

Part 1.4 – FINDINGS

INTRODUCTION

1. **Structure of report and assumptions.** The Panel chose to break down their findings into 3 main categories. Firstly, analysis of incident site evidence to establish the cause and attributable factors to the incident; secondly, discussion of broader sortie conduct raised as a result of the Panel's investigations; finally, analysis of the broader organisational influences connected with such an incident. In conducting this analysis the Panel chose to make two assumptions:

- a. As the aircraft height averaged approximately 100ft AGL approaching the incident site, the Panel considered that the discussions and findings of this report apply equally to helicopter LF not below 100ft AGL as well as Tactical LF not below 50ft AGL.
- b. Although part of Pegasus formation, the Panel found that the actions of the crew of ZH902 (Pegasus 1) had no direct influence on the incident and therefore concentrated on the training, competency and conduct of the crew of ZH898 (Pegasus 2) only. However, comments made by the crew of Pegasus 1 pertaining to sqn and organisational issues are relevant to this report and, as such, warranted inclusion.

Exhibit 17
Exhibit 37

Witness 2
Exhibit 37

Available Evidence.

2. The Panel had access to the following evidence:
 - a. Interviews with the crew of ZH898 (Pegasus 2).
 - b. Interviews with the crew of ZH902 (Pegasus 1).
 - c. Interviews with the horse riders involved in the incident.
 - d. Interviews with 18(B) Sqn DA, OC OCF and relevant station support staff.
 - e. Associated documentation including AMPA planned charts and maps used for the sortie, crew logbooks, authorisation sheets, STARs and OCF course documentation.
 - f. RAF Odiham ATC recordings.

Unavailable Evidence.

3. The following information was not available to the Panel:
 - a. CVFDR audio data at time of incident from ZH902 (1 hour overwritten loop).
 - b. CVFDR audio data from ZH898 more than 2 minutes prior to the incident.

Services.

4. The Panel were assisted by the following personnel and agencies:
 - a. Military Air Accident Investigation Branch (MilAAIB) Operations Investigators.
 - b. Low Flying Booking Cell.
 - c. Air Staff – Low Flying.
 - d. MAA Legal Advisor.
 - e. Med Legal (RAF) High Wycombe.
 - f. Specialist technical support from QinetiQ Boscombe Down.
 - g. UK NOTAM Office, Aeronautical Information Services.
 - h. National Air Traffic Service.
 - i. Central Flying School (Helicopters).
 - j. SH STANEVAL.
 - k. 705 NAS Training Officer.
 - l. RAF Odiham Met Office.

Evidence not considered by the Panel.

5. To ensure impartiality the following was not considered:
 - a. Defence Flying Complaints Investigation Team report into LF associated complaints.

Factors considered by the panel.

6. The following factors were considered by the Panel:
 - a. Aircraft track.
 - b. Aircraft height and size.
 - c. ZH898 crew's awareness of riders.
 - d. Sortie weather.
 - e. Disturbance to horse.
 - f. Nature and degree of injury.
 - g. Deviation from route.

- h. Delayed departure.
- i. Witnessing the incident.
- j. Initial actions having witnessed the incident.
- k. Post Incident Management.

INCIDENT EVENTS

7. **Aircraft track.** The injured rider stated that a Chinook overflew her position, causing her to fall from her horse. A plot, generated by QinetiQ, using heading and air speed data extracted from the ZH898 DAPU (no GPS data is recorded), corrected for the wind on the day, placed ZH898 directly over the incident location at approximately 1454 hrs (Fig 1.4-2). The accuracy of this plot was improved by cross reference to data supplied from the Heathrow 10 radar head by the National Air Traffic Service (Fig 1.4-1). This corroborated the witness statement from the non-operating student pilot from ZH898, who saw the rider fall from her horse. The Panel therefore concluded that ZH898 was the aircraft that overflew the riders' position.

Witness 5
Witness 6
Witness 3
Exhibit 37
Exhibit 5
Exhibit 31

Exhibit 37

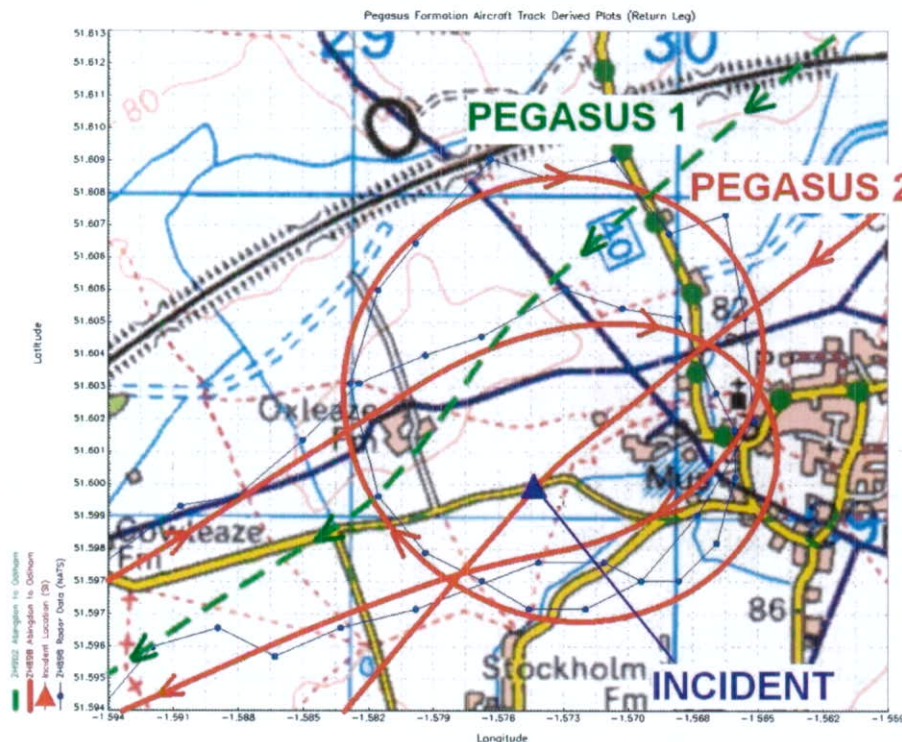


Fig 1.4-1. Plotted trace of Pegasus formation's track.



Fig 1.4-2. Overhead screen shot from QinetiQ reconstruction, showing aircraft plotted position relative to incident location.

8. **Aircraft height and size.** The riders expressed concern over the height of the helicopters, stating that they assessed the aircraft height as less than 50 feet above the ground. Data retrieved from the DAPU of ZH898 showed an aircraft RADALT height of 86ft AGL (Fig 1.4-2 & Fig 1.4-3) as the QinetiQ-derived plot passed the incident location. The Panel recognise it is genuinely difficult, even for experienced observers, to estimate aircraft heights accurately from the ground. The Chinook is a large helicopter and this can add to the impression that it is flying lower than is actually the case. The riders also commented on the enormity of the aircraft suddenly appearing overhead. Though impossible to quantify, the Panel could not discount the impact the size and associated noise of the Chinook may have on a horse. The data also revealed that, with exception of take off and landing, the RADALT did not read below 50ft at any point of this LF sortie (Fig 1.4-3). The Panel found that the crew of ZH898 did not operate below 50ft AGL and 30ft MSC. The Panel found that both the aircraft height and size were **contributory factors** to the incident.

Witness 5
Witness 6
Exhibit 4
Exhibit 37

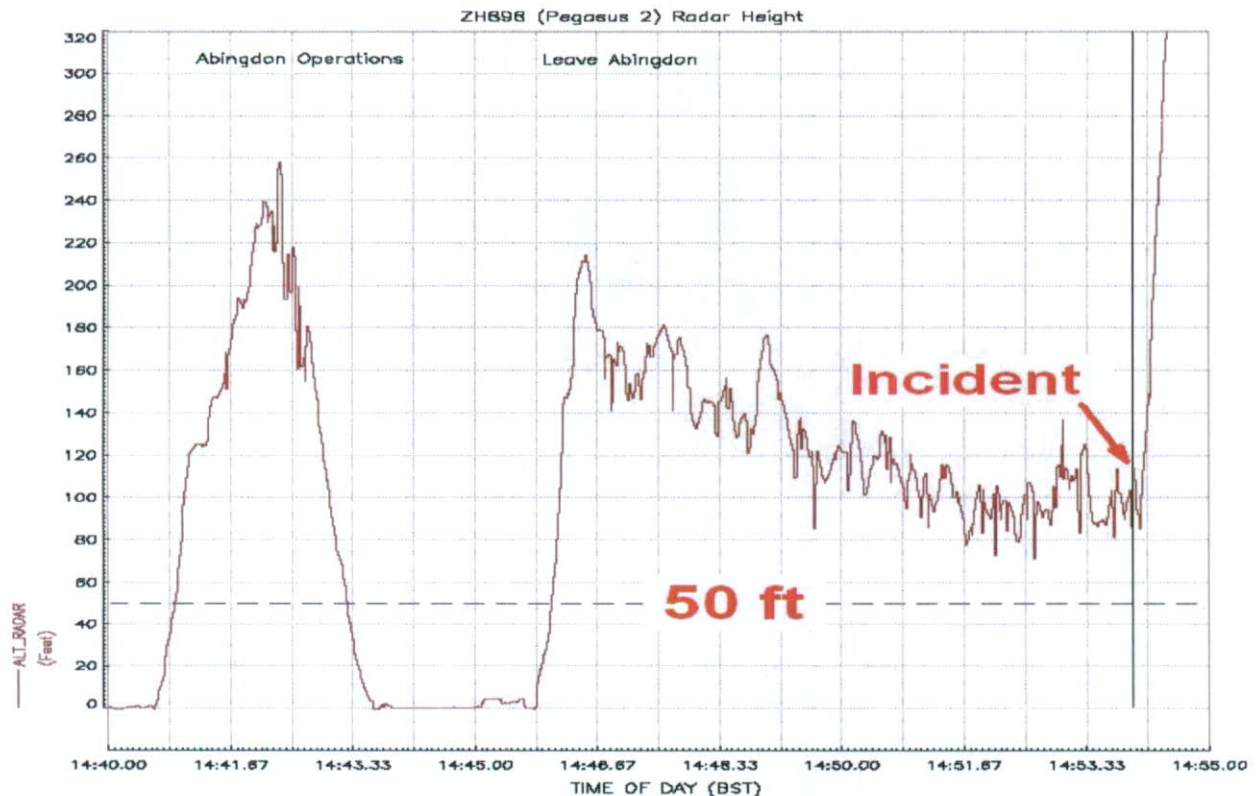


Fig 1.4-3. Trace of ZH898's RADALT. (Exhibit 37)

9. **ZH898 crew's awareness of riders.** The incident occurred on a minor road, bordered by a dense hedge of deciduous vegetation. To the south the hedge was up to 4ft high but to the north, the direction from which the formation approached, it contained embedded trees and extended from approximately 12ft to over 60ft. Were the riders to have been adjacent to the lowest part of the hedge (where witness reports suggest the incident occurred), the QinetiQ reconstruction suggests the lead rider's head may have started to become visible to the crew up to 5 seconds before the overflight (Fig 1.4-4). Taking into account the external view from the cockpit being restricted by the instrument panel, the pilots' window of opportunity to see the riders was further reduced to approximately 3.5 seconds. However, as the riders were advancing from the west, where the hedge extended beyond 12ft, these figures are reduced to such a level it is highly improbable any member of the crew would have seen the riders prior to overflight. Both riders corroborate this, stating that though they witnessed a Chinook 200-300m north of their position (Pegasus 1), they could not see ZH898 (Pegasus 2) through the dense hedge, stating that it appeared 'low and over my head'. The Panel found the riders' lack of warning of overflight was a **contributory factor**. Given the density of vegetation the presence of a high visibility tabard on one rider would have made very little difference on their detection range. Even if the crew, who reported they were looking out of the cockpit prior to the incident, had seen the riders at the maximum predicted range, the short distance and duration to the incident location would not have afforded them sufficient opportunity to conduct an effect avoiding manoeuvre. The Panel found the minimal chance for the crew to see the riders prior to their overflight was a **contributory factor** to the incident.

Exhibit 5
Exhibit 37
Exhibit 58
Witness 1
Witness 2
Witness 3
Witness 5
Witness 6
Witness 9
Annex A

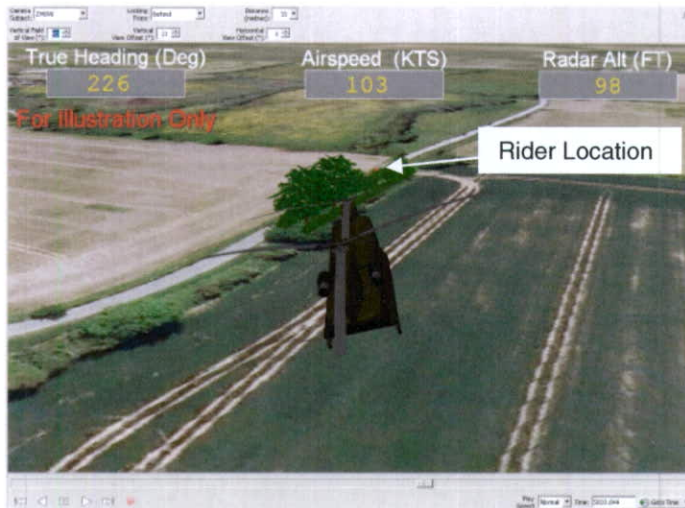


Exhibit 37

Fig 1.4-4. Pilots' line of sight view 5 seconds prior to overflight.



Exhibit 37
Exhibit 58

Fig 1.4-5 a, Incident location (X); 1.4-5 b, reconstruction of rider's view of approaching aircraft 3 seconds prior to overflight.

10. **Sortie weather.** The Panel sought to establish whether pilot visibility may have been further restricted by poor weather. High pressure building from the south, following the recent passage of a cold front, left predominantly good flying conditions, with reported visibility of greater than 10 km and no cloud below 3000ft. As such, the Panel found the weather was suitable for the sortie and therefore **not a factor** in the incident.

Exhibit 5

11. **Disturbance to horse.** The one witness present stated that the affected horse "whipped around to the left", unseating the experienced rider who fell onto the asphalt road. The Panel found that the sudden appearance of the aircraft, low and immediately ahead of the lead rider, with its associated escalation in noise, is very likely to have caused the horse to instigate a fight or flight reaction. The Panel found that this was the **cause** of the incident. The second rider successfully, but with difficulty, remained mounted while her horse similarly reacted.

Witness 5
Witness 6
Exhibit 37
Exhibit 38

12. **Nature and degree of injury.** The injured rider's mount was in excess of 16 hands (1.63m) and the injury the rider sustained was considered consistent with a fall from that height onto an asphalt surface. The medical advice

Witness 6
Exhibit 38

substantiates the Panel's theory that if the horse had been ridden over a softer surface at the time of the fall it may have lead to less severe injuries. The Panel found that the surface on to which the rider fell was therefore an **aggravation factor**.

13. **Deviation from route.** The planned route involved Pegasus formation passing to the south of Uffington, away from the riders' position, but the actual routes flown were to the north of the village. The presence of a temporary avoid at Baulking Grange Riding School (0.5nm & 500ft) and the Lambourn Gallop Environmental Avoid meant there was little space for the formation to transit to the south (Fig 1.4-6). Both QHIs stated that the line drawn on the chart was a guide and they deviate from it according to the suitability of the terrain. Given the freedom of tactical manoeuvre afforded to formations, the Panel believed this minor deviation from the route was entirely reasonable but positioned the aircraft over the riders' location.

Witness 1
Witness 2
Exhibit 8
Exhibit 10
Exhibit 31
Exhibit 37
Exhibit 48

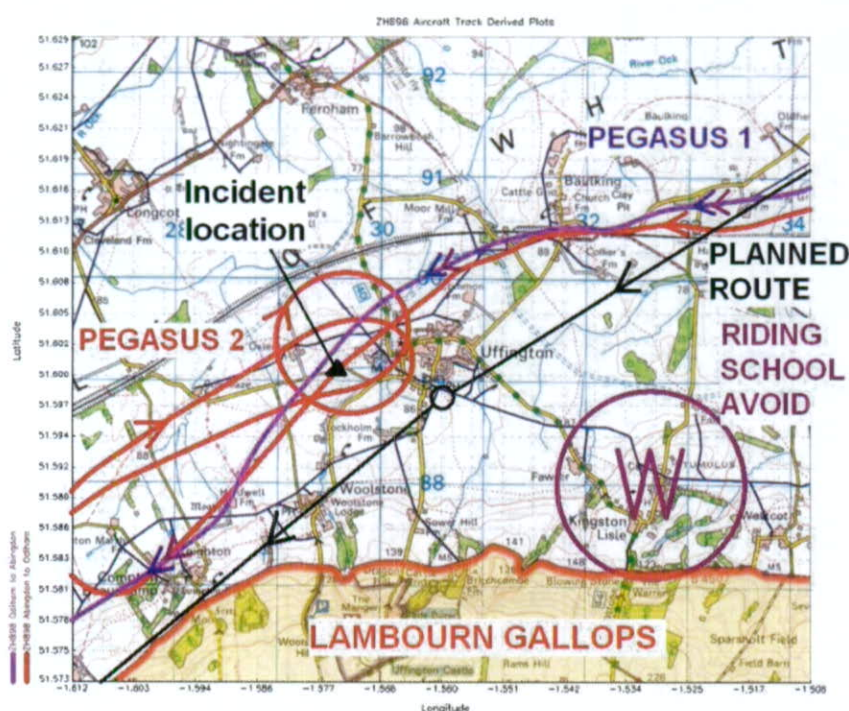


Exhibit 37

Fig 1.4-6. Actual vs planned route.

14. **Delayed departure.** The Panel also investigated whether the unserviceability of ZH901 on start-up, and subsequent 37 minute delay in departure had any impact on the incident. The aircraft captain stated that no changes to bookings were required and he assumed he was still cleared for a 2 hour sortie, despite not confirming this with the DA prior to lift. Had the sortie lifted on time it is likely that the riders would have had almost 1 km displacement from the aircraft's route. The Panel, therefore, found that no undue pressure was placed on the aircraft captain, however, the delayed departure influenced the coincidental nature of the incident and is considered a **contributory factor**.

Witness 1
Witness 6
Exhibit 8
Exhibit 37

15. **Witnessing the incident.** The crew of Pegasus 2 were authorised to carry an Odiham-based service passenger for the duration of their sortie and, following the front seat crew change at Abingdon, she had been sat in the troop

Witness 1
Witness 3
Exhibit 1

commander's seat. As a consequence, the non-operating student pilot, who would normally occupy that position, was standing in the cabin, adjacent to the starboard cabin door. With the No 2 student crewman sat at his usual position, on the oils box looking forward, the non-operating pilot's focus of attention was out to the 4 o'clock of the aircraft and down from the horizontal (Fig 1.4-7). As the aircraft's track was offset by just a few metres to the east of the horse riders they happened to pass directly through the non-operating pilot's line of sight, enabling him to witness the rider falling off her horse. Had the incident not been witnessed post incident actions would not have been initiated until 2015 hrs on 25 Aug 11, when the first flying complaint was received on station. Consequently, data from the Cockpit Voice and Flight Data Recorder (CVFDR), at the very least, and from the DAPU would have been lost as both aircraft were planned to fly again later that day.

Exhibit 4
Exhibit 8
Exhibit 37
Exhibit 57



Exhibit 57

Fig 1.4-7. Reconstruction of No 2 crewman (right) and non-operating pilot's cabin position at the time of the incident.

16. **Initial actions having witnessed the incident.** Once the QHI was made aware of the incident he immediately ordered the formation to climb out of low level, enabling him to concentrate on post incident management. Having returned to the site, at sufficient height to minimise further disturbance, he had identified the injured party and contacted RAF Benson Approach by radio requesting assistance from the emergency services within 2 minutes 30 seconds of the incident. Believing he had achieved all he could over the incident site he then departed the scene, confirming his intentions with Benson Approach and requesting 18(B) Sqn were apprised of the situation, all within 4 minutes and 20 seconds of the incident. The Panel found that the aircraft captain acted swiftly and decisively in initiating a response from the emergency services.

Witness 1
Exhibit 37

17. **Post Incident Management (PIM).** Minimal audio evidence was available to the Panel as both Pegasus formation aircraft took in excess of 30 minutes to shut down following their return to base. The Odiham Flying Order Book (FOB), states: *'Following any aircraft incident that may lead to an inquiry, aircrew are to shutdown the ac as soon as practicable and within one hour of the incident to preserve Cockpit Voice Data'*. The Panel established that this delay resulted from a lack of clarity in the management of the incident. The DA, Duty Flight Commander (DFC) and OC SHFHQ, having been made aware of the situation, attempted, separately to manage the aircraft. The practice of passing all messages via ATC instead of directly to the aircraft using the sqn's discrete frequency, allowed a situation of confusion to perpetuate with regard to intentions. The DA, DFC, 2 i/c 18(B) Sqn and SFSO sought a template in the Odiham Station Crash Support and Major Incident Plan (CSMIP) to confirm their actions. Unable to find anything appropriate they drew upon their experience of these matters to gather evidence and manage the situation. This was sufficient in all aspects except the effective communication with the aircraft to shutdown. A review of the CSMIP by the Panel confirmed that there was little direction for an incident of this nature. The Panel therefore consider this to be an **observation**.

Witness 1
Witness 2
Witness 4
Witness 7
Witness 16
Exhibit 18
Exhibit 20
Exhibit 29
Exhibit 37

SORTIE CONDUCT

18. **Crew Competency.**

a. **Captain.** QHI and Non-Handling Pilot. An experienced Chinook operator, he had amassed 1432 hrs on the aircraft at the time of the incident, with 1792 hrs total in his flying logbook. His F5291 dated 15 Feb 11, categorised him as average in his Chinook competent to instruct (C to I) course while his latest 2020G placed him as high average in the air for the period to 31 Mar 11. Though he was relatively inexperienced as an instructor, with 166 hrs as a B2, he was assessed by his Flight Commander as easily meeting B1 standard and due for his B1 upgrade in Nov 11.

Witness 7
Exhibit 41
Exhibit 42
Exhibit 45
Exhibit 46

b. **QHCI.** The crewman instructor had only recently returned from CFS(H) at Shawbury, completing his C to I on the Chinook on 30 Jun 11 to an above average standard. At the time of the incident he had instructed on 16 sorties though only logged hours from 11, resulting in 22 instructional hours as a B2. The Panel believe this was due to the lack of familiarity logging instructional hours by a newly qualified QHCI. His extensive experience, with 2340 hours total and 2079 on the Chinook, coupled with an above average assessment on his 2020G dated 16 Jan 11, meant his Flight Commander was content for him to instruct on this sortie.

Witness 7
Exhibit 41
Exhibit 43
Exhibit 47
Exhibit 54

c. **Handling student pilot.** Though new to rotary wing aircraft the student pilot occupying the cockpit seat at the time of the incident was the most experienced aviator on board. The Panel believe that his extensive fast jet experience, including time as the Jaguar display pilot, ensured he had adequate capacity in the low level environment to maximise his look out for potential hazards.

Witness 7
Exhibit 41

d. **Non-operating student pilot.** Positioned in the cabin at the time of the incident, (S40) Witness 3
Witness 7

. He was the only member of the crew to witness the rider falling from her horse.

e. **No 1 student crewman.** As a consistently average *ab initio* student crewman, he offered no concerns about his abilities on the instructional staff. Exhibit 61

f. **No 2 student crewman.** As a consistently above average *ab initio* student crewman, he placed no concerns about his abilities on the instructional staff. Exhibit 61

g. **The Duty Authoriser.** A Master Aircrewman (MAcr) and a B1 QHCl, the authoriser was an experienced aviator. A former Royal Naval Chief Aircrewman, he had operated the Chinook for 8 years and logged 1939 hrs on the aircraft since 2003, and over 5700 hrs total rotary experience. Though not a member of the OCF at the time of the incident, he had previously served as their Senior Crewman and was due to return to that role in Oct 11. The authoriser had been appointed to his role by the Station Commander and had those powers confirmed on the F1575C, Wing Authorisation Matrix. One of only two MAcr to hold such power on the sqn, he had completed the Flying Authorisers Course (FLAC) on 17 Sep 08 and performed the duty extensively in the UK and on deployed operations prior to the incident. Witness 4
Witness 7
Exhibit 61
Exhibit 62
Exhibit 68

h. The Panel concluded that the crew and the MAcr authorising the sortie were current, qualified and trained to perform and authorise the assigned sortie respectively and therefore crew competency was **not a factor** in the incident.

19. **Aircraft serviceability.** Review of the aircraft Logistic Information Technology Systems (LITS) confirmed that ZH898 was correctly roled for the sortie and serviceable in all respects, with no open MF702 or MF703 entries that could affect the aircraft with regard to this incident. ZH898 was signed over to the new captain on completion of their sortie and was verbally confirmed as serviceable at that time. The RADALts are routinely checked prior to each sortie, as part of the preflight checks, and were assessed as serviceable. The Panel, therefore, concluded that serviceability was **not a factor** in the incident. Witness 1
Exhibit 35
Exhibit 36
Exhibit 37

20. **Chinook Long course**

a. **OCF course overview.** The CL course is an established course training pilots and crewmen to LCR standard in 28 weeks. Recently adapted to be taught on the Chinook Mk3 vice the Mk2, this change involved only minor syllabus modifications. 41 course is the second CL course to run using the new Mk3 syllabus. At the time of the incident the course was running an estimated 2 weeks behind schedule due to a period of bad weather during the previous night flying phase. The OC OCF accepted there was some pressure on the sqn to achieve the course graduation date but believed this was still achievable. The course was due to conduct its operational phase (Op phase), the culmination of the Witness 7
Exhibit 24

UK based training, the following week. No evidence was found by the Panel of course progress affecting the conduct of this sortie, it was therefore **not a factor** in this incident.

b. **Planned sortie content.** The sortie being flown was CL OP (Ops sortie) No 4, which teaches tactical formation and, although not stated in the course specifications (C-specs), is flown primarily at low level. There was an additional training objective added to the sortie, again not detailed in the C-spec, which was an introduction to LF at not below 50ft AGL. At this stage in the training, the students had only previously been taught LF to 100ft AGL. The requirement to operate the aircraft at low level down to 50ft AGL is specified in JHC Training and Air Staff Instructions (TASIs) and is reflected in the CL course Training Directive documentation, though this specific training objective is not detailed in any part of the CL C-specs. The 2 QHIs stated that OCF instructional staff commonly believed that the 50ft requirement was contained within a sortie on the Mk2 version of the CL course. However, OC OCF acknowledged that requirement was omitted when a sortie was removed from the Mk3 course.

Witness 1
Witness 2
Witness 7
Exhibit 4
Exhibit 21
Exhibit 24
Exhibit 69

c. **Order of training.** There is no formal prerequisite structure documented for the various phases of the CL course other than that implied in the sortie numbering. OC OCF confirmed that the tactical formation and LF skills are beneficial if taught prior to commencing the Op phase. The 2 QHIs stated that by achieving this prior to starting the Op phase it allows staff and students to maximise training opportunities while detached.

Witness 1
Witness 2
Witness 7

d. **Guidance for instructors.** CL course C-specs contain minimal instruction for QHI/ QHCIs for individual sortie content. The Chinook OCF does not have sortie I-specs or sortie guidance for instructors, detailing a suggested sortie running order or indicating common errors and points to emphasise. The Panel noted this is unusual as most instructional units have such documentation, as recommended by SH STANEVAL. It does have an instructor's study guide but this only gives advice for teaching standard manoeuvres and profiles. Despite the absence of specific guidance for this sortie, the Panel considered that the instructors taught this sortie in a logical and progressive manner. The Panel concluded that without an instructor's sortie guide, content and instructional guidance is passed verbally from instructor to instructor, leading the Panel to question standardisation of content and techniques taught.

Witness 1
Witness 2
Witness 7
Exhibit 24
Exhibit 27
Exhibit 73

e. The deficiencies in the course documentation and the lack of robust guidance for OCF staff were evident to the Panel. However, the Panel found the sortie was well constructed and met the perceived instructional requirement. The standard of course documentation was considered as an **other factor** in the incident.

21. **Planning and preparation.**

a. **Route selection.** The detailed route planning was undertaken by the students based on the training fields and Abingdon airfield, specified to them by the QHIs. Given the sortie duration and the various airspace restrictions in the region the choice of possible routes were limited. This is

Witness 1
Witness 2
Exhibit 8

particularly illustrated in the Uffington area, which is a low level choke point between the Sandhill Farm (Shrivenham) Glider Site to the north and the Lambourn Gallops to the south (Fig 1.4-8). The Panel found that the planned low level route gave due consideration to avoiding built-up areas and high horse concentrations. The decision to reverse the route was valid based on the plan to conduct training with 2 pilots per aircraft, swapping right hand seat at Abingdon, and a balance of instructor workload verse formation practice.

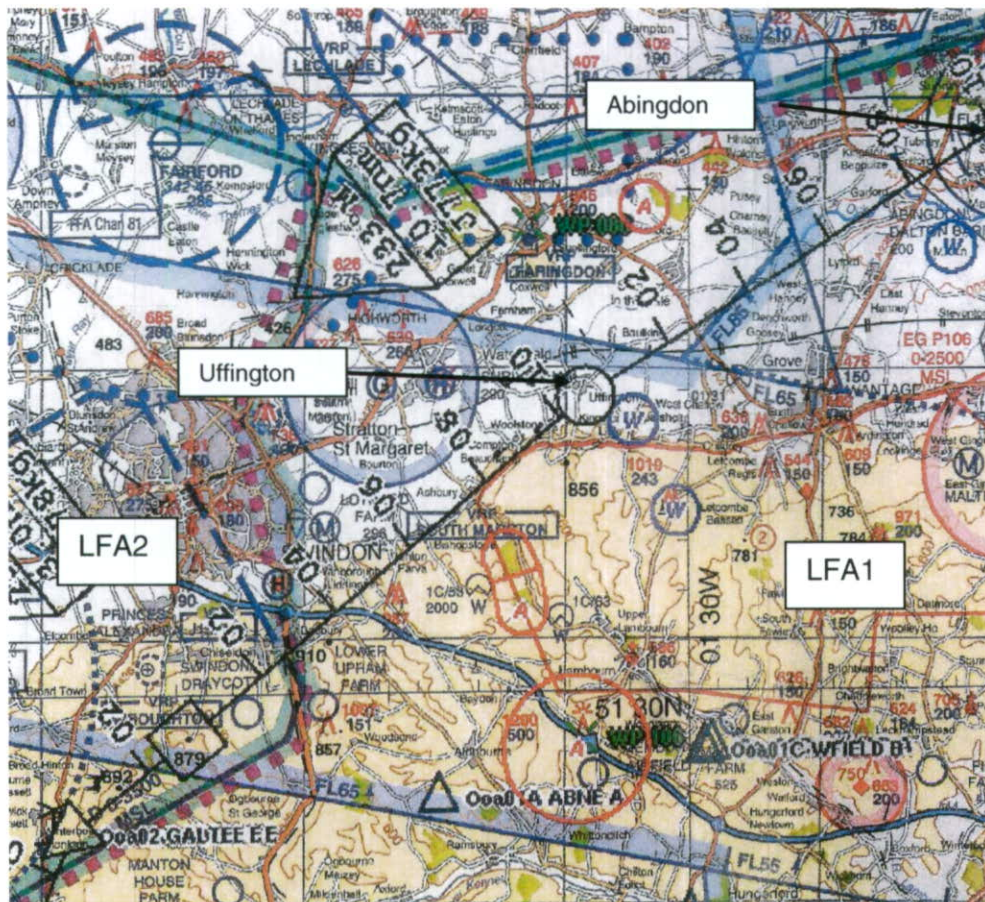


Exhibit 8

Fig 1.4-8. Pegasus formation's planned route.

b. **AMPA charts.** The Panel considered the charts and their preparation to ensure that they were adequate for the sortie. Odiham Hot Poop 10-21 mitigates concerns over the quality of printed AMPA charts by precluding their use for night flying below 500ft MSD but does not restrict their use by day. Analyses by the Panel of the AMPA charts used for this sortie confirmed that the print quality did not match that of the No1 AIDU pre-printed low flying charts. However, the charts appeared adequate for this sortie and were correctly annotated with all promulgated restrictions and NOTAMs. The Panel noted some areas of the chart had been obscured by AMPA annotations, however, the section of the route near Uffington was free of chart clutter.

c. The Panel found that planning was sufficient for the sortie and therefore was **not a factor** in the incident.

Witness 7
Exhibit 8
Exhibit 28
Exhibit 48
Exhibit 49

22. **Sortie brief.** The sortie was briefed by the students at 1130 hrs on the 25 Aug 11, using the Support Helicopter Planning and Briefing Aide-Memoire (SOP18 Annex A) format. All crewmembers were present. Due to the addition of the 50ft AGL LF training objective both QHIs elaborated on the skill and considerations for flying at that height, on completion of the brief. The students had not received the relevant mass brief (CL OPS 02: MB21 – UKC Phase GS2) prior to the sortie, however, both QHIs stated they had covered the relevant points following the sortie brief, noting that the students had already flown tactical formation as part of their Defence Helicopter Flying School (DHFS) training. The Panel felt that, despite this omission, the brief sufficiently prepared the students for the sortie and was conducted in sufficient time prior to the planned lift to prepare the students and not place them under any undue pressure. The DA was not present at the brief. The Panel concluded that briefing was adequate and therefore **not a factor** in the incident.

Witness 1
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Witness 10
Witness 11
Witness 12
Witness 13
Witness 14

23. **Sortie authorisation**

a. The Odiham FOB states that, where possible, authorisation should be achieved by the DA attending sortie briefs so he can fully meet the requirements of his supervisory role. At the time of Pegasus formation's brief the flying programme was subject to significant changes from numerous aircraft unservicabilities. The DA stated that his priority of focus was therefore at managing the flying programme and arranged to meet his authorisation requirements through an extended formation outbrief with both the aircraft captains. The authorisation sheets were correctly annotated with the sortie's requirements although the Panel noted 2 errors:

Witness 1
Witness 2
Witness 4
Exhibit 3
Exhibit 4
Exhibit 18

i. **Aircraft registration.** The captain failed to inform the DA of the change in aircraft after ZH901 became U/S on start, leaving the wrong aircraft registration on the authorisation sheet. RAF Odiham has a central engineering unit, located separately from the 18(B) Sqn ops desk. Both the authorising officer and the aircraft captain noted that this separation often caused such omissions. Though STARs is the main medium to publish alterations to the flying program, the efficient management of that information is entirely dependant on good telephonic communication between the various parties involved, namely the flight line, the engineering program manager (EPM) and the DA. As each party is not always located next to their phone, as in the case of the DA attending sortie briefs, such information is often not passed leading to mismanagement of the available assets. The Panel believed such occurrences are inherent when individuals vital to the efficient management of assets are not collocated.

Witness 1
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ii. **LFA 2 booking.** The use of Galtee E necessitated a transit of what was formerly RAF Lyneham's Zone and had subsequently reverted to Class G airspace in LFA 2 on 19 Jul 11 (Fig 1.4-8). LF booking provision was made for LFA 1, iaw SOP for a Dedicated User Area (DUA), and detailed in the authorization sheets but no booking was made for the short period of the route in LFA 2. When the aircraft captains were questioned about this omission they stated

Witness 1
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Exhibit 8
Exhibit 44

that the NOTAM created ambiguity and therefore believed they did not require a booking.

b. The Panel found that the authorisation meet JHC FOB's requirement for LF not below 50ft AGL. However, RAF Odiham had published HOT POOP 11/10, which was aimed at preventing 'blanket authorisations' for transits at 50ft AGL. The Panel found that the wording in HOT POOP 11/10 generated some ambiguity for the aircraft captains and authorisers of OCF sorties, instructing down to 50ft AGL.

Exhibit 17
Exhibit 50

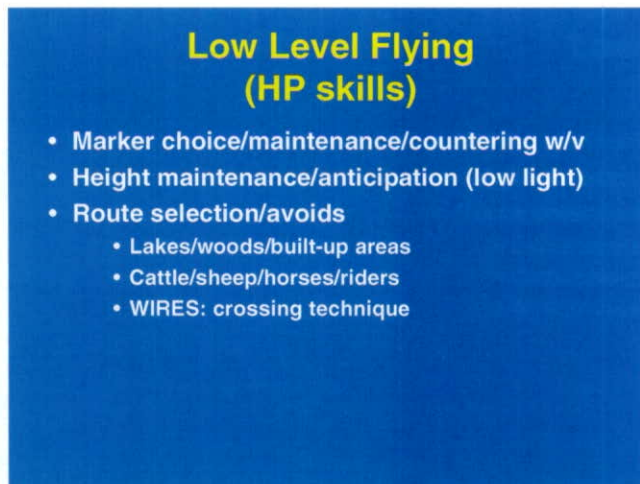
c. The Panel found that the sortie had been correctly authorised and the DA had, other than the 2 omissions, adequately fulfilled his supervisory role. Authorisation was therefore **not considered a factor**.

ORGANISATIONAL CONSIDERATIONS

24. **Pilot LF training and rider awareness.** The Panel investigated what specific training and advice is given to crews operating in the low level environment with regard to horse and rider awareness. The Panel also sought to understand what the attitude was within the Chinook force towards horse riders to ascertain whether there is a culture of horse avoidance. The Panel found the following:

a. As part of initial helicopter pilot low flying training, conducted at DHFS, consideration for livestock and, in particular, for horses with riders is imparted on the students in both route planning and flying the planned route. The 2003 fatality is often used as a teaching point as part of this training.

Exhibit 59



Witness 1
Witness 2

Fig 1.4-9. DHFS LF Brief.

Though the students do not receive a LF mass brief this consideration is continually stressed by individual instructors during the CL course at Odiham, with the added awareness of the effect of the increased noise footprint the Chinook has on livestock. The proximity to the source of the 2003 fatality helps to drive home this consideration.

b. At the planning level it was evident to the Panel that instructors discourage low level flight near to areas of high horse concentrations. Comments from one QHI indicated that the chosen route was designed specifically for that purpose, stating that he knew that the Lambourn Gallops were not active at that time (after 1200 hrs) but that they still just elected to go round them as they thought there was a high intensity of horses in that area. He subsequently added that he would not ever suggest to his students that they ever fly straight across that area for that exact reason.

Witness 2

c. Throughout witness statements there are indications that individuals endeavour to identify riders where they can, while conducting LF. Awareness of the consequences of knocking a rider off a horse, for the pilot and for the rider, further drives this. Again, this is illustrated by the CVFDR recording from ZH898 in the 2 minutes prior to the incident, where the crew can be heard reporting horses on or near their route and taking action to avoid their overflight.

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Witness 11
Witness 12
Witness 13
Witness 14
Exhibit 37

d. Pegasus formation's QHIs stated that sudden avoidance manoeuvres can often exacerbate the disturbance to horse riders so they train their students to only conduct a 'soft turn', where possible. This was illustrated by Pegasus 1's actions just prior to the incident, though no audio from the CVFDR was available to confirm as such. Crewmembers stated they had seen a horse rider to the north of their track, on a road in position SU 298902 ($\frac{3}{4}$ mile north of Uffington) and conducted a soft avoidance turn, noting that they subsequently got the crewman to check that the rider had not been disturbed.

Witness 1
Witness 2

e. The Panel found that there was a healthy and considerate culture of horse and rider awareness within the crews of 18(B) sqn. Training to minimise rider disturbance commences at the earliest opportunity and was continually stressed throughout their aviation careers, with crews planning and conducting LF as professionally as possible within the constraints of MOD requirements. Training was therefore **not a factor** in the incident.

25. **2005 Review of UK Military Helicopter Low Flying.** As a response to the 2003 fatality, a review of UK Military Helicopter Low Flying (UKMHLF) was published in 2005 that considered the recommendations drawn by the Louth and Spilsby Coroner. The Panel sought to investigate the consequences of these recommendations and draw an opinion on their validity at the time of the Uffington incident. A full review of defence helicopter LF policy is beyond the scope of this report. AS LF conducts regular internal reviews of UK LF and, although the 2010 report was not available to the Panel, discussion with AS LF staff was valuable to this inquiry. The 2005 UKMHLF report had a number of main areas of discussion reviewed in the following paragraphs:

Exhibit 51
Exhibit 52

a. **Better communication with the public.** In response to this recommendation a free-phone advisory service and website was established to offer information on helicopter low level activity to the

Exhibit 52

public. As a consequence, Helicopter Training Areas (HTA) were established and, with it, the detail required for low level bookings was extended, beyond simple LFA entry and exit times. This necessitated a software upgrade to Military Flying Management Information System (MFMIS) to process the LF information. After an initial surge in the phone line and website use (30 calls a month), a subsequent lack of public interest (less than 5 calls a month) and rising costs lead to the IPT dropping the software upgrade to MFMIS. The free-phone is directed to the Low Flying Booking Centre (LFBC) at RAF Wittering, however, due to the limited aircraft information required to make a LF booking there is very little information that can be passed on to the public. Information available is limited further in DUAs due to the retrospective nature of the booking system. Major exercises and Tactical Training Area timings are publicised on the MOD website but again they only contain non specific information. The Panel found that night users of LFA 1 already publish detailed route information on an in use military system (Central Aviation Data Service (CADS) funded by JHC). This could easily be extended to capture detailed UK Low Flying System (UKLFS) planned routing and be made available to the LFBC for publication. The Panel considered that providing planned flight information to the horse riding community could reduce the risk of a recurrence, and its absence was therefore an **other factor**.

b. **Improved technology to assist the aircrew in locating horse riders.** The review went into depth regarding this matter, focusing on realistic, affordable and sustainable solutions. The conclusion was to encourage the use of high visibility jackets for all horse riders. In this particular incident, the injured rider was wearing a high visibility jacket but, due to the large roadside hedge, she was obscured to the crew of the approaching aircraft. The Panel believe the continued use of high visibility jackets remains the most effective and economic method of identifying riders from the air and thus reducing the likelihood of a recurrence of this incident. AS LF staff currently work with the British Horse Society to promote use of high visibility clothing, highlighting the findings of trial Bright Eyes.

Exhibit 39
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Exhibit 52

c. **Low flying Complaints and LFA Usage.** LF data shows a marked increase in the number of LF complaints per flying hour from 2007 to present (Fig 1.4-10), despite the actual number of low flying hours logged decreasing over the same period. AS LF attributed this to 2 factors. Firstly, the MOD has made it much easier for the public to complain, by increasing awareness and improving the facilities to do so. Secondly, public tolerance of military training activity is fragile at this moment in time and there is little understanding for the need for pre-deployment training. This increase in the complaints trend is apparent across all the LFAs but it is amplified in LFA 1, which has had consistently more complaints per flying hour than any other LFA over a 5 year period. This is attributed to the geographical location of the military bases within the LFA and the nature of their flying patterns. Due to the helicopters' speed and fuel capacity, they are limited to a finite range from their home base, meaning a helicopter taking off from a base within LFA 1 will generally operate exclusively within that area. The fact that this DUA has three JHC helicopter stations within its boundaries, each containing sqns that conduct pre deployment and continuation LF training, appears to be the

Exhibit 51
Exhibit 52
Exhibit 53

main factor behind the level of complaints within LFA 1 compared to others. The Panel felt this contradicted one of the findings from the 2005 review. The coroner suggested restricting LF to specific areas, either to the pre-1979 LF system or, more restrictively, just to military land. The 2005 review rejected the coroner's suggestion, on the grounds of aircrew familiarity, and advocated sharing the 'burden' of LF around as much of the country as possible. What has ultimately been the consequence of such high density of helicopter bases is a restriction in the areas used for LF. This situation is only going to be exacerbated by the addition of 14 Mk 6 Chinooks from 2013 and the relocation of assets from Dishforth and Gutersloh to RNAS Yeovilton as part of the Lynx Wildcat programme from 2014. The future basing of helicopters in the southern half of the UK is undetermined, but there is the potential that the outcome will add further users to an already over-crowded situation. Ultimately, this is likely to increase chances of a recurrence of such an incident in LFA 1.



Fig 1.4-10. Five year analysis of complaints vs LF hours. (Exhibit 53).

d. **Overseas LF training.** The 2005 review also explored the concept of training pilots in LF overseas. JHC coordinate platform wide overseas training in the form of Environment Training (ET), preparing crews for deployed operations. The scope of these exercises is broad, with the primary focus being adaptation to environmental conditions which cannot be replicated in the UK. LF training, though not a core requirement, is a fundamental by-product of such exercises. JHC is currently trying to compress its overseas training activity as it places significant strain on both budgets and availability of assets, not to mention its impact on harmony. The Panel recognised that increased overseas training could ultimately reduce the burden on the UKLFS and therefore help reduce the risk of recurrence. However there will always remain a residual requirement for UK based continuation training. Thus, the merit of overseas training, balanced against its impact on assets and limited

Exhibit 51
Exhibit 52
Exhibit 72

budgets, needs to be weighed up against any reduction to the risk of recurrence.

26. **Navigation techniques and LF complaints.** AS LF staff also commented on the different approaches to low flying by the three services. Two methods are in common use: the 'straight line' technique and the 'path of least resistance'. The 'straight line' technique is the principal method taught at DHFS and used predominantly by the RAF in the UK. The 'path of least resistance' is used by AAC and CHF that takes advantage of the best tactical line using terrain and other key features. AS LF state that the two different techniques generate a considerably different level of complaints from members of the public, with the 'straight line' technique producing the most. This is based on more than just anecdotal evidence however AS LF did not have statistical proof to back it up. The Panel noted that this agrees with their collective tri-service (anecdotal) experience though believe that, while one technique may reduce complaints and the associated impact on the population, the Panel could not draw any conclusion as to whether it would reduce the likelihood of such an incident occurring in the future.

Exhibit 52

27. **Incident location LF avoid.** MOD has a strict policy for granting permanent flying avoids over sensitive areas. In the case of the 2003 incident the avoidance was retained as a mark of respect for the family of the deceased. The Panel did not believe that in this incident a sustained avoid over the area of Uffington coheres with current MOD policy and so the current temporary avoid, for JHC crews, should be removed.

Exhibit 51

28. **Management of operating risk.** The Panel sought to establish whether the Risk to Life (RtL), to a third party, when conducting LF in a Chinook had been recognised and documented, and at what level that risk should be owned. Inspection of the last 12 months JHC Quarterly Aviation Reports (QUAvR)/ Unified Air Systems Risk Registers (UASRR) for the Chinook shows that risk is primarily identified for Operational occurrences but no mention is made of LF. As the Delivery Duty Holder (DDH) RAF Odiham is currently drafting their Risk Register, IAW MAR RA 1210, however this did not consider LF. This was also found to be common of all JHC platforms. As the Operational Duty Holder (ODH) it is Comd JHC's responsibility to reduce the aggregated RtL across his AOR and, as such, his staff own and hold Risk Registers from the individual platforms. Due to the 2003 fatality the Panel found that LF should be categorised as Catastrophic under the definitions for Severity on the Defence Aviation Hazard Risk Matrix (HRM). As a consequence LF can only be categorised, as a minimum, a Medium risk. When the Likelihood of such an accident is considered, the risk is raised to High as the definition implies this Likelihood is Remote, due to the civilian fatality occurring within the last 10 years. MAR RA 1210 states that a Medium or High risk should be owned by the ODH (JHC). The acknowledgment of the Societal Concern further emphasises the requirement for this risk to be managed. The Panel consider this an **observation**.

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Exhibit 63
Exhibit 70
Exhibit 71

29. **Defence measures.** Military Flying, and especially LF, has comprehensive rules and regulations that act as defence measures ensuring that LF is conducted safely with minimal risk to first, second and third parties. The Panel found that in the events surrounding this incident none of the rules and regulations relating to LF were broken and as such none of the defence

Witness 1
Witness 2
Witness 4
Exhibit 17
Exhibit 60

measures were breached. This leads to the potential supposition that the defence measures to ensure safe LF are inadequate as they have not prevented this incident and therefore could not prevent a recurrence. The current rules and regulations ensure minimal risk to other parties; it is the assessment of this risk that must be regularly reviewed to ensure that it is ALARP. Due to the nature of LF the next scale of defence measure to guard against recurrence would require a fundamental change to MOD LF policy.

30. Health and Safety aspects.

a. The Panel found that there were no reportable Health and Safety aspects regarding the crew of ZH898. The aircraft captain undertook his duties to report the incident to RAF Benson by radio and to RAF Odiham on his return.

Exhibit 65

b. The injury to the rider is an HSE defined RIDDOR reportable injury. The fact that the second rider was not dismounted could be perceived as a near miss.

31. Degree of injury. The panel found that:

Exhibit 38

a. **Aircrew.** No injuries were sustained by any member of the crew of ZH898.

Civilian personnel. (S40)

32. Damage to aircraft, public and civilian property.

a. Nil.

Summary of Cause and Contributory Factors

33. Cause. The Panel consider that if the following event had not occurred the incident would not have happened:

a. The horse reacting to being startled by the disturbance created by ZH898 passing overhead its location.

Para 11

34. Contributory Factors.

a. The crew of ZH898 not seeing the riders.

Para 9

b. The operating height and size of ZH898.

Para 8

c. ZH898 directly overflying the riders.

d. Lack of visual warning to the horse and rider of impending overflight by ZH898.

Para 9

e. Delayed departure.

Para 14

- f. The rider becoming unseated.

35. **Aggravating Factors.**

- a. The type of surface on to which the rider fell. Para 12

36. **Other Factors.**

- a. Standard of course documentation. Para 20
- b. Public access to planned helicopter LF route information. Para 25

37. **Observations.**

- a. Post Incident Management. Para 17
- b. Absence of helicopter LF from Risk Register. Para 28