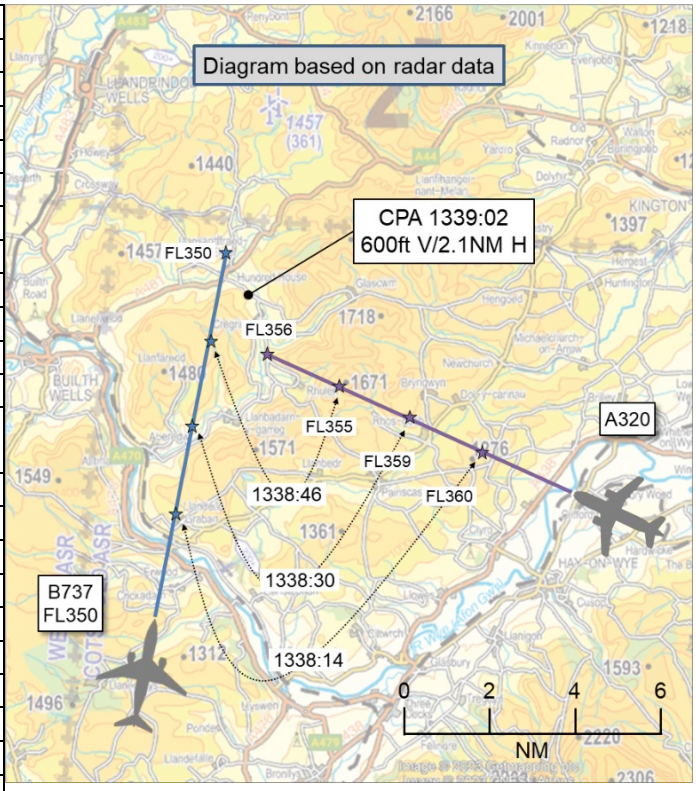
AIRPROX REPORT No 2023054

Date: 15 Apr 2023 Time: 1339Z Position: 5209N 00317W Location: 5NM E Builth Wells

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	B737	A320
Operator	CAT	CAT
Airspace	London UIR	London UIR
Class	C	C
Rules	IFR	IFR
Service	Radar Control	Radar Control
Provider	London S05/23	London S08/35
Altitude/FL	FL350	FL356
Transponder	A, C, S+	A, C, S+
Reported		
Colours	Blue, white	Green, white
Lighting	Position, strobes, anti-col	NR
Conditions	VMC	VMC
Visibility	>10km	>10km
Altitude/FL	FL350	FL350
Altimeter	1013hPa	1013hPa
Heading	NK	NR
Speed	NK	400kt
ACAS/TAS	TCAS II	TCAS II
Alert	TA	TA
Separation at CPA		
Reported	500ft V/2NM H	NR V/NR H
Recorded	600ft V/2.1NM H	



THE B737 PILOT reports that they were descended to FL350 from FL360 abeam BHD. After being transferred to London [Sector 5/23] frequency 133.600MHz, they were cleared to "Descend when ready FL280 to be level by ANJAK" [they recall]. Whilst cruising at FL350, awaiting the descent point for that clearance, they received a TA. The contact appeared to the east on the navigation display, +700ft and still descending at a range of approximately 3-4NM. The contact continued to descend to +500ft but its rate reduced significantly. Anticipating an RA, they asked the London controller about the traffic and were told "Avoiding action, turn left 330° and descend now FL280". HDG SEL and LVL CHG were selected and an immediate turn and descent began. The contact passed behind at a range of approximately 2NM with +500ft separation. No communication between the London controller and the conflicting aircraft was recalled to have been heard. The London controller later said they'd be filing a report.

The pilot assessed the risk of collision as 'Medium'.

THE A320 PILOT reports that, with approximately 30 miles to run to the calculated descent point, a clearance to "Descend when ready FL200 to be level by BADSI" was issued by London Control. A decision was made to commence the descent early as there was turbulence at FL360. The descent was commenced in Open Descent [mode] but a vertical speed of 1500fpm was selected almost immediately due to being below the descent profile. Very shortly after commencing descent, a "TRAFFIC, TRAFFIC" alert was heard. The range [scale of the display] was reduced and amber traffic was spotted crossing left-to-right at approximately 800ft below their current altitude. The aircraft was also acquired visually by the crew. The PF immediately reduced the VS [vertical speed] as the intruder was on a converging trajectory. Avoiding action was issued by the [London Sector 8/35] controller to turn left, heading 230°. The PF immediately disconnected the AP and commenced the left turn in an effort to expedite the manoeuvre, given the proximity of the other aircraft. The aircraft came within

approximately 500ft vertically and 2NM laterally. Once clear, a clearance for routing to BADSI was again issued.

The pilot perceived the severity of the incident as 'Medium'.

THE LONDON S5/23 TACTICAL CONTROLLER reports that [the pilot of the B737] was routing directly to AVTIC at FL350, and they had previously issued a 'when ready' clearance of 'FL280, level by AVTIC'. The [B737] pilot asked about traffic near them and [the controller] spotted the STCA against [the A320] at FL356 to the southwest of the [B737] and immediately issued avoiding action to the [pilot of the B737] to turn left heading 330°. On their next transmission, they instructed [the pilot of the B737] to descend to FL280 and subsequently updated the pilot with Traffic Information. When clear of the traffic, they instructed [the pilot of the B737] to route directly to AVTIC again. The [pilot of the A320] was on [the Sector 8/35] frequency.

The events described have not been checked for accuracy against the appropriate RTF recording.

THE LONDON S5/23 PLANNER reports that [the pilot of the B737] was on frequency at FL350. [The controller] didn't spot the infringing aircraft ([the A320]) until the STCA had started flashing. The [A320] was descending and they first saw it when its level was indicating approximately FL355. The Track Data Block (TDB) was brown and showing as a Rogue Sector Entry (RSE). The [pilot of the B737], who was in contact with the S5/S23 Tactical, asked about the traffic ([the A320]), which was in contact with the S8/S35 Combined Tac and Planner. The S5/S23 Tactical [controller] responded quickly and issued an avoiding action turn to the left for the [B737 pilot], and passed relative traffic position information. At this time, the S8/S35 Tactical [controller] issued avoiding action for the [pilot of the A320] to turn to the left.

The events described have not been checked for accuracy against the appropriate RTF recording.

THE LONDON S8/35 TACTICAL CONTROLLER AND PLANNER reports that they cleared [the pilot of the A320] to 'descend when ready to FL200 by BADSI' to make the agreed level for [their particular route]. At the time they had cleared the aircraft down, it was in the area of the airspace where the base of their sector was FL355. As the aircraft descended into Sector 5 airspace, it caused a loss of separation with [the B737]. They gave avoiding action as soon as they noticed their error which was when the STCA activated. They passed Traffic Information and then, once clear of conflict, gave the [pilot of the A320] a routing back towards BADSI.

The events described have not been checked for accuracy against the appropriate RTF recording.

Analysis and Investigation

NATS Unit Investigation

Summary: [The pilot of the A320] was descended from FL360 to FL200, unintentionally entering Sector 5 airspace, resulting in a loss of separation minima with [the B737] which was maintaining FL350. The Sector 8/35 Combined Tactical and Planner stated they had an incorrect mental model of the sectorisation, believing they were also working Sector 5 and 23 when issuing this descent instruction. This descent instruction, to [the pilot of the A320], was issued without cognisance of the confliction with [the B737] which was a background track. The pilot of [the B737] queried the potential confliction with the Sector 5 and 23 controller, coincident with STCA activating. Both aircraft were issued with resolution advice.

Description of the event: The LAC Sectors 8 and 35 were being operated in a Tactical and Planner combined configuration. At 1337:05, the Sector 8/35 Tactical Controller (S8/35CTandP) instructed the pilot of [the A320] to "*descend when ready flight level two hundred, be level BADSI*". The base of Sector 35 airspace was FL355, with Sector 5 positioned below. This instruction was issued approximately 24.5NM prior to the sector boundary with no co-ordination with [the Sector 5 controller].

[The B737] was displayed as a background track to the S8/35CT&P, whilst [the A320] was displayed as a background track to the Sector 5/23 Tactical (S5/23T) controller, therefore the LAC iFACTS tools provided no warning of the confliction, and neither controller was cognisant of the other aircraft outside their sector boundaries. [iFACTS tools form a part of the toolset available to LAC control teams and provide the human controller additional information on trajectory prediction, conflict detection, flight path monitoring and tactical data].

LAC Low-Level Short Term Conflict Alert (STCA) activated at 1338:43, coincident with the S5/23T display alerting to [the A320] being a Rogue Sector Entry (RSE) and, subsequently, a red confliction alert in the iFACTS Separation Monitor (SM).

The S8/35CT&P did not receive this RSE or iFACTS alert. Coincident with these system alerts, the pilot of [the B737] requested via the RT; "*I've got traffic on the right-hand side, how many miles east?"*

The S5/23T immediately responded, at 1338:49, with "*[B737 callsign], avoiding action turn left radar heading three three zero degrees*", followed by an instruction to "*descend now flight level two eight zero*". Traffic Information was passed stating "*that traffic is in your south now, range about two miles*".

Coincident with the S5/23T and [B737 pilot] transmissions, the S8/35CT&P separated the garbling Track Data Blocks (TDB) of the two aircraft, and was heard to emit a verbal exclamation, at 1338:50, signifying their recognition of the confliction. They immediately instructed "*[A320 callsign], avoiding action, turn left heading two four zero degrees*" at 1338:53. An audible cockpit alarm could be heard when the pilot responded. The S8/35CT&P then provided Traffic Information "*traffic is in your one o'clock, about [indiscernible] mile*". The pilot responded, "*in sight, we got T-A on*". NERC radar displayed [the A320 pilot] had subsequently initiated a climb with Mode C displaying FL356 at 1339:04.

Minimum separation occurred at 1339:00 and was recorded on NODE multi-track radar as 2.1NM and 500ft. As the avoidance manoeuvres took effect, separation minima were restored at 1339:32.

Investigation: The west LAC airspace was fundamentally changed on 23rd March 2023. This Airprox occurred on the 23rd day after implementation of West Airspace Deployment (WAD). Part of the changes to this airspace was the re-allocation of both vertical and lateral sector boundaries throughout the sector grouping. Of particular importance to the cause of this event, the Sector 5/35 vertical boundaries were changed from FL335 to FL355, and the western sector boundaries moved to be parallel with the north/south airway, amalgamating Sectors 8 and 35 into level split sectors west of the airway.

The usual procedure for traffic descending in this scenario was for the sector team to wait until the aircraft was west of the lateral S8/35 boundary before issuing a descent clearance. A descent could be instructed prior to the lateral boundary provided back co-ordination with Sector 5 occurred. The S5/23T highlighted in interview that this was one of only two scenarios within WAD where this lateral boundary was a descent stipulation point procedure.

The CA4114 from the S8/35CT&P stated they 'cleared [the A320 pilot] to descend when ready to FL200 by BADSI to make the agreed level for traffic [routeing to this particular destination]. At the time I cleared the aircraft down it was in the area of airspace where the base of my sector is FL355'. Co-ordination was required with Sector 5 for this descent, however, this was not enacted by the controller, either verbally (positioned adjacent), electronically or by telephone.

The NATS4118 stated from discussion with both Tactical Controllers post event, that the 'S8/35 controller who issued the incorrect clearance had appeared to revert to a method of operation on airspace which had changed 23 days previously while in a low stimulus environment.' The NATS4118 further stated that the S8/35CT&P 'couldn't account for the input errors into the iFACTS

tools', relating to the descent clearance prior to the S35 lateral boundary where the vertical boundary of FL355 applied.

Previously, at 1333:04, the pilot of [an uninvolved aircraft] at FL380, had requested a descent. The S8/35CT&P had instructed the pilot to "descend flight level two hundred, be level at BADSI" and had also not co-ordinated this descent with Sector 5. [That aircraft] had been approximately 8NM from the Sector 5 airspace boundary, however, descended after the Sector 5 lateral boundary and did not infringe Sector 5. The NATS4118 highlighted that these descent clearances were permissible 'before the new airspace was implemented'. This further confirms they believed they were operating in previous procedures and weren't taking account of the changed airspace.'

The S8/35CT&P clarified in interview that, on reflection, they believed their mental model of the airspace they were in control of was triggered by seeing "XFL200" displayed for [the route the A320 had been on] as though the sectors were bandboxed. This created an erroneous confirmation bias that their sector configuration was 'Brecon Combined' (BCN) - Sectors 5, 8, 23 and 35.

When the Mode C of [the A320] displayed a descent, the TDB was garbled by [the B737], potentially hiding the fact that [the pilot of the A320] had initiated their descent earlier than potentially expected. The pilot's ASR stated this was due to having experienced turbulence at FL360. In interview, the S8/35CT&P stated they had no set expectation of when [the pilot of the A320] would initiate descent after the 'when ready' clearance.

The limitations of the iFACTS tool is that it only creates trajectories for Recognised Flights. Recognised Flights comprise: Flights for which a coordination exists (including electronic CFPs), Rogue Sector Entries (except military RSEs), Blockers, Manually Recognised flights. With no initial iFACTS protection alerting the controllers to the confliction, the STCA and RSE (for S5/23T only) provided warnings to the controllers, but only after separation minima had already been eroded.

The ATC Requirements and Acceptance Manager clarified that a dedicated training review of WAD was in process, with a training review scheduled within the timetable.

Conclusions:

- The S8/35 controller was operating in a combined Tactical and Planner configuration due to low traffic levels and complexity, with the NATS 4118 describing the traffic scenario as a '*low stimulus environment'*.
- The S8/35CT&P had an incorrect mental model of their sectors caused by 'XFL200' displayed for the traffic [routeing to this particular destination], causing them to erroneously perceive that they were established in a BCN combined configuration.
- Based on the incorrect mental model of their airspace, the S8/35CT&P had previously instructed [the pilot of an uninvolved aircraft] to descend without co-ordinating this descent with Sector 5. This error did not result in a Sector 5 airspace infringement, therefore, did not highlight the incorrect mental model of airspace, potentially reinforcing the incorrect perception of the airspace boundaries.
- The S8/35CT&P subsequently provided a similar instruction to the pilot of [the A320] to descend to FL200 when ready. This instruction was provided prior to the lateral delineation of S5/S8 airspace boundary and was not co-ordinated with Sector 5 as required. The reasoning for this erroneous instruction was the same incorrect mental model of the controller's airspace boundaries as shown with [the uninvolved aircraft] previously. The S8/35CT&P stated this was due to 'XFL200' displayed for these flights.
- iFACTS did not display a conflict between the aircraft as per design, despite the significant nature of the conflict geometry.
- The top of descent point for [the A320 had been anticipated to have been] further west, however, the aircraft was experiencing turbulence and, as a descent clearance had already been provided, the crew initiated descent early to mitigate against the turbulence.

- Separation minima were immediately eroded as [the pilot of the A320] initiated a descent in confliction with [the B737] background track. The aircraft TDBs were garbled at that time. Both controllers were unaware of the potential confliction, therefore the TDB garbling on the S8/35CT&P display did not contribute to the event.
- The pilots of both aircraft had received TCAS TA alerts. The pilot of [the A320] had slowed their rate of descent as a result of their TA alert.
- The pilot of [the B737] requested Traffic Information based on their TCAS TA alert. STCA activated coincident with this pilot request, 15sec after separation minima were eroded. STCA activated as designed.
- The S8/35CT&P did not initially detect the STCA alert. At that time, a transfer of an unrelated aircraft to the next frequency via the RT was completed, along with two transfers of aircraft using CPDLC instructions, potentially indicating that the controller had unconsciously filtered out the STCA alert.
- Coincident with STCA activation, the RSE highlighted the descent of [the A320] to the S5/23T controller only and also provided a warning in the S5/23T SM, although this was not observed by the controller as they were already aware of the confliction.
- The S5/23T immediately provided an avoiding action instruction, followed by Traffic Information to the pilot of [the B737]. Coincidently, the S8/35CT&P also provided an avoiding action instruction and Traffic Information. The two aircraft at this time were on diverging tracks, with [the A320] on a track to pass behind [the B737].
- The S8/35CT&P opined that they would not have made the same error in the previous WEST airspace configuration, stating that this error was caused by an incorrect perception of also working Sector 5/23 at the time of the clearance. It was assessed that the WAD OCT was not the significant contributing factor in the S8/35CT&P applying an incorrect mental model of their combined sector airspace, however, there was potential for the airspace change to be an aggravating factor.

UKAB Secretariat

An analysis of the NATS radar replay was undertaken and both aircraft could be positively identified from Mode S data. The CPA was determined and the diagram constructed from the radar data. Both aircraft were observed to turn to the left in the moments after CPA.

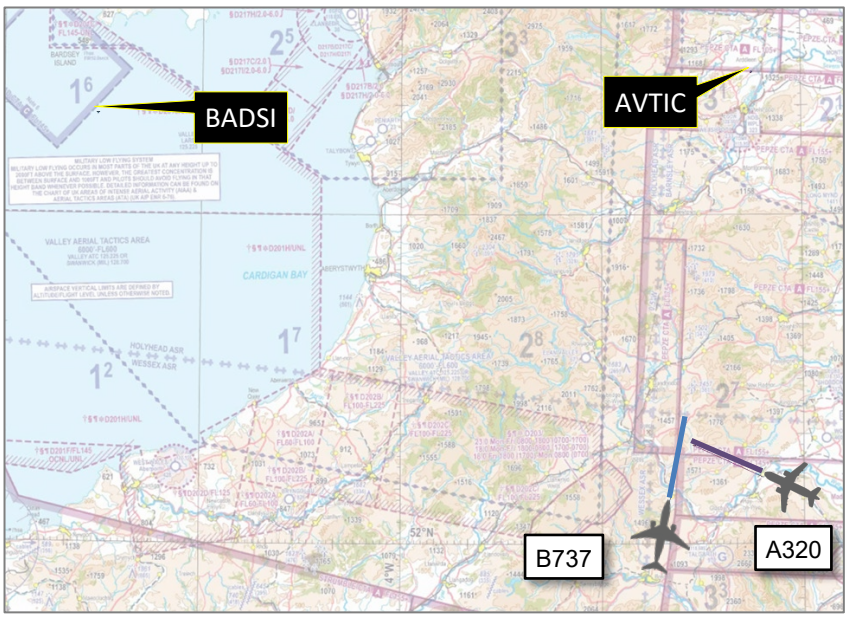


Figure 1 – Aircraft positions and navigation points

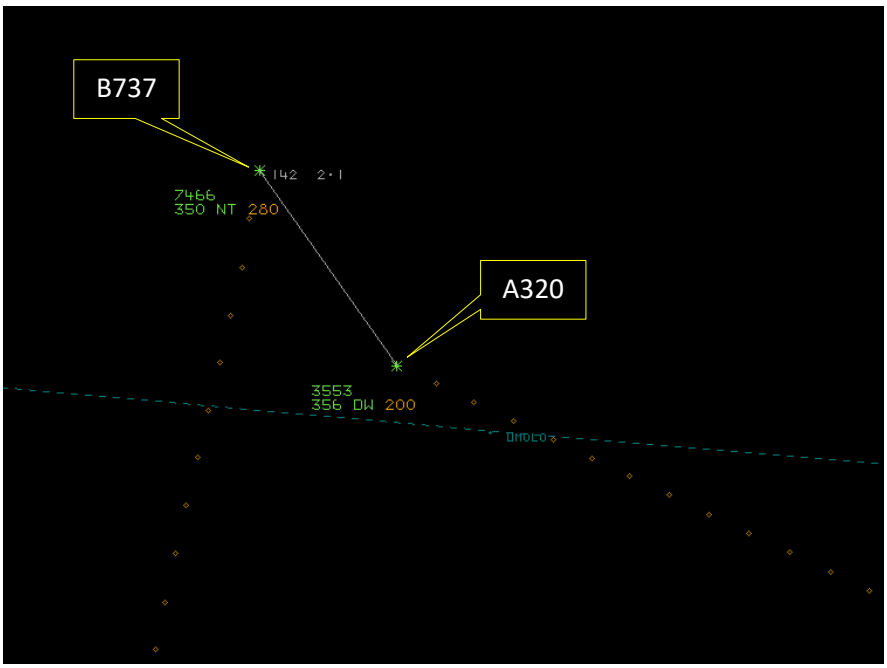


Figure 2 – CPA at 1339:02

The B737 and A320 pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard.[1]

Summary

An Airprox was reported when a B737 and an A320 flew into proximity 5NM east of Builth Wells at 1339Z on Saturday 15th April 2023. Both pilots were operating under IFR in VMC, in receipt of a Radar Control Service from London Area Control.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from both pilots, radar photographs/video recordings, reports from the air traffic controllers involved and reports from the appropriate operating authorities. Relevant contributory factors mentioned during the Board's discussions are highlighted within the text in bold, with the numbers referring to the Contributory Factors table displayed in Part C.

The Board first considered the actions of the pilot of the B737, and members noted that they had received a TCAS Traffic Alert (**CF9**) whilst they had been flying at FL350 prior to having reached a descent point. The Board noted that the pilot of the B737 had queried the traffic with the London Sector 5 controller and, consequently, had been given avoiding action. The pilot of the B737 had also been passed Traffic Information that had confirmed that the traffic in question, the A320, had been behind them by 2 miles. Members appreciated that the pilot of the B737 had been concerned by the proximity of the A320 (**CF8**) and agreed that there had been nothing further that they could have done to have increased the separation.

Members next turned their attention to the pilot of the A320. Members noted that the London Sector 8 controller had issued a clearance for them to 'descend when ready'. The pilot of the A320 had elected to descend shortly after having received that clearance due to turbulence at their current level. It had been during that descent that the pilot of the A320 had received a 'Traffic, Traffic' annunciation that had alerted them to a potential conflict with the B737 (**CF9**). The crew of the A320 had visually acquired the B737 and had therefore reduced their rate of descent. The pilot of the A320 had subsequently received avoiding action from the London Sector 8 controller, a turn to the left which, by reference to the NATS radar replay, was assessed by members to have been initiated momentarily after CPA. As had been

[1] (UK) SERA.3205 Proximity.

the case during their consideration of the actions of the B737 pilot, members appreciated that the proximity of another aircraft had caused the pilot of the A320 concern (**CF8**).

Members next turned their attention to the ground elements, and considered the actions of the London Sector 5 controller. Although the exact sequence could not be determined, it was apparent to members that the pilot of the B737 had questioned the proximate traffic at appreciably the same time that the London Sector 5 controller had received a Rogue Sector Entry alert and the STCA had triggered (**CF7**). Members agreed that the London Sector 5 controller, once alerted, had reacted quickly to provide avoiding action.

Members next considered the actions of the London Sector 8 controller. From the extensive investigation material available to them, it was clear to members that the London Sector 8 controller had assumed that the sectorisation model with which they had been operating had been the previous model, and that that the model had changed 23 days earlier. The underlying cause for this mistaken belief could not be positively determined, and members turned their attention to the tools available to the controller. A member with particular knowledge of London Area Control explained that the iFACTS tool had been designed to highlight aircraft entering airspace sectors to the receiving controller, and would not have been expected to have alerted the London Sector 8 controller to an aircraft that had been leaving their sector. Members could not determine whether the London Sector 8 controller had been aware that, shortly after having issued a clearance to the A320 pilot to descend 'when ready', the pilot had elected to begin their descent whilst east of the airspace lateral boundary, and had entered the Sector 5 airspace. Nonetheless, it was agreed that the London Sector 8 controller had erroneously assumed that the configuration of the sectors had been such that they also had had control over Sector 5 and, therefore, coordination with another controller had not been necessary (**CF3**). As such, members agreed that the London Sector 8 controller had not complied with the applicable procedures (**CF1**), and that the issued clearance had led to an unsafe situation (**CF4**). Members noted that the B737 had been a 'background track' for the London Sector 8 controller and, therefore, agreed that they had not assimilated any situational awareness of the B737 (**CF6**). Consequently, the potential conflict between the B737 and A320 had been detected late (**CF2**). Members noted that the London Sector 8 controller had realised their error and, although had not reacted immediately to the STCA that had triggered (**CF7**), had subsequently provided avoiding action to the pilot of the A320.

Concluding their deliberations, members were in agreement that it had been the TCAS Traffic Alert and the STCA that had provided the first alerts to the unfolding events, and that avoiding action was subsequently provided by the controllers. Members were satisfied that there had been no risk of collision, but it had been the incorrect assumption of the London Sector 8 controller that had ultimately led to a loss of separation minima (**CF5**). As such, the Board assigned Risk Category C to this event.

PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK

Contributory Factors:

	2023054			
CF	**Factor**	**Description**	**ECCAIRS Amplification**	**UKAB Amplification**
	Ground Elements			
	• Regulations, Processes, Procedures and Compliance			
1	Human Factors	• ATM Regulatory Deviation	An event involving a deviation from an Air Traffic Management Regulation.	Regulations and/or procedures not fully complied with
	• Situational Awareness and Action			
2	Human Factors	• Conflict Detection - Detected Late	An event involving the late detection of a conflict between aircraft	
3	Human Factors	• Expectation/ Assumption	Events involving an individual or a crew/ team acting on the basis of expectation or assumptions of a situation that is different from the reality	
4	Human Factors	• Inappropriate Clearance	An event involving the provision of an inappropriate clearance that led to an unsafe situation	

5	Human Factors	• Separation Provision	An event involving Air Navigation Services separation provision.	
6	Contextual	• Traffic Management Information Action	An event involving traffic management information actions	The ground element had only generic, late, no or inaccurate Situational Awareness
	• Electronic Warning System Operation and Compliance			
7	Technical	• STCA Warning	An event involving the triggering of a Short Term Conflict Alert (STCA) Warning	
	Flight Elements			
	• Situational Awareness of the Conflicting Aircraft and Action			
8	Human Factors	• Unnecessary Action	~~Events involving flight crew performing an action that was not required~~	Pilot was concerned by the proximity of the other aircraft
	• Electronic Warning System Operation and Compliance			
9	Contextual	• ACAS/TCAS TA	An event involving a genuine airborne collision avoidance system/traffic alert and collision avoidance system traffic advisory warning triggered	

Degree of Risk: C.

Safety Barrier Assessment[2]

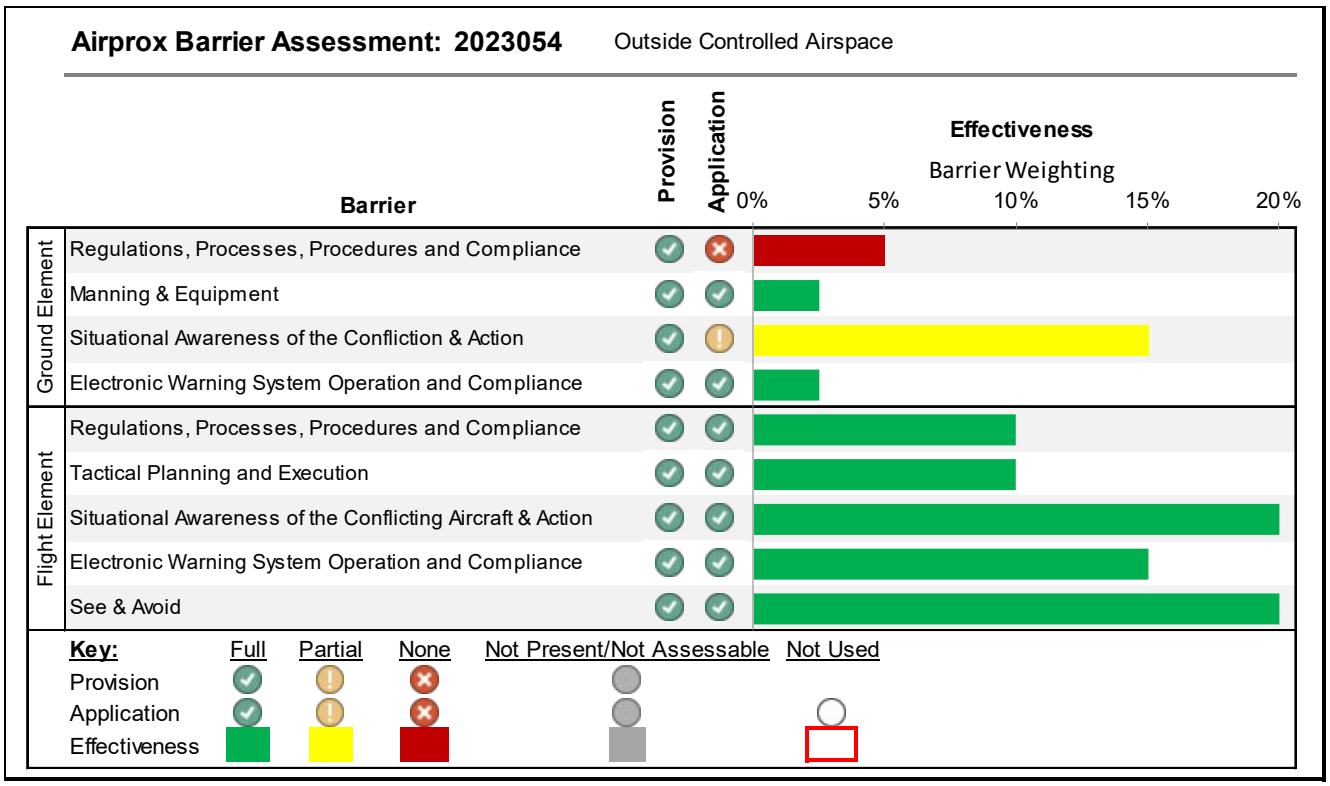
In assessing the effectiveness of the safety barriers associated with this incident, the Board concluded that the key factors had been that:

Ground Elements:

Regulations, Processes, Procedures and Compliance were assessed as **ineffective** because the London Sector 8 controller had not complied with the procedure to coordinate the flow of traffic with the London Sector 5 controller.

Situational Awareness of the Confliction and Action were assessed as **partially effective** because the London Sector 8 controller had detected the conflict between the aircraft late based on an incorrect assumption of the sectorisation of the airspace.

[2] The UK Airprox Board scheme for assessing the Availability, Functionality and Effectiveness of safety barriers can be found on the UKAB Website.


Airprox Barrier Assessment: 2023054
Outside Controlled Airspace
Barrier
Provision
Application
Effectiveness
Barrier Weighting
0%
5%
10%
15%
20%
Ground Element
Regulations, Processes, Procedures and Compliance
Manning & Equipment
Situational Awareness of the Confliction & Action
Electronic Warning System Operation and Compliance
Flight Element
Regulations, Processes, Procedures and Compliance
Tactical Planning and Execution
Situational Awareness of the Conflicting Aircraft & Action
Electronic Warning System Operation and Compliance
See & Avoid
Key:
Full
Partial
None
Not Present/Not Assessable
Not Used
Provision
Application
Effectiveness