

From	To	Speech Transcription	Time
Trail Typhoon	Approach	Go for details	09.43.46
Approach	Trail Typhoon	[Trail Typhoon C/S] it will be a right three six zero, climb to height two thousand feet, maintain your squawk and back to me stud four	09.43.49
Trail Typhoon	Approach	Right three six zero, two thousand feet, stud four [Trail Typhoon C/S]	09.43.57
Approach	Trail Typhoon and Typhoon Formation	[Trail Typhoon C/S] roger reset squawk one seven three four, [Typhoon formation C/S] turn right heading two three zero degrees	09.44.03
Lead Typhoon	Approach	Right two three zero [Typhoon formation C/S]	09.44.10
Lead Typhoon	Approach	[Typhoon formation C/S] approaching three thousand for further	09.44.13
Approach	Typhoon Formation	[Typhoon formation C/S] roger, descend height two thousand feet, when steady and level cockpit checks, report complete	09.44.16
Lead Typhoon	Approach	Two thousand feet wilco [Typhoon formation C/S]	09.44.21
Lead Typhoon	Approach	[Typhoon formation C/S] limited checks complete, gear on the glide	09.44.27
Approach	Typhoon Formation	[Typhoon formation C/S]	09.44.32
Approach	Typhoon Formation	[Typhoon formation C/S] on climb out it will be to Director stud five please	09.45.33
Lead Typhoon	Approach	Stud five [Typhoon formation C/S]	09.45.39
Lead Typhoon	Approach	[Typhoon formation C/S] steady and level	09.45.41
Approach	Typhoon Formation	[Typhoon formation C/S]	09.45.43
Approach	Typhoon Formation	[Typhoon formation C/S] message	09.46.01
Lead Typhoon	Approach	Go ahead	09.46.03
Approach	Typhoon Formation	[Typhoon formation C/S] flight there's a pair just on radar ahead	09.46.05
Approach	Typhoon Formation	They are joining for visual circuits, they report the circuit is fit	09.46.06
Lead Typhoon	Approach	Copied	09.46.11
Approach	Typhoon Formation	[Typhoon formation C/S] turn right heading two four five	09.46.13
Lead Typhoon	Approach	Right two four five [Typhoon formation C/S]	09.46.16
Approach	All	Coningsby all stations new diversion Marham I F R	09.46.24
Approach	Typhoon Formation	[Typhoon formation C/S] traffic south west eight miles, tracking north, slow moving, two thousand five hundred feet on the Barnsley one zero one six, you track will be, it will take you ahead of that track	09.46.36
Lead Typhoon	Approach	[Typhoon formation C/S]	09.46.45
Approach	Typhoon Formation	[Typhoon formation C/S] at one zero and one two miles contact Coningsby Talkdown stud seven	09.46.57
Lead Typhoon	Approach	Stud seven [Typhoon formation C/S], [Typhoon formation C/S] push seven	09.47.03

A transcript of the Coningsby LARS frequency is reproduced below:

From	To	Speech Transcription	Time
Harvard	LARS	[Harvard C/S] is now climbing to one thousand six hundred feet, Barnsley one zero one six	09.40.40
LARS	Harvard	[Harvard C/S] roger, say again your type	09.40.45
Harvard	LARS	Harvard	09.40.46
LARS	Harvard	Roger	09.40.48
LARS	Harvard	[Harvard C/S] Coningsby	09.42.59
Harvard	LARS	Coningsby [Harvard C/S]	09.43.01
LARS	Harvard	We have got multiple instrument recoveries to runway two five at Coningsby, are you able to transit over our stub at two thousand five hundred feet?	09.43.04
Harvard	LARS	Affirm, transiting at two thousand five hundred feet [Harvard C/S]	09.43.13
LARS	Harvard	Roger, report level please at two thousand five hundred feet, Barnsley one zero one six	09.43.16
Harvard	LARS	Report level two thousand five hundred [Harvard C/S]	09.43.21
Harvard	LARS	[Harvard C/S] is level at two thousand five hundred one zero one six	09.44.38
LARS	Harvard	[Harvard C/S] Thank you	09.44.42
LARS	Harvard	[Harvard C/S] Coningsby is going to have radar recoveries, fast jets, currently north east of you by four miles, southwest bound at five hundred feet below.	09.47.13
Harvard	LARS	Copied the traffic, looking, [Harvard C/S]	09.47.22
Harvard	LARS	[Harvard C/S] is now descending to one thousand five hundred feet	09.51.47

Analysis and Investigation

Military ATM

At the time of the Airprox, the Typhoon pilot was under a Traffic Service with Coningsby Talkdown and the Harvard pilot was under a Basic Service with Coningsby LARS.

The Coningsby LARS controller recalled the Harvard pilot calling for a Basic Service at 1000ft with no Mode C. As the Harvard pilot approached Holbeach Range, a transit was sought and approved at 1000ft. The controller was planning deconfliction of the Harvard against the fast-jet inbounds and had considered descending the Harvard to 500ft to pass beneath the MATZ stub. The Harvard pilot then requested a climb to 1600ft and at that point, the controller requested if the Harvard pilot could continue climb to 2500ft to deconflict with the fast-jets. The Harvard pilot climbed to 2500ft and reported level; the LARS controller passed this information to the Approach controller. LARS was then instructed to hand the Harvard over to Approach because the LARS controller was being reallocated to Talkdown. Once on Talkdown, the controller identified the Typhoon on the PAR display and received them on frequency. The Talkdown controller opted not to give Traffic Information to the Typhoons because there appeared to be no collision risk on PAR and the traffic had already been called by Approach.

The OJTI in Approach was instructing a trainee and the flight of Typhoons were under a Traffic Service. The trainee descended the Typhoons to 2000ft on QFE 1021hPa and instructed the pilots to perform cockpit checks. Two further pairs of fast jets were pre-noted inbound. At this point the Approach Room was re-configured to handle the pre-notes. The Approach trainee was moved to Director Position, for which he was already qualified, the Approach OJTI took the Approach position and also took the LARS frequency to allow the LARS controller to move to provide a second Talkdown. The Harvard pilot was handed over from LARS, as the only track, at 2500ft on the Barnsley 1016hPa. Approach called the Harvard to the Typhoons at 8nm range and advised that their track would keep them clear. As the tracks would pass close in azimuth at 650ft

height separation, Approach called the Typhoons to the Harvard pilot at 4nm, 500ft below. At a range of 10nm and 12nm from touchdown, the pairs trail was handed to Talkdown. Approach assessed the collision risk as 'negligible'; task difficulty and workload were assessed as 'low'.

The Supervisor was in the Approach Room to instigate the manning change to handle the multiple recoveries. The Supervisor was 'tight' on manpower and had to stop the training in Approach to cover Director. The Supervisor had monitored the LARS frequency and had heard the Harvard pilot being asked to climb to 2500ft for deconfliction with the recoveries. The Supervisor was aware that Approach had passed Traffic Information to both tracks and the handover confirmed the Harvard at 2500ft Barnsley QNH 1016hPa. As the Typhoons were transferred to Talkdown, the Supervisor re-positioned to the Visual Control Room to assess weather conditions; the first indication of an Airprox was when the Typhoon pilot called three hours later. In comparison to the Approach controller, the Supervisor assessed the unit and controller workload as 'high'.

At 0940:04, the Typhoon pilots were instructed to set the QFE at 1021hPa and a descent to 2000ft was passed at 0944:16. At 0943:04, LARS transmitted to the Harvard pilot, "*We have got multiple instrument recoveries to runway two five at Coningsby, are you able to transit over the stub at 2500 feet?*" The Harvard pilot replied with '*Affirm*' and at 0944:38 confirmed, "[Harvard C/S] *is level at 2500 1016.*"

Approach provided Traffic Information at 0946:35 (Figure 1), "[Typhoon formation C/S] *traffic south west, 8 miles, tracking north slow moving, 2500 feet Barnsley 1016, your track will be able to take you ahead of that track.*"

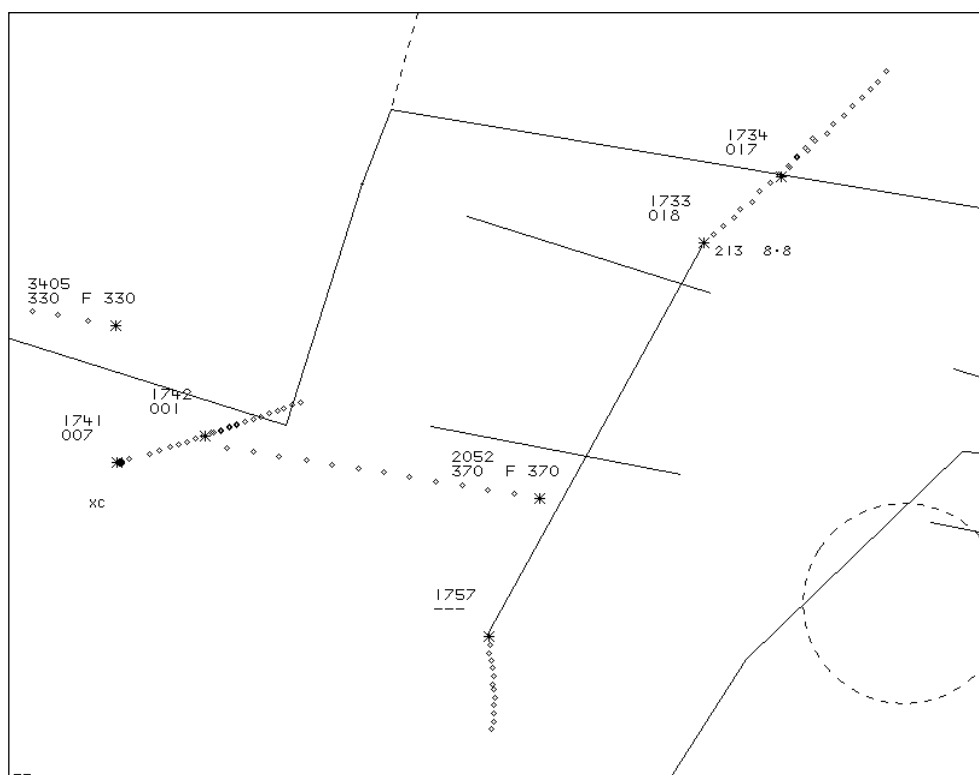


Figure 1: Traffic Information at 0946:35 (Typhoons 1733/1734; Harvard 1757)

At 0946:36, the Typhoon pilots were transferred to the Coningsby Talkdown frequency. At 0947:13, (Figure 2), the Approach controller (having taken over the LARS frequency) advised, "[Harvard C/S] *Coningsby is going to have radar recoveries fast jets, currently north east of you by 4 miles, southwest bound at 500 feet below.*" The Harvard pilot replied with, "*Copied the traffic, looking [Harvard C/S].*"

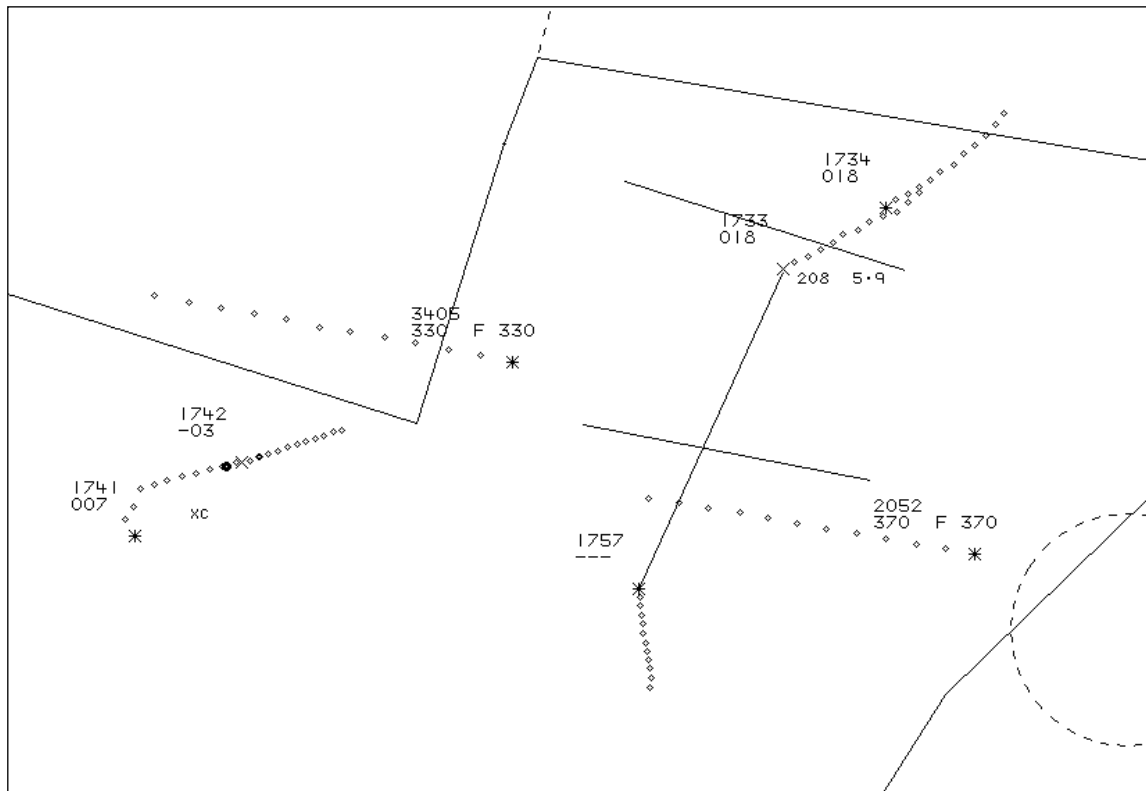


Figure 2: Traffic Information at 0947:13

The Typhoons were on a trails approach with the lead squawking 1733 and the trail, Airprox, Typhoon squawking 1734, as per Figure 3.

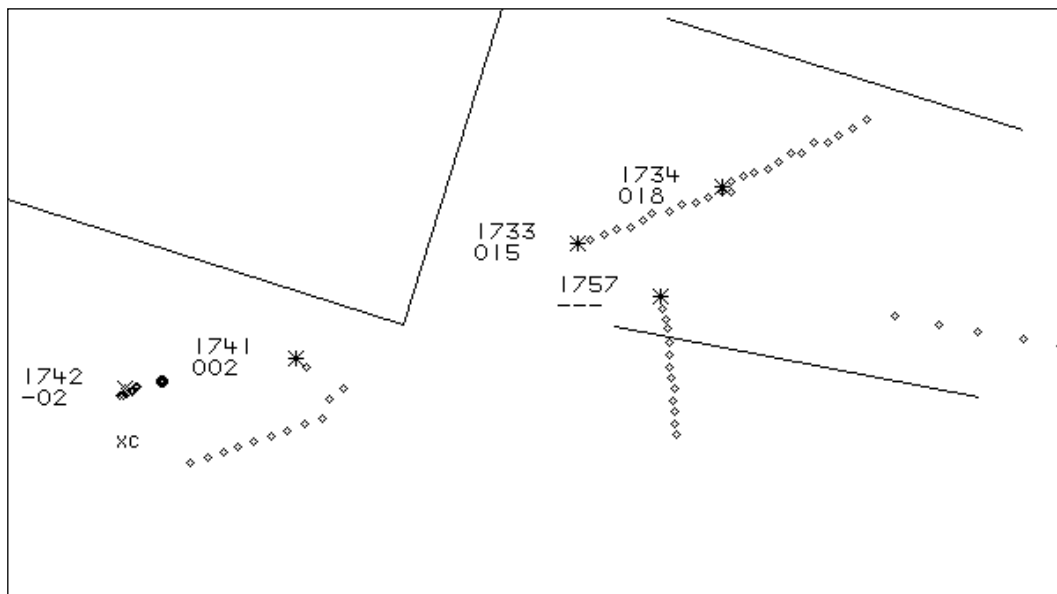


Figure 3: Geometry at 0948:37

The CPA was at 0949:05 (Figure 4) at 0.1nm horizontally; height separation was not recorded because the Harvard Mode C was not available.

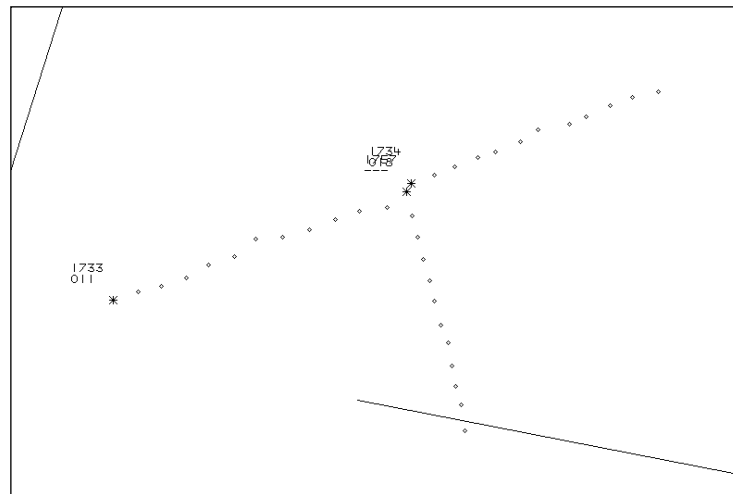


Figure 4: CPA at 0949:05

The control team had to re-configure to meet the traffic demands and this put an end to the training in Approach. The OJTI did, however, provide continuity in the role and understood the interaction between the Harvard MATZ crosser and the inbound Typhoons. LARS had made the Harvard pilot aware of the inbounds and produced a plan to deconflict the aircraft by a minimum of 500ft. The Harvard did not have Mode C and ATC ensured that the pilot reported level on the RPS and was aware of the reason behind the altitude request. The Typhoon formation callsign was given Traffic Information at 8nm and told that their track was taking them clear of the confliction; the Harvard pilot was passed Traffic Information on the Typhoons at 4nm. The Manual of Military Air Traffic Management, Chapter 11, paragraph 45, states that, for Radar Services to formations outside controlled airspace 'Radar services shall be given to the lead aircraft only.' Coningsby controllers demonstrated what was required of them, as per the CAP774 on the provision of UK FIS. The comment that the Typhoon track would take them ahead of the Harvard may have been the case for the lead element but it did in fact close with the wingman trail. The Talkdown controller spotted the Harvard on PAR but in the context of previous information and the height difference on precision radar, an update was not provided.

The Harvard pilot assisted ATC by complying with the climb instruction and was made aware of the other traffic. The pilot did not think that there was a risk of collision and it is evident from the climb request and Traffic Information, the Harvard pilot was more aware of the nature of the conflicting traffic and comfortable with the situation. The Typhoon crew were called traffic at 8nm and from the information given, there appeared to be vertical and horizontal separation. The trail Typhoon pilot saw the Harvard with an estimated 100ft vertical separation and a descent was initiated to build-in an estimated 400ft separation.

ATC, including Approach and Talkdown (using Precision Approach Radar (PAR)), were content that height separation had been factored in and traffic called; the controller monitoring on radar would have assumed that the Harvard would maintain altitude unless stated. It is worth noting that the non-linear scale of PAR display could mean that relatively small separations appear to have large gaps between contacts on the display.

Ultimately, pilots in Class G are responsible for their own collision avoidance. Normal barriers would be ACAS/TAS, radar-derived Traffic Information and 'see-and-avoid'. Neither aircraft were equipped with ACAS or a TAS; this barrier was absent. Traffic Information was provided from ATC to all pilots concerned and a procedure was established to provide height separation, although the lack of Mode C on the Harvard made this difficult to monitor. Both pilots saw the other aircraft at relatively close ranges. The Harvard pilot, in level cruise, was looking for 'fast-jets' and was updated on traffic one minute and fifty seconds prior to CPA. The Typhoon pilot was told of the Harvard two and a half minutes prior to CPA; the pilot was conducting an initial air sortie and lookout would have had to compete with monitoring of the lead Typhoon on his radar, in receipt of near constant RT from Talkdown.

UKAB Secretariat

The Typhoon and Harvard pilots shared an equal responsibility for collision avoidance and not to fly into such proximity as to create a danger of collision³. If the incident geometry is considered as converging⁴, then the Harvard pilot was required to give way to the Typhoon⁵. Assuming the Harvard pilot was level at 2500ft on 1016hPa and the Typhoon at 2000ft on 1021hPa, the vertical separation can be calculated as 635ft at CPA.

Comments

HQ Air Command

Owing to the fact that Coningsby Approach rightly provided range and bearing to the Harvard from the lead Typhoon, the onus was on the pilot of the trail Typhoon to monitor the situation and preserve safety, either by continuing the procedure with sufficient situational awareness or abandoning it if there was sufficient concern. The independent assessment of proximity by Coningsby ATC was in accordance with their training and regulation but, in the opinion of the trail Typhoon pilot, was inadequate to ensure that the trail Typhoon and Harvard remained comfortably separated. Having received only one message of proximate traffic, the pilot of the trail Typhoon had little opportunity to comprehend the dynamic picture solely based on ATC information; a timely update from Talkdown would have provided the pilot with a reminder of the Harvard's relative position.

Summary

An Airprox was reported when a Typhoon FGR4 and a Harvard flew into proximity at 0949 on Tuesday 30th September 2014. Both pilots were in VMC, the Typhoon pilot under IFR in receipt of a Traffic Service from Coningsby Talkdown and the Harvard pilot under VFR in receipt of a Basic Service from Coningsby LARS.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from the pilots of both aircraft, transcripts of the relevant RT frequencies, radar photographs/video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

The Board first considered the actions of the controllers. The rising workload created by multiple recovering formations required a high degree of control position re-allocation, which the ATC team at Coningsby achieved successfully. The re-allocation of the LARS controller to a Talkdown position also fortuitously allowed him to apply his previous situational awareness of the closing geometry between the trail Typhoon and Harvard such that he was not concerned by the degree of proximity. Both pilots were passed Traffic Information on each other although members noted that the Typhoon formation had been informed of "*traffic south west eight miles, tracking north, slow moving, two thousand five hundred feet on the Barnsley one zero one six, you track will be, it will take you ahead of that track.*". The Board wondered whether the trail Typhoon pilot, on an early sortie in his training, may have assimilated this as his track also being ahead of the Harvard which would have contributed to his surprise when he saw it in close proximity. Members noted that Military Air Traffic Regulations required that Traffic Information to formations be passed as relative to the formation leader only, and military personnel re-iterated that it was then the duty of subordinate elements of a formation to form and maintain situational awareness of other traffic based on their understanding of their position relative to the formation leader. In this case the trail Typhoon pilot was expected to assimilate that the Harvard would pass behind the lead Typhoon and then to request further information from ATC, if required, to clarify the Harvard's position relative to himself.

³ Rules of the Air 2007 (as amended), Rule 8 (Avoiding aerial collisions).

⁴ Note that aircraft converging in plan view are not converging in the sense covered by the Rules of the Air unless they are at a similar level.

⁵ *ibid.* Rule 9 (Converging).

Turning to the pilots' actions, the Harvard pilot had availed himself of the Coningsby LARS service to the mutual benefit of all those concerned, and had correspondingly been coordinated against the inbound Typhoon formation. He was passed Traffic Information on, and gained visual with, the trail Typhoon, which passed below him; the Board noted that he was not concerned by the proximity of the Typhoon. For his part, the trail Typhoon pilot had been passed Traffic Information on the Harvard, (but, as explained above, with reference to the lead Typhoon some 2.2nm ahead), and had reported being sufficiently startled by its proximity that he had had to bunt in order to 'avoid passing uncomfortably close'. Notwithstanding, the Board noted that he had assessed the risk of collision as 'Low'. Members felt that he had probably been occupied with the task of maintaining radar trail on the formation leader, had not fully assimilated the Traffic Information on the Harvard, and had been startled by its unexpected presence as it passed almost directly overhead. They determined that this was the root cause of the Airprox. As such, the Board was satisfied that the event certainly merited submission as an Airprox, given that the Typhoon pilot had been concerned that safety may have been compromised, but that, in this case, normal procedures and safety standards had applied.

Of further note, an ATC member pointed out that, although the missed approach procedure is depicted on approach plates as occurring at Decision Height or Altitude, the procedure may be started at any point after the final approach fix. They further commented that the missed approach procedure for PAR RW25 at Coningsby required a climb to altitude 2730ft. Therefore, although the risk was low, a finite possibility existed for the radar approach and transit traffic to have flown into conflict whilst coordinated and conducting an approved procedure if the Typhoon pilot had chosen to go around before Decision Altitude. They opined that ATC would be well served by routing transiting traffic 'outside' the final approach fix, or behind the traffic on approach which could become a factor, including trail members of the same formation.

PART C: ASSESSMENT OF CAUSE AND RISK

<u>Cause:</u>	The Typhoon pilot was concerned by the proximity of the Harvard.
<u>Degree of Risk:</u>	E.
<u>ERC Score⁶:</u>	2.

⁶ Although the Event Risk Classification (ERC) trial had been formally terminated for future development at the time of the Board, for data continuity and consistency purposes, Director UKAB and the UKAB Secretariat provided a shadow assessment of ERC.