Kings College Hospital (KCH) - Provision of PINS IAP procedure

ACP-2023-027

CAP1616 STAGE 2 SUBMISSION

15 November 2023

Table of Contents

1 Introduction

1.1 Background

Kings College Hospital (KCH) in Denmark Hill is the primary Major Trauma Centre (MTC) for Air Ambulance Charity Kent Surrey Sussex (AACKSS). AACKSS serves a population of 4.8 million and its helicopter service is operated by Specialist Aviation Services Ltd, the sponsor of this ACP.

Within the UK Major Trauma Network, KCH is the primary MTC accessible by air for all major/poly-trauma patients from Kent and the surrounding areas of South London.

KCH lies inside the London City CTR and below the London TMA. At present, operations to KCH are limited to Visual Meteorological Conditions (VMC) due to the lack of Instrument Approach and Departure Procedures.

AACKSS transports patients to KCH on average once a day but, due to the limitation to operate in VMC conditions, approximately only two thirds of these patients are conveyed by air. Transport by helicopter is faster than by road and therefore improves outcomes for critically ill patients.

SAS, on behalf of AACKSS, is the main operator to KCH. Essex and Herts Air Ambulance (AA), and Dorset and Somerset AA (both operated by SAS) also convey a small number of patients to the hospital.

The purpose of this ACP is to gain approval for the design and introduction of Required Navigation Performance (RNP) instrument procedures using Helicopter Point in Space (PINS) criteria. These will supplement the existing VFR procedures, which will remain the primary means of approach.

1.2 ACP process

The ACP process is defined in Civil Aviation Authority (CAA) guidance document CAP1616[1]. Under this process, a Statement of Need for this ACP was submitted to the CAA on 21 April 2023 (Reference DAP1916V2-723).

An assessment meeting was held on 15 June 2023 and the CAA confirmed that the ACP is being progressed under Part 1C (Airspace Change Process for RNP Instrument Approach Procedures (IAPs) without an Approach Control Service).

This document is the Stage 2 submission, which is the assessment of options.

[1] "Guidance on the regulatory process for changing the notified airspace design and planned and permanent redistribution of air traffic, and on providing airspace information, CAA Publication CAP1616, March 2021.

2 Current operation

2.1 Introduction

KCH is situated in the Southern portion of the London City CTR, 6nm (Nautical Miles) South West of London City, and 13nm East of Heathrow. The landing pad is available 24/7, all year around.

From 1 April 2022 to 31 March 2023 there were 365 patient transfers to the hospital.

2.2 Site description and location

KCH has an elevated helideck, situated 200ft above mean sea level. The most notable permanent obstacles above the height of the helideck are a church situated approximately 225m East of the helipad which extends to 40ft above the height of the helideck, and a hospital chimney 100m SW which extends <30ft above the height of the helideck.

The local features around KCH are shown on the following VFR map.

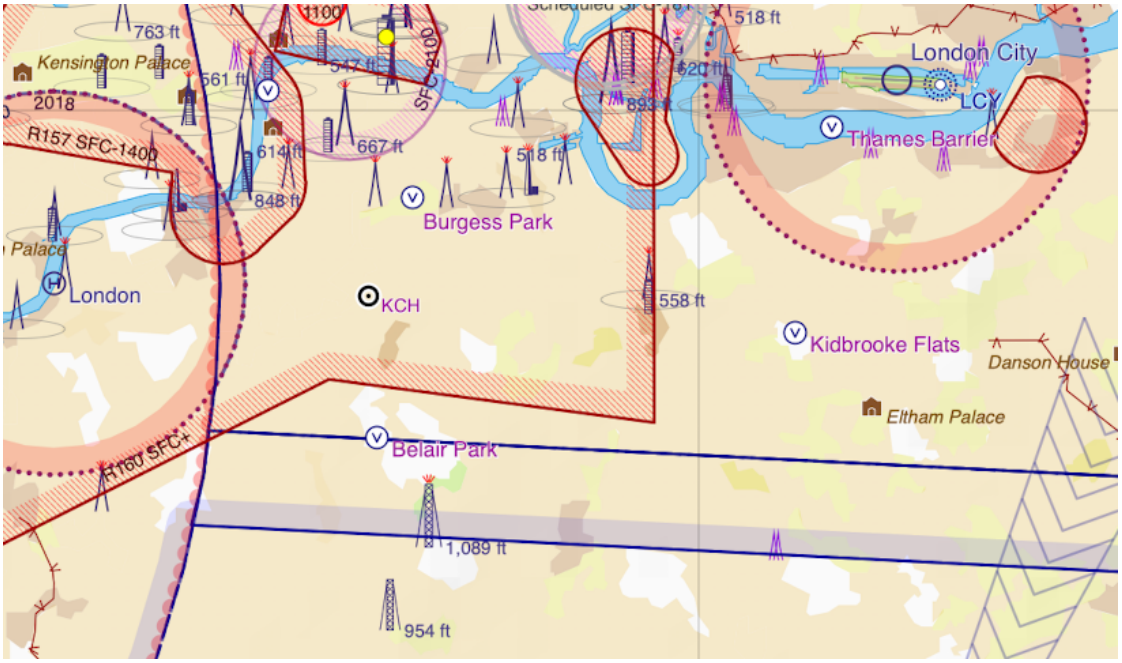

Figure 1: Local features to KCH

2.3 Airspace description

The approach to KCH is in the London City CTR and any traffic in this area is under a radar control service and is typically HEMS or Police.

Whilst there is VFR traffic on known heliroutes there is no common VFR traffic in this part of the CTR. There is no visual circuit associated with KCH Helideck. There are no local aerodromes operating circuit traffic.

The closest frequent VFR airspace users to KCH are traffic transiting the London Heliroutes 2.5nm to the North, and 2nm to the West of KCH. London (Battersea) Heliport is located 3.2nm to the West of KCH.

VFR arrivals to KCH are generally direct track under Category Alpha in coordination with Heathrow/Thames. Departures from KCH are generally due South (towards Redhill) and are conducted under Category Echo.

All operations to KCH share communications protocols with the other helipad equipped London MTCs. This provides situational awareness and ensures deconfliction of helipad movements between SAS operated aircraft and the London Air Ambulance. This is achieved using the emergency service 'TETRA' communications network.

2.4 The current approach and departure procedure

The following figure illustrates the current VFR routings to KCH in purple (routings of other AACKSS flights to RSCH and WHH are shown in green and orange). It shows that most inbound arrivals are in the sector between East and South East. The figure shows the 72 flights to KCH between 14 June 2023 and 22 September 2023, of which 12 were direct patient transfers from other hospitals:

- William Harvey, Ashford (7),
- Darent Valley, Dartford (4), and
- QEQM, Margate (1).

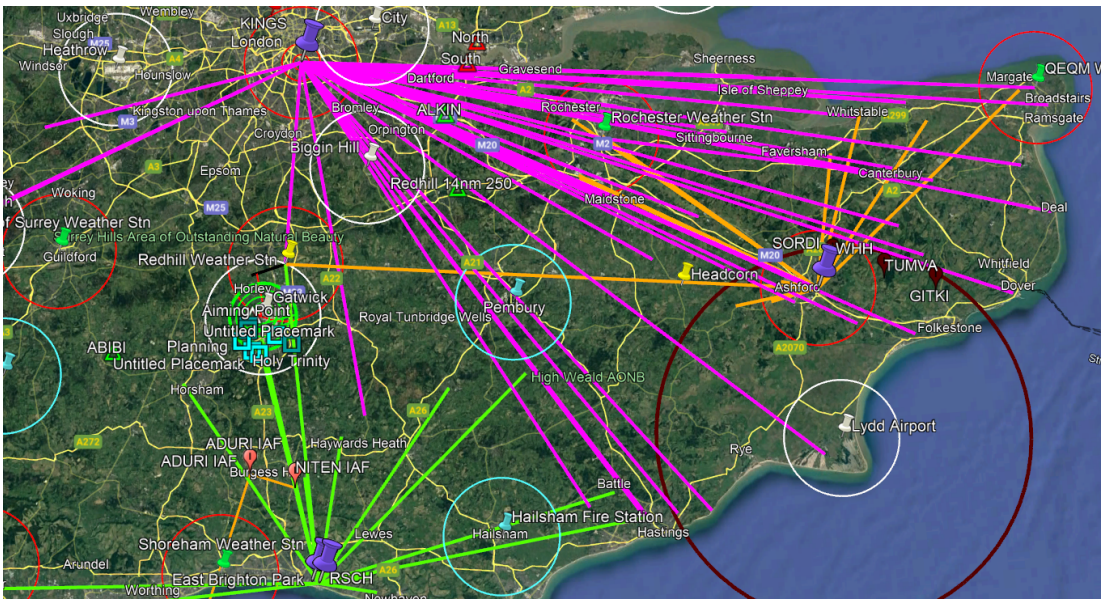

Figure 2: Current routings to KCH (purple lines)

The current usual directions for landings are shown on the figure below. Also marked are significant local obstacles (a Chimney and Tower) and 2 areas that are avoided for noise reasons.

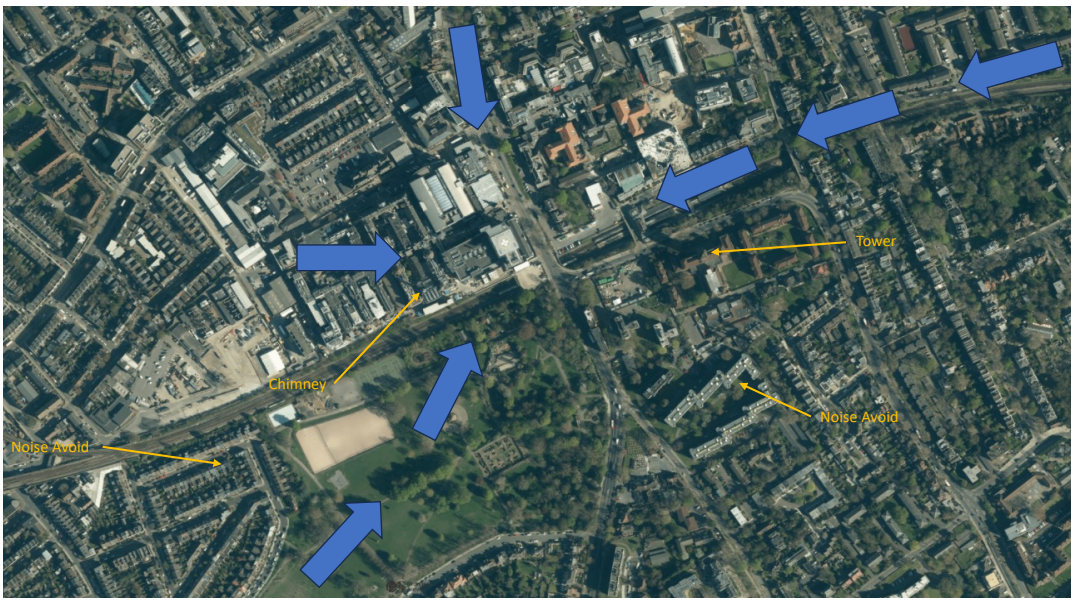

Figure 3: Landing directions of the current approach procedure

Approach clearances to KCH are generally given as “not above 1300ft”, though these may be to slightly higher altitudes when operating in the hours of darkness.

3 Design principles

3.1 Introduction

CAP1616 requires that options are assessed against the sponsor's Design Principles (DPs). Two DPs are provided in CAP1616 Part 1c as a minimum to assess against, and there is no requirement for change sponsors' own DPs to be developed at Stage 1. However, in this case, two additional DPs are proposed:

1. To minimise impact on other airspace users. This was chosen because the airspace of operation is of very high density, with significant nearby users such LCY, LHR and London (Battersea) Heliport.
2. To support where possible a transition to future more advanced concepts of PINS. This was proposed as future concepts of the same PINS procedure might allow the aircraft to operate at lower minima which will deliver more patient benefits. The initial procedure will be "Proceed VFR", but a future version of it could be "Proceed visually" or operated with reduced VFR minima.

3.2 Description

The final Design Principles are as follows:

	Design principles	Source
1.	The proposal must maintain a high level of safety	CAP1616 Part 1c (para 350).
2.	The proposal should avoid overflight of densely populated areas where possible	CAP1616 Part 1c (para 350).
3.	The proposal should minimise impact on other airspace users	Project sponsor
4.	The proposal should support, where possible, a transition to future more advanced concepts of PINS	Project Sponsor

Table 1: Design Principles

4 Early engagement

4.1 Introduction

Given the proximity of KCH to major London airports (notably London City and Heathrow) and its location inside the London City CTR, meetings were held with NATS on 5 Jul 2023 and 2 Aug 2023 to understand the constraints of operating in this airspace.

4.2 Summary of meetings with NATS

Key points from the meetings were:

- It is important to minimise impact on LCY operations and essential to avoid impacts on LHR operations.
- To minimise impact on LCY 27 operations, the procedure approaching from the east should attempt to maintain the required lateral separation (3nm) from LCY 27 arrivals.
- Any procedure into KCH will impact LCY 09 arrivals that overfly the ODLEG waypoint.
- An approach from the west may involve arriving from the south. Initially, it was felt that there should not be a missed approach to the north due to the potential for reduced separation from LCY traffic. After careful consideration it was decided that, as LCY would likely be on 09 in this scenario, deconfliction would be required in any case and so a possible go-around to the north would not be a further cause of conflict.
- It would be beneficial to have a hold to reduce controller workload. The ALKIN hold could be used for this purpose.
- An abbreviated flight plan filed by R/T or phone would be acceptable but as much notice as possible should be given.
- Departures could either turn south and leave CAS quickly or could take an easterly track and then route to the ALKIN hold. Both options have merits and disadvantages and need further investigation.
- A Letter of Agreement (LOA) between London TC at Swanwick and LCY tower would be appropriate to formalise the coordination.

5 Options considered

5.1 Introduction

Several alternatives were considered for the design, but the options were heavily constrained as discussed in this section.

5.2 Airspace constraints

The airspace constraints are shown below.

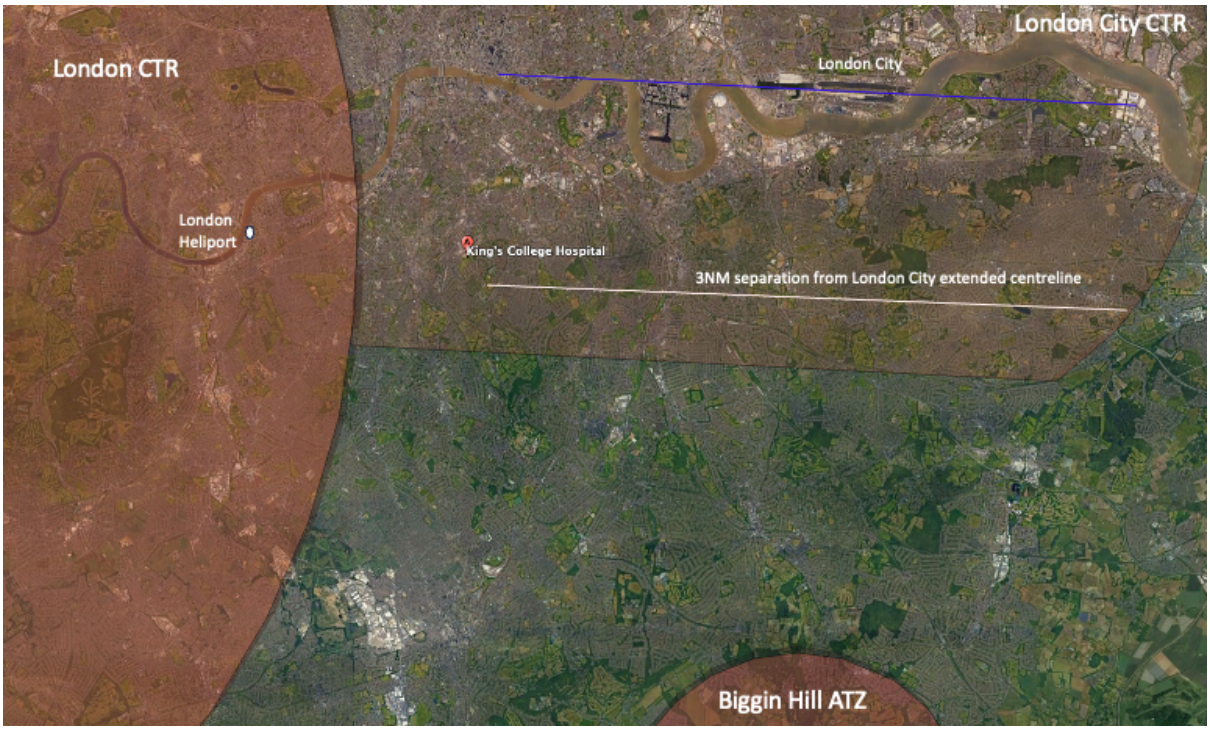

Figure 4: Airspace constraints

The constraints are as follows:

- The procedure should be inside the Controlled Airspace (CAS) as much as possible to benefit from an ATC separation service.
- However, it should as much as possible stay more than 3nm away from LCY traffic as this is the radar separation minima in this airspace. LCY will not be able to operate independently if the PINS procedure is within 3nm and this will increase ATC workload and disrupt LCY operations.
- The procedure should stay out of the London CTR (shown on the left), or if required to enter the London CTR should do so to the minimum practical extent and remain beneath 1500ft to prevent interference with Heathrow traffic. Avoiding impacts on Heathrow traffic was a requirement stated by NATS during early engagement.

- The procedure should minimise impact on other nearby facilities (Biggin Hill and London Heliport) as far as possible.

Several options were considered and discounted:

- An approach directly from the East (ie on 270 straight to KCH), discounted because it would be within 3nm of all LCY operations.
- An approach from the South or South East, discarded because it would only be in CAS for a short period of the approach. (Approaches from South East would also impact with Biggin Hill)
- Any approaches from the West discarded because of the proximity to LHR and entry in the London CTR.

The only option to maintain flight in CAS as long as possible but also maintain 3nm from LCY is for a westerly approach along the southern side of the London City CTR, below the white line shown, until west of the 'Isle of Dogs'. This is the option that is proposed.

6 Proposed option

6.1 Introduction

This section gives the indicative design of the proposed option for the KCH PINS procedure and, initially, its expected use.

6.2 Expected use of the PINS procedure

From 1 April 2022 to 31 March 2023 there were 365 patient transfers to the hospital, 121 of which were in the hours of darkness.

It is anticipated that having PINS procedures in place could enable an additional 70-80 direct AACKSS HEMS patient transfers per year due to the enhanced utility of the aircraft.

KCH is also used by other operators:

- Essex and Herts AA & Dorset and Somerset AA who might gain a few extra movements per year.
- London Air Ambulance, who make 1 landing for about 3.5 AACKSS landings, might expect to make an additional 20 landings per year.

It is estimated that there could be approximately an additional 100 landings per year to the KCH based on all the potential users.

6.3 Indicative procedure design – Approach

There is only one option proposed for the approach, but there are two alternatives for the missed approach. This figure shows the initial, intermediate and missed approach phases only. The approach has two IAFs for joining outside of CAS and then enters CAS but maintained 3nm from LCY (the black dotted line) until as late as possible. The visual segment is compliant with “Proceed visually” requirements.

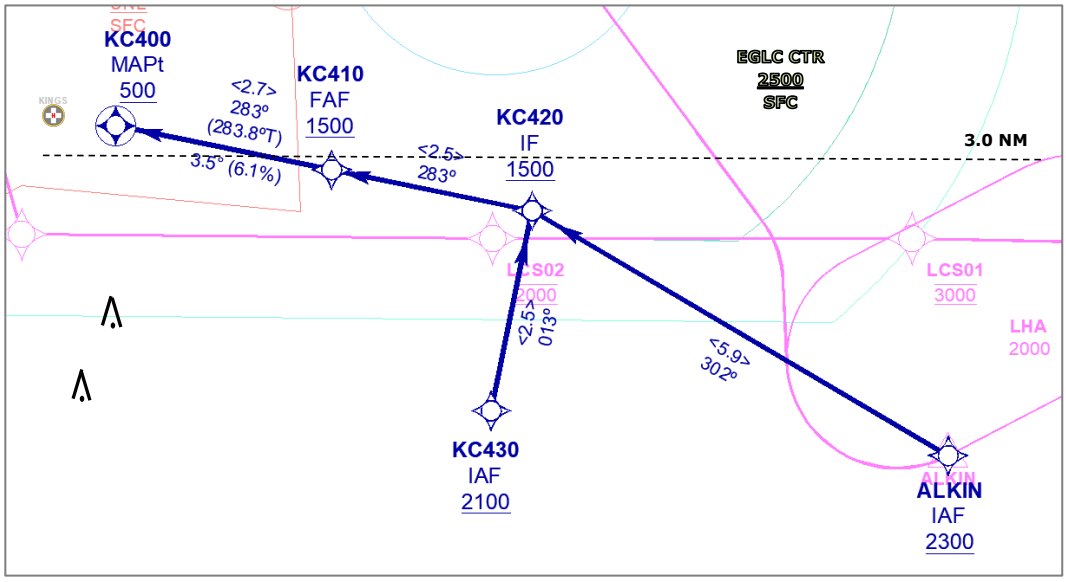

Figure 5: Proposed initial, intermediate and missed approach phases

The missed approach has two options as shown below. Note the MATF is the same in both options, so the visual segment/initial missed approach will not change. At the moment, option B is preferred as this would take the aircraft to IAF KC430 from where it would be straight forward to exit the hold and go straight into another approach. However, operationally both options are expected to be equally as effective as each other, so engagement shall establish which procedure minimises the impact on other stakeholders.

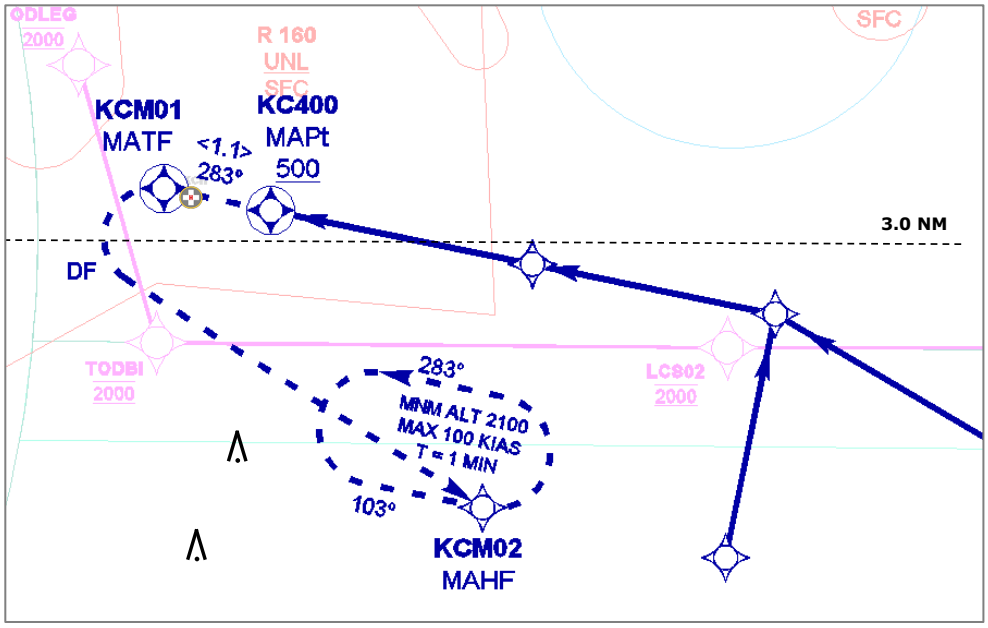

Figure 6: Missed Approach – option A

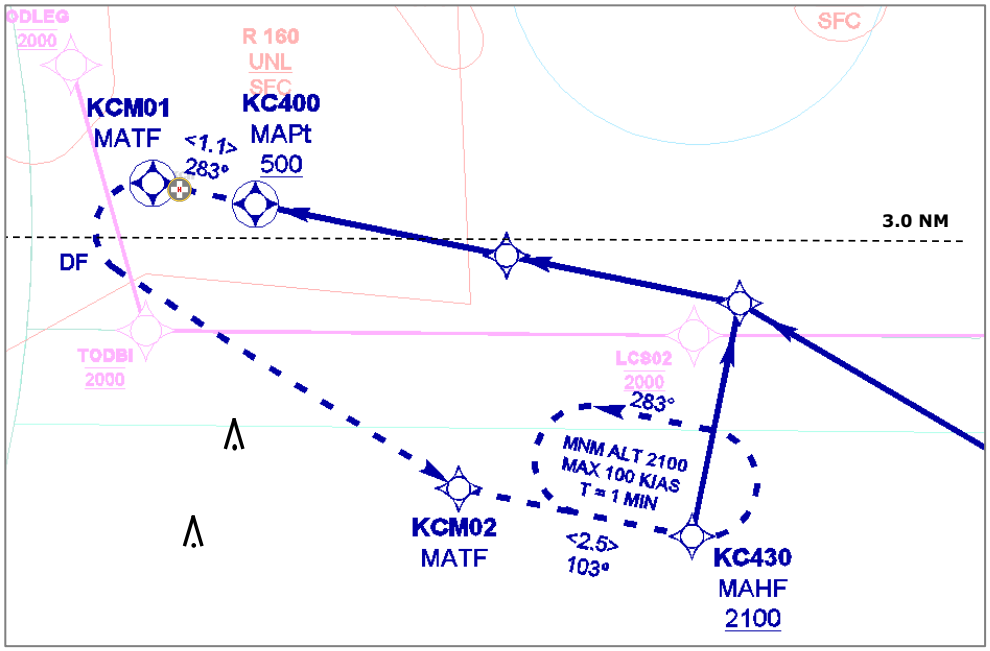

Figure 7: Missed Approach – option B

Detail of the landing segment/initial missed approach is shown below.

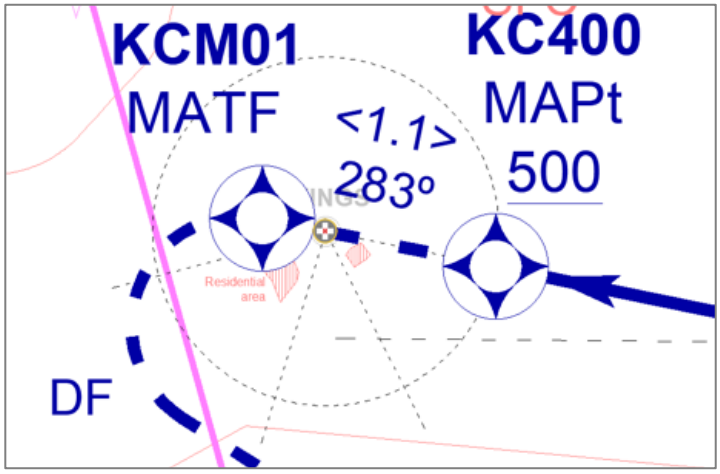

Figure 8: Detail of landing segment/initial missed approach

6.4 Indicative procedure design – Departure

Two departure procedures are proposed, giving options under different weather conditions. The first turn of the westerly departure enters the London CTR and London (Battersea) Heliport Local Flying Area but this cannot be avoided.

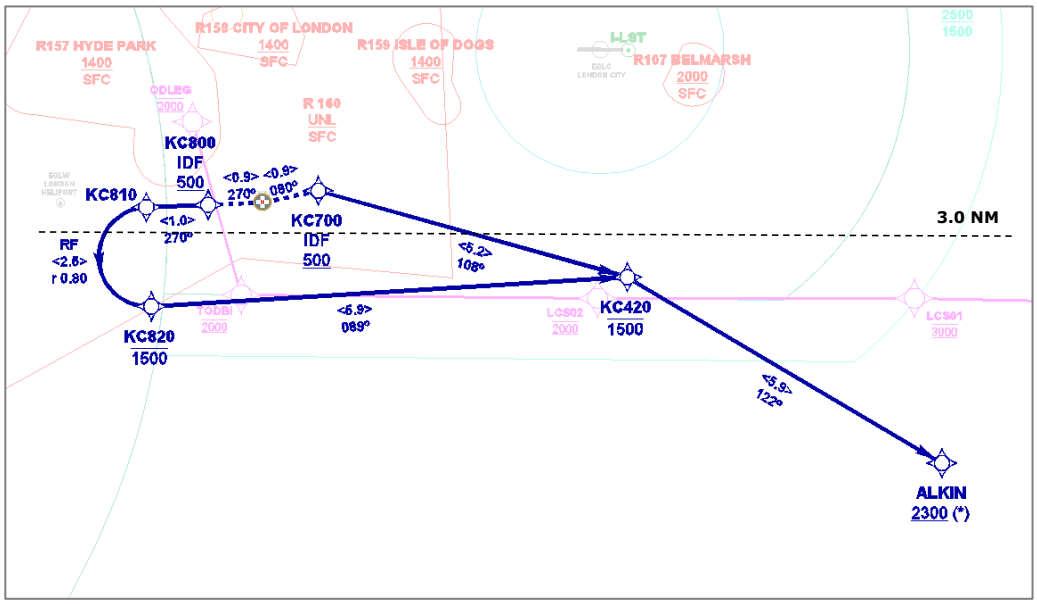

Figure 9: Departure procedures

6.5 Operational procedures

As today, the procedure will be in CAS under the ATC separation service provided by NATS (Thames Director). Procedures will be introduced to ensure coordination with other stakeholders (LCY, LHR, London Heliport and Biggin Hill).

Deconfliction of use of the helideck will be undertaken using the same procedures as currently used, ie:

- All operations to KCH are coordinated by the regional HEMS desk.
- All emergency service operators share situation awareness using the 'TETRA' communications network and use this to ensure deconfliction of helipad movements.

7 Design principle evaluation

7.1 Introduction

This section presents the design principle evaluation (DPE) against the design principles presented in Section 2.

The DPs are listed below along with the criteria for the evaluation.

	Design Principles	Red	Amber	Green
1.	The proposal must maintain a high level of safety	Significant safety risks identified that are not expected to be resolvable.	Safety risks are identified to be resolved, but an acceptable solution is expected.	No significant safety risks identified at this stage.
2.	The proposal should avoid overflight of densely populated areas where possible	The proposed design overflies densely populated areas.	The proposed design overflies densely populated areas, but mitigations may be possible, or this is unavoidable.	The proposed design does not overfly densely populated areas, or where it does is unavoidable.
3.	The proposal should minimise impact on other airspace users	Significant impact on other airspace users	Other airspace users will need to make significant changes to their operations	Impacts can be managed such that users do not need to make significant changes to their operations
4.	The proposal should support, where possible, a transition to future more advanced concepts of PINS	Procedure definitely not suitable for "proceed visually"	Procedure may be suitable for "proceed visually"	Procedure is likely to be suitable for "proceed visually"

Table 2: Design principle evaluation criteria

7.2 Evaluation of DP 1: The proposal must maintain a high level of safety

The proposed option has a high level of safety from these respects:

- It is in controlled airspace for as much as possible, so it benefits from an ATC separation service to the greatest extent.
- It provides aircrew with an Instrument Procedure in place of a Visual one.
- The use of a pre-published and known procedure should reduce ATC workload.

- It is expected the design will be PANS OPS compliant and takes account of all other airspace and local constraints.
- It maintains a track away from London City and other airports in the London CTR, and from Biggin Hill as much as possible.

However, Letters of Agreement still need to be agreed with relevant stakeholders and therefore the proposed option is currently assessed at AMBER against this DP. The assessment is expected to be GREEN once the solutions have been achieved.

7.3 Evaluation of DP 2: The proposal should avoid overflight of densely populated areas where possible

It is not possible to entirely avoid overflight of densely populated areas in this proposal since the hospital is in London. The following figure shows the populated areas around KCH when approaching from the East.

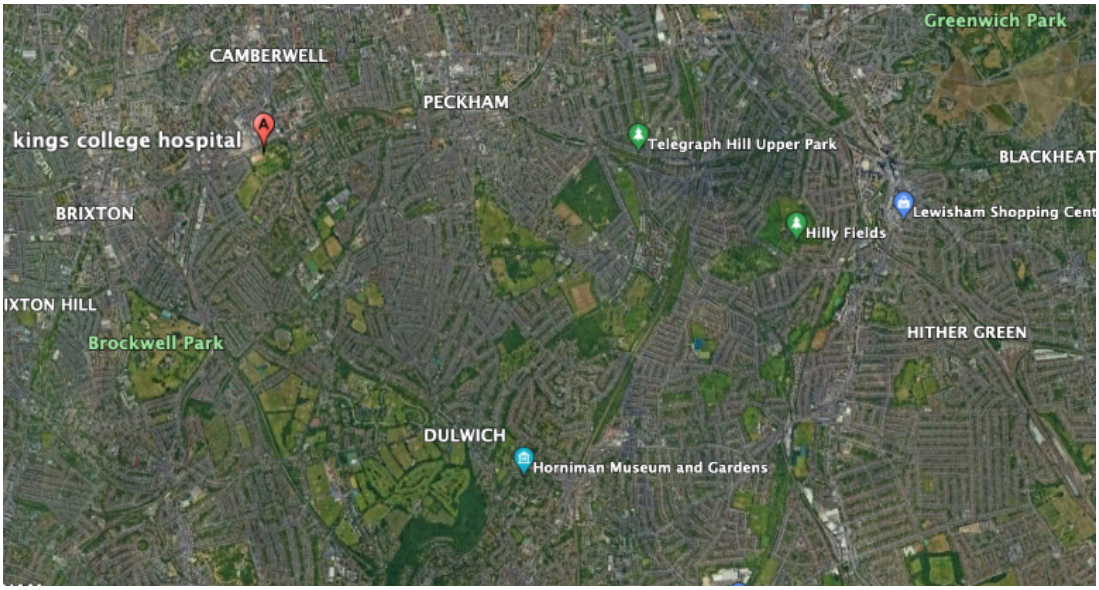

Figure 10: Populated areas East and South of KCH

However, the proposal aims to avoid 2 noise sensitive areas that have been identified near to the hospital. These are shown below. They are avoided in current operations and will also be avoided by the PINS procedure as shown below.

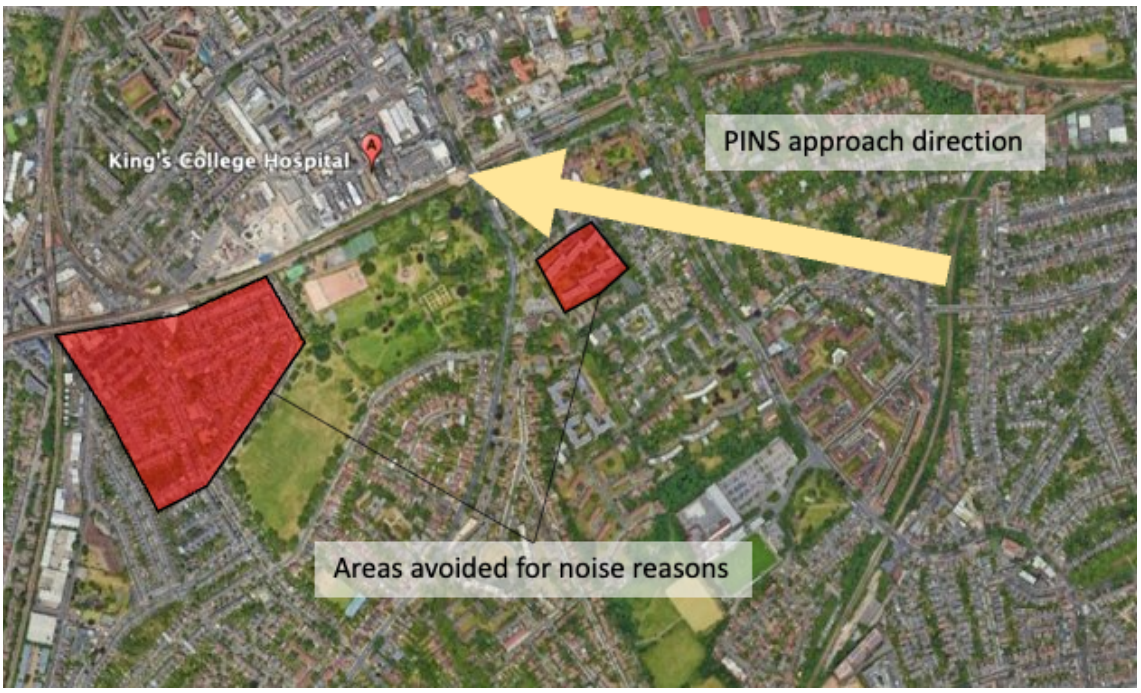

Figure 11: Avoiding noise sensitive areas close to KCH

Given the unavoidability of overflight of populated areas but also the fact that it avoids the existing noise sensitive areas close to the hospital, this DP is assessed as GREEN.

7.4 Evaluation of DP 3: The proposal should minimise impact on other airspace users

Impacts on other airspace users cannot be avoided in this airspace as it is so close to other airports. Nevertheless, the proposal minimises impact on other airspace users as follows:

- The PINS approach and missed approach track are beyond radar separation (3nm) from LCY aircraft tracks as far as possible.
    - For Westerly LCY approaches, the PINS approach is further than 3nm during the final approach and departure track. LCY missed approaches can be vectored to the North so will also remain further than 3nm. This means westerly approaches should be entirely independent of the PINS procedure.
    - For Easterly LCY approaches, it is not possible to maintain radar separation from PINS. The LCY easterly approach arrives south of KCH and passes over the ODLEG waypoint, which is within 1nm from KCH, at 2000ft. In this case, the two procedures cannot be independent and ATC coordination will be required when both are used.
- The procedure maintains distance from Heathrow traffic as far as possible.
- The procedure is outside of the London (Battersea) Heliport Local Flying Area except for the initial turn of the missed approach. A coordination procedure will be established with the Heliport.

- The procedure crosses the Biggin Hill Approach procedure but remains well clear of the Biggin Hill ATZ. A coordination procedure will be established with Biggin.

This DP is therefore assessed as GREEN since impacts on other airspace users are managed such that they do not require other airspace users to significantly change their operations.

7.5 Evaluation of DP 4: The proposal should support, where possible, a transition to future more advanced concepts of PINS

The proposal is based on “proceed VFR” operation for both the approach and departure visual segments. In the future, this element may be developed into a “proceed visually” operation which will have lower weather minima and therefore will allow operations in lower visibility or cloud base.

“Proceed visually” PINS operations are not yet approved in the UK, but the procedure can be designed with approach and departure tracks that are compliant with both of the “visual segment” requirements. This will ease the transition from “proceed VFR” to “proceed visually”.

It should be noted that there are other requirements that will need to be fulfilled for this change to happen, although they should not alter the track over the ground.

The proposed procedure is designed to the requirements of “proceed visually” as far as possible at this stage, so this DP is evaluated as GREEN.

8 Initial appraisal of the proposed option

8.1 Introduction

This section presents an initial appraisal of the proposed option from the perspectives of safety, the environment, economic factors and airspace users.

8.2 Safety Impact

The section considers the safety impact from a qualitative perspective. A complete safety assessment will be submitted with the final ACP.

An ATM safety questionnaire has been completed for this ACP and reviewed by the CAA. The main element for further work from the questionnaire and the CAA review is:

- The need for engagement with stakeholders and safety assurance to be supported by Letters of Agreement (LOAs).

Initial discussions with NATS highlighted constraints and issues to be resolved, but did not raise any particular safety concerns. The results of this early engagement are in Section 4.

8.3 Environmental impact

This ACP meets the requirements of paragraph 356 of CAP1616 so a limited environmental assessment is required, as provided below.

As described earlier, the introduction of PINS procedures, in combination with the lit landing facility, is expected to result in about 100 additional HEMS flights to the hospital per year.

These missions will be undertaken by the same aircraft already operating VFR to the hospital (AW169 helicopters for AACKSS).

Aircraft will generally fly at similar altitudes or slightly higher under the PINS procedure than today under VFR. At present, clearances into the London City CTR are generally at 1300ft - 1500ft. The PINS procedure starts at 2100ft or 2300ft (depending on where the approach is joined) and has a final approach fix at 1500ft.

The aircraft on the PINS procedure will not follow the usual VFR routes shown in Figure 2, but will be on the PINS procedure shown below. The intermediate/final approach tracks are on a heading of 283° which is consistent with the most common approach directions used in current VFR operations. It can be seen that, from the IF at 1500ft, the procedure passes North of New Eltham over Hither Green when it starts to descend to the Missed Approach Point, passing over Lewisham.

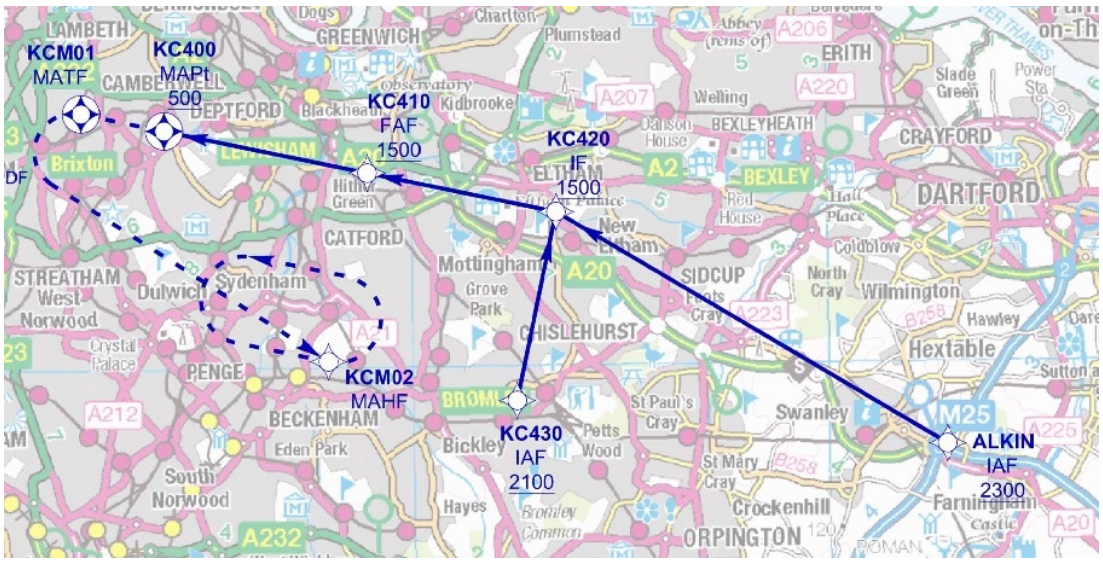

Figure 12: Arrival procedure

Detail of the two departure procedures are shown below which merge at point KC420. The Easterly departure is slightly north of the arrival track. The Westerly departure is similar to the missed approach, but goes slightly further west, and overflies Streatham and Catford.

Figure 13: Departure procedure East

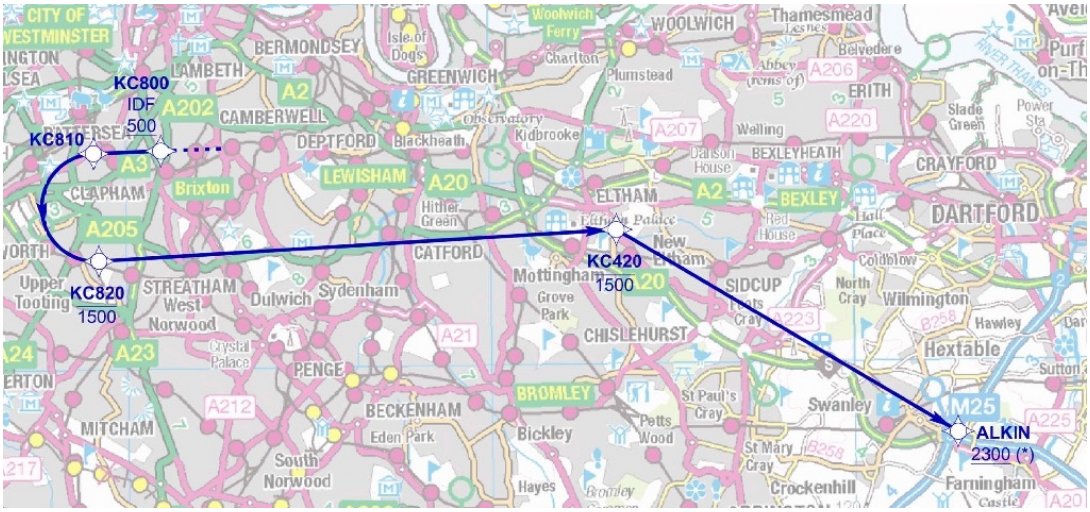

Figure 14: Departure procedure West

Initially, some of the current VFR flights will use the PINS procedure for training purposes. Therefore, there may be a change in track for those existing flights with these flights approaching on the PINS procedure paths instead of the current directions. Once the procedure is established, and crews are familiar with its operation, this is not expected to continue. The number of additional PINS flights during this training phase is likely to be up to 30, over a 2-month transition period.

8.4 Economic impact

The new PINS procedure will improve patient medical outcomes which will have a positive economic impact.

In addition, a qualitative description of the economic effects are as follows:

- **Fuel burn**: There will be increase fuel use as there will be more HEMS missions flown, although there is less fuel used by road ambulance.
- **Greenhouse gases**: There will be additional greenhouse gases (eg CO2) caused by the additional fuel burn, although there is less fuel used by road ambulance.
- **Operator training costs**: There will be additional operator training required to introduce the new PINS procedure. However, longer term, the procedure will be used to maintain IFR currency which will reduce transits to other IFR training aerodromes.
- **Heliport infrastructure costs**: There may be additional costs on heliport infrastructure, e.g. if changes to the MET system or lighting are required.

It is not expected there will be any impact on General Aviation access to airspace.

8.5 Impacts on airspace users

The PINS procedure could have the following impacts on other airspace users:

- Controller intervention maybe required for an arrival to London City (LCY) on Westerly operations that is on a missed approach if a helicopter is close to landing at KCH. In this case, the 3NM separation requirement could be infringed if controller action is not taken.
- During Easterly operations at LCY, all operations with KCH will need to be co-ordinated as the LCY approach overflies the PINS approach. This cannot be avoided. When departures are lower priority (Category Echo) then this will ease the co-ordination requirements with LCY.
- Arrivals to Biggin Hill will also need to be co-ordinated as the PINS procedure will cross the Biggin approach track when Biggin arrivals are 6.5nm from touchdown (at an altitude of about 2000ft).
- The use of the ALKIN hold will also have to be co-ordinated.
- The westerly departure procedure will briefly enter the London (Battersea) Heliport Local Flying Area, at an altitude of “not above 1500ft”.
- Coordination will be undertaken with Heathrow.

To formalise co-ordination, letter of agreements will be established with:

- London TC at Swanwick,
- LCY,
- Biggin Hill, and
- London Heliport (Battersea).

9 Summary

Kings College Hospital (KCH) is a Major Trauma Centre Approach Located in Denmark Hill, South London used by the Air Ambulance Charity Kent Surrey Sussex (AACKSS). The helicopter service for AACKSS is operated by Specialist Aviation Services Ltd, the sponsor of this ACP.

The purpose of this ACP is to gain approval for the design and introduction of RNP instrument procedures using Helicopter PINS criteria at KCH. These will supplement the existing VFR procedures and enable approximately an additional 100 HEMS missions to the hospital per year.

A design has been proposed that meets the application's Design Principles. It has been subject to an initial appraisal and it is proposed to take the application to Consultation in Stage 3 of the 1616 process.

A Acronyms

AA	Air Ambulance
AACKSS	Air Ambulance Charity Kent Surrey Sussex
ACP	Airspace Change Proposal
ATC	Air Traffic Control
CAA	Civil Aviation Authority
CAS	Controlled Airspace
CTR	Control Zone
DP	Design Principle
ft	feet
HEMS	Helicopter Emergency Medical Services
IAP	Instrument Approach Procedure
KCH	Kings College Hospital
LCY	London City
LHR	London Heathrow
LOA	Letter of Agreement
MTC	Major Trauma Centre
nm	nautical mile
PINS	Point In Space
RNP	Required Navigation Performance
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions