Hazard Identification Report

Doncaster Sheffield Airport – CTA-13

07 May 2019

CPJ-5237-HAZ-233 V1.0

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Abbreviations

ACAS	Airborne Collision Avoidance System
ACP	Airspace Change Proposal
AIP	Aeronautical Information Publication
AIC	Aeronautical Information Circular
AIRAC	Aeronautical Information Regulation and Control
ATC	Air Traffic Control
ATCSL	Air Traffic Control Services Limited
CAS	Controlled Airspace
CTA	Control Area
CTR	Control Zone
DSA	Doncaster Sheffield Airport
FMC	Frequency Monitoring Code
FMS	Flight Management System
GNSS	Global Navigation Satellite System
HAZID	Hazard Identification
IFP	Instrument Flight Procedures
IFR	Instrument Flight Rules
LoA	Letter of Agreement
MAC	Mid-Air Collision
NOTAM	Notice to Airmen
PANS-OPS	Procedures for Air Navigation Service Operation
PBN	Performance-Based Navigation
PSR	Primary Surveillance Radar
RMZ	Radio Mandatory Zone
RNAV	aRea NAVigation
SID	Standard Instrument Departures
SiS	Signal in Space
SME	Subject Matter Experts
SMS	Safety Management System
SSR	Secondary Surveillance Radar
STCA	Short Term Conflict Alert
TMZ	Transponder Mandatory Zone
VFR	Visual Flight Rules

References

[1] CPJ-5237-PRE-232 HAZID Presentation V1.0;

[2] UK CAA CAP 760 – Guidance on the Conduct of Hazard Identification, Risk Assessment and the Production of Safety Case;

[3] ATCSL/ATCSL/ATS/SMS/002 Air Traffic Services Safety Manual;

[4] ATCSL/ATCSL/ATS/Forms/011 Risk Assessment – Hazard Analysis Log;

[5] ATCSL/ATCSL/ATS/Forms/010 Risk Assessment – Hazard Analysis Form;

[6] CPJ-5237-DOC-135 HAZID Report V1.0.

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1. Introduction

1.1. Background

1.1.1. Following the UK Civil Aviation Authority's (CAA) CAP725 Airspace Change Proposal (ACP) process, Doncaster Sheffield Airport Limited (DSAL) submitted a proposal for the introduction of Performance-Based Navigation (PBN) Standard Instrument Departures (SIDs) and Instrument Approach Procedures (IAPs) in May 2018. The proposal included an additional portion of Controlled Airspace (CAS) in the form of a Control Area (CTA). This airspace had been proposed as a Class D volume of airspace to be known as 'CTA-13' and was designed to contain the ROGAG Standard Instrument Departures (SIDs).

1.1.2. In March 2019, the CAA Safety and Airspace Regulation (SARG) department advised DSAL that it required them to conduct further consultation with aviation stakeholders on the classification of this additional CAS prior to re-submitting the Doncaster Sheffield Airport (DSA) ACP.

1.1.3. A Focus Group was held on 1 May 2019 with the Air Navigation Service Providers (ANSPs) and the representatives from airlines, that operate at DSA, to discuss the airspace classification options available. This Focus Group formed the basis of the Hazard Identification (HAZID) brief as they were held on the same day.

1.2. Aim

1.2.1. The aim of this document is to present the findings of the HAZID event conducted for the introduction of a Class E Control Area (CTA) with an associated Transponder Mandatory Zone (TMZ) at DSA. This report presents the hazards identified, the process used, and any assumption made. All identified hazards and assumptions are recorded in Annex A for further analysis and development purposes. ATCSL provide the terminal Air Traffic Services (ATS) and the HAZID was conducted under the auspices of the ATCSL Safety Management System (SMS), relevant excerpts are provided at Annex B.

1.3. Hazard Identification Event

1.3.1. The HAZID event took place at DSA on 1 May 2019. The following Subject Matter Experts (SME) attended:

Name	Organisation	Position
[redacted]	NATS En-Route Ltd	Manager ATC Airspace Design Prestwick Centre
[redacted]	NATS En-Route Ltd	ATM Procedures Prestwick Centre
[redacted]	Cyrrus Ltd	Operations Director (HAZID Facilitator)

Name	Organisation	Position
[redacted]	ATCSL	Manager ATS Doncaster Sheffield Airport
[redacted]	ATCSL	Deputy Air Traffic Control Manager
[redacted]	Flybe	Base Captain DSA
[redacted]	Cyrrus Ltd	Principal ATM Consultant
[redacted]	TUI	Base Captain DSA

Table 1: HAZID Event Participants

2. Hazard Identification Process

2.1. Overview

2.1.1. The process used to elicit the credible hazards that may be applicable to the introduction of an additional Control Area (CTA-13) at DSA involved a brainstorming session with the participants. The hazards related to the introduction of this airspace was discussed and recorded.

2.2. Process

2.2.1. The process used to identify the hazard(s) specific to CTA-13 during the event is set out below. An iterative approach was used in order to identify credible hazards.

- Record/validate any assumptions made (see paragraph 3.1);
- Identify the hazards that could be present during the lifecycle of the airspace for each scenario identified:
    - Air Traffic Control (ATC Systems);
    - ATC Procedures;
    - GNSS (SiS),
    - Airborne Systems;
    - Flight Crew;
    - Airspace and other aircraft.
- Identify cause(s) and consequence(s) of each hazard;
- Identify existing defences/mitigations against each hazard;
- Record the hazards, causes, consequences and existing mitigations (see Annex A1).

2.2.2. Once the hazards had been identified and the causes, consequences, mitigations and considerations had been established, a Risk Assessment was conducted. The Risk Assessment was conducted using the ATCSL SMS as a basis (see Annex B). The output of the Risk Assessment for each hazard is at Annex A2.

2.2.3. The information generated from the tasks listed in paragraph 2.2.1 and 2.2.2 will be used within the ATCSL Safety Assessment. All assumptions made during the HAZID process need to be validated through the project lifecycle. Consequently, where major changes to the SIDs and this associated airspace or assumptions made are considered appropriate in the future, they will need to be followed by a revalidation of these HAZID findings.

3. Hazard Identified

3.1. Assumptions

3.1.1. Table 2 records the assumptions made during the HAZID event. The assumptions shall be validated through the project lifecycle.

No.	Assumption (ASS)
ASS 1	Current level of risk presented by operations in Class D and Class G airspace is tolerable (in accordance with the ANSP's SMS and statutory requirements).
ASS 2	ROGAG SID procedures are designed in accordance with PANS-OPS regulations (obstacle and terrain clearance) and current airspace containment policy.
ASS 3	Operational Procedures will be defined for the implementation and through-life safety of the IFPs and the associated airspace.

Table 2: HAZID Assumptions

3.2. Control Area (CTA-13) Class E TMZ

3.2.1. No hazards were identified for the following scenarios as these were captured in the initial HAZID recorded and submitted as CPJ-5237-DOC-135:

- ATC Systems;
- GNSS (SiS);
- Airborne Systems;
- Airspace and other aircraft.

3.2.2. Hazards Identified during the process for the introduction of a Class E TMZ (CTA-13) at DSA are listed in Table 3. These hazards apply to the following scenarios:

- ATC Procedures; and
- Flight Crew

Hazard ID	Hazard (H)
H1	Incorrect application of ATC procedures
H2	Lack of understanding by aircrew of the rules and the differences between the service provided in Class D and Class E airspace

Table 3: CTA-13 (Class E + TMZ) Identified Hazards

4. Observations

4.1. A number of observations were made during the HAZID event, which event members deemed as significant to system development, but which could not be defined as hazards. The observations are recorded in Table 4.

ID	Observation
OBS 01	Class E (TMZ) may result in an increased level of workload associated with uncertainty and unpredictability of the intentions of VFR traffic as compared to Class D.
OBS 02	In the development of operational procedures for the introduction of the new SIDs and airspace, NATS En-Route Ltd and ATCSL need to develop a Letter of Agreement (LoA).

Table 4: Observations

A. Hazard Log

A.1. CTA-13 Class E (TMZ)

ID	Hazard	Cause(s)	Consequence(s)	Mitigations and Considerations
H1	Incorrect application of ATC procedures	Insufficient training (due to lack of ATCO experience with Class E), unfamiliarity with Class E rules, complexity of airspace environment (four different airspace classifications: A, D, E and G)	Mid-Air Collision (MAC) or AIRPROX	**Mitigations:** Training – ATCOs will undergo training aligned to the change in airspace and the potential risks; NERL PC familiarity with Class E (possible combined training for consistency) – NERL PC currently operate Class E airspace and can share training and lessons learned; ATCSL potential upgrade to safety nets (STCA) – ATCSL investigate upgrading their current ATM System to include STCA; LoA between ATCSL/NERL – coordination between the two units to be agreed to enhance transfer (control and communications) arrangement. **Considerations:** ATCO skillset – ATCSL ATCOs do not have experience working Class E airspace, whilst training may address this there is a Human Factors element of ingrained habits to managing CAS; STCA PC capability – NERL PC to provide a 'Duty of Care' to ATCSL in the event that a STCA alert if identified; Tactical information available through transponder codes – Creating a TMZ allows ATCOs to identify traffic in terms of position and altitude; Use of listening squawk – as above, provides ATCOs with additional information to be able to positively control IFR traffic.

ID	Hazard	Cause(s)	Consequence(s)	Mitigations and Considerations
H2	Lack of understanding of the rules and the differences between the service provided in Class D and Class E	Aircrew not informed when moving from one to another. Variable knowledge levels due to paucity of Class E in the UK	MAC or AIRPROX	**Mitigation:** Consider informing aircrew when crossing D/E boundary – Although this provides aircrew with enhanced knowledge of the airspace they are flying in and therefore the associated service, this is identified as additional workload and creates R/T congestion TCAS – Aircrew are provided with early notification of potential conflicts; Stakeholder engagement – informing stakeholders through Focus Groups and the consultation process to ensure better understanding of the airspace and associated level of service. **Considerations:** Briefing through existing groups and forums - The DSA LAIT, National GA training (Airspace Infringement Working Group - Airspace & Safety Initiative) and any other applicable forum to share and educate.

A.2. Risk Assessment

ID	Hazard Description	Severity	Probability	Assessment without mitigation	Probability (Mitigated)	Assessment with mitigation
H1	Incorrect application of ATC procedures	2	3	6 Unacceptable	4	8 Review
H2	Lack of understanding of the rules and the differences between the service provided in Class D and Class E	2	3	6 Unacceptable	4	8 Review

B. Risk Assessment (ATCSL ATS Safety Manual)

B.1. Severity Classification

Accidents (1)	Accident – as defined in Regulation (EU) No. 996/2010 on the investigation and prevention of accidents and incidents in civil aviation. Also includes loss of or substantial damage to major aerodrome facilities. Serious injury or death of multiple colleagues/members of public at the aerodrome.
Serious Incidents (2)	Serious Incident - as defined in Regulation (EU) No. 996/2010 on the investigation and prevention of accidents and incidents in civil aviation. For the aerodrome, an event where an accident nearly occurs. No safety barriers remaining. The outcome in not under control and could very likely lead to an accident. Damage to major aerodrome facilities. Serious injury or death of multiple colleagues/members of public at the aerodrome.
Major Incidents (3)	A major incident associated with the operation of an aircraft, in which safety of aircraft may have been compromised, having led to a near collision between aircraft, with ground or obstacles. A large reduction in safety margins. The outcome is controllable by use of existing emergency and non-normal procedures and/or emergency equipment. The safety barriers are very few approaching none. Minor injury to occupants of the aircraft or colleagues/members of the public at the aerodrome. Minor damage to aircraft or major aerodrome facilities may occur.
Significant Incidents (4)	Significant incident involving circumstances indicating that an accident, a serious or major incident could have occurred, if the risk had not been managed within safety margins, or if another aircraft had been in the vicinity. A significant reduction in safety margins but several safety barriers remain to prevent an accident. Reduced ability of the flight crew or air traffic control to cope with the increase in workload as a result of the conditions impairing their efficiency. Nuisance to occupants of the aircraft or colleagues/members of public at the aerodrome.
No Effect Immediately (5)	No immediate effect on safety. No direct or low safety impact. Existing safety barriers come into play to avoid the event turning into a significant incident or accident.

Figure 1: Severity Classification

B.2. Probability Classification

	Probability of Occurrence Definitions				
	Extremely improbable (5)	**Extremely remote (4)**	**Remote (3)**	**Reasonably probable (2)**	**Frequent (1)**
Qualitative definition	Should virtually never occur	Very unlikely to occur	Unlikely to occur during the total operational life of the system	May occur once during total operational life of the system	May occur several times during operational life
Quantitative numerical definition	< 10-9 per hour	10-7 to 10-9 per hour	10-5 to 10-7 per hour	10-3 to 10-5 per hour	1 to 10-3 per hour
Quantitative annual/daily equivalent (approximate)	Never	Once in 1000 years to once in 100,000 years	Once in 10 years to once in 1000 years	Once per 40 days to once in 10 years	Once per hour to once in 40 days

Figure 2: Probability Classification

B.3. Risk Tolerability Classification

			Probability of Occurrence				
			Extremely Improbable	**Extremely Remote**	**Remote**	**Reasonable Probable**	**Frequent**
			5	**4**	**3**	**2**	**1**
			< 10^{-9} per hour	10^{-7} to 10^{-9} per hour	10^{-5} to 10^{-7} per hour	10^{-3} to 10^{-5} per hour	1 to 10^{-3} per hour
ESARR4 SEVERITY	Accidents	**1**	Review	Unacceptable	Unacceptable	Unacceptable	Unacceptable
	Serious Incidents	**2**	Acceptable	Review	Unacceptable	Unacceptable	Unacceptable
	Major Incidents	**3**	Acceptable	Acceptable	Review	Unacceptable	Unacceptable
	Significant Incidents	**4**	Acceptable	Acceptable	Acceptable	Review	Unacceptable
	No Effect Immediately	**5**	Acceptable	Acceptable	Acceptable	Acceptable	Review

Figure 3: Risk Tolerability Classification

B.4. Consequence Categories

Consequence Category	Treatment
Acceptable	The consequence is so unlikely or not severe enough to be of concern. The risk is tolerable and the Safety Objective has been met. However, consideration should be given to reducing the risk further to As Low As Reasonably Practical in order to further minimise the risk of an accident or incident.
Review	The consequence and/or likelihood are of concern; measures to mitigate the risk to ALARP should be sought. Where the risk still lies within the 'Review' region after ALARP risk reduction has been undertaken, then the risk may be accepted provided that the risk in understood and has the endorsement of the individual ultimately accountable for safety within the organisation.
Unacceptable	The likelihood and/or severity of the consequence are intolerable. Major mitigation or redesign of the system may be necessary to reduce the likelihood or severity of the consequences associated with the hazard.

Figure 4: Consequence Categories