOND PART GOOD FRICTION: 95 THIRD PART GOOD FRICTION: 95 TWY SFC: PARTLY COV WITH WET SN TL: 65 WIND: 160 DEG, 16 KT VISIBILITY: TDZ 7 KM CLD OVC 600 FT AIR. TEMP: 1 DP. TEMP: 0 QNH: 1012 TREND: NOSIG END OF INFO Z
2017-11-23 09:50:10	ARRDEP RIGA-ATIS INFO A TIME: 0950 EXP ILS APCH RWY: 18 RWY SFC: WET BR. ACTION: FIRST PART GOOD FRICTION: 95 SECOND PART GOOD FRICTION: 95 THIRD PART GOOD FRICTION: 95 TWY SFC: PARTLY COV WITH WET SN TL: 65 WIND: 160 DEG, 16 KT VISIBILITY: TDZ 10 KM OR MORE CLD OVC 500 FT AIR. TEMP: 1 DP. TEMP: 0 QNH: 1012 TREND: NOSIG END OF INFO A
2017-11-23 10:07:24	ARRDEP RIGA-ATIS INFO B TIME: 1007 EXP ILS APCH RWY: 18 RWY SFC: WET BR. ACTION: FIRST PART GOOD FRICTION: 95 SECOND PART GOOD FRICTION: 95 THIRD PART GOOD FRICTION: 95 TWY SFC: PARTLY COV WITH WET SN TL: 65 WIND: 160 DEG, 14 KT VISIBILITY: TDZ 10 KM OR MORE CLD OVC 400 FT AIR. TEMP: 1 DP. TEMP: 1 QNH: 1012 END OF INFO B
2017-11-23 10:20:10	ARRDEP RIGA-ATIS INFO C TIME: 1020 EXP ILS APCH RWY: 18 RWY SFC: WET BR. ACTION: FIRST PART GOOD FRICTION: 95 SECOND PART GOOD FRICTION: 95 THIRD PART GOOD FRICTION: 95 TWY SFC: PARTLY COV WITH WET SN TL: 65 WIND: 170 DEG, 16 KT VISIBILITY: TDZ 4000 M WEATHER: BR CLD OVC 400 FT AIR. TEMP: 1 DP. TEMP: 1 QNH: 1012 TREND: NOSIG END OF INFO C
2017-11-23 10:42:03	ARRDEP RIGA-ATIS INFO D TIME: 1041 EXP ILS APCH RWY: 18 RWY SFC: WET BR. ACTION: FIRST PART GOOD FRICTION: 95 SECOND PART GOOD FRICTION: 95 THIRD PART GOOD FRICTION: 95 TWY SFC: PARTLY COV WITH WET SN TL: 65 WIND: 160 DEG, 13 KT GUSTING TO 23 KT VISIBILITY: TDZ 6 KM WEATHER: BR CLD OVC 400 FT AIR. TEMP: 1 DP. TEMP: 1 QNH: 1012 END OF INFO D
2017-11-23 10:47:01	ARRDEP RIGA-ATIS INFO E TIME: 1046 EXP ILS APCH RWY: 18 RWY SFC: WET BR. ACTION: FIRST PART GOOD FRICTION: 95 SECOND PART GOOD FRICTION: 95 THIRD PART GOOD FRICTION: 95 TWY SFC: PARTLY COV WITH WET SN TL: 65 WIND: 160 DEG, 15 KT VISIBILITY: TDZ 5 KM CLD OVC 400 FT AIR. TEMP: 1 DP. TEMP: 1 QNH: 1012 END OF

	INFO E
2017-11-23 10:50:10	ARRDEP RIGA-ATIS INFO F TIME: 1050 EXP ILS APCH RWY: 18 RWY SFC: WET BR. ACTION: FIRST PART GOOD FRICTION: 95 SECOND PART GOOD FRICTION: 95 THIRD PART GOOD FRICTION: 95 TWY SFC: PARTLY COV WITH WET SN TL: 65 WIND: 160 DEG, 15 KT VISIBILITY: TDZ 6 KM CLD OVC 400 FT AIR. TEMP: 1 DP. TEMP: 1 QNH: 1012 TREND: NOSIG END OF INFO F

FALV51 EVRA 230800 CCA
EVRR GAMET VALID 230900/231500
EVRR RIGA FIR BLW FL100
SECN I
SIG SFC WIND:FOR AREAS S AND NORTH 1 2 LCA GUSTS 170/30KT
SIG SFC VIS:FOR AREAS 1 2 AND 09/12 LCA S 3000M DZ BR
FOR AREA 3 LCA 4000M SN SNRA FZRA
SIG CLD:FOR AREAS 1 2 AND 09/12 S OVC 300/4000FT AGL
12/15 FOR AREA S LCA BKN/OVC 500/4000FT AGL
FOR AREA 3 BKN/OVC 500/ABV 10000FT AGL
ICE:FOR AREAS 3 MOD INC ABV 500/3000FT AND ABV 6000FT AMSL,
LCA IN FZRA BLW 3000FT AMSL
TURB:FOR AREAS S AND N OF 1 2 MOD BLW 4000FT AMSL
SIGMET APPLICABLE:A1 AT TIME OF ISSUE
SECN II
PSYS:09 WARM FRONT OVER CENTRAL PART OF LATVIA MOV E 10KT NC
SFC WIND:160/10-15KT,FOR AREAS S, N OF 1 2 GUSTS 28KT
WIND/T:
1000FT 180/30KT MS02
2000FT 210/35KT PS03
5000FT 260/20KT PS04
10000FT 300/25KT MS05
SFC VIS:8-10KM
CLD:FOR AREAS 1 2 3 AND 09/12 S NIL
12/15 FOR AREA S SCT SC 2000/4000FT AGL
FZLVL:FOR AREAS S 1 7000-8000FT AMSL
FOR AREAS 2 100FT AND 6000FT AMSL
FOR AREA 3 SFC
MNM QNH:
09/12 1001HPA FOR S, 1002HPA FOR 1
1007HPA FOR 2, 1010HPA FOR 3
12/15 1000HPA FOR S, 1001HPA FOR 1
1006HPA FOR 2, 1009HPA FOR 3
SEA:T07 HGT 3.0M
OTLK:231500/231800 SAME HAZARDOUS WX=

1.8. Aids to Navigation

1.8.1. STCA system

STCA is a ground-based safety net intended to assist the controller in preventing collision between aircraft by generating, in a timely manner, an alert of a potential or actual infringement of separation minima.

A Short Term Conflict Alert (STCA) is a system to warn the ATCO of any situation where the minimum separation distances between any pair of radar tracks is, or is predicted to be within a short look ahead time (usually 2 minutes), violated. This is achieved via a visual alert on the radar display, though some systems also provide an audible alert. STCA is a concept rather than a specific system; there are therefore a number of differing implementations used by ATC providers across the world.

The generation of Short Term Conflict Alerts is a function of an ATC radar data processing system. If the distance between the three-dimensional position of two aircraft is predicted to be reduced to less than the defined applicable separation minima within a specified time period, the visual alert will be generated to the radar controller within whose jurisdiction area the aircraft is operating.

Specific training should be provided to ATC staff for the correct use of STCA. All types of flight transponder-equipped aircraft with Mode C are eligible for generation of STCA.

In the event an STCA generated in respect of controlled flights, the controller **shall without delay take action to ensure** that the applicable separation minimum will not be infringed.

1.9. Communications

ATCC controllers provide communication with a computerized voice communication system using pre-set switching and distribution of various aeronautical frequencies and direct communication lines. Frequencies 118.8 MHz "GMC" controller, 118.1 MHz "Tower" controller 129.925MHz use for pilot - controller communication. Co-ordination within Riga FIR shall be performed using available "ATRACC+" system functionality.

For the investigation the "GMC", "Tower" and "APP" Controller's console's recordings on the frequency 118.8 MHz, 118.1 MHz and 129.925MHz were used. The quality of the recordings was good. The controller's and crew members of NAX-8MT and BTI1F5 used standard phraseology and there had not principal errors in the used phraseology during communication.

1.10. Aerodrome information

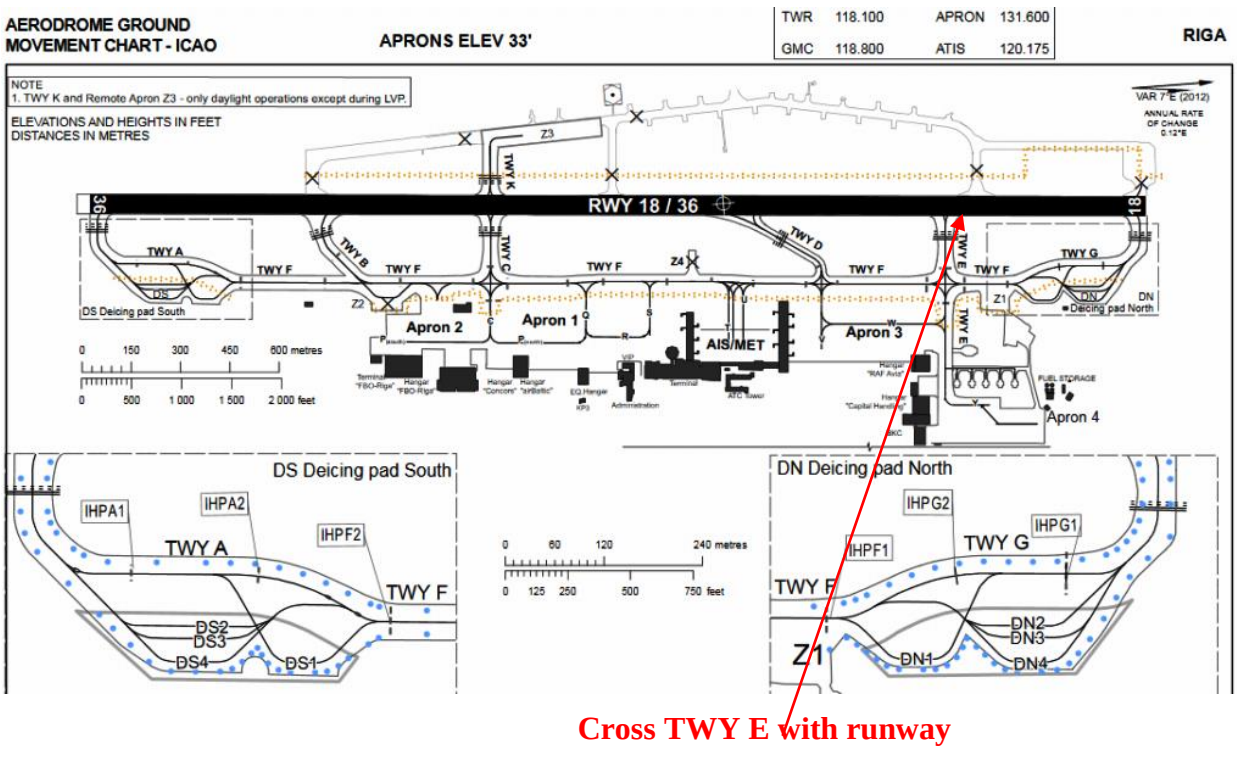


Figure 12. Aerodrome ground movement chart (EVRA)

RWY designator	TORA (m)	TODA (m)	ASDA (m)	LDA (m)	Remarks
1	**2**	**3**	**4**	**5**	**6**
18	3200	3200	3200	3200	NIL
18	**2600**	**2600**	**2600**	**-**	**Take-off from intersection with TWY E**
36	3200	3200	3200	3200	NIL
36	2500	2500	2500	-	Take-off from intersection with TWY B
36	1980	1980	1980	-	Take-off from intersection with TWY C

1.11. Flight recorders

The incident reconstruction was based on radar information and voice communications transcript between GMC, Riga TOWER and APP controller's of Riga ATCC and both aircraft crew members involved in incident.

1.12.Wreckage and impact information

Not damage

1.13. Medical and pathological information

Not relevant to this incident

1.14. Fire

There was no fire

1.15. Survival aspects

NIL

1.16. Tests and research

NIL

1.17. Organizational and management information

According to Law on Aviation of the Republic of Latvia the authority responsible for activities of the utilizations of the airspace of the Republic of Latvia for civil and military needs and the flight of aircraft shall be controlled by the Air traffic control unit - the State Joint-Stock Company – "Latvijas Gaisa Satiksme - LGS" which is the Air Navigation Service (ANS) provider in the Republic of Latvia. Air traffic control has provided in the airspace of Riga FIR, by Latvian Air Navigation Services (LGS) staff.

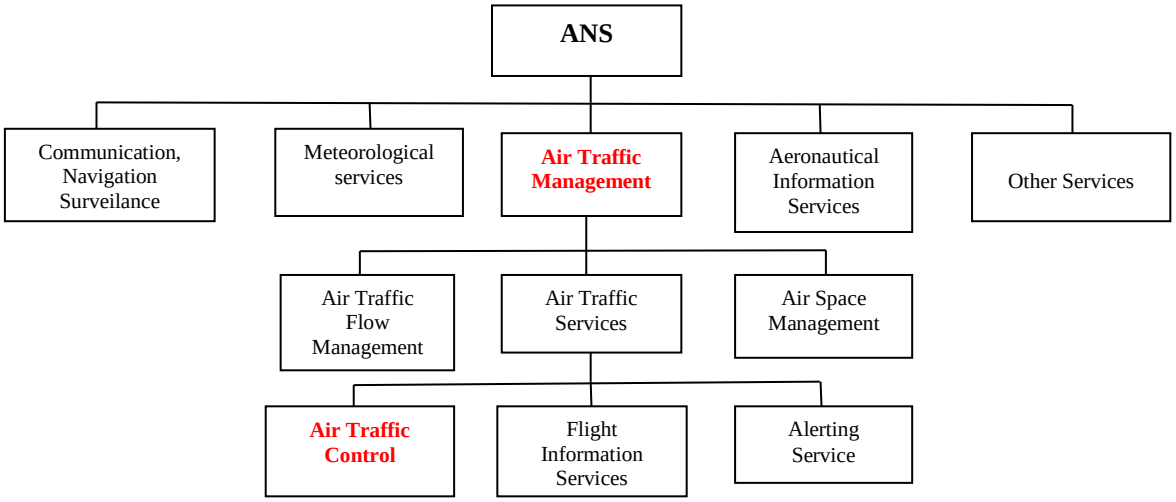


Figure 9 Air navigation services rendering by “Latvijas Gaisa Satiksme - LGS”

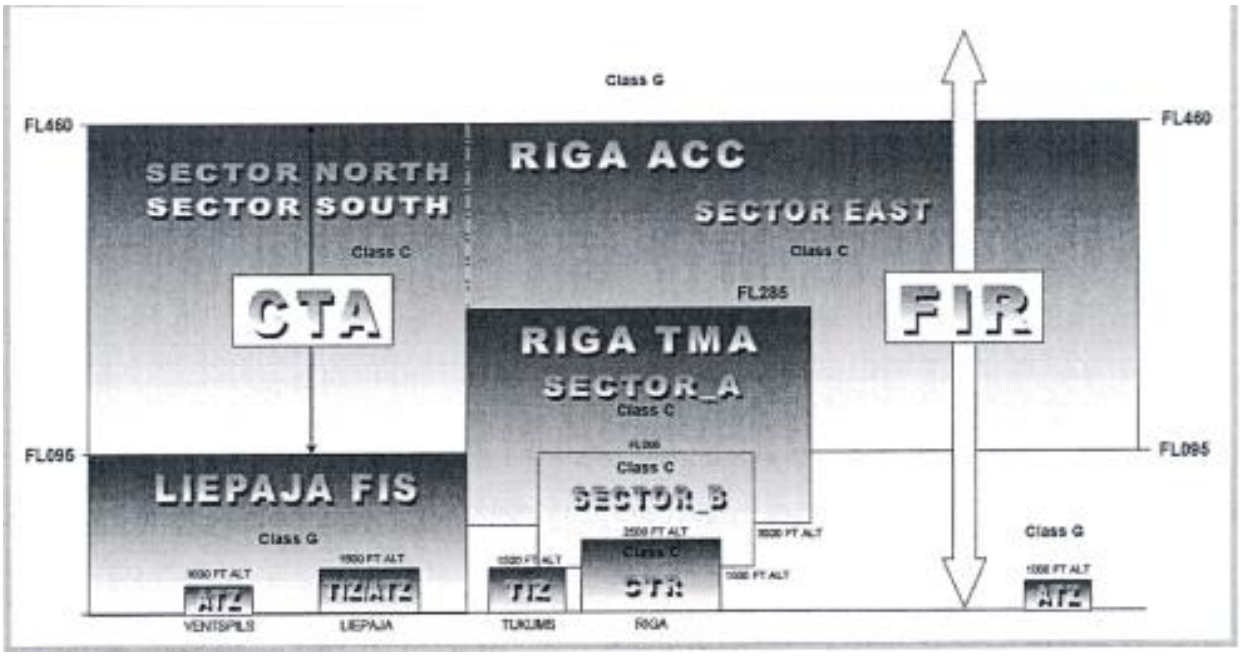


Figure 11 ATS AIRSPACE CLASSIFICATION

1.18. Additional information

NIL

1.19. Useful or effective investigation techniques

NIL

2. Analysis

2.1. Introduction

The analysis is based on the GMS, Riga Tower, sector Approach controller's actions, radio communications, radar recordings and Air traffic service´s procedures analysis.

The purpose of this investigation is reconstruction of the circumstances of flight in order to analyze, determine causal factors and develop recommendations on preventive actions in the future.

2.2. Air traffic service´s procedures

The conduct of the air traffic control service operation at Riga International airport was regulated by the following policies of the air navigation service provider LGS:

- DI-GSV/TWR-01/3 AIRPORT RIGA TOWER CONTROLLER OPERATIONAL MANUAL**;**
- Air Traffic Control Centre Approach Sector Operations Manual DI-GSV/GSVC-01

2.2.1. Control functions of aerodrome Tower controller

Departure procedures

In all cases when departing traffic **has not left 2500ft ALT in climb**, the TWR **Controller is responsible for the separation provision** from ACFT within Riga CTR AoR.

Establishing the required separation TWR controller shall take into account **minimum pilot reaction time** and **time for departure clearance (conformation) issuing**.

The following should be considered for the sequencing of departing aircraft:

- types of aircraft and their relative performance;
- routes to be followed after take-off;
- APP controller requirements, only due to the traffic situation within TMA.

Departures shall normally be cleared in the order in which they are ready for take-off, except that deviations may be made from this order of priority to facilitate the maximum number of departures with the least average delay.

According to Airport Riga Tower Controller Operational Manual **DI - GSV/TWR – 01/3** paragraph 3.2.10.1. take-off clearance **shall not be issued** until:

- ATC clearance and its changes has been co-ordinated with Riga APP;
- ATC clearance and its changes are related to and acknowledged by the aircraft concerned.

According to Airport Riga Tower Controller Operational Manual **DI - GSV/TWR – 01/3** paragraph 3.2.10.2. take-off clearance **may be issued** when:

- the aircraft is approaching the runway-holding position of the runway-in-use;
- the aircraft is taxiing to line up position of the runway-in-use;
- the aircraft is at line up position of the runway-in-use.

According to paragraph 3.2.10.4. of Manual **DI - GSV/TWR – 01/3** departing aircraft shall be normally permitted to commence take-off when:

- preceding departing aircraft has crossed the end of the runway in use or
- has started a turn or

- previously landed aircraft has vacated the runway in use.

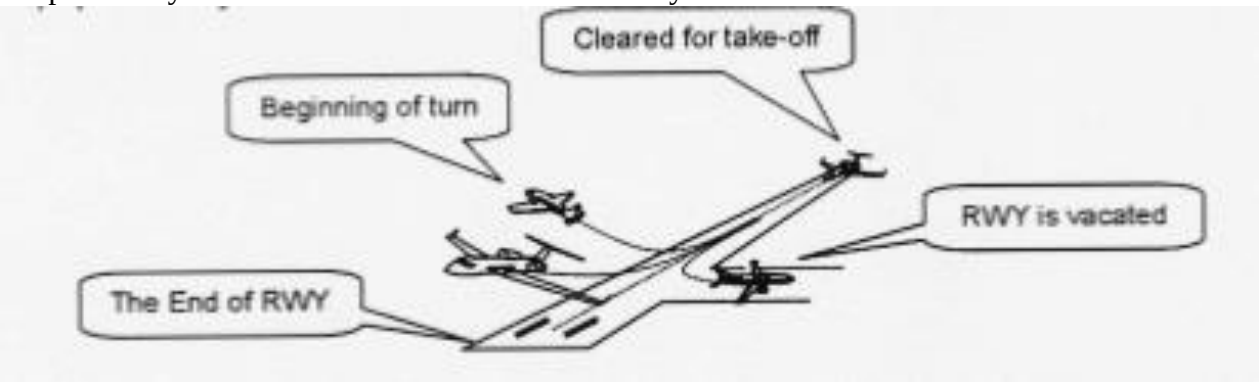


Figure12. Illustration of departing aircraft

Additional requirements prescribed in the Manual **DI - GSV/TWR – 01/3** what TWR controller shall take into account:

-Issuing take-off clearance for succeeding departing aircraft Tower controller should take into consideration the **rate of climb of the preceding departing aircraft**.

-Some Business JETS and Turbo Props (e.g. DH-8D) may have high initial climb and TWR controller should take this into account and if situation dictate so **apply more extended separation**.

Radar based control of non-wake turbulence categorized departing traffic:

In all cases, when departing aircraft are entering TMA, the vertical separation of not less than **1000 Ft**, or the longitudinal separation of not less than:

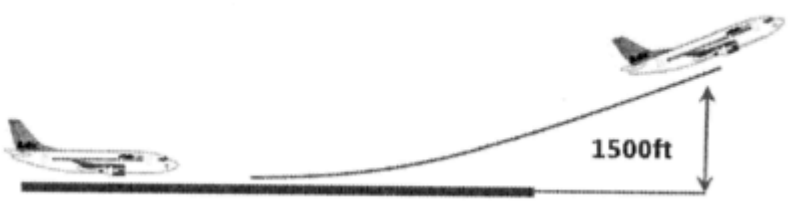
- **3 NM** or
- 5 NM when primary (Riga Thales) or secondary radar (Riga Thales)/source of information (MSS-W RIX) is out of order shall exist between two departing aircraft.

2.3.1. Riga Tower controller actions

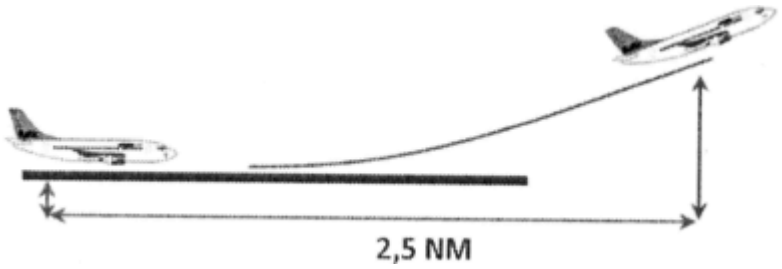
According to information received during the Tower controller interview conducting departure of both aircraft Boeing 738 and Bombardier DH-8D Controller followed requirements prescribed in the paragraph 3.2.10.5.4.of Manual **DI - GSV/TWR – 01/3.**

When separation of not less than 3 NM is provided in TMA Riga TWR controller may issue take-off clearance for succeeding departing a/c when preceding departing a/c is faster or both departing a/c involved have same flight performances and preceding departing a/c, climbing 4000 ft or higher, has passed:

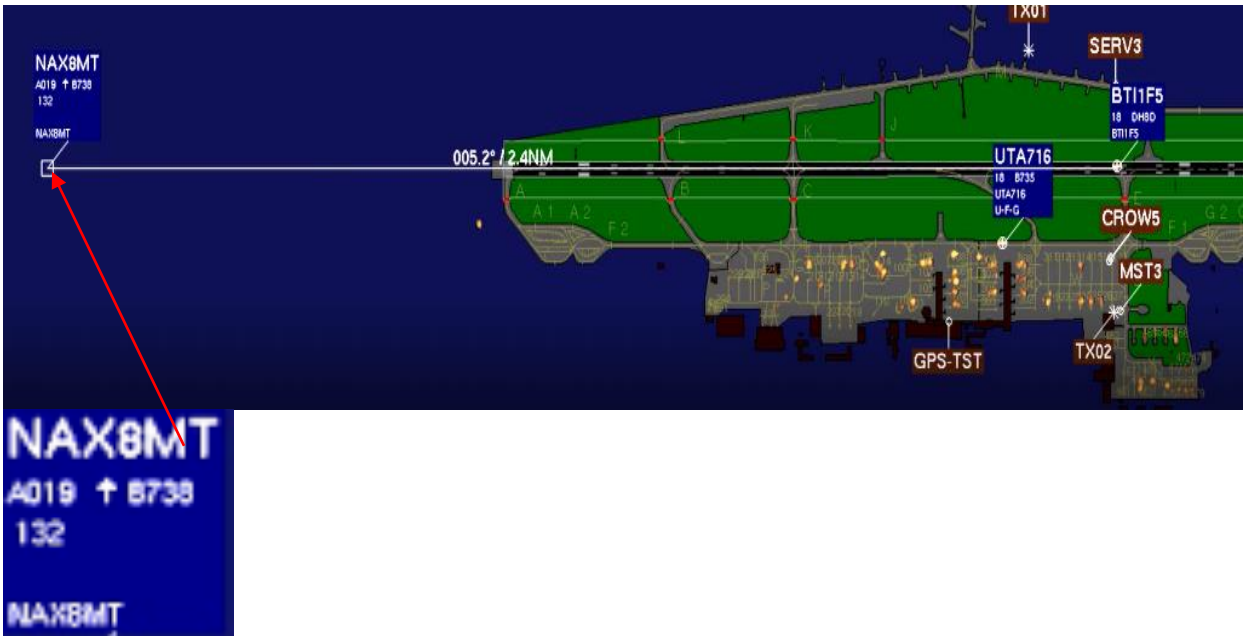
a) **the end of runway-in-use and crossing altitude 1500 ft**, or



b) **a point of 2,5 NM from the line-up position of succeeding departing aircraft**



Analysing the recordings of SMGCS it was stated that when Bombardier DH-8D was cleared to take off and started rolling distance from line-up position and point of preceding aircraft was less than 2.5NM.



In reality TWR Controller had to act in compliance with other instruction **(IMPORTANT INFORMATION AND LOCAL INSTRUCTION No 114)** which was separate supplement and not included in the Manual **DI - GSV/TWR – 01/3.**

According to **Local instruction No 114** the paragraph **3.2.10.5.4.** of Manual **DI - GSV/TWR – 01/3** was changed in following edition:

"When separation of not less than **3 NM** is provided in TMA, Riga TWR Controller issues take-off clearance for succeeding departing a/c when preceding departing a/c is faster or both departing a/c involved have same flight performances and preceding departing a/c, climbing 4000 ft or higher, **has crossing:**

- altitude **2000 ft, and**
- **has** passed a point of **3 NM** from the line-up position of succeeding departing a/c.

Tower Controller was introduced with the Local instruction No114 under the signature (04.11.2015) but in practice on 23 November, 2017 failed to use requirements of instruction.

In such case properly assessing real situation according to Local instruction No114 it was appropriate to apply more extended separation.

2.3.2. Control functions of aerodrome APP Controller

If the ACFT is going to proceed below 2500ft ALT within Riga CTR AoR, responsibility for air Traffic control provision shall not be handed over APP controller.

Unless otherwise instructed aircraft shall establish two-way radio communication with Riga Approach on assigned frequency not later than passing 1500ft ALT after take-off.
When airborne at first contact pilot reports to APP controller"

- Call sign;
- SID or radar heading given by ATC;
- Level

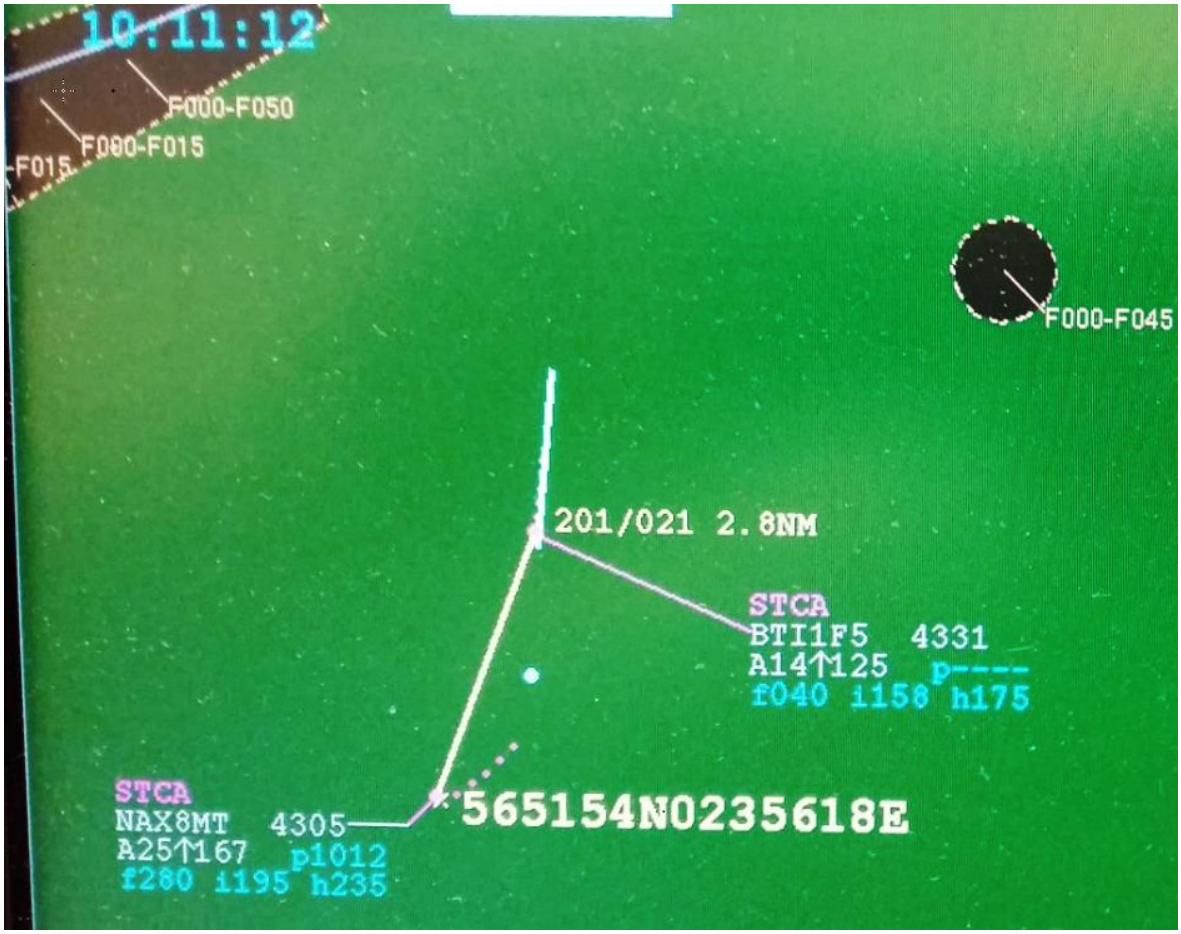
2.3.3. Approach Sector controller actions

When he pilot of NAX-8MT established first contact with APP controller on frequency 129.925 MHz it passing **900 feet and climbing to 4000**."

At that time BTI1F5 was not cleared for take-off by Riga Tower controller yet.

At **10:10:11:** The Tower Controller gave clearance for Air Baltic BTI1F5 to take-off.

The Norwegian NAX-8MT at that time crossed altitude 1900ft and had passed a point of 2.4 NM from the line up position of succeeding departing aircraft DHC-8-402.



When STCA an alert triggered of a potential or actual infringement of separation minima APP Controller twice tried to establish contact with Air Baltic BTI1F5.

The crew of Air Baltic BTI1F5 failed to establish radio contact with APP controller when passed ALT 1500ft. The crew of Air Baltic BTI1F5 answered to APP Controller second call at **10:11:31** and declared that they are passing 2600ft already.

APP controller instructed the Air Baltic BTI1F5:" Stop at 2500 turn left 170", but Air Baltic BTI1F5 at that time passed flight level **2900** already.

Unfortunately instruction to turn left could not to prevent infringement of separation standards and the established separation standards were infringed.

3. Conclusions

During process of investigation were made the following conclusions:

3.1. Findings

- In order to maintain an overview traffic, the Air Traffic Control radar system ATRACC+ was in use;

- At the time of the incident the traffic was handled by TWR Controller;

- TWR Controller failed to act in compliance with instruction (IMPORTANT INFORMATION AND LOCAL INSTRUCTION No 114);

- Local instruction No114 was separate supplement and not included in the Manual of TWR Controller DI - GSV/TWR – 01/3;

- Tower Controller was introduced with the Local instruction No114 under the signature;

- There was fixed violations of the RIGA TOWER CONTROLLER'S LOCAL INSTRUCTION No 114 rules;

- The crew of Air Baltic BTI1F5 failed to establish radio contact with APP controller when passed ALT 1500ft.

- Both the APP sector and Riga Tower Controller 's held valid licenses and ratings and was qualified and current at their positions;

- Before the incident the workload of the Tower controller was light;

- STCA ALERT signals trigged on;

- Vertical separation between aircraft was 700FT, horizontal 2.6 NM;

- The Manual of Tower Controller "DI-GSV/TWR-01/3", that was in force at the day of incident, had of more detailed instructions about TWR Controller's actions in case of some new generation turboprop aircraft take off performance;

- Within the context of this incident there were not find lack of human resources, budget resources, deficient planning, as well as were not find any adversarial or conflicting or when they are supplanted by unofficial rules and values and confusion abounds that could to have influence on creation of this serious incident;

- At the time of incident Visual Meteorological Conditions (VMC) prevailed.

3. 2. Causes

3.2.1. Main Cause

The source or origin of an event that played the major role that caused this incident - infringement the separation minima between an aircraft Boeing738, aircraft call sign NAX-8MT and Bombardier DH-8-420, aircraft call sign BTI1F5 was that TWR Controller failed to use requirements of IMPORTANT INFORMATION AND LOCAL INSTRUCTION No 114.

3.2.2. Contributing causes

Failure of the crew of Air Baltic BTI1F5 to establish radio contact with APP controller when passed ALT 1500ft.

Amendments for provision separation standards did not made directly in the Tower Controller Manual "DI-GSV/TWR-01/3".

3.3. Primary cause

The event after which incident became inevitable.

Giving clearance for take-off for succeeding departing aircraft DHC-8-402 in contrary of requirements LOCAL INSTRUCTION No 114 which was in force.

4. Safety Recommendations

It is recommended that the authority responsible for air navigation services in the Latvian airspace VAS Latvijas Gaisa Satiksme (LGS):

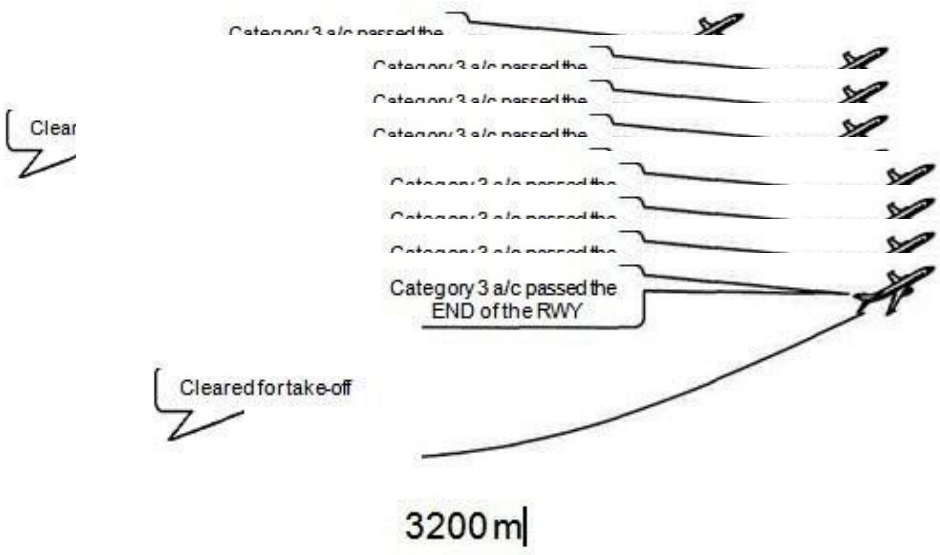
Recommendation LV 2018-004

To revise Tower Controller Operational manual and make necessary amendments directly.

Riga December 11, 2018

Investigator in charge Visvaldis Trūbs

Director of Transport Accident and
Incident Investigation Bureau Ivars Alfreds Gaveika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