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Technical Aerodrome Safeguarding Assessment

Royal UK Property Holdings LLP

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EXECUTIVE SUMMARY

Report Purpose

The potential impact upon aviation activity associated with Heathrow Airport as a result of the proposed development has been assessed. The assessment has considered Obstacle Limitation Surfaces (OLS), Radar Impact, Communication Navigation and Surveillance (CNS) equipment, Instrument Flight Procedures (IFPs), aviation lighting, and crane usage.

Assessment Conclusions

Obstacle Limitation Surfaces

The proposed development is located beneath the Inner Horizontal Surface (IHS) of Heathrow Airport. The development is not predicted to vertically infringe the IHS and would maintain a vertical clearance of 14m.

No impact is predicted upon the OLS at Heathrow Airport. Mitigation is not required.

Radar Impact

The proposed development is predicted to be within line of sight to the secondary surveillance radar. No significant operational impact as a result of reflections or shadowing is predicted due to the height of the proposed development and existing neighbouring buildings.

Consultation with NATS is recommended to understand their position.

Communication Navigation and Surveillance Equipment

No impact is predicted upon the assessed equipment due to the proposed development being either laterally outside or below the building restricted areas.

Instrument Flight Procedures

No infringement of the Maximum Elevation Figure, Area Minimum Altitude, or Surveillance Minimum Altitude Chart is predicted.

Based on the predicted clearance of the development to the OLS and existing neighbouring buildings in this area, no infringement of instrument flight procedures is predicted.

A detailed IFP assessment may be requested by Heathrow Airport. Consultation with the safeguarding team is recommended to confirm their position.

Public Safety Zones

The proposed development is not located within the Public Safety Zones. No impact is predicted.

Crane Usage

Cranes which do not extend more than 14m above the maximum building height are not predicted to infringe the OLS.

A crane operation scheme may be requested by Heathrow Airport. Consultation with the safeguarding team to confirm requirement is recommended.

Lighting

Aviation lighting is not expected to be required for the proposed building development.

Recommendations and Next Steps

It is recommended that crane heights are restricted to no more than 14m greater than the maximum height of the proposed development to ensure no infringement of the OLS.

Consultation with NATS and Heathrow Airport's safeguarding team to confirm their position regarding the development is recommended.

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ABOUT PAGER POWER

Pager Power is a specialist technical consultancy based in the United Kingdom and has been providing independent expertise on planning issues in the UK and Republic of Ireland for solar, wind, and building developments for over 20 years.

Established in 1997, the company initially specialised in assessing the impact of wind turbines on radar systems. Pager Power has since expanded into a multidisciplinary technical planning consultancy that offers a comprehensive range of services and has supported renewable and building projects in more than 60 countries, including the Republic of Ireland.

Pager Power's core competencies now include:

- Aviation and Radar;
- Daylight, Sunlight and Overshadowing;
- Glint and Glare;
- Shadow Flicker;
- Telecommunications.

Using proprietary modelling software, each study is tailored to the individual project, ensuring that results are relevant, defensible, and aligned with current national and international standards. The company also provides planning support and stakeholder consultation across all service areas, helping clients to understand constraints, explore potential mitigation options, and forge a path forward for their projects.

Pager Power's work helps our clients identify potential risks, inform project design, and support the decision-making process, and can provide support at any stage of a project, from initial feasibility through to completion. Pager Power's assessments – recognised for their objectivity, accuracy, and technical integrity – are designed to withstand legal scrutiny, and are trusted by developers and stakeholders alike.

1 PROPOSED DEVELOPMENT DETAILS

1.1 Proposed Development Overview

The proposed development comprises two buildings: Unit 100 and Unit 200. The proposed development is located approximately 3.6km north of Heathrow Airport. Figure 1 below shows the site layout[1].



Figure 1 *Proposed development site plan*

[1] Source: 23517-UMC-ZZZZ-SI-DR-A-0606.P11 Site Layout.pdf (cropped).

1.2 Development Elevations

Figure 2 below shows an elevation diagram[2] of the proposed development. Unit 100 is shown on the left; Unit 200 is shown on the right.

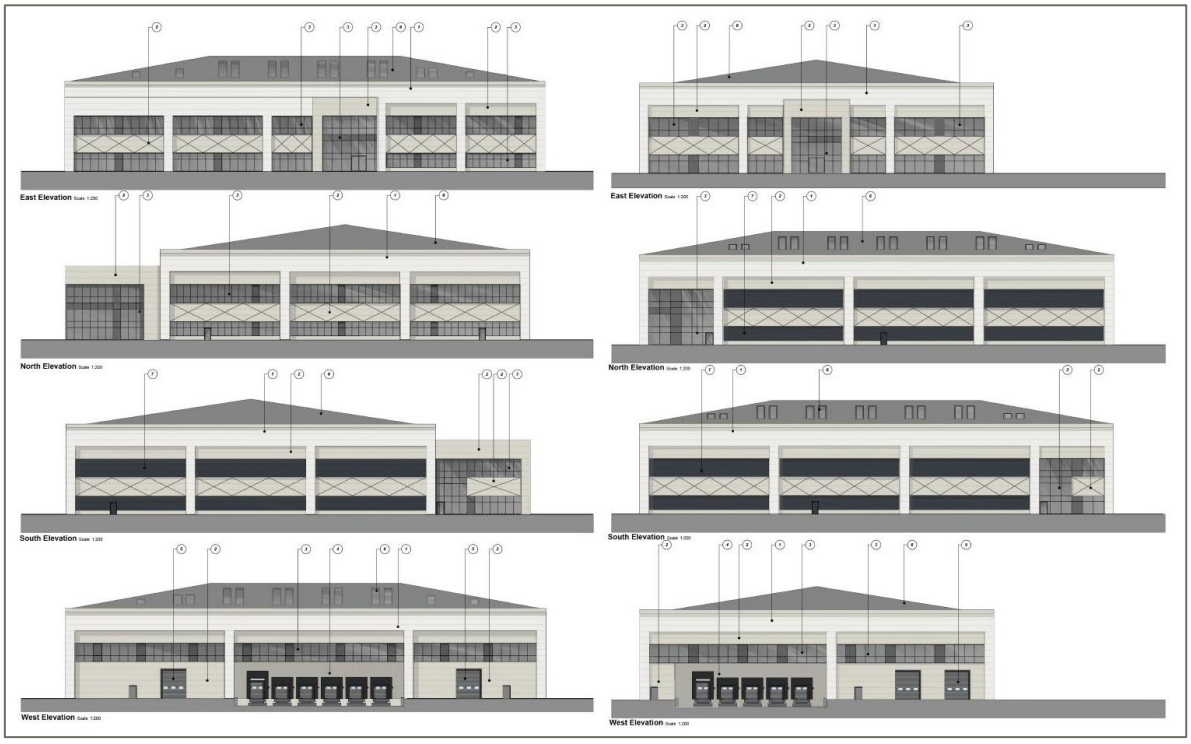


Figure 2 *Elevation diagrams*

1.3 Development Heights and Assessed Points

Table 1 below shows the heights, above ground level (AGL) and above mean sea level (AMSL) used in this assessment.

Building	Height AGL	Terrain[3]	Height AMSL
Unit 100	18.65m	35m	53.65m
Unit 200	18.4m		53.4m

Table 1 *Assessed development heights*

For the purposes of this assessment, the corner points of the development footprint have been considered assuming the entire footprint at the maximum building height to present a conservative analysis. The coordinates have been extrapolated from the site plans and are presented in Appendix A.

[2] Source: 23517-UMC-ZZ-ZZ-DR-A-1303.P04 Unit 100 Proposed Elevations (Single Pitch).pdf & 23517-UMC-ZZ-ZZ-DR-A-1304.P04 Unit 200 Proposed Elevations (Single Pitch).pdf

[3] Source: OS 50 DTM.

2 OBSTACLE LIMITATION SURFACES ASSESSMENT

2.1 Overview of Obstacle Limitation Surfaces

The Obstacle Limitation Surfaces (OLS) consist of a set of imaginary planes defined in three dimensions for physical safeguarding purposes (i.e., ensuring that physical structures do not present a safety hazard at an airfield) and are defined around civil and military aerodromes. The dimensions and geometry of the surfaces are constructed based on detailed rules defined in:

- For licensed aerodromes: UK Civil Aviation Authority's Civil Aviation Publication 168 for licensed aerodromes;
- For certificated aerodromes: Assimilated Regulation (EU) No. 139/2014; and,
- For military aerodromes: UK Military Aviation Authority (MAA): Regulatory Article (RA) 3512: Permanent Fixed Wing Aerodrome - Obstacle Environment for military aerodromes.

The size of the surfaces is dependent on the number of runways, their dimensions and the procedures carried out at the aerodrome. London Heathrow is a certificated aerodrome and therefore has been assessed in accordance with the Assimilated Regulation (EU) No. 139/2014.

The proposed runway has been assessed in addition to the existing runways due to this being formally safeguarded by the airport.

2.2 OLS Results and Plot

The assessed coordinates relative to the OLS are plotted in Figure 3 on the following page. The assessed coordinates are shown by the cluster of red crosses – due to the scale, they appear as a single icon.

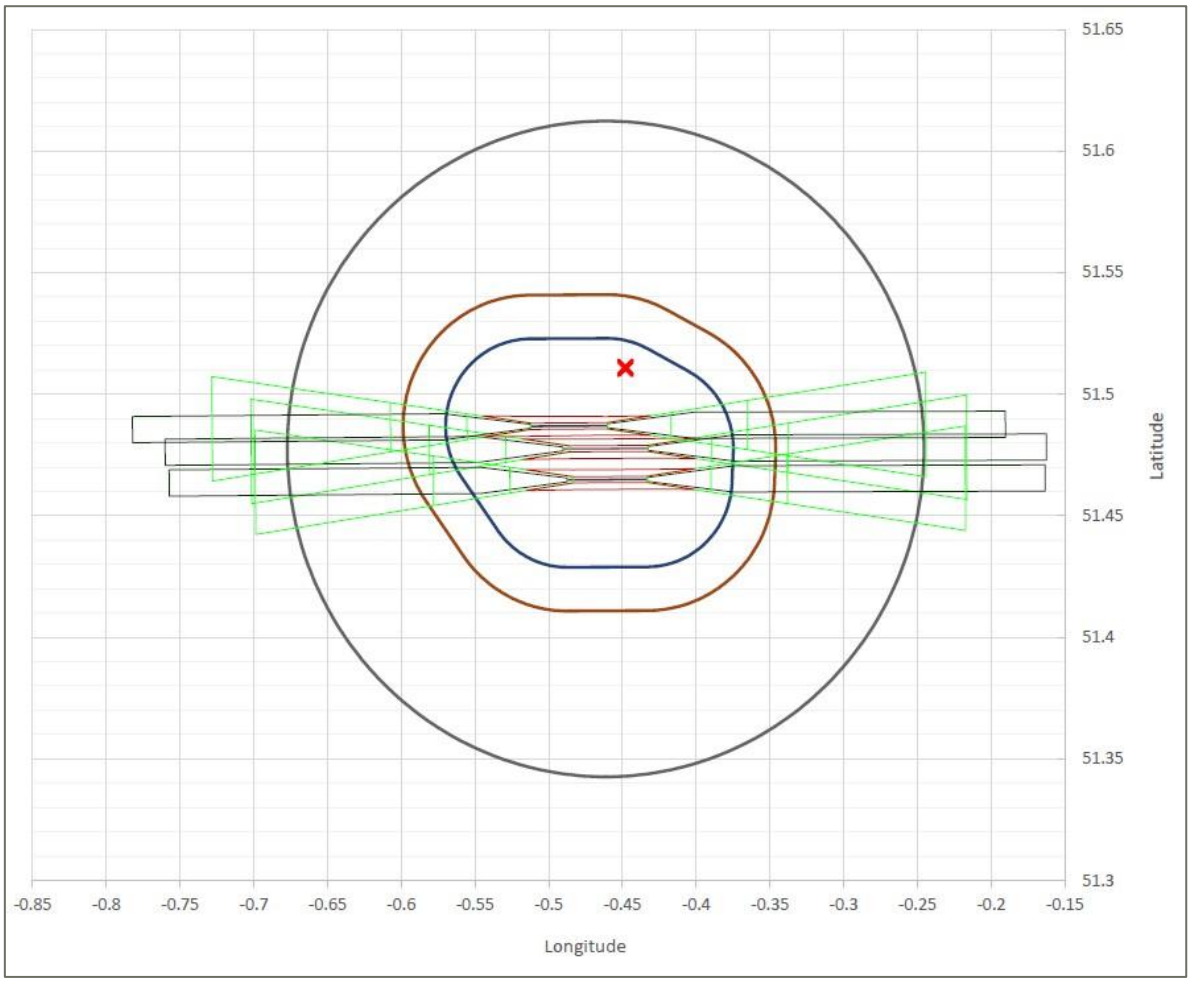


Figure 3 *OLS plot*

The proposed development is located beneath the Inner Horizontal Surface (IHS). The development is not predicted to vertically infringe the IHS, and would maintain a vertical clearance of 14m.

2.3 Conclusions

No infringement of the OLS at Heathrow Airport is predicted. A minimum vertical clearance of 14m is predicted to be maintained. No impact is predicted. Mitigation is not required.

3 RADAR ASSESSMENT

3.1 Overview

Radar line of sight analysis has been completed for the proposed development to determine the extent of the visibility to the Secondary Surveillance Radar (SSR) at Heathrow Airport. The overall assessment approach is presented in the following section.

3.1.1 Technical Assessment

- Radar line of sight assessment based on the building vertex coordinates assessed at the maximum height above ground level of the proposed development;
- Screening assessment to determine whether existing buildings and/or landscape features would hide/shield the proposed development from the radar.

3.1.2 Operational Assessment

- Should a technical impact be predicted, further assessment of the predicted operational impact is made considering the potential for:
  - Reflection of signals;
  - Shadowing of signals.

3.1.3 Cumulative Assessment

- Assessment of the predicted impact in the context of the existing environment.

3.2 Heathrow Radar Infrastructure

Table 2 below provides the details for the assessed Heathrow Airport SSR radar. Radar data has been provided by NATS.

Radar Type	Secondary Surveillance Radar (SSR)
Overall radar altitude above mean sea level	67m
Distance between the proposed development and radar	5.56km
Grid bearing from radar to proposed development	354.2°

Table 2 *Heathrow Airport SSR radar details*

3.2.1 Radar Image

A ground-based view of the Heathrow Airport radar is shown in Figure 4 below.



Figure 4 *Ground-based view of the Heathrow SSR*

3.2.2 Radar Types and Usages

There are two radar situated upon the metal lattice tower. The lower radar is a non-cooperative Primary Surveillance Radar (PSR), the taller is the co-operative SSR which has been assessed within this report.

SSR broadcast interrogating radio signals that are detected by aircraft with on-board transponders. The transponder responds by broadcasting a radio reply which normally contains identification and altitude information. The SSR determines the aircraft's horizontal position from the direction the antenna is orientated, and the time taken to receive a response from the interrogation.

Both radar will be used by air traffic controllers to provide approach services to aircraft landing at and departing from Heathrow Airport. Both radar will also be used by air traffic controllers at national air traffic control centres to provide services to en-route aircraft.

The radar of significance with respect to the predicted impact is the SSR. The PSR is not expected to be affected.

3.2.3 SSR Capabilities

The radar is fitted with a Large Vertical Aperture (LVA) antenna. It is a Mode S monopulse SSR supplied by Raytheon Systems Limited as part of a nationwide contract to upgrade NATS' national network of twenty sites.

The radar has a range of advanced built-in capabilities for increasing its reliability and performance. Specific features that reduce the radar's susceptibility to interference from buildings are listed in Table 3 below and on the following pages.

Feature	Form of interference	How feature reduces interference	Additional Information
Integral Tracking Function	Reflections	More likely to determine return is genuine if it moves as an aircraft return is expected to	Ensures good false target suppression
Refined Algorithms	Reflections and Shadowing	Experience on many sites used to enhance performance	Ensures good performance in complex environments
Identification and rejection of false replies	Reflections	False returns are rejected	If two or more replies are identified from the same source all but the first is rejected
Side Lobe Suppression	Reflections	False returns arising from antenna sidelobes are rejected	P1 and P2 pulses are used. This is an encoding system which enables sidelobe signals to be detected by comparing pulse sizes
Sensitivity Time Control (STC)	Reflections	Removes reflections	Removes relatively low amplitude replies
Minimum Detection Signal Level (MDS)	Shadowing	Maximises radar coverage whilst minimising noise detections	-
Dynamic Threshold	Shadowing	Weak signals stronger than any interference signals are detected	-
Reply to Reply Correlation	Reflections	Multiple replies required for target processing	Single reply reports are rejected

Feature	Form of interference	How feature reduces interference	Additional Information
FRUIT[4] Rejection	Reflections	Track initiation only allowed if report contains two or more correlating replies in the same SSR mode	e.g. two or more Mode A replies
Track Processing	Reflections and Shadowing	Improvements are made in target location using history of target position	Improvements made when confidence in location information is low
False Target Processing	Reflections	Advanced processing that applies a series of tests to identify and reject false returns	Techniques include: 1: Check whether Mode A code is unique 2: Check "known" reflection zones 3: Use geometric analysis for checking reflection zones 4: Self adaptive processing

Table 3 *Radar features for reducing interference*

3.3 Radar Interference – Technical Overview

Buildings, structures and terrain can interfere with SSR. The level of interference normally depends on the size of the interfering structure and its distance from the radar. A larger structure closer to the radar is more likely to interfere than a smaller structure which is further away. The two predominant forms of interference are considered. These are listed in the following sub-sections.

3.3.1 Reflections

Reflections from a structure can potentially result in genuine aircraft returns being plotted in the wrong place as a result of the structure reflecting signals in a specular (mirror-like) way. This means that an air traffic controller could mis-manage aircraft, leading to safety implications.

Both in-bound and out-bound signals are weakened due to reflections because they are reflected by a structure in both directions.

[4] FRUIT – False Replies Unsynchronized in Time.

3.3.2 Shadowing

Radar signals are weakened by physical obstacles. The most significant signal blocking is often caused by terrain. Large obstructions within a radar's area of coverage can have a 'shadowing' effect, reducing the signal strength immediately behind them.

This effect is most pronounced immediately behind the structure and becomes less pronounced with distance. This is important because it means a structure's 'shadow' does not block radar coverage indefinitely, and the areas with the highest losses should be considered in an operational context.

Both in-bound and out-bound signals are weakened by shadowing because signals are attenuated by a structure in both directions.

3.4 Line of Sight Analysis

A radar line of sight assessment was completed for the proposed development. The line of sight chart from the Heathrow Airport SSR to the most visible corner coordinate is shown in Figure 5 on the following page.

The box labelled 'certainty' provides the distance (in metres) by which the proposed development is or is not within line of sight to the assessed radar (rounded to one decimal place).

The chart shows that, based on bare-earth terrain, the Proposed Development will be within radar line of sight to the SSR at Heathrow Airport. A technical impact therefore cannot be ruled out. The following sections consider the potential for an operational impact.

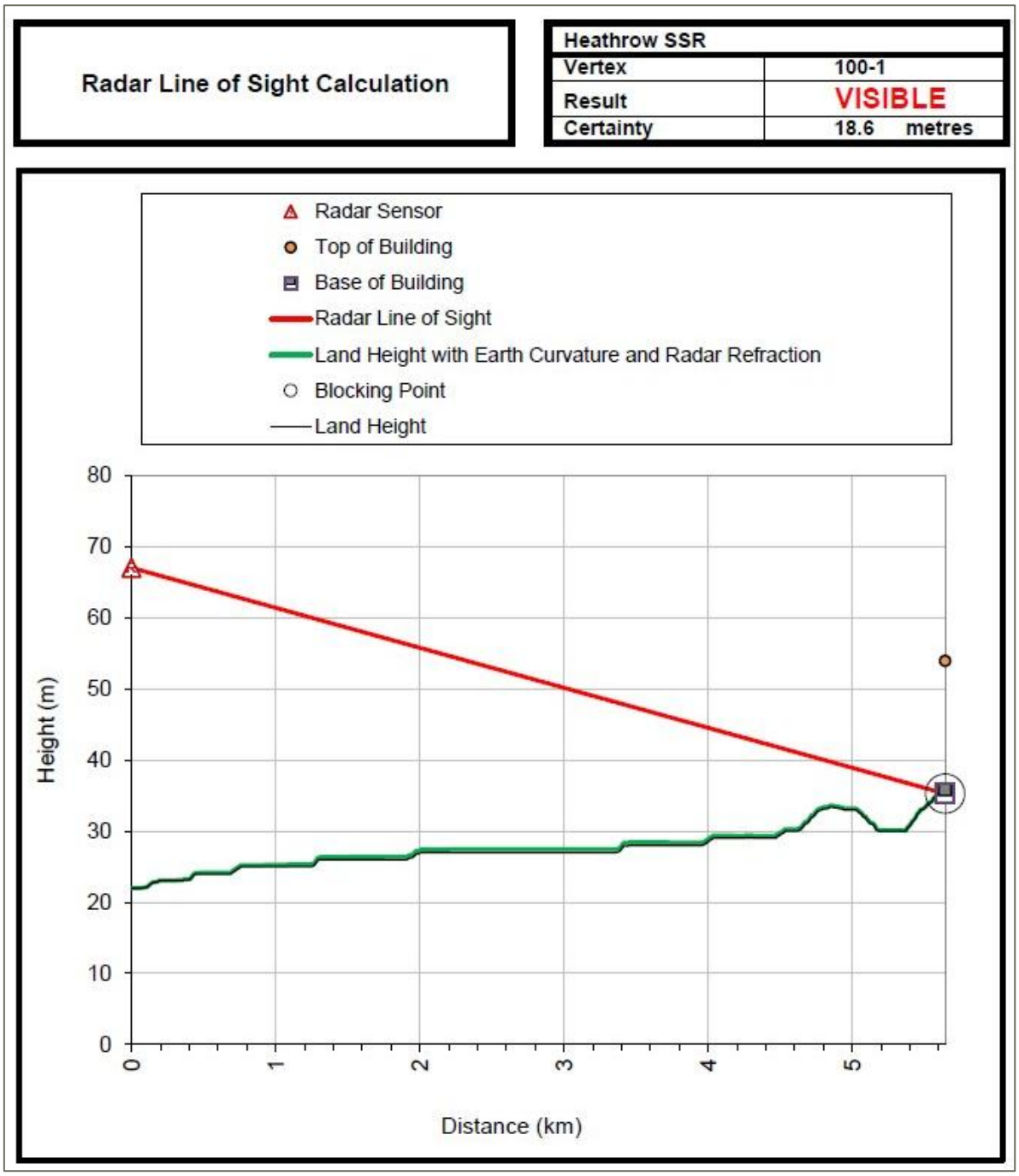


Figure 5 *Radar line of sight chart*

3.5 Radar Interference Analysis – Shadowing

A review of the available imagery shows that buildings of similar height exist in front of the proposed development relative to the SSR. As such, shadowing effects may already be present from the existing building at the development location and to its south. The development may extend this shadow due to its location and increase in height.

It is understood that impacts from shadowing are less significant for NATS radar compared to the impact of reflections.

Overall, whilst a low-lying shadow will be formed behind the proposed development relative to the radar, no significant shadowing effects are predicted to materialise. Only aircraft flying at a very low altitude would be in the shadow and the majority of typical traffic would not enter this area.

Consultation with NATS is recommended to understand their position regarding the Proposed Development.

3.6 Radar Interference Analysis – Reflections

The south facing façade of Unit 200 is predicted to be visible to the Heathrow SRR. There are buildings located between the Heathrow SSR and the proposed development that are predicted to partially screen the proposed development, shown in Figure 6 below. It is also predicted that if any remaining reflections are possible and experienced by the Heathrow Airport SSR, they would not be operationally significant in practice because the radar has sophisticated mechanisms for minimising interference.



Figure 6 *Existing buildings between Heathrow SSR and Proposed Development*

Overall, no operational impacts are predicted upon the SSR at Heathrow Airport due to reflections from the proposed development.

Consultation with NATS is recommended to understand their position regarding the proposed development.

4 CNS ASSESSMENT

4.1 Assessment Methodology

4.1.1 Overview

The Communication, Navigation, and Surveillance (CNS) equipment at Heathrow Airport have been assessed in accordance with the Building Restricted Areas (BRAs) defined within ICAO EUR DOC 015 - European Guidance Material on Managing Building Restricted Areas.

4.1.2 Directional Facilities

The typical BRA shape within EUR DOC 015 for safeguarding directional facilities is presented in Figure 7 below.

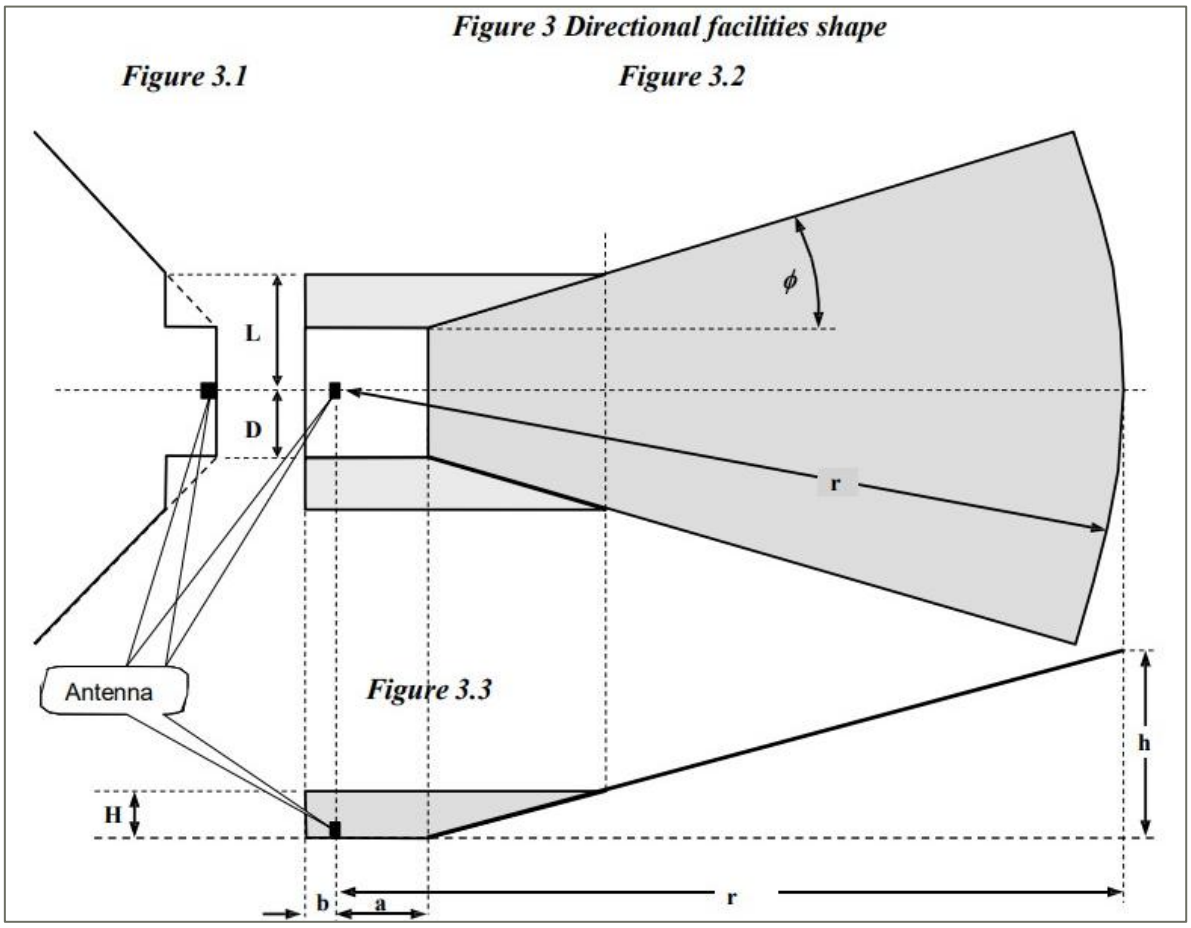


Figure 7 *Directional facilities shape*

The specific BRA parameters for safeguarding ILS localisers (LLZ), ILS GP, and directional DME are presented in Figure 8 below.

*Type of **navigation** facilities*	***A*** *(m)*	***b*** *(m)*	***h****(m)*	***r*** *(m)*	***D*** *(m)*	***H*** *(m)*	***L*** *(m)*	***ϕ*** *(°)*
ILS LLZ (medium aperture single frequency)	Distance to threshold	500	70	a+6000	500	10	2300	30
ILS LLZ (medium aperture dual frequency)	Distance to threshold	500	70	a+6000	500	20	1500	20
ILS GP M–Type (dual frequency)	800	50	70	6000	250	5	325	10
MLS AZ	Distance to threshold	20	70	a+6000	600	20	1500	40
MLS EL	300	20	70	6000	200	20	1500	40
DME (directional antennas)	Distance to threshold	20	70	a+6000	600	20	1500	40

Figure 8 *ILS BRA parameters – LOC*

4.1.3 Omni-Directional Facilities

The typical BRA shape within EUR DOC 015 for safeguarding omni-directional facilities is presented in Figure 9 below.

Figure 2.1: Omni - Directional BRA Shape (three dimensional representation)

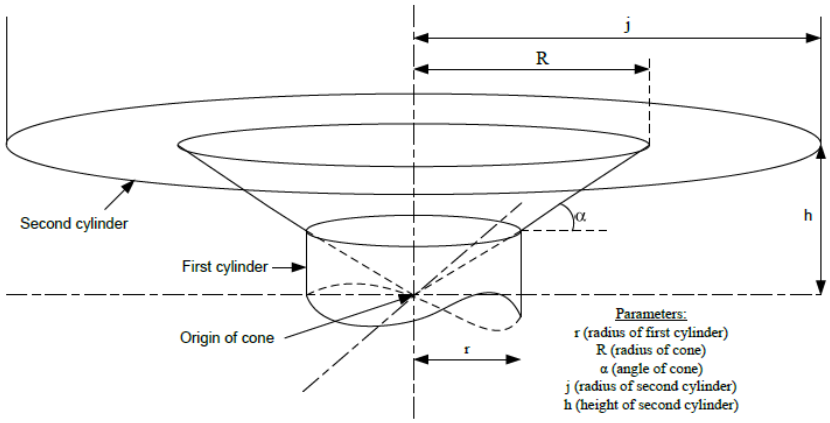


Figure 2.2: Omni - Directional BRA Shape (side elevation view)

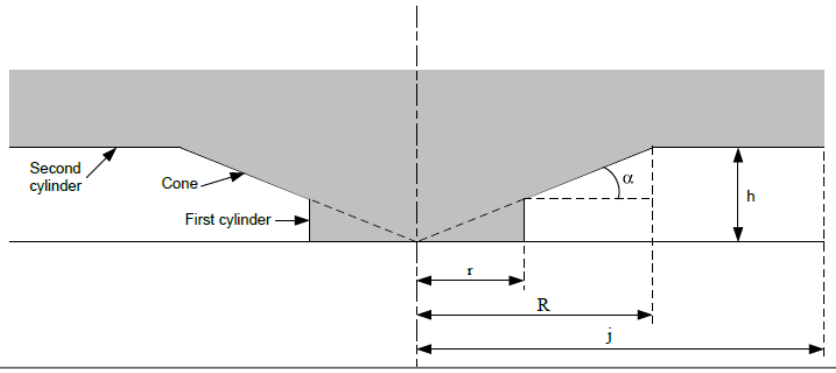


Figure 9 *Omni-Directional BRA Shape*

The specific BRA parameters within EUR DOC 015 for safeguarding omni-directional facilities are presented in Figure 10 below.

*Type of **navigation** facilities*	*Radius (r – Cylinder) (m)*	*Alpha (a – cone) (°)*	*Radius (R- Cone) (m)*	*Radius (j – Cylinder) (m) Wind turbine(s) only*	*Height of cylinder j (h -height) (m) Wind turbine(s) only*	*Origin of cone and axis of cylinders*
DME N	300	1.0	3000	N/A	N/A	Base of antenna at ground level
CVOR	600	1.0	3000	15000	52	Centre of antenna system at ground level
DVOR	600	1.0	3000	10000	52	Centre of antenna system at ground level
Direction Finder (DF)	500	1.0	3000	10000	52	Base of antenna at ground level
Markers	50	20.0	200	N/A	N/A	Base of antenna at ground level
NDB	200	5.0	1000	N/A	N/A	Base of antenna at ground level
GBAS ground Reference receiver	400	3.0	3000	N/A	N/A	Base of antenna at ground level
GBAS VDB station	300	0.9	3000	N/A	N/A	Base of antenna at ground level
VDB station monitoring station	400	3.0	3000	N/A	N/A	Base of antenna at ground level

Figure 10 *Harmonised guidance figures for the omni-directional navigational facilities*

4.2 Identified CNS Equipment Details

The details of the identified CNS equipment, located at Heathrow Airport, and assessed within this report are presented in Table 4 below and on the following page.

Equipment	Facility	Latitude	Longitude	Bearing
ILS Localiser (LOC)	LOC 09L-IAA	51.47770	-0.42696	269.71
	LOC 09R-IBB	51.46497	-0.42823	269.72
	LOC 27L-ILL	51.46476	-0.49117	89.68
	LOC 27R-IRR	51.47747	-0.49372	89.67
ILS Glide Path (GP)	GP 09L-IAA	51.47875	-0.48068	269.71
	GP 09R-IBB	51.46360	-0.47793	269.72
	GP 27L-ILL	51.46374	-0.43889	89.68
	GP 27R-IRR	51.47884	-0.43819	89.67
ILS Distance measuring equipment (DME)	DME 09L-IAA	51.47884	-0.45903	Omni-directional
	DME 09R-IBB	51.46382	-0.45858	
	DME 27L-ILL	51.46382	-0.45858	
	DME 27R-IRR	51.47884	-0.45903	
Non-directional beacon (NDB)	NDB-BUR	51.51901	-0.67719	
	NDB-CHT	51.62314	-0.51858	
	NDB-EPM	51.31956	-0.37198	
	NDB-WOD	51.45278	-0.87880	
VHF Omni-direction range (VOR) DME	VOR.DME-BIG	51.33088	0.03481	
	VOR.DME-BNN	51.72616	-0.54975	
	VOR.DME-DET	51.30400	0.59728	
	VOR.DME-LAM	51.64603	0.15170	

Equipment	Facility	Latitude	Longitude	Bearing
VHF Omni-direction range (VOR) DME	VOR.DME-LON	51.48725	-0.46654	Omni-directional
	VOR.DME-MAY	51.01718	0.11612	
	VOR.DME-MID	51.05395	-0.62500	
	VOR.DME-OCK	51.30505	-0.44718	
	VOR.DME-SAM	50.95525	-1.34506	

Table 4 *Identified CNS equipment at Heathrow Airport*

No CNS equipment associated with the proposed third runway has been considered within this assessment. Safeguarding of BRAs for such is not understood to be considered within current safeguarding requirements.

Radar facilitates are also present at Heathrow Airport. A radar impact assessment is presented in Section 3 of this report.

4.3 Lateral Analysis

The BRAs have been mapped for the CNS equipment identified in the prior sub-section.

Where a proposed development is located laterally outside the BRA, no impact upon the associated equipment is predicted. Where a development is predicted to be located laterally within a BRA, further analysis is undertaken.

Table 5 below and on the following page lists for each facility whether the proposed development is located laterally within or outside of the associated BRA.

Equipment	Facility	Lateral Analysis Result
ILS Localiser (LOC)	LOC 09L-IAA	**Outside**
	LOC 09R-IBB	**Outside**
	LOC 27L-ILL	**Outside**
	LOC 27R-IRR	**Outside**
ILS Glide Path (GP)	GP 09L-IAA	**Outside**
	GP 09R-IBB	**Outside**
	GP 27L-ILL	**Outside**

Equipment	Facility	Lateral Analysis Result
ILS Glide Path (GP)	GP 27R-IRR	Outside
ILS Distance measuring equipment (DME)	DME 09L-IAA	Outside
	DME 09R-IBB	Outside
	DME 27L-ILL	Outside
	DME 27R-IRR	Outside
Non-directional beacon (NDB)	NDB-BUR	Outside
	NDB-CHT	Outside
	NDB-EPM	Outside
	NDB-WOD	Outside
VHF Omni-direction range (VOR) DME	VOR/DME-BIG	Outside
	VOR/DME-BNN	Outside
	VOR/DME-DET	Outside
	VOR/DME-LAM	Outside
VHF Omni-direction range (VOR) DME	VOR/DME-LON	Within
	VOR/DME-MAY	Outside
	VOR/DME-MID	Outside
	VOR/DME-OCK	Outside
	VOR/DME-SAM	Outside

Table 5 *Lateral analysis summary*

Further analysis of the VOR/DME-LON is presented in the following subsection.

No impact is predicted upon other assessed facilities as the proposed development is laterally outside the BRAs.

4.4 Vertical Analysis

Further analysis of potential vertical infringements of the BRAs for the VOR/DME-LON is presented below.

The BRAs for the facility are presented in Figure 11 below.

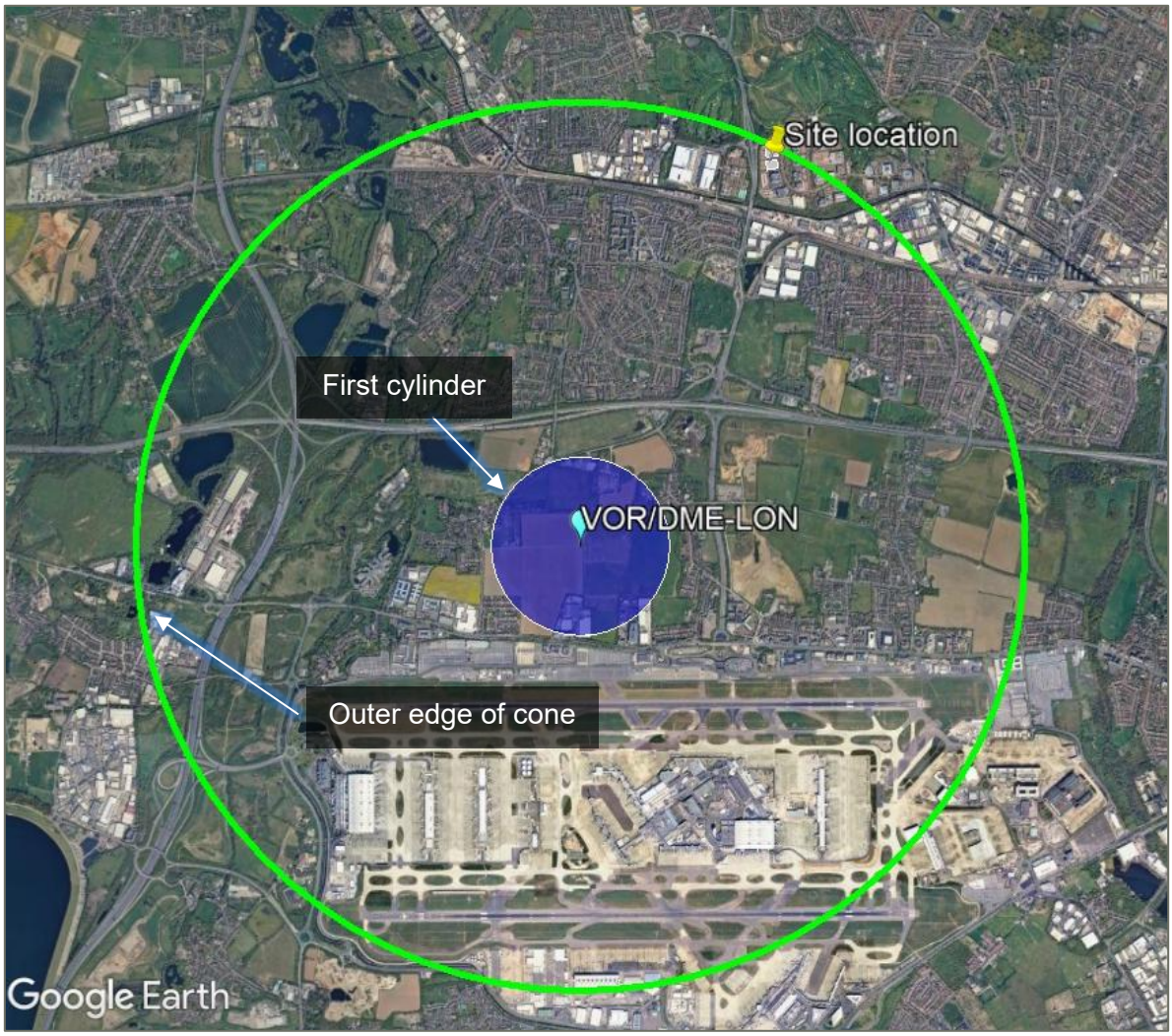


Figure 11 *Building restricted areas – VOR/DME-LON*

The proposed development is predicted to be vertically clear of the BRAs for the VOR/DME-LON, with a minimum clearance of 23m.

No significant impact is predicted upon the VOR/DME-LON due to no predicted vertical infringement of the associated BRAs.

4.5 Assessment Conclusion

No impact is predicted upon the assessed CNS equipment due to the proposed development being either laterally outside the BRAs or below the BRAs.

5 INSTRUMENT FLIGHT PROCEDURES

5.1 Overview

Instrument Flight Procedures (IFPs) are published documents that consist of defined three dimensional routes for aircraft arriving and departing airports.

In practice, aircraft do not necessarily fly these routes exactly due to limitations on the performance of aeronautical instruments, pilots and variations in wind and pressure conditions.

As a general rule, IFPs are designed so that there are vertical and horizontal safety margins between the specified trajectory and surrounding terrain and obstacles. These margins vary depending on the phase of flight and whether UK, European, or International rules are being considered. This means that if the vertical clearance between an IFP route and the top of the proposed development exceeds the appropriate vertical clearance, then it will not have a significant safety impact on aircraft flying the route.

This means that an area around and beneath these three-dimensional routes must be kept clear of obstacles to ensure that there is no significant collision risk to aircraft flying these procedures as shown in Figure 12 below.

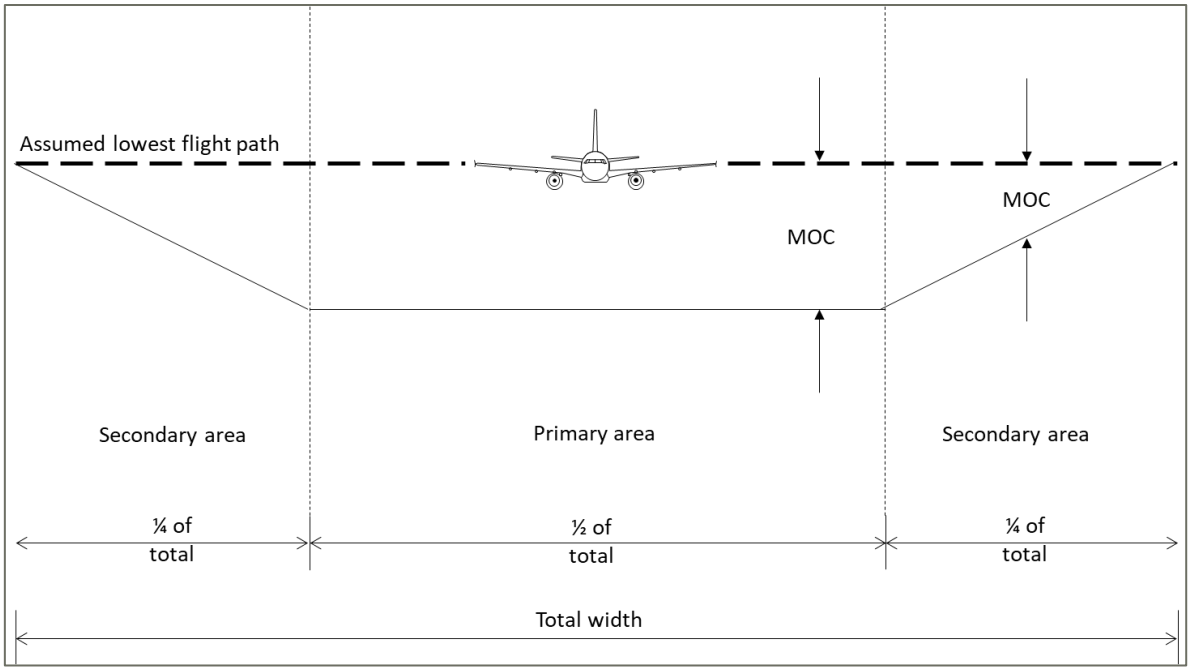


Figure 12 *Instrument Flight Procedure Minimum Obstacle Clearances*

5.2 Maximum Elevation Figure (MEF)

The MEF shows the maximum altitude of the highest terrain or structure in a particular quadrangle of a standard aeronautical chart. The proposed development has a maximum altitude of 176 feet, and it is located within the quadrangle where the MEF is 1,700 feet. The proposed development is below the MEF, therefore, the MEF will not be affected by the proposed development.

5.3 Area Minimum Altitude (AMA)

The AMA provides minimum obstacle clearance above all obstacles (terrain and structures) in a particular quadrangle of an aeronautical chart, normally this requirement is 2000ft in mountainous areas and 1000ft otherwise.

The Area Minimum Altitude shown for the quadrangle in which the development is located is 2,200 feet AMSL. The proposed development has a maximum altitude of 176 feet AMSL which is 2,024 feet below the Area Minimum Altitude. This is greater than the specified clearance of 1000 feet (a non-mountainous area). The proposed development will therefore not affect the current Area Minimum Altitude.

5.4 Surveillance Minimum Altitude Chart (SMAC)

SMAC are published to show the lowest altitude a pilot will be instructed to fly whilst receiving an air traffic control service. Figure 13 on the following page shows the ATC SMAC for Heathrow Airport[5] (annotated with a green crosshair to mark the approximate location of the proposed development).

Heathrow Airport's SMAC shows that the minimum altitude for the SMAA is 1,800 feet AMSL above the proposed development. The proposed development is not within 5NM of a lower sector.

The proposed development has a maximum altitude of 176 feet AMSL which is 1,624 feet below the SMAA and greater than the required clearance of 984 feet.

There are two FAVAs located to the east and south-east of the proposed development shown on the SMAC. It is understood that there is no buffer applied to the FAVA and therefore the proposed development is laterally clear of the FAVA, and no impact upon the FAVA I predicted.

No impact upon the SMAC is predicted.

[5] Source: NATS AIP.

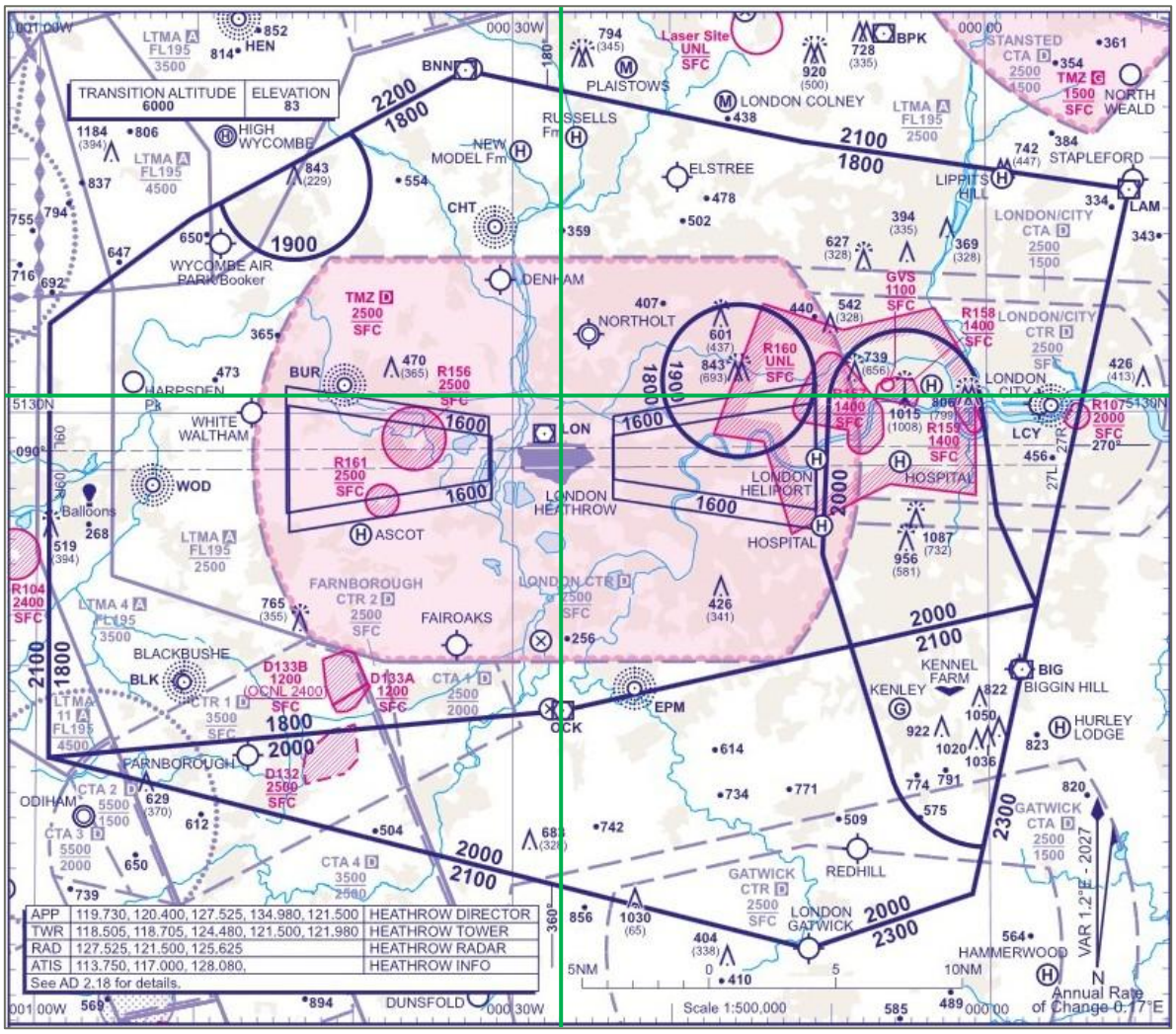


Figure 13 *Surveillance Minimum Altitude Chart – Heathrow Airport*

5.5 High-Level IFP Assessment

Where the obstacle limitation surfaces of an aerodrome are not infringed by a development, there is typically no impact upon the instrument flight procedures. The analysis has shown that the Proposed Development is does not vertically infringe the OLS at Heathrow Airport.

No further assessment of specific procedures associated with Heathrow Airport has been carried out, due to the clearance of the OLS and existing development in the area.

A detailed IFP assessment may be requested by Heathrow Airport. This assessment should be carried out by an APDO (Approved Procedure Design Organisation). Consultation with the safeguarding team is recommended to confirm their position.

6 PUBLIC SAFETY ZONES

6.1 Heathrow Airport Public Safety Zones

Public Safety Zones (PSZ) are areas of land at the ends of the runways at the busiest airports, within which development is restricted in order to control the number of people on the ground at risk of death or injury in the event of an aircraft accident on take-off or landing.

Heathrow Airport PSZ, for the existing and proposed runways, and the location of the proposed development are shown in Figure 14 below. Restricted areas are outlined in red. Controlled areas are outlined in blue.

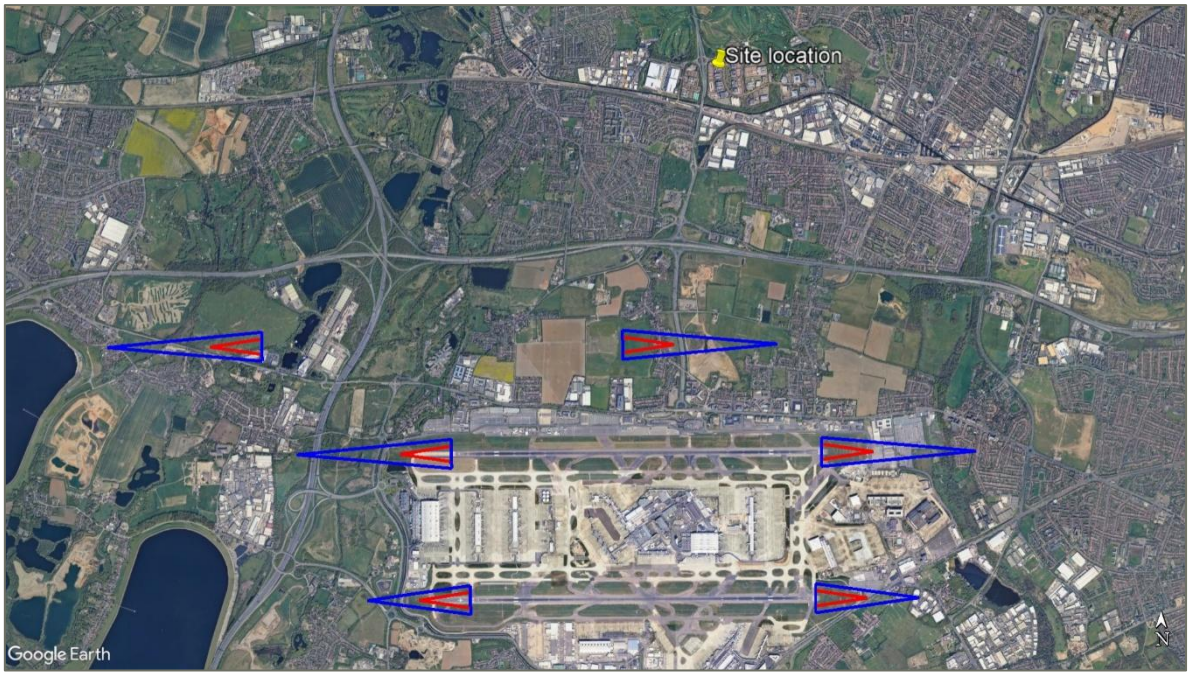


Figure 14 *Public Safety Zones*

6.2 Heathrow Airport PSZ conclusions

The analysis has shown that the development is laterally clear of all Heathrow Airport PSZs. Therefore, no impact upon the safety zones is predicted.

7 LIGHTING REQUIREMENTS AND CRANE USAGE

7.1 Overview

The following sections present high-level considerations for aviation lighting requirements for the proposed development and crane usage (during construction).

7.2 Obstacle Lighting

The Proposed Development is less than 150 metres above ground and does not infringe the OLS of the nearest licensed aerodrome (London Heathrow).

CAP168 published by the CAA defines an obstacle[6] as: '*All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft, or that extends above a define surface intended to protect aircraft in flight, or that stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.'*

No requirement for aviation lighting has been identified for the proposed development.

7.3 Crane Usage

During the construction phase, cranes will be present at the site that will reach elevations greater than the final building height. In principle, safeguarding concerns for cranes are the same as for building developments. A crane design is not fixed at this stage.

7.3.1 OLS

It is recommended that crane heights are restricted to no more than 14m greater than the maximum height of the proposed development to ensure no infringement of the OLS.

7.3.2 BRAs

It is recommended that crane heights are restricted to no more than 23m greater than the maximum height of the proposed development to ensure no infringement of the BRAs associated with VOR/DME-LON.

7.3.3 Lighting

Crane lighting may be requested by Heathrow Airport. Consultation with the safeguarding team is recommended to understand their position regarding crane operations.

[6] CAA CAP168, Chapter 4, Lighting of Obstacles.

APPENDIX A – COORDINATE DATA

The table below presents the assessed coordinates and heights.

Coordinate	Longitude (°)	Latitude (°)	Elevation (amsl)
100-1	-0.44739	51.51091	53.65m
100-2	-0.44749	51.51135	53.65m
100-3	-0.44771	51.51134	53.65m
100-4	-0.44777	51.51158	53.65m
100-5	-0.4486	51.5115	53.65m
100-6	-0.44844	51.51081	53.65m
200-1	-0.44731	51.51014	53.4m
200-2	-0.44743	51.51064	53.4m
200-3	-0.44851	51.51054	53.4m
200-4	-0.44839	51.51003	53.4m

Coordinate data



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