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Swiss Transportation Safety Investigation Board STSB

Final report no. 2393 of the Swiss Transportation Safety Investigation Board STSB

on the airprox between the aircraft

Bombardier CL-600-2B19, 9H-ILB, and Diamond DA-40, HB-SDV

on 18 December 2020

16 NM ENE Sion (canton of Valais)

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General information on this report

In accordance with

article 3.1 of the 12th edition of Annex 13, effective from 5 November 2020, to the Convention on International Civil Aviation of 7 December 1944, which entered into force in Switzerland on 4 April 1947, as at 18 June 2019 (SR *0.748.0*);

Article 24 of the Federal Act of 21 December 1948 on Aviation, as at 1 May 2022 (AviA, SR *748.0*);

Article 1, para. 1 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 and repealing Directive 94/56/EC, which entered into force in Switzerland on 1 February 2012 in accordance with a decision by the joint committee of the Swiss Confederation and the European Union (EU) and based on the Air Transport Agreement of 21 June 1999 between Switzerland and the EU;

and article 2 para. 1 of the Ordinance of 17 December 2014 on the Safety Investigation of Transportation Incidents, as at 1 February 2015 (OSITI, SR *742.161*);

the sole purpose of an investigation into an aircraft accident or serious incident is to prevent further accidents or serious incidents from occurring. It is therefore expressly not the purpose of this safety investigation and report to establish blame or to determine liability.

Should this report be used for purposes other than those of accident prevention, this statement should be given due consideration.

The German version of this report constitutes the original and will prevail.

Unless indicated otherwise, all other information relates to the time of the serious incident.

All of the times referred to in this report, unless otherwise indicated, are given in Coordinated Universal Time (UTC). For the region of Switzerland, Central European Summer Time (CEST) was the local time (LT) at the time of the serious incident. The relationship between LT, CET and UTC is:
LT = CET = UTC + 1 hour.

Summary

Location	16 NM (30km) east-northeast of Sion (canton of Valais)		
Coordinates	621 400 / 132 600 (Swiss Grid 1903)	**Altitude**	approx. 12,500ft AMSL[1]
Date and time	18 December 2020, 12.23 UTC		

Type of incident	Airprox
Airspace	Class E
Airprox distance	100ft vertical, 1.1NM horizontal
Stipulated separation minima	None between IFR and VFR traffic
Airprox category	ICAO[2] category B

Aircraft 1	Business jet Bombardier CL-600-2B19 “Challenger 850”	9H-ILB
Operator and owner	VistaJet Limited, Luqa LQA 4000, Malta	
Relevant equipment	Transponder, TCAS[3]	
Type of operation	Non-scheduled flight	
Flight rules	Instrument flight rules (IFR)	
Point of departure	Kortrijk-Wevelgem (EBKT) airport, Belgium	
Destination	Sion (LSGS) airport	
Flight phase	Approach	
Captain	Dutch citizen, born in 1975	
Licence	Airline Transport Pilot Licence Aeroplane (ATPL(A)) according to the European Union Aviation Safety Agency (EASA), issued by the German *Luftfahrt-Bundesamt* (LBA)	

Flying hours	**Total**	5800 h	**During the last 90 days**	86 h
	On aircraft type	2400 h	**During the last 90 days**	86 h

Aircraft 2	Single engine airplane Diamond DA-40 NG	HB-SDV
Operator and owner	Avilù SA, 6982 Agno	
Relevant equipment	Transponder	
Type of operation	Private	
Flight rules	Visual flight rules (VFR)	
Point of departure	Lausanne (LSGL) airfield	
Destination	Lugano (LSZA) airport	

[1] AMSL: above mean sea level

[2] ICAO: International Civil Aviation Organization

[3] TCAS: traffic alert and collision avoidance system

Flight phase	Cruise flight			
Pilot	Italian citizen, born in 1964			
Licence	ATPL(A), issued by FOCA			
Flying hours	**Total**	8100 h	**During the last 90 days**	80 h
	On aircraft type	50 h	**During the last 90 days**	13 h

1 Key information

1.1 Course of events

The Diamond DA-40 single-engine airplane, registered as HB-SDV, took off at around noon on 18 December 2020 from Lausanne (LSGL) airfield. The pilot intended to fly southbound over the Rhone Valley through the area of the Sion Terminal Control Area (TMA)[4], which is located east-northeast of Sion airport (LSGS) in the zone of the instrument approach to runway 25, and made radio contact with the flight information service in Geneva at 12.05.25 UTC. Prior to the airprox, the single-engine airplane was flying in a straight line and ascending slightly in a southeasterly direction (cf. Figure 1).

The twin-engine business jet, a Bombardier CL-600-2B19 “Challenger 850” registered as 9H-ILB, was performing an instrument approach to Sion airport at the same time. The crew was in contact with the control tower at Sion airport using the radio call sign “Vistajet 645”. Prior to the airprox, 9H-ILB was descending in a southwesterly direction in accordance with the instrument approach procedure and entered the Sion TMA which was not active at this time (cf. section 1.3).

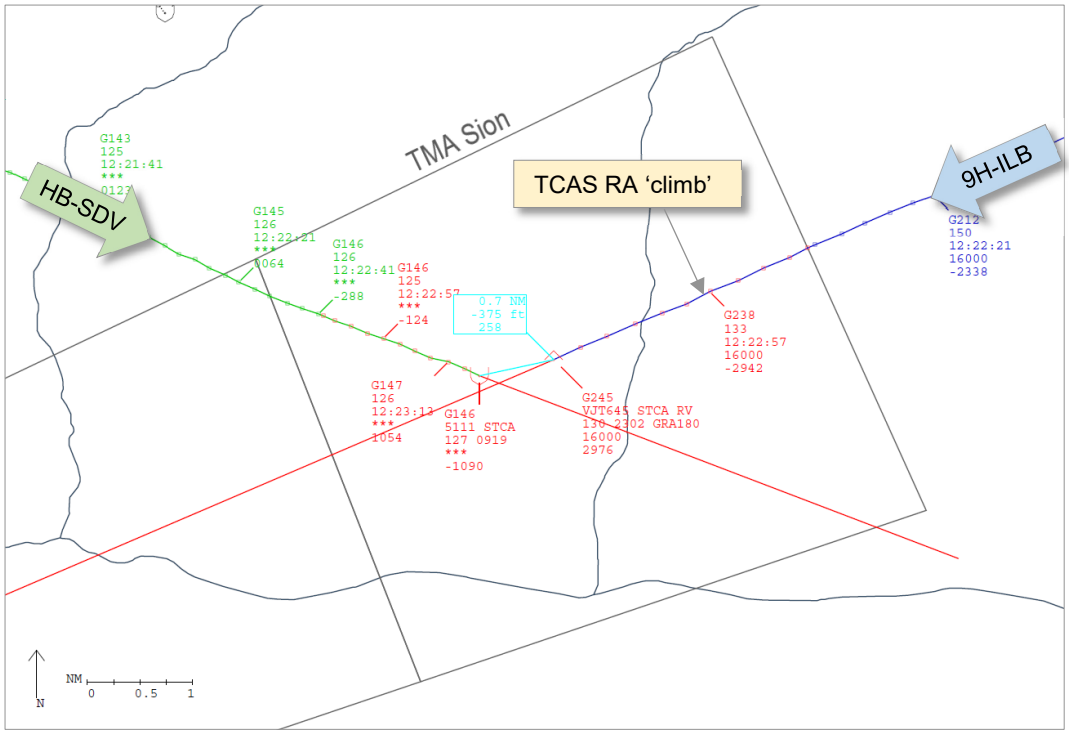

Figure 1: Radar plot of the flight paths of HB-SDV (green) and 9H-ILB (blue) at 12.23.21 UTC when the two aircraft came into close proximity of each other at a distance of 0.7 NM horizontally and 375 ft vertically (light blue).

Sion control tower transmitted a traffic information to 9H-ILB notifying the crew of the single-engine airplane flying under VFR which was proceeding southbound in its 1 o’clock position at a distance of 7 NM and at an altitude of 13,000 ft AMSL (*“unknown VFR traffic, 1 o'clock position, 7 miles, 13 000 ft, proceeding southbound”*). The controller also contacted Geneva flight information service which sent traffic information to HB-SDV. Its pilot was notified of the jet approaching under IFR which was located in its 10 o’clock position at a distance of 4 NM and 1400 ft

[4] According to the Swiss VFR manual, the abbreviation TMA originally meant Terminal Manoeuvring Area.

above its flight altitude descending towards Sion (*"traffic at 10 o'clock, 4 miles, it's 1400 ft above your level, in descent IFR to Sion"*).

Shortly afterwards at 12.22.58 UTC, the TCAS collision warning system of 9H-ILB issued a resolution advisory (RA) "climb". The crew of 9H-ILB followed this RA and initiated a climb (cf. Figure 2). At the same time, the pilot of HB-SDV transmitted via voice radio that the 9H-ILB was in sight and that he would therefore enter a climb (*"in sight, we climb a little bit"*).

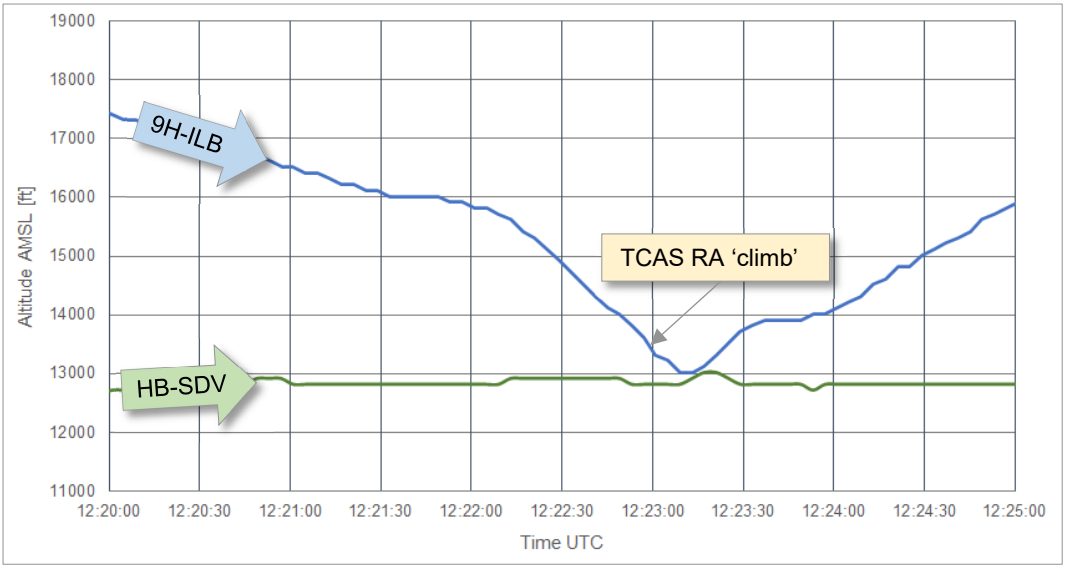

Figure 2: Flight altitudes of HB-SDV (green) and 9H-ILB (blue) in feet above mean sea level, plotted over time. The steps in the curves are due to the altitude recording being rounded to 100 ft.

The two aircraft – both climbing – now moved into greater proximity with one another. At 13.23.15 UTC, the pilot of HB-SDV indicated that he would now have to descend because 9H-ILB was also climbing *("we have to descend because he is climbing"*). The distance between the aircraft was still 100 ft vertically and 1.1 NM horizontally. The vertical distance then increased again, reaching 375 ft at 0.7 NM and 900 ft at 0.1 NM.

1.2 Weather conditions

Switzerland was on the edge of a high-pressure area over Eastern Europe. The sky above the Rhone Valley in Valais was clear with visibility of at least 70 km. At 12,500 ft above mean sea level, there was a southwesterly wind of 20 kt and the temperature was -10 °C. The QNH (air pressure reduced to sea level calculated using the values of the standard atmosphere) of Sion airport was 1025 hPa. The weather conditions had no impact on the course of events.

1.3 Information about the airspace

Sion airport's TMA is a class D airspace (i.e. entry authorisation required) which aims to protect aircraft approaching under IFR and can be temporarily activated. In this case the Sion TMA was not active resulting in an airprox in class E airspace (i.e. entry authorisation not required).

Some civil and military airports in Switzerland have temporary TMAs. They are generally designated on the aeronautical chart with the abbreviation HX (cf. Figure 3, image on right) and as 'TMA HX' in the VFR manual.[5] This kind of TMA can be activated at short notice via voice radio if required and must be activated during IFR approaches and departures.

In contrast, the Sion TMA is marked on the aeronautical chart by a border which deviates from this rule (cf. Figure 3, image on left) and is designated as 'TMA TEMPO' in the VFR manual. Along with Alpnach TMA, Sion TMA is the only one of this kind in Switzerland. It is not activated at short notice via voice radio, but instead only after prior publication via NOTAM[6] and DABS[7].

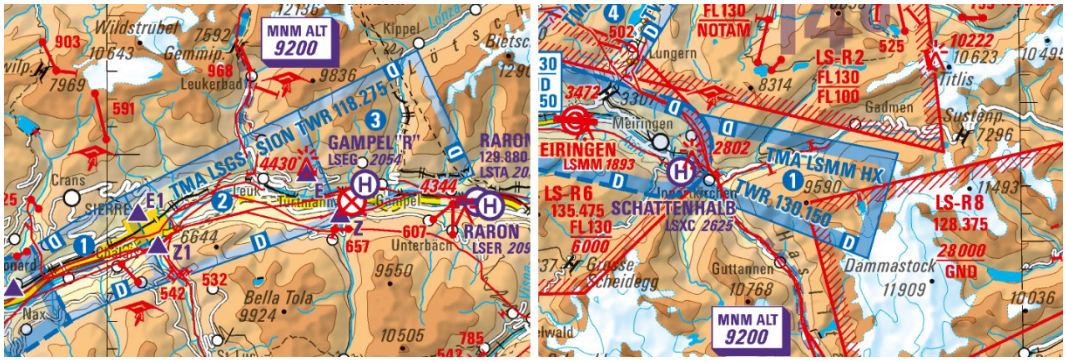

Figure 3: Image of temporarily activated TMAs on the aeronautical chart of Switzerland: on the left is Sion TMA (activation after prior publication, labelled with a thin light frame), and on the right, for the purpose of comparison, Meiringen TMA (activation via voice radio, labelled with a normal frame and the abbreviation 'HX'). Source of the maps: Federal Office of Topography.

The procedure for activating the Sion TMA dates back to Sion airport's original use as a military airfield when military IFR approaches usually took place at defined operating times and during the week. However, civil use of the airport has constantly increased and civil IFR approaches primarily take place at short notice and at weekends.

At the time of this incident, Sion was being operated as a regional airport with mixed civil and military usage. Since the start of 2022, Sion has been a purely civil airport and is only used by the Swiss air force as an alternate airport. The airspace structure had not been adapted to the new circumstances since.

[5] cf. Switzerland's VFR manual, VFR RAC 2-0-2

[6] NOTAM: Notice To Airmen

[7] DABS: Daily Airspace Bulletin Switzerland

1.4 Comparable incidents

There have frequently been close encounters between aircraft flying under IFR and those flying under VFR in the Sion TMA when the TMA is not active – i.e. in class E airspace. The following incidents, which are practically identical to this case, are some recent examples:

- 13 January 2022: There was an airprox between a Falcon 2000 business jet, registered as CS-DFG and performing an instrument approach to runway 25 in Sion at a flight altitude of around 7000 ft AMSL, and a Bristel B23 single-engine airplane, registered as HB-KGP. The Falcon 2000's TCAS issued a resolution advisory (RA) which the crew followed.
- 12 February 2022: There was an airprox between a Challenger 350 business jet, registered as CS-CHE and performing an instrument approach to runway 25 in Sion, and a Robin DR-400 single-engine airplane registered as HB-KFQ. The Challenger 350's TCAS issued an RA which the crew followed.
- 23 February 2022: There was an airprox between a Falcon 2000 business jet, registered as CS-DLH and performing an instrument approach to runway 25 in Sion at a distance of around 12 NM from the runway threshold at a flight altitude of approx. 10,000 ft AMSL, and a Piper PA-28 single-engine airplane registered as HB-PMT. The Falcon 2000's TCAS issued an RA which the crew followed.
- 10 April 2022: There was an airprox between a Citation Excel business jet, registered as PH-GHZ and performing an instrument approach to runway 25 in Sion at a flight altitude of around 11,000 ft AMSL, and an EC 120 helicopter registered as HB-ZIE. The Citation Excel's TCAS issued an RA which the crew followed.

Airprox incidents that occur in class E airspace often involve aircraft flying under VFR and which – in contrast to this incident – have neither a transponder nor radio contact with air traffic control. A recent example of this kind of airprox incident in the Sion TMA airspace is provided below:

- 19 March 2022: There was an airprox between a Falcon 2000 business jet, registered as CS-DLB and performing an instrument approach to runway 25 in Sion at a flight altitude of approx. 6000 ft AMSL and a paraglider which the Falcon 2000's crew recognised visually and was thus able to maintain sufficient separation.

A working group called "Airspace Echo Task Force" set up in 2018 by Skyguide, the Swiss air navigation service provider, indicated in a report drawn up in early 2022 that the entire Rhone Valley was a hotspot. To improve flight safety, consideration should be given to discussing with the FOCA the possibility of establishing a Transponder Mandatory Zone (TMZ) with listening squawk for this area, as was already implemented in the area of Altenrhein-Friedrichshafen, another hotspot, in March 2022.

2 Analysis

2.1 Operational aspects

The airprox occurred in class E airspace which the HB-SDV operating under VFR could enter without radio contact. However, traffic information concerning the business jet was transmitted to the pilot of HB-SDV thanks to radio contact with Geneva flight information service, despite this not being stipulated. 9H-ILB also received traffic information concerning the single-engine airplane from Sion control tower. Both traffic information transmissions provided the crews with suitable support to visually spot the other aircraft and to avoid it if necessary, which corresponds to collision prevention according to the “see and avoid” principle.

The “see and avoid” principle applicable in class E airspace was pushed to the limit despite the transmission of traffic information. However, the business jet’s TCAS collision warning system – thanks to HB-SDV’s activated transponder – provided an additional warning about HB-SDV and issued a resolution advisory to climb which the crew followed. This ensured that a safe vertical distance was achieved by the time the horizontal distance between the two aircraft had reduced to practically zero.

2.2 Airspace

The Sion TMA cannot be activated at short notice but instead only after prior publication of a NOTAM which was a suitable procedure for the former military flight operations. Today this procedure means civil IFR traffic approaching Sion must pass through heavily used class E airspace. The associated safety deficit is well known and has already led STSB to issue several safety recommendations.[8]

In such cases, activation of the Sion TMA would mean that the crew of an aircraft, such as HB-SDV operating under VFR, would have to make contact with the control tower in Sion before entering the TMA. This would, for example, give the air traffic controller the opportunity to delay flight through the area if an aircraft, such as 9H-ILB, is performing an instrument approach within the TMA. It is very clear that the inflexible procedure for activating the Sion TMA contributed to the occurrence of the airprox.

At least air traffic control has recognised the frequency of airprox incidents in class E airspace around Sion airport and identified this area as a hotspot for such incidents. To date, no adjustments have yet been made to the airspace structure or to the conditions for use of the airspace around the airport. The STSB is therefore issuing a safety recommendation (cf. section 4.1.1).

To make flight crews aware of the current situation with the temporary TMA Sion, the STSB also issues two safety notices (cf. section 4.2.1).

[8] Safety recommendation no. 466 on the definition of airspace in which only aircraft equipped with a functioning and activated transponder is permitted to fly (TMZ);
Safety recommendation no. 518 on the introduction of a mandatory requirement without exception to carry an operational and active transponder when flying over Swiss territory;
Safety recommendation no. 499 on the introduction of compatible collision warning systems based on the standards of international civil aviation for general aviation;
Safety advice no. 24 on keeping the transponder switched on continuously and making contact with the air traffic controller in the proximity of regional airports in class E airspace.

3 Conclusions

3.1 Findings

- There are no clues for restrictions of a technical, meteorological or human nature.
- The airprox between a business jet performing an instrument approach and a single-engine airplane operating under visual flight rules took place within the boundaries of the Sion TMA.
- This TMA was not activated and could not be activated at short notice due to procedural regulations.
- The airprox took place within class E airspace. VFR traffic, which cannot be identified by air traffic control or collision warning systems, is generally expected in such airspace.
- Both aircraft had activated transponders, were in radio contact with different air traffic control units and each had received traffic information from them.
- The crew of the business jet followed a TCAS resolution advisory which prevented a collision or a near miss.

3.2 Causes

In order to achieve its objective of prevention, a safety investigation authority shall express its opinion on risks and hazards that have been identified during the investigated incident and which should be avoided in the future. In this sense, the terms and formulations used below are to be understood exclusively from the perspective of prevention. The identification of causes and contributory factors does not, therefore, in any way imply assignment of blame or the determination of administrative, civil or criminal liability.

The airprox occurred due to the fact that both aircraft crews failed to visually recognise the other early enough to ensure sufficient distance based on the “see and avoid” principle.

Outdated procedures preventing activation of the Sion TMA at short notice contributed to the occurrence of the airprox.

4 Safety recommendations, safety advice and measures taken since the serious incident

4.1 Safety recommendations

In accordance with international[9] and national[10] law, all safety recommendations are submitted to the supervisory authority of the competent state. In Switzerland, this is the Federal Office of Civil Aviation (FOCA) or the supranational European Union Aviation Safety Agency (EASA). The competent supervisory authority decides on the extent to which these recommendations must be implemented. All authorities, companies and individuals are called upon to work towards improving flight safety in relation to safety recommendations issued.

The STSB publishes the responses of the competent federal office or supervisory authorities abroad at www.sust.admin.ch providing an overview of the current status in terms of implementation of the relevant safety recommendation.

4.1.1 Airprox incidents within the Sion TMA

4.1.1.1 Safety deficit

An increase of airprox incidents has been observed in class E airspace around Sion airport, particularly within the boundaries of the Sion temporary Terminal Control Area (TMA) between aircraft on an instrument approach to Sion and aircraft operating under visual flight rules. Air traffic control recognized the entire area as a so-called "hotspot".

The temporary Sion TMA cannot be activated at short notice via voice radio but instead only after prior publication via Notice to Airmen (NOTAM) and Daily Airspace Bulletin Switzerland (DABS). As a result, IFR traffic approaching and departing must pass through class E airspace where VFR traffic – which is not in contact with air traffic control and which air traffic control or collision warning systems may not identify – is expected.

4.1.1.2 Safety recommendation No. 585

The Federal Office of Civil Aviation (FOCA) should promptly take suitable measures to reduce the risk of airprox incidents in the Sion TMA area arising from IFR traffic passing through class E airspace, for example by permanently activating the current TMA via NOTAM ("TMA TEMPO") or by introducing a TMA that can be activated at short notice via voice radio if necessary ("TMA HX").

4.2 Safety advices

STSB may publish general relevant information in the form of safety advice[11], if a safety recommendation in accordance with Regulation (EU) no. 996/2010 does not seem appropriate, is not formally possible or if the less prescriptive form of safety advice is likely to have a greater effect.

[9] Annex 13 of the International Civil Aviation Organization (ICAO) and article 17 of 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 and repealing Directive 94/56/EC.

[10] Article 48 of the Ordinance of 17 December 2014 on the Safety Investigation of Transportation Incidents (OSITI), as at 1 February 2015 (OSITI, SR *742.161*)

[11] Article 56 of the Ordinance of 17 December 2014 on the Safety Investigation of Transportation Incidents (OSITI), as at 1 February 2015 (OSITI, SR *742.161*)

4.2.1 Airprox incidents between aircraft within the temporary Sion TMA

4.2.1.1 Safety deficit

An increase of airprox incidents has been observed in class E airspace around Sion airport, particularly within the boundaries of the Sion temporary Terminal Control Area (TMA) between aircraft on an instrument approach to Sion and aircraft operating under visual flight rules.

The temporary TMA Sion is generally not activated. Accordingly, no Notice to Airmen (NOTAM) has been published in this regard and there is no entry in the Daily Airspace Bulletin Switzerland (DABS) that would indicate an activated TMA Sion. It is possible that crews conducting an instrument approach to Sion or on a visual flight in this airspace are not aware of this.

4.2.1.2 Safety advice No. 52

Target group: Flight crews performing an instrument approach to Sion

Flight crews conducting an instrument approach to Sion should inform themselves in advance about the status of the temporary TMA Sion by means of Notice to Airmen (NOTAM) and an entry in the Daily Airspace Bulletin Switzerland (DABS). Activation of this temporary TMA is indicated by a corresponding NOTAM and an entry in the DABS. Conversely, if this information is not available, the temporary TMA is not activated. In this case, the flight path of the instrument approach leads through class E airspace up to the boundary of the Control Zone (CTR) of Sion airport, approximately 5 NM before the runway threshold of runway 25.

In class E airspace, VFR traffic must be expected at all times, that is not in contact with Sion tower (TWR) and that may not have a transponder switched on. The principle of "see and avoid" applies to collision avoidance.

4.2.1.3 Safety advice No. 54

Target group: Flight crews performing a VFR flight within the temporary TMA Sion

The temporary TMA Sion is not normally activated, which can be recognized by the absence of a corresponding Notice to Airmen (NOTAM) and the lack of an entry in the Daily Airspace Bulletin Switzerland (DABS). Instrument approaches to Sion are within the limits of this temporary TMA, which is why VFR traffic must expect an increased volume of IFR traffic here. In general, the "see and avoid" principle applies in Class E airspace to avoid collisions. In order to increase the situational awareness of all parties involved, it is advisable to contact the air traffic controller at Sion Tower (TWR) even if the TMA is not activated.

4.3 Measures taken since the serious incident

None

This final report was approved by the Swiss Transportation Safety Investigation Board (Art. 10 let. h of the Ordinance on the Safety Investigation of Transport Incidents of 17 December 2014).

Bern, 31 October 2023 Swiss Transportation Safety Investigation Board