Specialist Aviation Services (SAS)

CAP 1616 Assessment Meeting

ACP-2023-027 Kings College Hospital

ACP-2023-028 Brighton Hospital

Agenda

- Introduction - CAA
- Who are SAS and AACKSS? why do we see a need for IFR in HEMS? - SAS
- UK HEMS suitability to IFR integration - SAS
- Statements of need (discussion & review) - ALL
    - ACP-2023-027 Kings College Hospital, London
    - ACP-2023-028 Royal Sussex County Hospital, Brighton
- Issues or opportunities arising from proposed changes - SAS
- Options to exploit opportunities or address issues identified - SAS
    - AACKSS illustrative concepts
- CAP 2520 – discussion - ALL
- Provisional indication of the level and process requirements - CAA
- Provisional process timescales - ALL
- Next steps - ALL
- AOB - ALL

Introduction - CAA

Who are Specialist Aviation Services (SAS)?

1984
A History

Police Aviation Services Ltd.

The business started this year as Police Aviation Services Ltd. It was the first police aviation operator to be approved in the UK.

1986
A History

Medical Aviation Services Ltd.

Following the success of Police Aviation Services two years later Medical Aviation Services Ltd was formed.

1999
A History

Launch Operator for the MD 902.

SAS became the launch operator for the MD 902 in the UK.

2015
A History

Specialist Aviation Services Ltd Formed

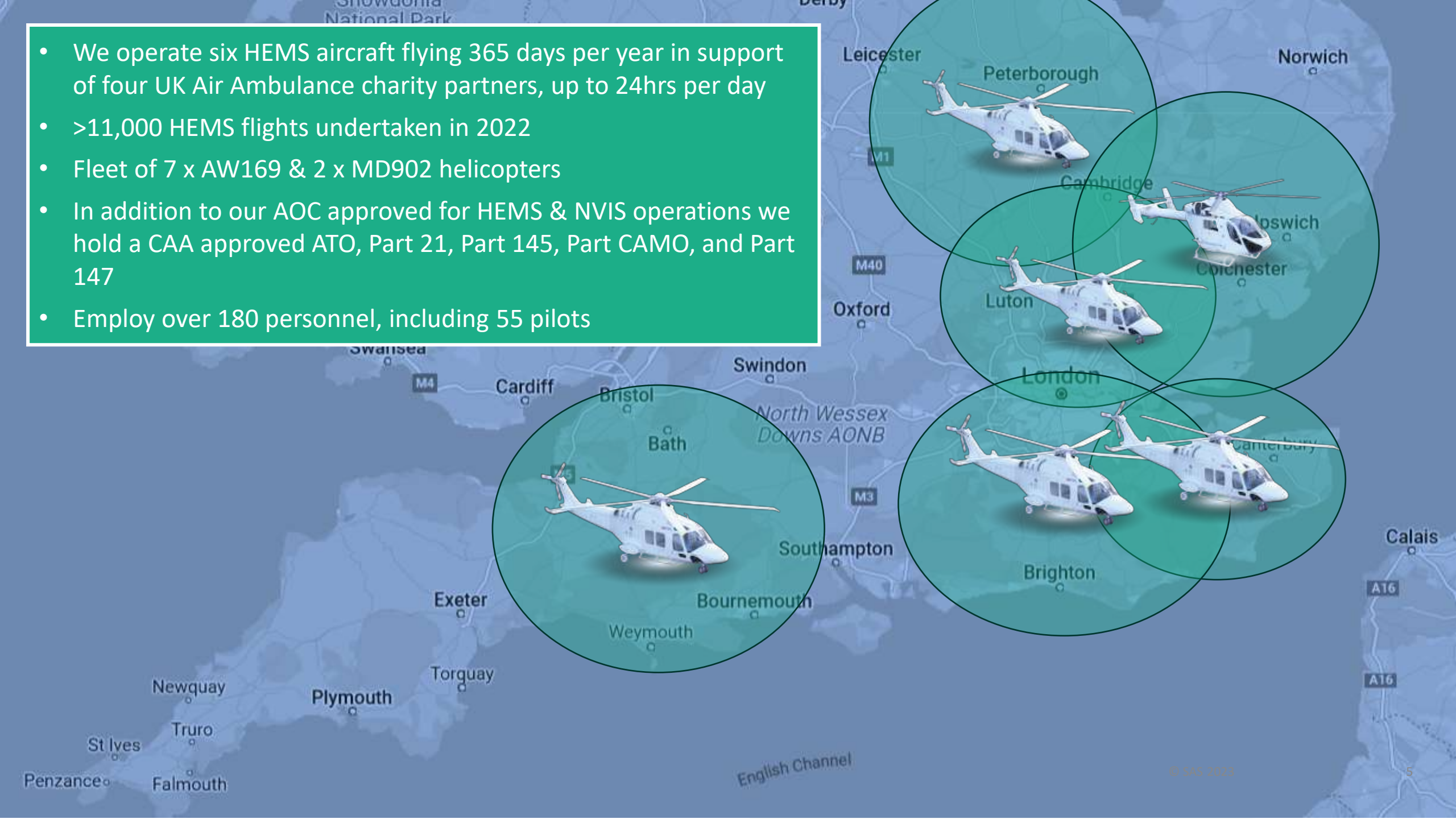
Specialist Aviation Services Ltd formed and all previous company names withdrawn from use.

2017
A History

HEMS Leonardo AW169 Launch Operator

SAS becomes the launch operator for HEMS Leonardo AW169 in the UK.

- We operate six HEMS aircraft flying 365 days per year in support of four UK Air Ambulance charity partners, up to 24hrs per day
- >11,000 HEMS flights undertaken in 2022
- Fleet of 7 x AW169 & 2 x MD902 helicopters
- In addition to our AOC approved for HEMS & NVIS operations we hold a CAA approved ATO, Part 21, Part 145, Part CAMO, and Part 147
- Employ over 180 personnel, including 55 pilots



Who are Air Ambulance Charity Kent Surrey & Sussex (AACKSS)?

Est. 1989

7,390 km²
Area covered

40,000
Total incidents attended

87%
Income from donations and fundraising

Operating a fleet of 3 x AW169 helicopters and serving a population of approximately 4.8 million people, AACKSS are driven by saving lives and ensuring the best possible patient outcomes

Over the past three decades AACKSS have attended over 40,000 incidents. Last year alone we responded to over 3,200 incidents

Using Night Vision Goggles since 2013, AACKSS were the first 24hr HEMS service in the UK

Our dispatchers task our crews of pilots, doctors and paramedics, and life-saving equipment, to our patients 24/7/365

When the call comes, we can reach any part of Kent, Surrey or Sussex in under 30 minutes

Why do SAS/AACKSS need PinS & IFR en-route in HEMS?

Our Five-Year Strategy

We are taking bold, collaborative action to reach more patients, improve more outcomes and save more lives, by:

- Developing our aviation capability to increase the number of hours we can fly for
- Investigating the use of drones to get defibrillators to those in need more quickly
- Developing a Patient and Family Aftercare Service to support our patients and families in their rehabilitation and recovery
- Continuously innovating and utilising technology to develop and further improve the treatment and care we can deliver

Why do SAS/AACKSS need PinS & IFR en-route in HEMS?

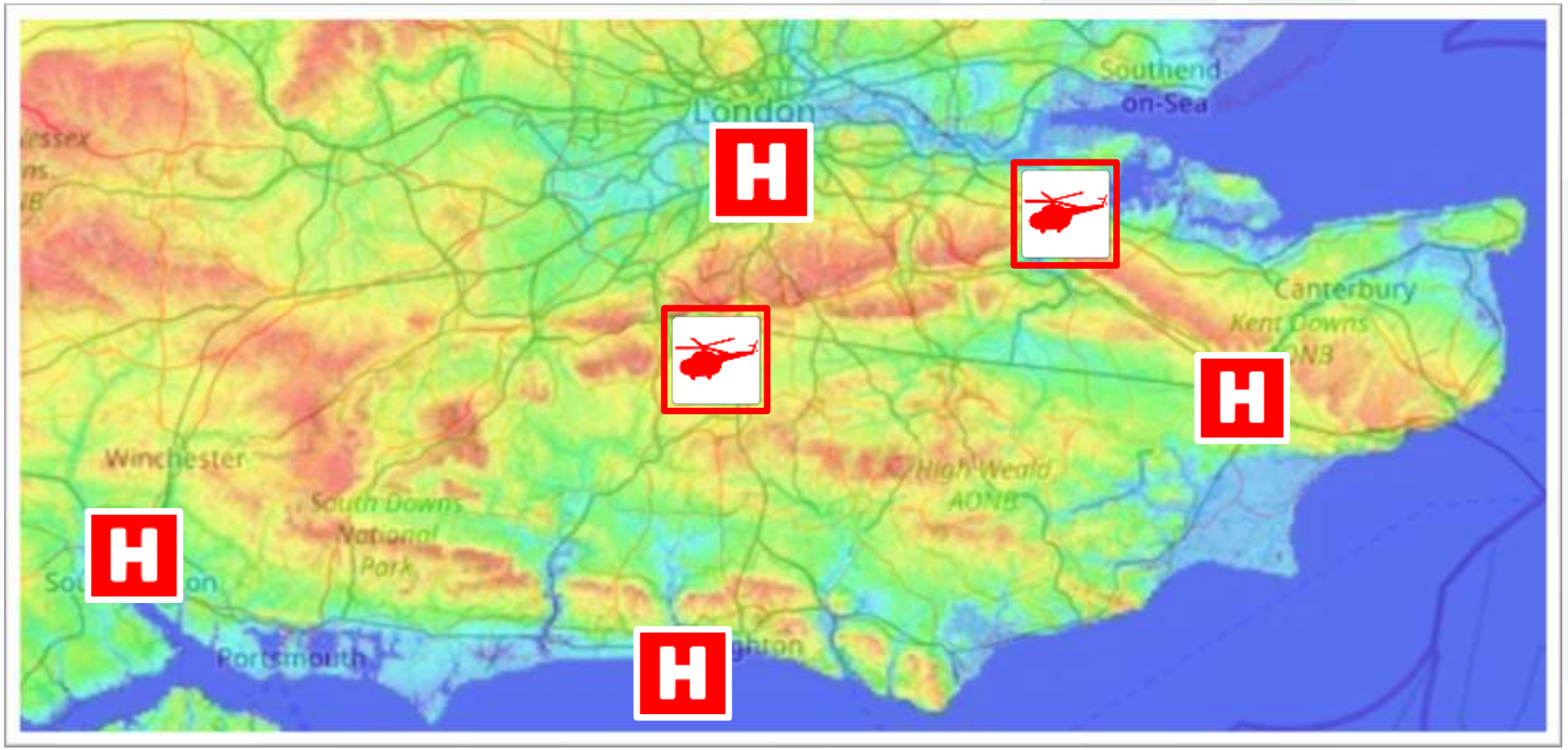
The short answer is – **to improve patient outcomes**

- Atlantic depressions routinely bring low cloud ceilings to the UK (in the region 600ft-1500ft AMSL), particularly during ‘warm sectors’
- The South East UK has regular extended ridge lines of terrain up to approx. 1200ft AMSL. These features are often situated between the region’s Major Trauma Centres (MTCs) and HEMS Operating Bases
- The inability to cross terraneous areas during UK weather systems frequently prevents VFR air access to a Major Trauma Centre (MTC) by air (approximately 1 in 3 patients cannot be conveyed by air)

  Note - for VFR Night HEMS:

  1,200 ft (1,000 for short periods) is the minimum permissible Night HEMS cloud base. This equates to 2,200ft AMSL in many regions. It is common for low-cloud to prevent VFR transit options despite favourable visibility & cloud base in the location of the HEMS Operating Base and/or Hospital
- Research shows that where required, the time savings associated with conveyance by air improve patient outcomes
- A network of Instrument Flight Procedures will enable us to improve operational coverage, reach more patients, convey more patients to hospital, and reduce the time to definitive care for those patients conveyed

AACKSS regional terrain illustration



454 m
410 m
368 m
328 m
291 m
257 m
225 m
196 m
169 m
144 m
122 m
102 m

= HEMS Operating Base

= Major Trauma Centre (MTC) or strategically significant hospital

UK HEMS suitability to IFR integration

- Favourable operating altitudes and temperatures – typical MSA is 2,400ft in South-East region, and 2,500-3,000ft in South-West
- Short HEMS sectors enabling IFR fuel reserves (typically <50nm)
- Good availability of IFR equipped aerodromes in the region (alternates, fuel etc)
- Widespread use of remote weather stations at hospitals, and nearby certified MET sources
- Well established multi-pilot HEMS operations and SOPs, reducing pilot workload and increasing cockpit capacity for workload management and monitoring
- Many UK HEMS pilots with previous multi-crew ‘offshore’ IFR experience on complex helicopters

UK HEMS suitability to IFR integration

- Helicopter types – SAS' commercial IFR operations are conducted exclusively using the AW169:
  - CS-29 safety standards & 4-axis automation
  - HTAWS, SVS & TCAS II for situational awareness and mitigations against MAC/CFIT
  - Dual GNSS/SBAS with full RNP APCH certification including: LNAV/VNAV/LP/LPV, BaroVNAV, RNP 0.3, and RNP AR APCH - *during complex RNP AR 0.1 trials in Switzerland, the AW169 average TSE was <10m during all approach phases*
  - Good fuel reserves (typical operating fuel on departure of 1h40 + IFR reserves, with capability to carry a further 20 mins endurance on departure if required)
  - Future MTOW increases are expected gaining further payload/endurance (ability to carry full fuel, an additional 100kg/0h20 fuel endurance discussed for certification pipeline)
  - SAS employ 53 IFR/PBN qualified and current pilots

Statements of need

ACP-2023-027 Kings College Hospital, London

ACP-2023-028 Royal Sussex County Hospital, Brighton

Kings College Hospital (ACP-2023-027)

Statement of need

"Kings College Hospital (KCH) in Denmark Hill is the primary Major Trauma Centre 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.

KCH lies inside the London City CTR and below the London TMA. At present, operations 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.

The purpose of this ACP is to gain approval for the design and introduction of RNP instrument procedures using Helicopter Point in Space (PINS) criteria. These will supplement the existing VFR procedures.

In addition to patient benefits, the instrument procedures will improve safety. It has been proven that planned IFR flight offers significant safety benefits over VFR flight in marginal VMC conditions, as supported by a number of AAIB recommendations for the adoption of PINS."

Brighton Hospital (ACP-2023-028)

Statement of need

"Brighton Royal Sussex County Hospital (BRSCH) is a Major Trauma Centre 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.

BRSCH lies on the south coast, sitting within class G airspace. At present a roof top helideck is being constructed but arrivals currently go to the nearby secondary Hospital Landing Site. Once completed operation will be limited to Visual Meteorological Conditions (VMC) due to the lack of Instrument Approach and Procedures.

AACKSS transports patients to BRSCH on average 3-4 times per week but, due to the limitation to operate in VMC conditions, about 1 patient a week must be conveyed by road instead of air. Transport by helicopter is faster than by road and therefore improves outcomes for critically ill patients.

The purpose of this ACP is to gain approval for the design and introduction of RNP instrument procedures using Helicopter Point in Space (PINS) criteria. These will supplement the existing VFR procedures.

In addition to patient benefits, the instrument procedures will improve safety. It has been proven that planned IFR flight offers significant safety benefits over VFR flight in marginal VMC conditions, as supported by a number of AAIB recommendations for the adoption of PINS."

Issues or opportunities arising from proposed changes

Issues or opportunities arising from proposed changes

Opportunities:

- Enabling new operational capabilities using modern technology
- Improving access to HEMS infrastructure in poorer weather
- Improving access to primary HEMS patients in poorer weather
- Community benefit from added capability and availability of a vital HEMS service, improving patient outcomes
- Enabling flight at safe & known IFR transit flight altitudes in place of low-level VFR routings, thereby;
  - Mitigating CFIT risks
  - Reducing risks to 3rd parties
  - Reducing noise impact for 3rd parties
  - Providing predictable and planned routings
- ATM – known routings in CAS
- Negligible environmental impact

Issues or opportunities arising from proposed changes

Potential issues:

- Negative impact on other airspace users if RMZ /TMZ deemed necessary in Class G
- Risks of MAC when flying IFR-to-VFR in Class G with non-radio and/or non-transponder/EC traffic
- Robustness of safeguarding against temporary and/or unnotified obstacles
- Initial limitations against potential benefits, particularly:
    - UK LPV/SBAS capabilities (threats of BaroVNAV errors which are overcome by LPV)
    - 'Proceed VFR' limitation with existing HEMS Night VFR requirements *(1,200ft cloud base, 1,000 for short periods)*

  Note – we are not pushing for 'Proceed Visually' at the offset, but will design with future-proofing in mind to maximise potential suitability (where appropriate) to Proceed Visually or reduced VFR minima (case-by-case).

    - Minimum OCH policy for PinS 'Proceed VFR' if applied from an elevated helideck as opposed to the MAPt environment

  Note – PinS doesn't require a destination when 'Proceeding VFR', so OCH needn't be associated with a given location which could be some miles away under VFR - example being Brighton where an option may be to locate the MAPt a short distance over water, away from the built up area and obstacle/terrain environment.

Options to exploit opportunities or address issues identified

Options to exploit opportunities or address issues identified

The implementation of IFR Point-in-Space procedures at King's Hospital and Brighton Hospital, are the proposed solutions to enable new operational capabilities using modern technology, improving operational availability, patient outcomes and safety when operating in marginal weather conditions.

These Point-in-Space procedures should be designed around the following principles:

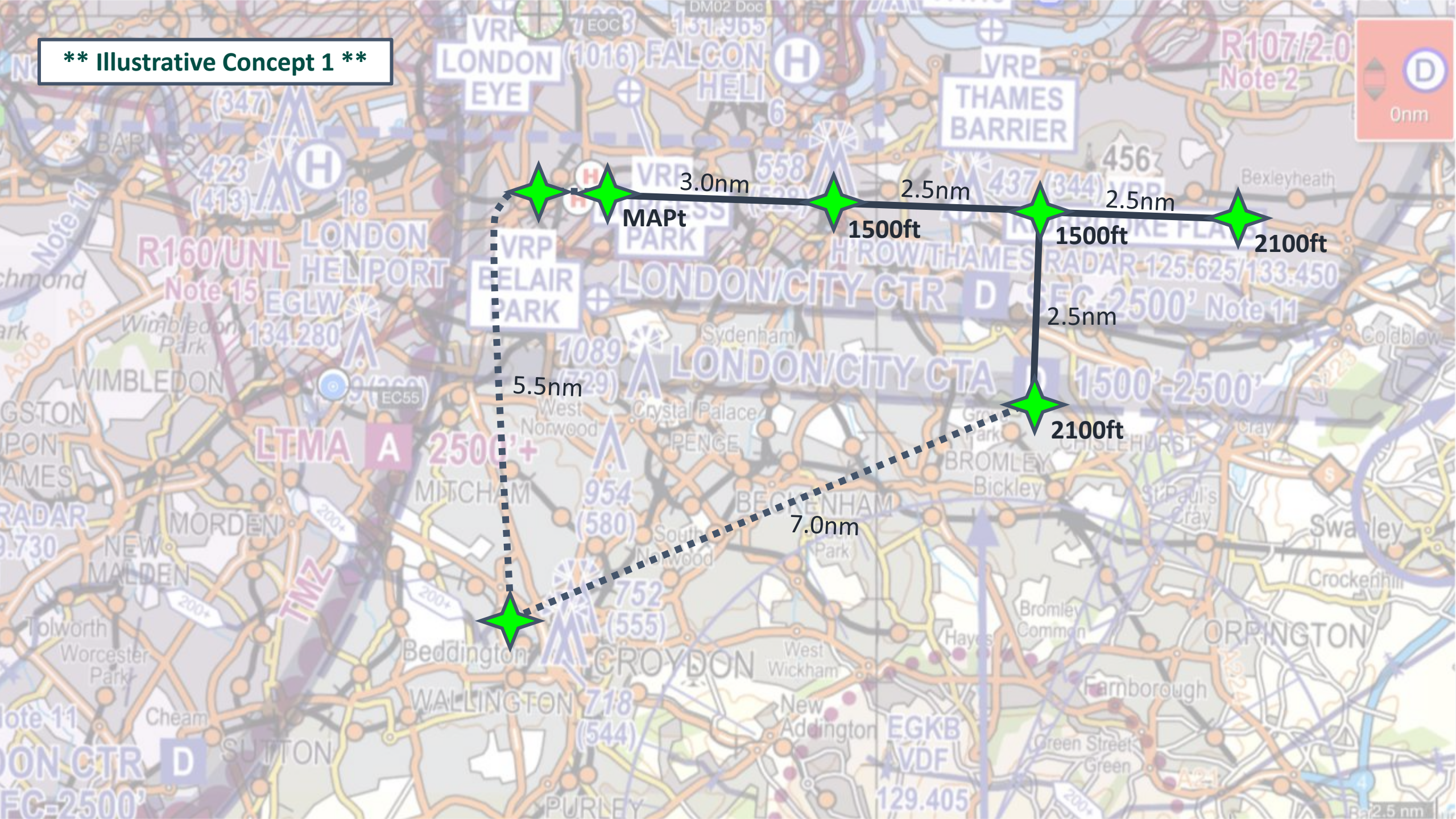
- The proposals must maintain a high level of safety
- The proposals should minimise impact on other airspace users
- The proposals should avoid unnecessary complexity and have ease of flyability (workload management)
- The proposals should avoid overflight of densely populated areas where possible
- The proposals should be future-proofed for capability improvements

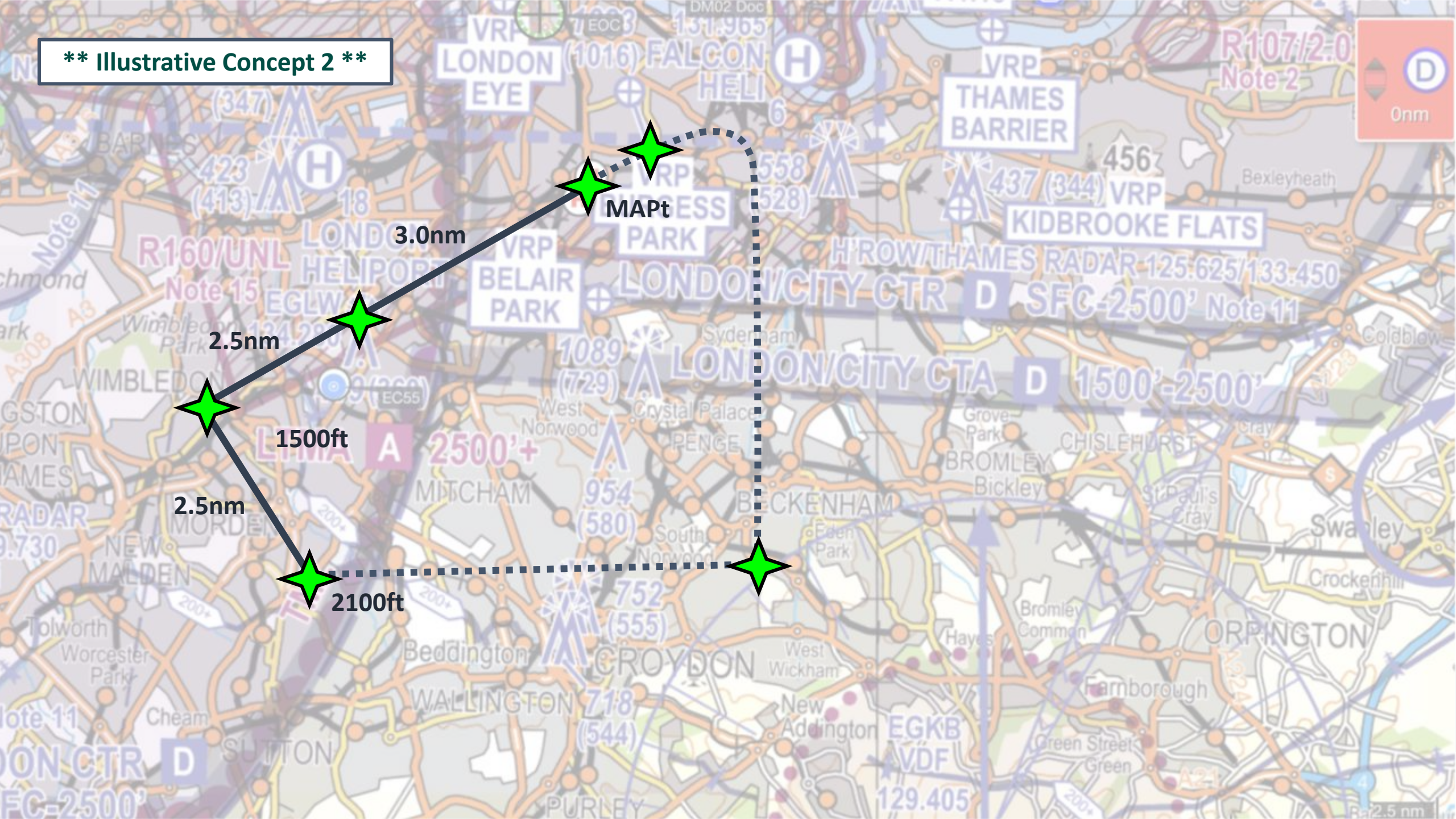
Kings College Hospital (KCH), London

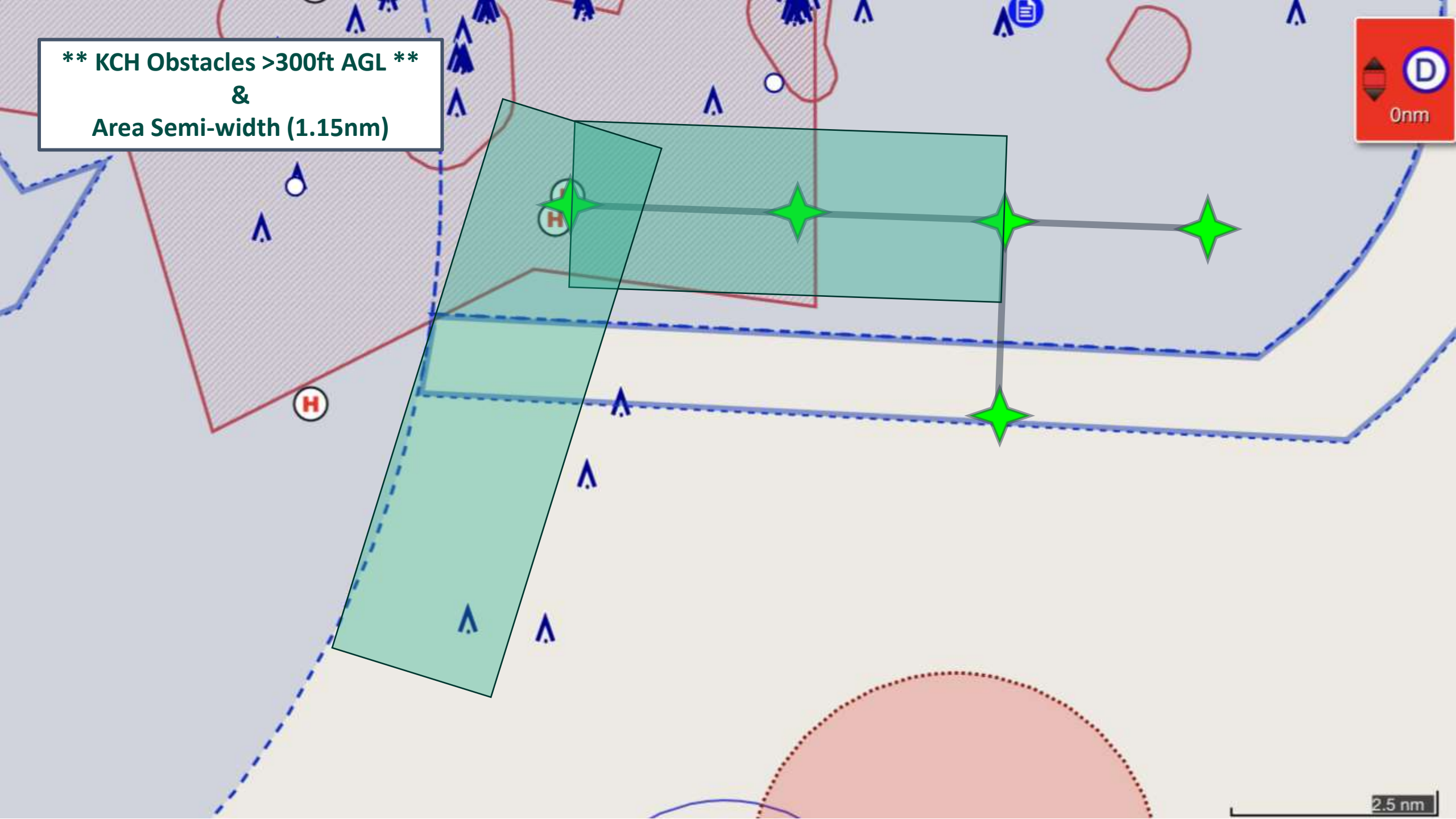
RNP 0.3 PinS procedures servicing two helipads at KCH (within approx. 500m of MAPt)

KCH Elevated Helideck - 200ft AMSL

Ruskin Park (secondary site) – 85ft AMSL


** Illustrative Concept 1 **
MAPt
3.0nm
1500ft
2.5nm
1500ft
2.5nm
2100ft
2.5nm
5.5nm
2100ft
7.0nm
LONDON/CITY CTR
LONDON/CITY CTA
LTMA
LONDON HELIPORT
THAMES BARRIER
LONDON EYE
FALCON HELI
BELAIR PARK
CROYDON
WIMBLEDON
MORDEN
BECKENHAM
BROMLEY
ORPINGTON
SUTTON
PURLEY
WALLINGTON
MITCHAM
R160/UNL
R107/2.0
TMZ
EGKB
VDF
0nm


** Illustrative Concept 2 **
MAPt
3.0nm
2.5nm
1500ft
2.5nm
2100ft


** KCH Obstacles >300ft AGL **
&
Area Semi-width (1.15nm)
D
0nm
2.5 nm

Kings College Hospital (PinS RNP 0.3 with LNAV & LPV minima)

Site Considerations:

- RNP 0.3 with 'Proceed VFR' approach *design for potential 'Proceed Visually' if achievable in future*
- Procedures are within radar control coverage Thames already handle all Biggin Hill and London City IFR traffic (including local IFR in Class G)
- Procedures are predominantly within controlled airspace – traffic separation & MAC mitigation
- Noise impact improvements by implementing a higher level segment over the congested area than the existing low-level VFR alternative in poor weather
- Minimise stakeholder impact - analysis performed on impact to London City and Heathrow traffic with NATS involvement. Very limited impact on first pass. NATS/LCY/LHR – no initial objections. Go-around avoids Battersea LFA, if possible
- Biggin Hill IFR traffic is only permitted under radar vectoring from Thames/Heathrow, unless radar not available. Very rare procedural traffic without radar
- Possible link to 'ALKIN' hold which is already commonly used for BIG/LCY sequencing, if desirable

Kings College Hospital (PinS RNP 0.3 with LNAV & LPV minima)

Site Considerations (continued):

- PinS Departure - reciprocal of the approach track departing to the East to permit an onward connection to Rochester/Redhill, with Biggin Hill, Southend and Gatwick as nearby IFR destinations if required
- Maximise obstacle clearance – where possible without negatively impacting other stakeholders maximise vertical/lateral separation from obstacles, within appropriate PANS OPS design constraints
- Maximum 5° final approach angle – design should factor ability to operate with a tailwind causing increased ground speed. Maximum permitted ROD for FMS approaches in Phase 8 is 800fpm (which at 5° is a maximum groundspeed of 90kts). Preferred final approach speed IAS is 70kts, permitting a 20kt tailwind if no greater than 5°

Kings College Hospital (PinS RNP 0.3 with LNAV & LPV minima)

Other relevant notes:

- Under VFR Category Alpha (HEMS) a similar routing would be requested en-route to Kings, which would still have the potential to impact local IFR traffic and is less predictable
- Procedures remain well clear of Kenley gliding site
- Procedures unnecessary track miles within controlled airspace
- Procedures stick to PANS-OPS criteria where possible – ideal minimum final approach segment distance 3 miles (obstacles permitting) to aid workload management during final approach segment
- Missed approach positioned to avoid Heathrow, and connect via radar control coverage to IFR alternates including Gatwick, Biggin, LCY and Southend

Specialist Aviation Services

EAST VIEW (KCH)

Specialist Aviation Services

WEST VIEW (KCH)

Specialist Aviation Services

SOUTH VIEW (KCH)

NORTH VIEW (KCH)

KCH - Safety Risks (CAP2520)

4.15 Special attention must be paid where applications include the situation where the IFP design proposes an Initial Approach Fix (IAF) located at an altitude close to the base level of controlled airspace (CTA Class D). In that case, a minimum of 500ft is the standard between the altitude at the IAF and the base level of the controlled airspace. Deviation from this standard can be proposed if supported by robust safety arguments and developed in both the safety case and the IFP design rationale but the CAA does not guarantee it will accept the proposal.

- In the case of Kings College Hospital, the local MSA from the south-east is 2,300ft. The LTMA at 2,500ft. It may be possible to reduce the IAF altitude to 2,100ft (when within 10nm), however the Crystal Palace transmitters will likely prohibit an IAF <2,100ft
- Would the existing Thames Radar coverage in this area and limitation to aircraft equipped with a Mode S transponder be a suitable mitigation to permit an IAF which is <500ft separated from the base of the LTMA?

KCH - ‘Proceed Visually’ vs ‘Proceed VFR’ (CAP2520)

- What might the roadmap to permitting ‘Proceed Visually’ look like in the future? (Survey, safeguarding etc…)
- Can SVFR be utilised for the VFR segment within a CTR if authorised by the air traffic controller?

Brighton Royal Sussex County Hospital (BRSCH)

RNP 0.3 PinS procedures servicing two helipads (within approx. 500m of MAPt)

Brighton Elevated Helideck - 350ft AMSL (TBC)
East Brighton Park – 110ft AMSL


** Illustrative Concept 1 **
MAPt
4.0nm
3nm
3nm

Brighton Hospital (PinS RNP 0.3 with LNAV & LPV minima)

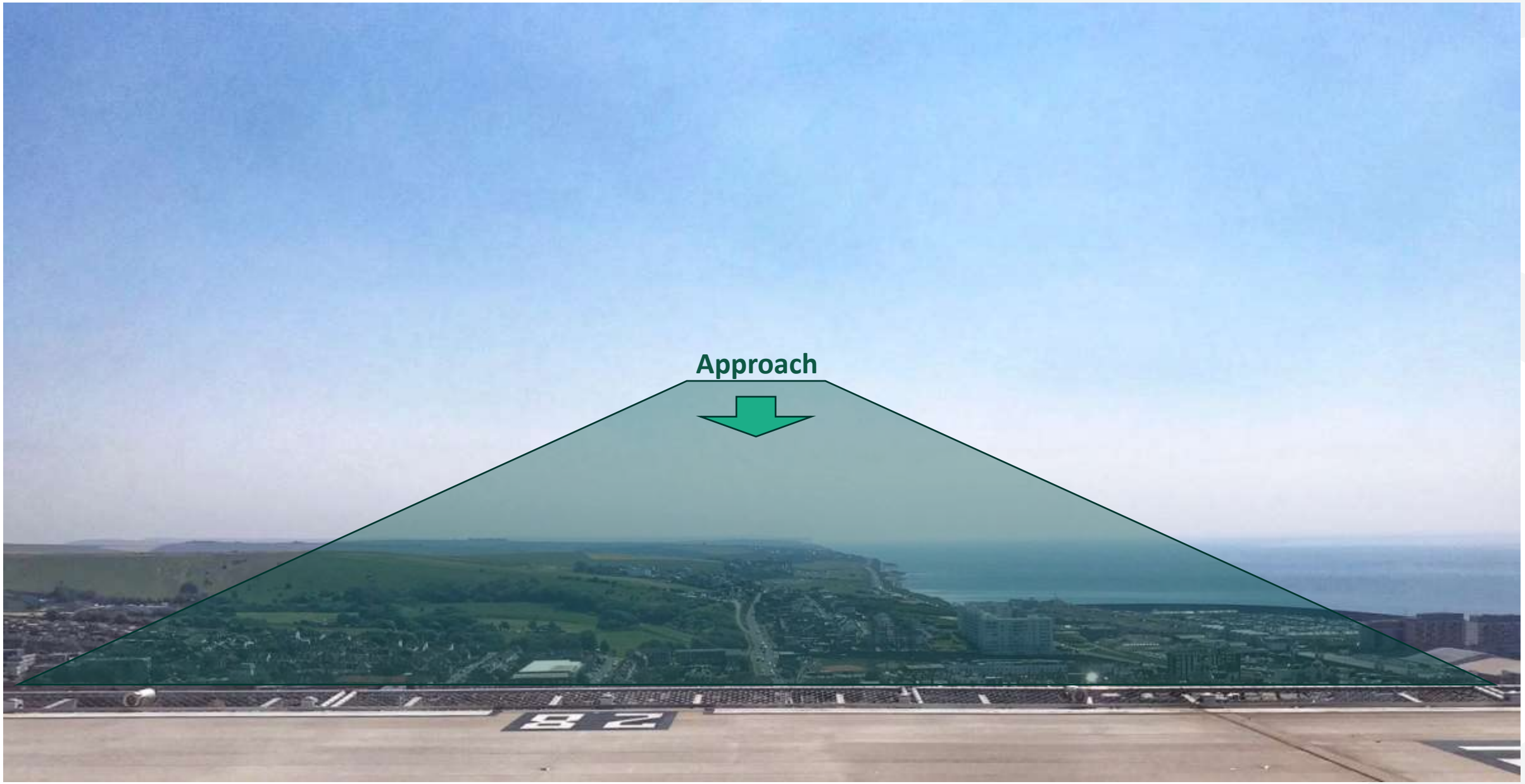
Site Considerations:

- RNP 0.3 with 'Proceed VFR' approach to service two closely separated landing sites at Brighton (elevated helipad & ground level alternative). Corresponding PinS departure
- Shortest available VFR segment (0.5-1nm) provided obstacles are not prohibitive without significant impact on minima
- Final approach / departure avoids built up areas, and is clear of significant obstacles and 3rd parties – maximum separation from obstacles and noise sensitive areas
- Approach / departure parallels the brightly lit coast line to offer maximum visual reference when operating over coastal water areas
- Procedures remain clear of Shoreham's IFPs
- Clear of gliding/paragliding sites and unlicensed aerodromes

Brighton Hospital (PinS RNP 0.3 with LNAV & LPV minima)

Other notes:

- Clear of all controlled airspace – an uncongested area
- We have an excellent working relationship with Shoreham who have very limited IFR traffic volumes
- Main significant hazard is likely to be VFR traffic following the coast (safety case needs to adequately mitigate this)

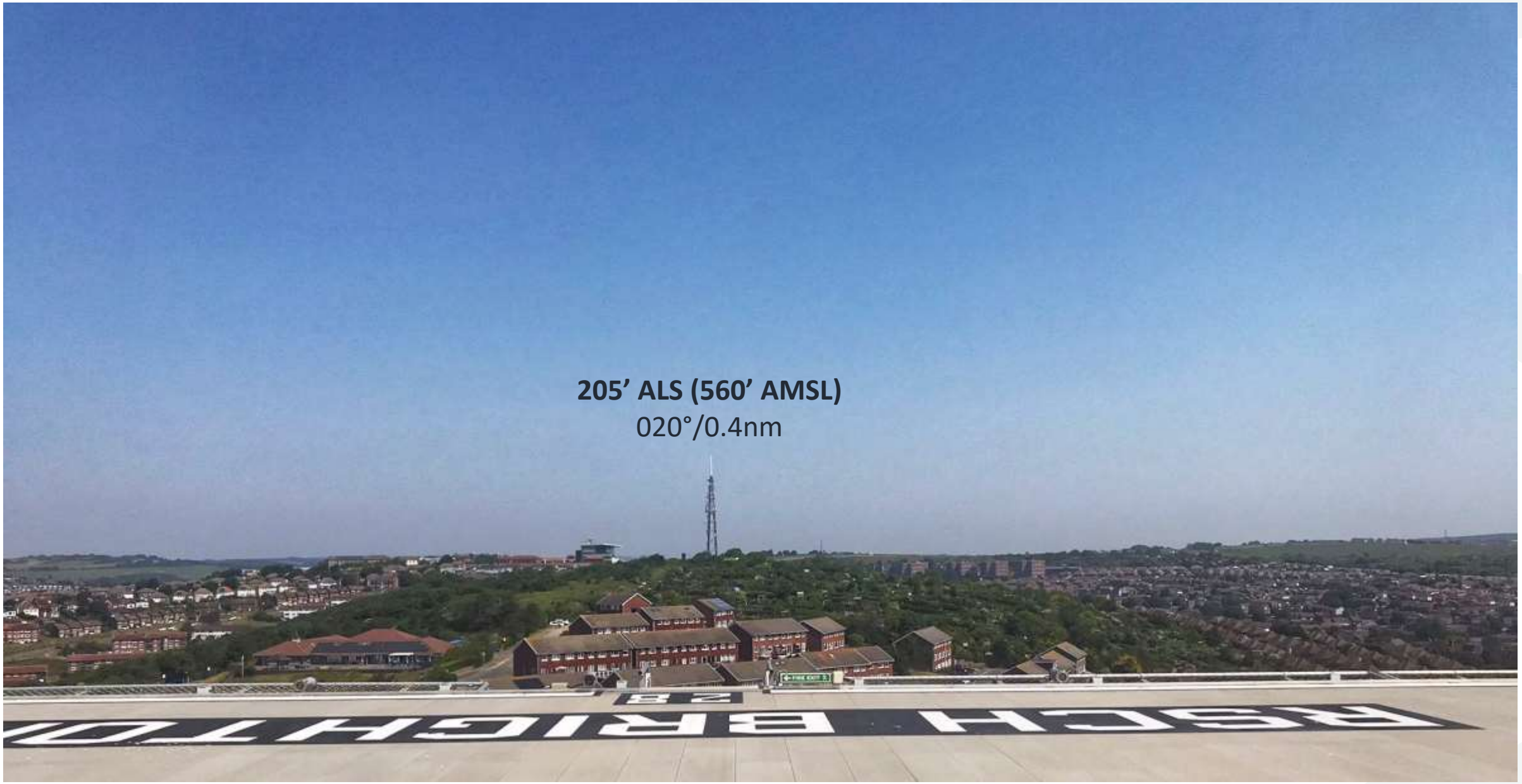


Specialist Aviation Services

EAST VIEW (BRIGHTON)

Specialist Aviation Services

WEST VIEW (BRIGHTON)


205’ ALS (560’ AMSL)
020°/0.4nm

Specialist Aviation Services

SOUTH VIEW (BRIGHTON)

CAP2520

General discussion points & questions

EGNOS/SBAS

> The loss of access to the European Geostationary Navigation Overlay Service (EGNOS), whilst limiting the scope of PinS in the UK with the publication of RNP approaches with LNAV only minima, is not a blocker for their deployment. It is expected that the situation will evolve with the development of multiple options including the potential development of a UK Satellite Based Augmentation System (SBAS).

- Our intent is to design to LNAV and LPV minima for future proofing.
- Will it be permissible to fly to the LNAV minima using LPV derived flight guidance (SBAS open service signal without an EWA)?
- Benefits of doing so could include:
  - Increased horizontal and vertical guidance accuracy (angular versus linear)
  - Protection against temperature errors
  - Protection against pilot induced barometric errors - CAA SN-2023/003 Risk of Controlled Flight into Terrain during 3D BARO-VNAV and 2D Approaches (Altimeter Setting Procedures)

EGNOS/SBAS

Safety Notice

Civil Aviation Authority

SAFETY NOTICE

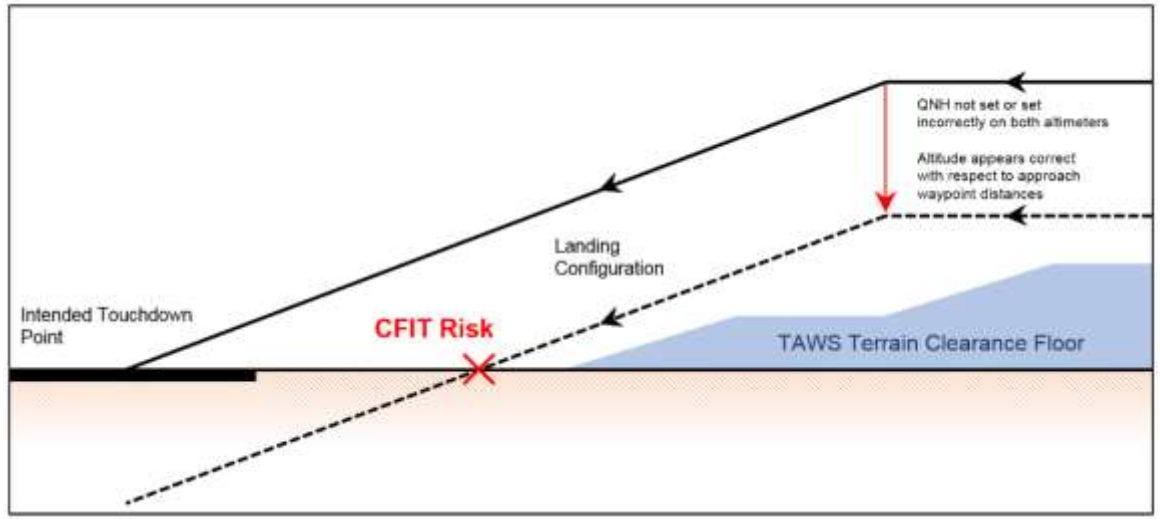
Number: SN–2023/003

Civil Aviation Authority

Issued: 28 April 2023

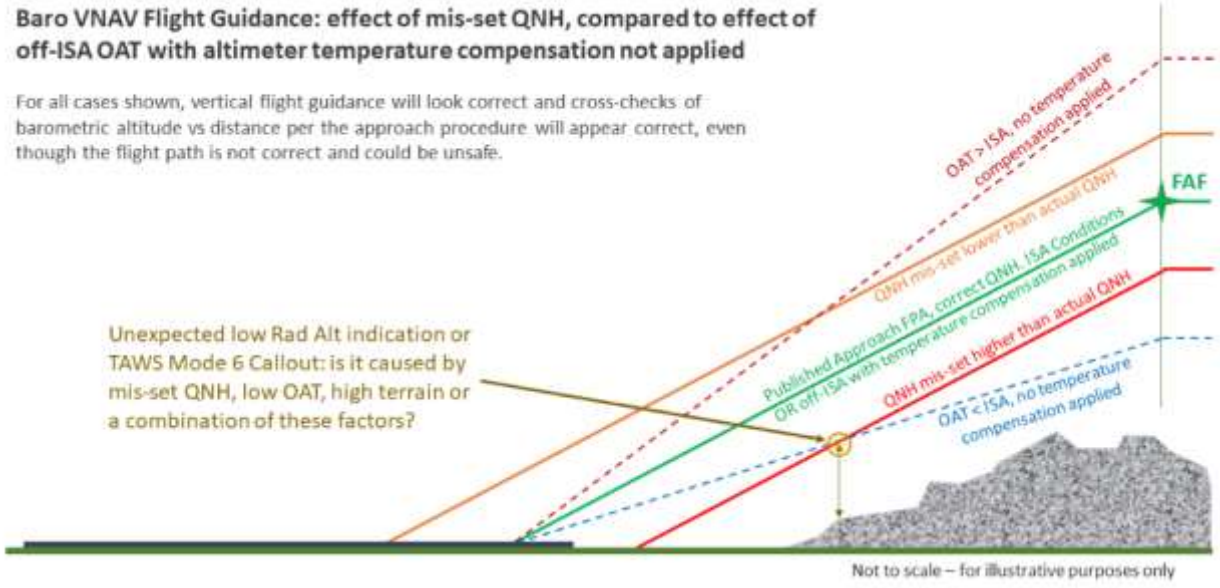
Risk of Controlled Flight into Terrain during 3D BARO-VNAV and 2D Approaches

(Altimeter Setting Procedures)



Baro VNAV Flight Guidance: effect of mis-set QNH, compared to effect of off-ISA OAT with altimeter temperature compensation not applied

For all cases shown, vertical flight guidance will look correct and cross-checks of barometric altitude vs distance per the approach procedure will appear correct, even though the flight path is not correct and could be unsafe.



Obstacle Clearance Height (≥500ft)

- OCH is defined as “"lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria“
- For the avoidance of doubt, whilst a blanket minimum OCH of 500ft is being applied, is it the case that any known obstacles are only required to be cleared by the standard obstacle clearance criteria (i.e. 246ft for LNAV)? Therefore a known 250ft obstacle such as a hospital building chimney would still permit a 500ft OCH provided it was the most limiting obstacle?
- In the case of a Point-in-Space approach over water with ‘Proceed VFR’

Safety Risks

4.15 Special attention must be paid where applications include the situation where the IFP design proposes an Initial Approach Fix (IAF) located at an altitude close to the base level of controlled airspace (CTA Class D). In that case, a minimum of 500ft is the standard between the altitude at the IAF and the base level of the controlled airspace. Deviation from this standard can be proposed if supported by robust safety arguments and developed in both the safety case and the IFP design rationale but the CAA does not guarantee it will accept the proposal.

- In the case of Kings College Hospital, the local MSA is 2,300ft, and the LTMA at 2,500ft. It may be possible to reduce the IAF altitude to 2,100ft (when within 10nm), however the Crystal Palace transmitters will likely prohibit an IAF <2,100ft.
- Would the existing Thames Radar coverage in this area and limitation to aircraft equipped with a Mode S transponder be a suitable mitigation to permit an IAF which is <500ft separated from the base of the LTMA?

Safety Risks

4.16	Referring to CAP 2304, safety arrangements will need to be developed and documented to include all relevant details, in particular to ensure that the IAP and any associated holding pattern will only be made available and used by one aircraft at any one time. As an example, sponsors can develop a slot allocation concept and demonstrate how this concept will be applied by operators.

- Movements of HEMS aircraft coordinated by a HEMS desk
- All movements to/from Brighton/Kings are coordinated by the same HEMS desk (SECAMB), on a common TETRA channel used ‘open channel’ i.e. aircraft hear each other’s calls
- Additionally, movements to all London Helipads make calls on a second common ‘open’ TETRA channel for wider group awareness of each other’s helipad movements
- In the case of PinS approaches to hospitals with an ‘approved operators only’ limitation applied, and restricted Nav DB coding table access (as per CAP2520), deconfliction may be achieved effectively by HEMS desk coordination, and monitoring of other HEMS aircraft over ‘open channel’ TETRA
- ‘ACANS’ also provides a useful pictorial tool for monitoring of other HEMS aircraft

Safety Risks

4.17 When PinS are implemented at aerodromes without approach control, consideration should be made to the use of technologies such as TCAS II, ADS-B and to the implementation of a Radio Mandatory Zone and/or a Transponder Mandatory Zone. It is emphasised by the Airspace Modernisation Strategy[25] which aims at simplifying the airspace structure and integrating new entrants (e.g., drones) rather than segregating and, at providing an equitable use of airspace when controlled airspace is not required.

- The potential benefits of an RMZ/TMZ are understood for IFPs in Class G. It is however also noted that an RMZ/TMZ may contradict our design principle to 'minimise the impact on other airspace users', and is likely disproportionate to the perceived need given the low forecast utilisation
- Does an RMZ/TMZ fall within the scope of CAP2520 & CAP1616 Part 1c?
- Given the potential impact on other GA traffic, would an RMZ/TMZ not require a formal consultation process?

SPA.PBN APPROVAL (RNP 0.3)

b) Operators should be approved for PinS approaches and/or departures in line with PBN RNP 0.3 helicopter operation (SPA.PBN.100 specific approval should be gained before the start of an Airspace Change Process). To obtain a PBN specific approval the sponsor shall ensure that the operator provide evidence that meets the requirements of SPA.PBN.105.

- As discussed with the GNSS Facilitation Team, SAS' RNP 0.3 H approval is in progress. Once our RNP 0.3 training programme is written and safety assessment complete we will have all the supporting material to formally apply
- SAS see this as a very low-risk to the project as we are confident in our eligibility and suitability to gain the approval, and hope to proceed with the ACP process in parallel

Provisional indication of the level and process requirements

ACP - Next Steps & Timeline Expectations

Outline of next steps of CAP 1616 part 1c

ACP - Next Steps?

ACP Stage	Timeline expectations
1: Initial stakeholder pre-engagement	Complete
2: Submit statement of need (CAP1616 stage 1)	Complete
3: Hold Assessment meeting with CAA (CAP1616 stage 1)	15-June-2023
4: Assessment of options (CAP1616 Stage 2)	
5: Safety assessment	
6: Consultation/Engagement (CAP161 Stage 3)	
7: Updates following consultation/engagement (CAP1616 Stage 4)	
8: Procedure validation	
9: Prepare final proposal (CAP 1616 Stage 4)	
10: Implementation (CAP1616 Stage 6)	
11: Operational preparation	
12: Post Implementation Review (CAP1616 Stage 7)	

AOB?

Thank you for your time…

Specialist Aviation Services