Aviation Safeguarding Assessment
November 2023

ABERFELDY VILLAGE MASTERPLAN

Aberfeldy:

Aviation Safeguarding Assessment

KLG119/R1/Issue 3

November 2023

K L Grant Consulting Ltd.

Authorisation Sheet

Report Title:	Aberfeldy Village: Aviation Safeguarding Assessment
Client:	Eco World London Development Company
Project Reference:	KLG119
Report Number:	KLG119/R1
Issue:	Issue 3

Prepared by:	Kate Grant		6th November 2023
Checked by:	Mark Eddowes		6th November 2023
Approved by:	Kate Grant		6th November 2023

KLG

K L Grant Consulting Ltd.

Summary

This report is an update to the previously submitted version that was submitted to the Council in support of the hybrid planning application. This updated version has been prepared in response to the changes to the planning application boundary as explained in the covering letter to accompany the amendments to the Proposed Development.

This Aviation Safeguarding Assessment has been prepared by KL Grant Consulting Limited and is submitted in support of a hybrid planning application for the Aberfeldy Village Masterplan. The hybrid planning application is made in relation to the north of East India Dock Road (A13), east of the Blackwall Tunnel Northern Approach Road (A12) and to the west of Abbot Road (the "Site") on behalf of The Aberfeldy New Village LLP' ("The Applicant"). The hybrid planning application is formed of detailed development proposals in respect of Phase A for which no matters are reserved ("Detailed Proposals"), and outline development proposals for the remainder of the Site, with all matters reserved ("Outline Proposals"). The Detailed Proposals and Outline Proposals together are referred to as the "Proposed Development".

The Proposed Development lies approximately 3.3 km to the west of London City Airport and 0.8 km to the north of the runway extended centreline, in an area subject to aerodrome safeguarding, the process by which airspace required for safe and efficient take-off and landing at airports is maintained free of new development. Specific height limits apply at the Site, according to international standards and recommended practices of the International Civil Aviation Organisation (ICAO), as implemented in the UK by the Civil Aviation Authority (CAA) and set out in Civil Aviation Publication (CAP) 168 on aerodrome licensing.

To support the planning process, an assessment of the Proposed Development against the height constraints that apply across the Site has been undertaken. In addition to determining the acceptable height of permanent buildings at the Site, some consideration has also been given to the acceptability of the use of cranes above the finished building heights during construction with respect to physical and operational safeguarding constraints.

The majority of the Proposed Development is for buildings up to a maximum height of 50 m AOD with 4 buildings having a maximum height between 50 m AOD and 100 m AOD. The tallest building, Building B3, has a maximum finished building height of 100 m AOD.

The following primary overall conclusions may be drawn from the aviation safeguarding assessment:

- The physical safeguarding assessment of the Proposed Development against the relevant obstacle limitation surface criteria applicable across the Site has confirmed that the proposed building heights identified comply with those requirements.
- The physical safeguarding assessment of the Proposed Development against the PANS-OPS instrument flight procedure design criteria applicable across the Site has confirmed that the proposed building heights identified comply with those requirements.
- The assessment of the physical safeguarding requirements applicable to temporary obstacles indicates that there is sufficient headroom above the proposed finished building heights to accommodate construction cranes without any adverse impacts on operations at London City Airport.

- The assessment of potential impacts on reasonably foreseeable non-standard operations such as one engine inoperative scenarios indicates that these must already safely accommodate existing obstacles that are closer to the airport runway. These existing obstacles limit the minimum climb gradient that is required to ensure an adequate vertical margin is achieved in the event of single engine failure on take-off. The Proposed Development will not increase this minimum climb gradient and therefore the identified building heights and construction activities up to the obstacle limitation surface hight limits specified will have no material adverse impact on the safety and efficiency of non-standard operations at London City Airport.

- The potential for tall buildings in the area of the Site to impact on the H10 radar located at Heathrow Airport is identified. Given the overall height and scale of the proposed buildings, the Proposed Development can be considered unlikely to result in any such adverse impacts. Furthermore, the extent of any potential impacts may be limited to some extent by the existing built environment which is likely to obscure the sightlines from the radar to the Site. If potential adverse impacts were identified, previous experience indicates that these can normally be addressed satisfactorily by a radar mitigation scheme, in agreement with NATS, the operators of the radar. NATS are statutory consultees under the planning process and will be able to advise during determination of the application if mitigation might be required.

- Preliminary assessment of the potential bird hazard associated with the proposed development indicate that it is unlikely to be significant and can be addressed by the adoption of well-established management measures, if considered appropriate. The primary bird hazard that may give rise to serious consequences is a multiple bird strike involving larger species, including in particular water birds such as gulls, geese and swans which may potentially be encountered in flocks by aircraft during take-off and landing operations. The nature and scale of the development site is such that it would seem unlikely to give rise to a significant increase in the likelihood of occurrence of these sorts of events. It is nevertheless recommended that the general guidance in respect of the avoidance of water and potential nest sites that may attract these species is followed during building design, with particular attention to the landscaping design. There is potential concern about the increasing use of urban areas by gulls, in particular the establishment of nesting colonies making use of flat roofs on buildings. Some active management to deter nesting of these species may be appropriate during the life of the development.

- The site is located outside the lateral limits of areas that are identified in CAP 168 as requiring attention in terms of potential dazzling or confusing lights. Given the site location to the side of flight paths it can be concluded that lighting at it can be expected not to represent any threat to the safety of operations at London City Airport. Reflective glare is also unlikely to be an issue as no PV panel installations are planned for the development.

Contents

1 Introduction

This report is an update to the previously submitted version that was submitted to the Council in support of the hybrid planning application. This updated version has been prepared in response to the changes to the planning application boundary as explained in the covering letter to accompany the amendments to the Proposed Development.

This Aviation Safeguarding Assessment has been prepared by KL Grant Consulting Limited and is submitted in support of a hybrid planning application for the Aberfeldy Village Masterplan. The hybrid planning application is made in relation to the north of East India Dock Road (A13), east of the Blackwall Tunnel Northern Approach Road (A12) and to the south west of Abbot Road (the "Site") on behalf of The Aberfeldy New Village LLP' ("The Applicant"). The hybrid planning application is formed of detailed development proposals in respect of Phase A for which no matters are reserved ("Detailed Proposals"), and outline development proposals for the remainder of the Site, with all matters reserved ("Outline Proposals"). The Detailed Proposals and Outline Proposals together are referred to as the "Proposed Development".

The planning proposals are for the demolition of existing structures and redevelopment to a maximum height of 100 m AOD.

The Site lies approximately 3.3 km to the west of London City Airport and 0.8 km to the north of the runway extended centreline, in an area subject to aerodrome safeguarding, the process by which airspace required for safe and efficient take-off and landing at airports is maintained free of new development. Specific height limits apply at the Proposed Development, according to international standards and recommended practices of the International Civil Aviation Organisation (ICAO), as implemented in the UK by the Civil Aviation Authority (CAA) and set out in Civil Aviation Publication (CAP) 168 on aerodrome licensing.

Two distinct height constraints associated with operations at London City Airport apply in the area of the Site:

- Aerodrome licensing requirements, prescribed in terms of the obstacle limitation surfaces (OLS) for the Airport;
- Operational requirements, prescribed by PANS-OPS criteria for instrument procedure design, employed for the design of operational procedures for take-off and approach that take account of the existing obstacle environment in the vicinity of the Airport and which generally lie above the OLS.

To support the planning process, an assessment of the Proposed Development against the height constraints that apply across the Site has been undertaken. In addition to determining the acceptable height of permanent buildings at the Site, some consideration has also been given to the acceptability of the use of cranes above the finished building heights during construction with respect to physical and operational safeguarding constraints.

The findings of this aviation safeguarding assessment are summarised in this report which comprises the following sections:

- A summary description of the Proposed Development and its location relative to London City Airport;
- An assessment of those proposals against the relevant physical safeguarding criteria;

- Additional operational safety assessment to confirm the acceptability of the proposals;
- An assessment of the Proposed Development against other safeguarding criteria, in particular the technical safeguarding of radar facilities operated by NATS and bird hazard management.

2 Site Description

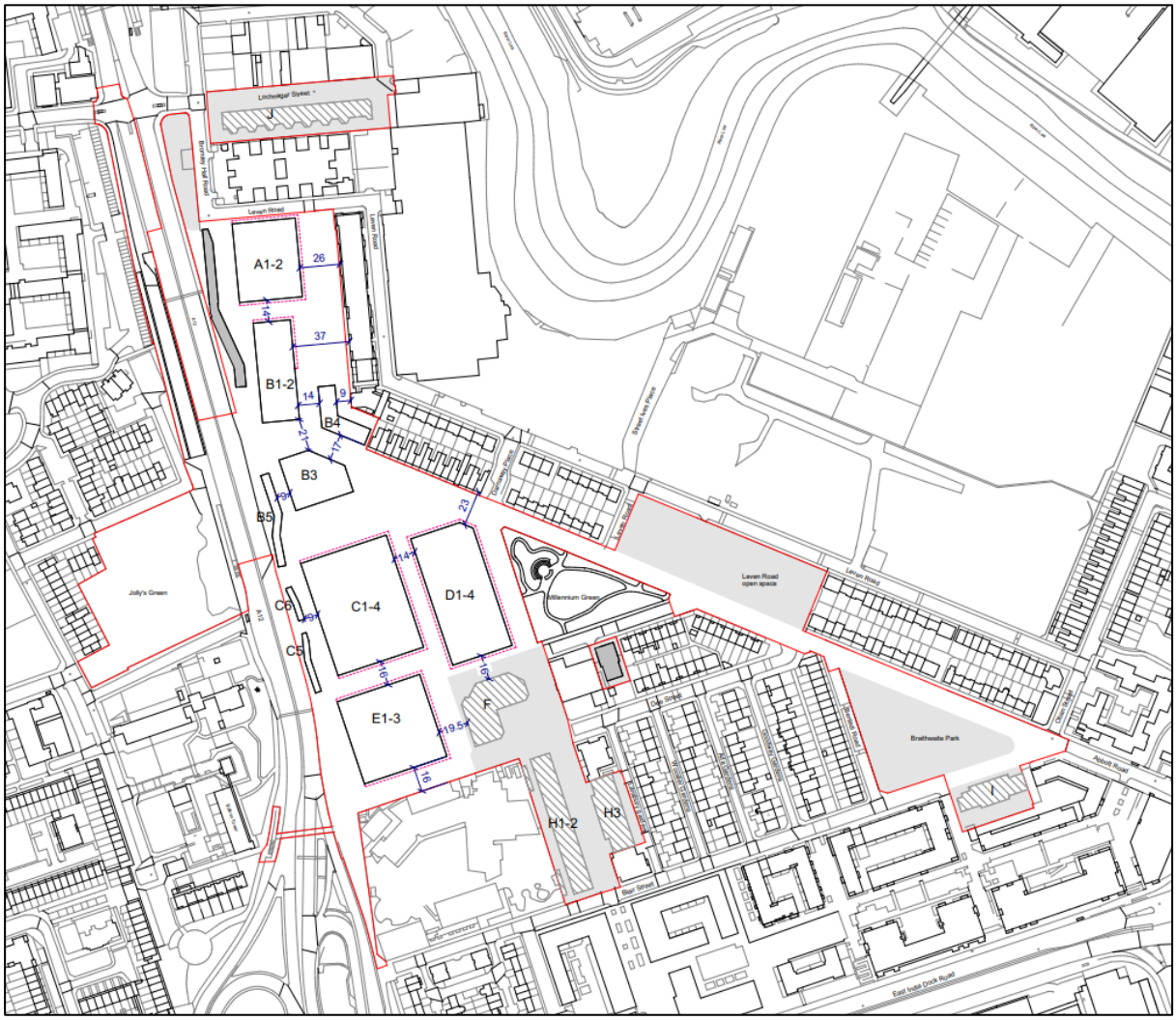
The Proposed Development comprises the comprehensive redevelopment of the Site. The Proposed Development will provide new retail and workspace floorspace along with residential dwellings and the pedestrianisation of the A12 Abbott Road vehicular underpass to create a new east to west route. The Development will also provide significant, high quality public realm, including a new Town Square, a new High Street and a public park.

The Site location in relation to the airport runway is shown in Figure 1. The most easterly point of the Site is approximately 3.3 km to the west of the Runway 09 threshold at London City Airport and approximately 0.8 km to the north of the runway extended centreline.

Figure 1: Site location in relation to London City Airport

A site plan showing the general layout of buildings of the Proposed Development is shown in Figure 2 and the maximum building heights for each building shown in Table 1. The majority of the Proposed Development is for buildings up to a maximum height of 50 m AOD with 4 buildings having a maximum height between 50 m AOD and 100 m AOD. The tallest building, Building B3, has a maximum finished building height of 100 m AOD. Figure 3 shows the 4 buildings which have heights in excess of 50 m AOD. Figure 3 also shows the identified assessment points for this aviation safeguarding review. At this site, it is evident that the height constraints will be most limiting at the most easterly points, which are closest to the airport. Coordinates for the easterly corners of the 4 buildings which extend above a height of 50 m AOD have been estimated by overlaying the site plan onto Google Earth and are provided in Table 1. In addition, the most easterly corner of the Site has been used to assess the rest of the Development at a height of at or below 50 m AOD. Coordinates for this point are also provided in Table 1.

Figure 2: Plan showing building layout



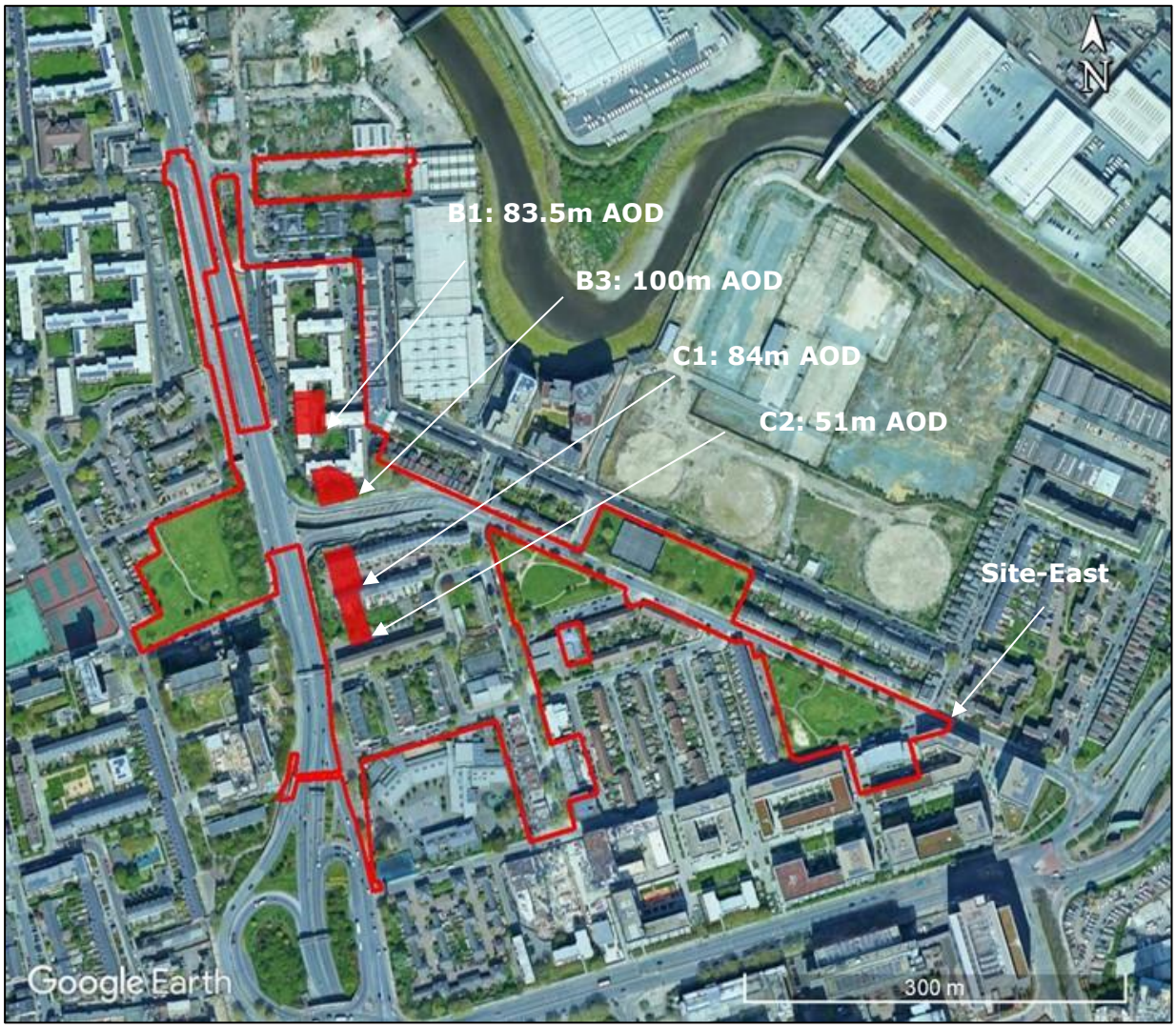
For the purposes of this assessment, it is convenient to work in terms of runway-aligned coordinates in which the site locations are specified with respect to their longitudinal distance, X, from the runway threshold and lateral distance, Y, from the runway extended centreline. The runway threshold coordinates identified in the Aeronautical Information Publication for London City Airport, where Runway 09 refers to the western threshold employed in easterly approaches and Runway 27 refers to the eastern threshold employed for approaches in a westerly direction, are as follows:

- Runway 09: WGS84 51 30 19.90 N, 000 02 44.73 E; OSGB 542076.680, 180494.174
- Runway 27: WGS84 51 30 17.73 N, 000 03 53.84 E; OSGB 543410.789, 180464.558

Table 1: Assessment points

Ref	OS Grid Coordinates		RWY 09 Aligned		RWY 27 Aligned		Maximum Building Height (m AOD)
	Easting	Northing	X (m)	Y (m)	X (m)	Y (m)	
B1-East	538311.6	181536.0	3787.2	-958.0	-5121.7	958.0	83.5
B3-East	538338.8	181487.0	3759.0	-909.7	-5093.4	909.7	100
C1-East	538345.7	181416.2	3750.6	-839.0	-5085.0	839.0	84
C2-East	538353.5	181375.4	3741.8	-798.4	-5076.2	798.4	51
Site-East	538810.3	181324.5	3284.0	-757.6	-4618.4	757.6	50

Figure 3: Plan showing taller buildings and assessment reference points



3 Physical Safeguarding Assessment

3.1 Outline of Constraints and Method

A number of distinct aviation-related height constraints apply in respect of the development Site, associated with the safeguarding of operations at London City Airport:

- General safeguarding criteria, prescribed by the UK Civil Aviation Authority in the context of aerodrome licensing and in accordance with ICAO standards, which are defined by a series of obstacle limitation surfaces (OLS). The OLS are a set of predominantly planar surfaces arranged about the runway and flight paths to and from it. Penetrations of the OLS are generally not permitted but penetrations of some surfaces may be allowed where it can be shown that these would not adversely affect the safety or regularity of aircraft operations.

- More specific criteria for the protection of flight procedures undertaken at individual airports, in accordance with ICAO standards and practices, as defined in ICAO PANS-OPS [1]. These criteria, defined in terms of a set of obstacle assessment surfaces (OAS), take account of the existing obstacle environment during the design of specific instrument flight procedures at individual airports. These criteria may place some restrictions on operations, the safety of which might otherwise be compromised by the existing obstacle environment. It is important from the perspective of the airport operator that new buildings would not introduce any additional restrictions that might adversely affect operational efficiency. On the other hand, where some restrictions already apply due to existing obstacles, this may allow some flexibility in respect of new developments, provided that these can be accommodated by those existing restrictions.

The safeguarding assessment normally begins with an assessment against the general safeguarding criteria defined in terms of the OLS. Typically, the OLS limits define the maximum permitted permanent building heights. However, analysis has shown that there are some operational criteria not fully safeguarded by the OLS. It is understood that London City Airport is aware of these issues and is taking steps to correct this deficiency. Therefore, further assessment of specific flight operations by reference to the OAS and other operational criteria has been undertaken to determine if any of these introduce more restrictive constraints on permanent building limits. The scope for temporary infringements of the OLS by cranes during construction has also been considered by reference to operational clearance margin requirements. Assessment of the safeguarding requirements of specific flight operations in the case of the Proposed Development site requires that three different operations are considered:

- Runway 09 approach operations, involving easterly approach over the west side of the airport along a flight path to the south of the Site;

- Runway 27 missed-approach operations, involving westerly approach from the other direction when an approach must be discontinued, requiring aircraft to fly over the runway and climb to the west again along a flight path to the south of the Site;

- Runway 27 departure, involving take-off initially to the west along a runway-aligned flight path to the south of the Site and then a turn to the north.

The primary approach procedures that require protection by reference to the PANS-OPS criteria are the precision approach operations which employ the instrument landing system (ILS) for both runway directions. In addition, there is a published non-precision approach procedure in each runway direction which may be employed when the glide path element of the ILS approach procedure is not serviceable. Accordingly, six different sets of surfaces may place overlapping and slightly different restrictions on building

heights at the Site: the general OLS safeguarding criteria; the final approach segment OAS of the Runway 09 ILS approach procedure; the missed-approach segment OAS of the Runway27 ILS approach procedure; the final approach segment OAS of the Runway 09 non-precision approach procedure; the missed-approach segment OAS of the Runway 27 non-precision approach procedure; the Runway 27 instrument departure.

The initial constraints assessment has considered the height limits across the Site in general associated with each of the sets of surfaces, to identify the most limiting surfaces that may apply. The OLS and OAS are defined in terms of rectilinear runway aligned coordinates: the longitudinal distance, x, from the runway end as measured along the runway extended centre line; the perpendicular lateral distance, y, from the runway extended centre line; the height above appropriate aerodrome reference elevations. As noted earlier, the assessment is facilitated by expressing the site location in terms of runway-aligned coordinates, as presented in Table 1, in common with the coordinate system by means of which the OLS and OAS are defined.

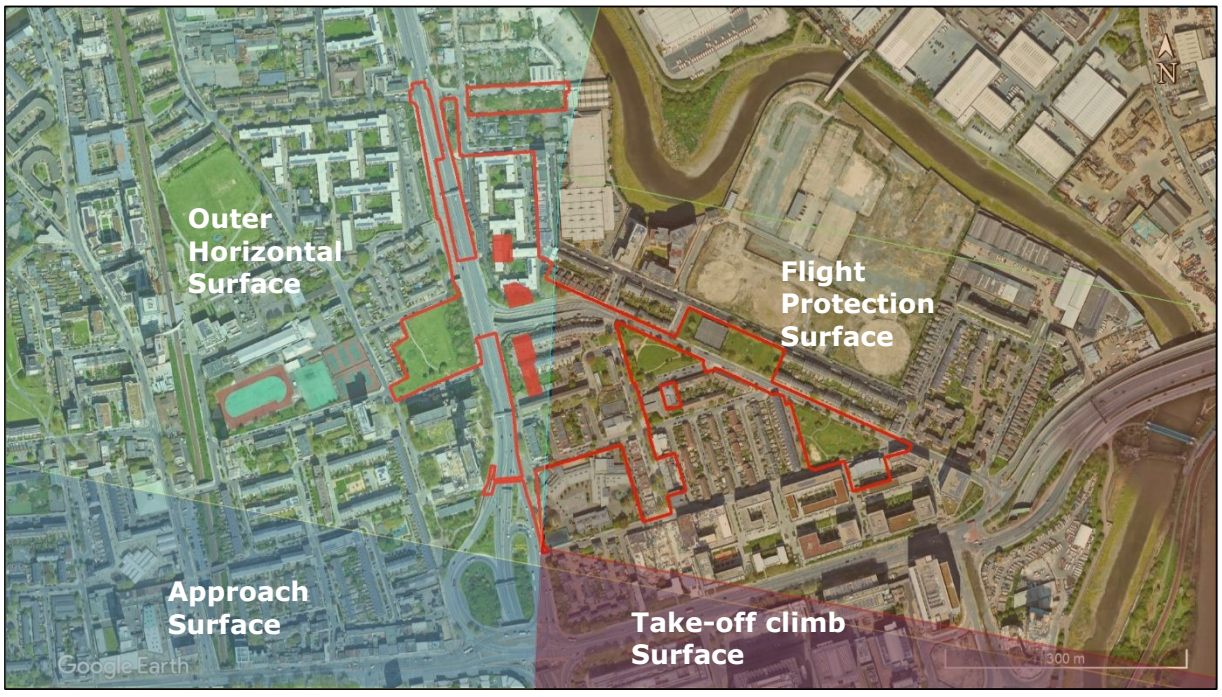
3.2 Obstacle Limitation Surface Assessment

Assessment against the OLS determines that the Site is located within the areas covered by the outer horizontal surface (OHS) and the Runway 27 flight protection surface (FPS).

The outer horizontal surface has a screening height of 155.3 m AOD. The flight protection surface (FPS) slopes upwards from east to west, aligned with the runway axis, at a 4% gradient from the end of Runway 27 up to the outer horizontal surface height of 155.3 m AOD.

Figure 4 shows the location of the Site and taller building elements in relation to the OLS surface areas.

Figure 4: Plan showing site location in relation to obstacle limitation surfaces



Assessment against the OLS further determines that, with the exception of a very tiny section of the south-west site corner, the Site is located outside the area covered by the Runway 09 approach surface (APPS) and Runway 27 take-off climb surface (TOCS) which are defined to protect easterly approach operations and westerly departures.

The very small sliver of land that protrudes into these surfaces is unlikely to have any significant building development and, in any event, the height of the APPS at this range from the airport is around 188 m AOD, significantly greater than the flight protection surface and outer horizontal surface height limits. The TOCS has the same slope and heights as the FPS, reaching a height limit of 155.3 m AOD at the edge of the OHS where this tiny segment of land intersects the surface boundary.

Table 2 summarises the obstacle limitation surface height limits at the identified assessment points.

Table 2: Obstacle limitation surface height assessment

Ref	OS Grid Coordinates		RWY 09 Aligned		OLS Height Limit (m AOD)	Maximum Building Height (m AOD)	Margin (m)
	Easting	Northing	X (m)	Y (m)			
B1-East	538311.6	181536.0	3787.2	83.5	155.3	83.5	71.8
B3-East	538338.8	181487.0	3759.0	100	155.3	100	55.3
C1-East	538345.7	181416.2	3750.6	84	155.3	84	71.3
C2-East	538353.5	181375.4	3741.8	51	155.3	51	104.3
Site-East	538810.3	181324.5	3284.0	50	137.6	50	87.6

It is evident that the Proposed Development at a maximum height of 100 m AOD complies with the OLS requirements and is acceptable. A minimum margin of 55.3 m between the building B3 is identified. Margins in excess of 70 m are determined for all of the other buildings across the Site.

3.3 Flight Procedure Assessment

The following instrument flight procedures, which involve flight operations from London City Airport in the vicinity of the proposed development, have been identified for assessment, in accordance with the Aeronautical Information Publication (AIP) [2]:

- ATC Surveillance Minimum Altitude Chart (AD2.EGLC-5-1)
- Runway 09 Initial Approach (AD2.EGLC-8-1 & 8-2)
- Runway 09 Visual Approach (AD2.EGLC-8-3)
- Runway 09 ILS Final Approach (AD2.EGLC-8-1)
- Runway 09 LOC Final Approach (AD2.EGLC-8-2)
- Runway 27 ILS Missed Approach, 2.5% climb gradient (AD2.EGLC-8-4)
- Runway 27 ILS Missed Approach, 3.0% climb gradient (AD2.EGLC-8-4)
- Runway 27 ILS Missed Approach, 3.5% climb gradient (AD2.EGLC-8-4)
- Runway 27 LOC Missed Approach, 2.5% climb gradient (AD2.EGLC-8-5)
- Runway 27 LOC Missed Approach, 3.5% climb gradient (AD2.EGLC-8-5)
- Runway 27 SID (AD2.EGLC-6-1 to 6-7)

In the area of the Site, flight procedures are fully safeguarded by the obstacle limitation surfaces. It is therefore evident from the significant margins identified between the

obstacle limitation surfaces and the Proposed Development that buildings up to a maximum of 100 m AOD will not have any significant impact on these flight procedures.

For Runway 09 approach procedures, the Site is located under the OAS Y surface. The Y surface has a height of 229 m AOD at the most easterly point of the Site. Therefore, it is evident that buildings and crane operations up to the limits of the OLS will have no significant impacts upon Runway 09 approach operations.

For Runway 27 missed approach procedures, the Site is located under an adjusted OAS Z surface, which takes account of the existing obstacle environment and a height constraint of around 207 m AOD is identified at the most easterly point of the Site.

For Runway 27 departure operations, aircraft will fly relatively close to the Site, however, a minimum climb gradient of 7.2% is specified to ensure a sufficient margin is achieved between aircraft and the existing obstacle environment. This minimum climb gradient will ensure that aircraft will pass the Proposed Development at a height of around 250 m AOD. The site is located after the earliest turn point, in the turn area where PANS-OPS requires a minimum obstacle clearance of 75 m. Therefore, it is evident that obstacles at the Proposed Development site up to a height of around 175 m AOD will have no impact upon normal departure operations.

3.4 Use of Construction Cranes

At a maximum building height of 100 m AOD, a minimum headroom of 55.3 m is determined between the top of the tallest building element and the outer horizontal surface at 155.3 m AOD. Greater headroom of around 70 to 100 m is identified above the other proposed buildings across the Site.

Whilst infringements of this surface may be permitted where it can be shown by aeronautical study that the infringement would not affect the safety or significantly affect the safety of operations, it is evident that there is adequate headroom between the building heights and the obstacle limitation surfaces to accommodate construction activities without any infringements.

Headroom of the order of 10 m is typically required as a minimum for the use of a single saddle jib tower crane. A further 10 m would be required if a second saddle jib crane with an overlapping operating area were to be employed. Luffing jib cranes, which may be preferred to saddle jib cranes where there is limited scope for jib over sail across areas adjacent to the Site, require more headroom, typically 40 m or more, according to the jib length.

Therefore, the assessment of the physical safeguarding requirements applicable to temporary obstacles indicates that there is sufficient headroom above the proposed finished building heights to allow for development of a viable crane plan to support construction.

4 Operational Safety Considerations

Broadly speaking, it is to be expected that where new developments are located beneath the OLS that are intended to provide for the general protection of flight paths they will not give rise to any material impact on the safety of operations. Similarly, where temporary structures such as construction cranes do not lead to the erosion of the vertical and lateral margins according to instrument flight procedure design criteria, these can generally be expected not to lead to a material impact on operational safety or efficiency. Where instrument flight procedures are designed to meet the identified PANS-OPS vertical and lateral margin criteria with respect to the existing obstacle environment they are evidently considered to provide for an acceptable level of safety. It would therefore seem to follow that where those criteria are met with respect to a new, temporary structure no material impact on operational safety or efficiency will arise.

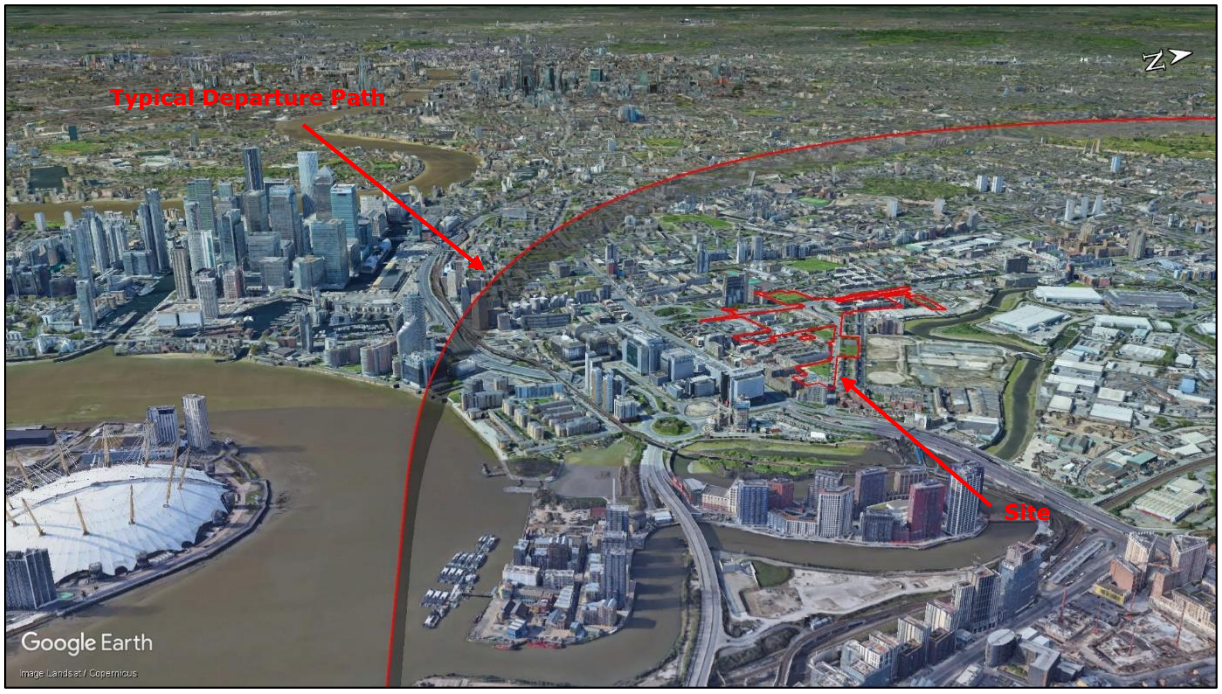
Notwithstanding these general observations, some further operational safety assessment is appropriate to ensure that there are no adverse impacts on some operations that may not necessarily be adequately covered by the specifications for the OLS and the OAS. For example, there are other operational criteria in respect of the one engine operative condition which merit specific consideration.

In addition, it should be noted that PANS-OPS cautions against the use of the precision approach criteria for the assessment of the potential safety impacts of penetrations of the standard OLS. The PANS-OPS criteria for defining the OCA that are employed in precision approach procedures were designed against an identified safety target. The OCA set by reference to these criteria are regarded to ensure clearance of obstacles from the start of the final approach to the end of the intermediate missed-approach segment of the ILS precision approach. The criteria are based on normal operations and PANS-OPS states that they shall therefore not be applied for assessing the safety of penetrations of the Annex 14 OLS. Such a statement would appear not to be entirely consistent with the evident presumption that adherence to PANS-OPS criteria provides for an adequate level of operational safety in the design of instrument flight procedures. It is understood that the primary concern in respect of the use of criteria based on normal operations alone to assess OLS penetrations is that they do not explicitly take account of the one-engine inoperative condition. In practice, this scenario will be accommodated by various operational factors, as is demonstrated by this assessment.

In addition to the one-engine inoperative scenario, go-around initiation below the OCA or “baulked landing” is a relatively common “non-standard” operation. Go-arounds may be initiated if the approach is not adequately stabilised or perhaps in the event of a runway incursion. Experience across a number of airports indicates a go-around rate of the order of 1 in 300 approaches. A proportion of these go-around events may be initiated below the OCA. For the late go-around, executed below the normal OCA, aircraft will have dropped below the level at which it can be guaranteed, on the basis of normal PANS-OPS criteria, that a safe vertical margin can be maintained with respect to all obstacles in the go-around path. There is a possibility during these operations that aircraft may drift from the runway aligned path into locations where obstacles are located. It is therefore important to establish if new obstacles will have any significant impact on these operations.

In the case of new obstacles at the Proposed Development, due to the tall building cluster around One Canada Square, it is expected that in the event of single engine failure in the missed approach or during departure operations, aircraft would need to turn and follow a path to the north of Canary Wharf to avoid collision with the existing obstacle environment. Figure 7 illustrates this, showing the scale and location of the development in relation to the existing built environment and the turning departure path.

Figure 5: Departure path relative to Site location and existing buildings



The nearest building to the departure path at the Site is laterally displaced by approximately 580 m from the nearest point along the turning departure path at a flight path length of approximately 3.8 km. Operational performance standards require that aircraft operators ensure that an adequate vertical margin is achieved during departure with respect to all obstacles in the take-off path with the critical engine of a multi-engine commercial transport aircraft inoperative. Under the IR-OPS Implementing Rules [5] of the European Aviation Safety Administration (EASA), the following requirements apply:

'The net take-off flight path shall be determined in such a way that the aeroplane clears all obstacles by a vertical distance of at least 35 ft or by a horizontal distance of at least 90 m plus 0.125 × D, where D is the horizontal distance the aeroplane has travelled from the end of the take-off distance available (TODA) or the end of the take-off distance if a turn is scheduled before the end of the TODA. For aeroplanes with a wingspan of less than 60 m, a horizontal obstacle clearance of half the aeroplane wingspan plus 60 m, plus 0.125 × D may be used.'

Compliance with the TOCS and FPS is expected to provide adequate safeguarding for this scenario. However, to demonstrate this is the case, the IR-OPS implementing rule criteria have been considered. In the event that an early turn is initiated, aircraft may fly over the Site and further consideration of the vertical clearance is required. There are existing infringements of the Runway 27 departure area which will already place some constraints on westerly departures. The Millennium Mills building is located approximately 1 km from the Runway 27 departure end of runway (DER) at a height of 51.51 m AOD compared to the Site which is located approximately 3.8 km m from the Runway 27 DER. Assuming a vertical margin of 35 ft at both the DER and the obstacles, the minimum climb gradient that would be required to meet the IR-OPS requirements for the Millennium Mills is estimated to be around 4.5%. For comparison, the minimum climb gradient which would be required to ensure adequate vertical clearance between the tallest building B3 is around 2.5% and cranes operating at the maximum OLS heights identified across the Site would require a minimum climb gradient of 4.0% to meet IR-OPS requirements. Therefore, as these climb gradients are less than the minimum required to accommodate the existing built environment, it is reasonable to expect that the Proposed Development and construction activities up to the OLS height limits

identified in Table 2 will not have any significant impact upon the safety of operations in the event of a one-engine inoperative scenario.

In principle, in addition to one-engine inoperative conditions and late go-arounds, a wide range of abnormal operational scenarios involving more major fault conditions or errors may be envisaged. Such events have a diverse range of causes and are not amenable to detailed individual assessment. Based on the recent historical accident rate, significant near-miss events may be considered to occur with a rate of the order of perhaps 10^{-6} to 10^{-7} per approach. Where they do occur, they may arise anywhere and a small fraction only might be expected to involve flight in the vicinity of the Site. In the event that operations that have been compromised by major failure or errors were to involve flight in that area these can generally be expected not to be compromised more than they are by the existing obstacle environment. It can be concluded that there would be no grounds for additional control of development to take account of these sorts of scenarios beyond the limits associated with the OLS and PANS-OPS criteria.

Therefore, on the basis of these findings, it can be concluded that, having regard to the rate of occurrence and other characteristics of the reasonably foreseeable off-normal operational scenarios of engine failure and late go-around below the OCA, the Proposed Development will not have any material impact on the safety or efficiency of operations at London City Airport.

5 Technical Safeguarding

Technical safeguarding is the process employed to protect radio signals that support aircraft operations from being adversely affected by physical or electromagnetic changes in their transmission environment. Most physical objects act as potential reflectors or diffractors of radio signals. A combination of object size, material, proximity and incident radio wavelength determine the extent to which objects act as reflectors or diffractors.

The technical safeguarding of navigational aids such as instrument landing systems and other equipment providing guidance directly to aircraft is achieved by reference to defined geometrical frames, representing the volumes of space around any given navigational aid that may need to be kept free of obstacles to avoid potential interference with effective operation. Guidance [3] on the dimensions of geometrical frames associated with specific types of equipment is provided by the CAA. The geometrical frames identified in CAA guidance are understood to be cautious and represent the volumes of space in which there may be some potential for adverse impacts from new objects but where, in practice, according to the details of the object and equipment concerned, no significant impact may arise. These frames are initially applied as screening criteria to identify those circumstances where some further assessment may be required to determine whether or not any impacts will occur in practice.

In general, it is expected that developments that comply with the limits defined by the OLS will not conflict with the requirements for the technical safeguarding of the relevant navigational aids located at London City Airport. At the location and heights being proposed, the Proposed Development is expected to be outside the geometrical frames that apply to equipment located at London City Airport and will not adversely impact on these navigational aids.

In addition, consideration needs to be given to the safeguarding of radar equipment employed for the support of air traffic control. In that context, impacts of tall buildings on the operation of the H10 radar located on the south side of London Heathrow Airport are a recognised potential concern. New tall buildings can give rise to two adverse impacts: interruption of radar coverage behind the buildings where airspace is shielded by them; reflections of signals from aircraft that lead to the generation of “false targets” along the line of the buildings. The extent to which any new development may adversely impact on the radar will be dependent upon the height of the structure relative to the radar and its distance from the radar, having regard to the curvature of the earth and the associated influence on sight lines. These parameters determine the extent to which a new structure may stand above its general surroundings and lead to additional restrictions on radar coverage. The presence of existing tall buildings that would shield sight lines from the radar are a further factor influencing the nature of impacts.

NATS have indicated in previous studies that due to the way that radar waves propagate around a development, consideration of the area 2 degrees either side of the bearing from the H10 radar to the development and a height of greater than around 100 m AOD in Central London provides a good basis for an initial screening of potential impacts and shielding due to existing development.

Figures 6 shows the sightline of some of the existing built environment between the H10 radar and the Proposed Development. It is evident that some significant existing tall buildings, including The Shard at a height of 309.5 m AOD may well shield the proposed development from view, and given the limited heights of the buildings being proposed, it is unlikely that NATS will raise any objections to the development.

Figure 6: H10 radar sightlines and existing developments

In the event that NATS, who will be statutory consultees on the planning application, did raise concerns, previous experience indicates that issues that arise can normally be addressed satisfactorily by a radar mitigation scheme (RMS), in agreement with NATS. A radar mitigation scheme would generally involve renumeration to NATS to enable them to implement a modification of the radar system software to suppress any false targets caused by reflected signals. Typically, planning consent would be granted with conditions which limit construction above a specified height until the RMS has been fully implemented and this can take several months as these software changes can only be made at certain times when the system can be temporarily taken offline.

6 Bird Hazard Management

Under international standards, safeguarding in respect of bird hazards applies out to a defined radial distance of 13 km around airports. The proposed development is within this safeguarded area. In our experience, the operators of London City Airport have previously given limited attention to this issue when considering developments of this type being proposed but now appear to be increasingly focusing attention on bird hazard management when responding to some applications during statutory consultation. The scale of development and proximity to the airport appear to be factors determining the importance now being attached to this safeguarding issue during the consideration of any given application. For some larger developments close to the airport, the airport operators have identified specific requirements for landscaping plans to be unattractive to birds so as to avoid adverse effects on the safety of operations at London City Airport and for submission of bird management strategies for approval by the airport as a condition on permissions.

Some preliminary guidance on bird hazard management is provided below.

ICAO guidance [4] identifies bird attractants falling within three general categories that should be minimised in development at or near airports, as follows:

- Food
- Water
- Shelter

Guidance provided by the UK CAA [5] identifies the same broad issues as primary considerations in bird hazard management near airports.

ICAO guidance states the following in respect of bird attraction associated with buildings:

"Structures. Architects should consult biologists during the design phase of buildings, hangars, bridges and other structures at airports to minimize exposed areas that birds can use for perching and nesting. When perching sites are present in older structures (such as rafter and girded areas in hangars, warehouses and under bridges) access to these sites can often be eliminated with netting. Anti-perching devices, such as spikes, can be installed on ledges, roof peaks, rafters, signs, posts and other roosting and perching areas to keep certain birds from using them. Changing the angle of building ledges to 45 degrees or more will deter birds. However, it is emphasized that incorporating bird exclusion or deterrence into the design of structures is the most effective, long-term solution."

The CAA provide the following general guidance on building design:

"When new buildings are being designed they should:

- *prevent wildlife gaining access to the interior and roof spaces*
- *use self-closing doors or plastic strip curtains or other mechanisms to prevent access by wildlife*
- *be without roof attractions - consider implications of green, flat and shallow pitched structures*
- *have minimal roof overhangs and be without ledges beneath overhangs or external protrusions*

- *allow easy access to rooftops in case it becomes necessary to take action against nesting gulls or waders that colonise large flat or shallow-pitched roofs. Gulls will also use steeply sloping roofs where the nests can be lodged behind vents, skylights, and in gullies etc."*

The CAA note further that sheltered ledges, access holes and crevices within and underneath structures can prove ideal nesting locations for feral pigeons, stock doves, pied wagtails and starling whilst rooftops themselves, including green roofs, may be attractive to gulls or wading birds such as oystercatchers, for nesting, loafing and roosting.

Water acts as a bird attractant and water features should be avoided in landscaping plans for development near airports. Management of water accumulations that may otherwise attract birds may be required during site preparation and construction activities.

Potential food attractants include food waste as well as landscaping features. Standard guidance recommends the avoidance of berry bearing plants that may attract birds and the avoidance of the creation of areas of dense cover for roosting by flocking species of birds. Careful attention to the management of wastes that might give rise to food sources is also recommended.

In practice, it would appear unlikely that bird hazard management is likely to be a major issue in the design of the Proposed Development. Modern aircraft are designed to be resilient to bird strike. Civil aircraft design and certification requirements specify the necessary tolerance of aircraft to defined bird strike events. Key elements of these standards include the ability of an engine to withstand ingestion of birds without catching fire, suffering uncontained failure or becoming impossible to shut down, whilst retaining some partial thrust for a specified period after the strike. These standards should ensure that any multi-engine civil aircraft will be able to withstand engine ingestion of a single "large" bird without endangering the aircraft, even if the engine is destroyed beyond economic repair, and similarly to withstand ingestion of a certain number of "small" and "medium" sized birds without endangering the aircraft.

The primary hazard that may give rise to serious consequences is therefore a multiple bird strike involving larger species, including in particular water birds such as gulls, geese and swans which may potentially be encountered in flocks by aircraft during take-off and landing operations. The nature and scale of the Site is such that it would seem unlikely to give rise to a significant increase in the likelihood of occurrence of these sorts of events. It is nevertheless recommended that the general guidance in respect of the avoidance of water and potential nest sites that may attract these species is followed during building design, with particular attention to the landscaping design. There is potential concern about the increasing use of urban areas by gulls, in particular the establishment of nesting colonies making use of flat roofs on buildings. If flat roofs form part of the design, some active management to deter nesting of these species may be appropriate during the life of the development.

7 Lighting and Reflective Glare

Requirements in respect of potentially dangerous, confusing or dazzling lights are set out in the Air Navigation Order (ANO), as described in CAP 3933. Article 224 in respect of "Lights liable to endanger" states the following:

A person must not exhibit in the United Kingdom any light which:

(a) by reason of its glare is liable to endanger aircraft taking off from or landing at an aerodrome; or

(b) by reason of its liability to be mistaken for an aeronautical ground light is liable to endanger aircraft.

CAP 168 provides some practical interpretation of these requirements. The focus is on avoiding lights along the flight path prior to the landing threshold that might be confused with landing lights or that might otherwise adversely affect operations. The site is located outside the lateral limits of areas that are identified in CAP 168 as requiring attention in this respect.

Given the site location to the side of flight paths it can be concluded that lighting at it can be expected not to represent any threat to the safety of operations at London City Airport.

It is understood that there are no plans to install PV panels on any of the buildings across the site, therefore, reflective glare from such installations will not be an issue.

8 Conclusions

The following primary overall conclusions may be drawn from the aviation safeguarding assessment:

- The physical safeguarding assessment of the Proposed Development against the relevant obstacle limitation surface criteria applicable across the Site has confirmed that the proposed building heights identified comply with those requirements.
- The physical safeguarding assessment of the Proposed Development against the PANS-OPS instrument flight procedure design criteria applicable across the Site has confirmed that the proposed building heights identified comply with those requirements.
- The assessment of the physical safeguarding requirements applicable to temporary obstacles indicates that there is sufficient headroom above the proposed finished building heights to accommodate construction cranes without any adverse impacts on operations at London City Airport.
- The assessment of potential impacts on reasonably foreseeable non-standard operations such as one engine inoperative scenarios indicates that these must already safely accommodate existing obstacles that are closer to the airport runway. These existing obstacles limit the minimum climb gradient that is required to ensure an adequate vertical margin is achieved in the event of single engine failure on take-off. The Proposed Development will not increase this minimum climb gradient and therefore, the identified building heights and construction activities up to the obstacle limitation surface hight limits specified will have no material adverse impact on the safety and efficiency of non-standard operations at London City Airport.
- The potential for tall buildings in the area of the proposed development to impact on the H10 radar located at Heathrow Airport is identified although unlikely given the overall height and scale of the proposed buildings. Furthermore, the extent of any potential impacts may be limited to some extent by the existing built environment which is likely to obscure the sightlines from the radar to the Site. If potential adverse impacts were identified, previous experience indicates that these can normally be addressed satisfactorily by a radar mitigation scheme, in agreement with NATS, the operators of the radar. NATS are statutory consultees under the planning process and will be able to advise during determination of the application if mitigation might be required.
- Preliminary assessment of the potential bird hazard associated with the proposed development indicate that it is unlikely to be significant and can be addressed by the adoption of well-established management measures, if considered appropriate. The primary bird hazard that may give rise to serious consequences is a multiple bird strike involving larger species, including in particular water birds such as gulls, geese and swans which may potentially be encountered in flocks by aircraft during take-off and landing operations. The nature and scale of the Site is such that it would seem unlikely to give rise to a significant increase in the likelihood of occurrence of these sorts of events. It is nevertheless recommended that the general guidance in respect of the avoidance of water and potential nest sites that may attract these species is followed during building design, with particular attention to the landscaping design. There is potential concern about the increasing use of urban areas by gulls, in particular the establishment of nesting colonies making use of flat roofs on buildings. Some active management to deter nesting of these species may be appropriate during the life of the development.

References

1 Procedures for Air Navigation Services: Aircraft Operations (Doc 8168), International Civil Aviation Organisation.

2 UK Aeronautical Information Publication
https://www.aurora.nats.co.uk/htmlAIP/Publications/2020-10-08-AIRAC/html/index-en-GB.html

3 CAP 670 Air Traffic Services Safety Requirements, UK Civil Aviation Authority, 2014

4 Airport Services Manual Part 3: Wildlife Control and Reduction, Fourth Edition, 2012, International Civil Aviation Organization

5 Wildlife Hazard Management at Aerodromes CAP 772, Civil Aviation Authority, Version 2, October 2017

ECOWORLD
LONDON
CREATING TOMORROW & BEYOND

POPLAR HARCA

ABERFELDY VILLAGE MASTERPLAN