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Aviation Safety Assessment

Fairoaks Airport - Goldsworth Road, Woking

Goldsworth Road Development LLP

December, 2020





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KEY FINDINGS

Introduction

Pager Power has been invited to undertake an Aviation Safety Assessment of the impact of the Proposed Goldsworth Road development on Fairoaks Airport.

Applicable Guidance

This assessment has been undertaken in accordance with the consolidated Rules of the Air applicable to United Kingdom Aviation in 2020[1]. These Consolidated Rules contain applicable rules and guidance from the European Aviation Safety Agency (EASA) and the UK Civil Aviation Authority (CAA). Other applicable rules and guidance include the UK Aeronautical Information Publication (AIP), specifically the entries for Fairoaks, Farnborough and Heathrow, as well as Civil Aviation Publication 168 Licensing of Aerodromes.

Scope

This assessment considers the potential impact of the Proposed Development on aeroplanes and helicopters departing from and landing at Fairoaks Airport during the day and at night.

Fairoaks Airport

Fairoaks Airport has a single runway and is licensed by the Civil Aviation Authority. Flights to and from the airport operate in accordance with Visual Flight Rules (VFR).

Proposed Development

The Proposed Development consists of four tall buildings near Woking railway station having a maximum altitude of 147.8 metres[2] above mean sea level lying approximately 3.4 kilometres[3] south of the Airport.

Physical Safeguarding Assessment

A physical safeguarding assessment has been undertaken to determine whether the proposed development breaches the Airport's Obstacle Limitation Surfaces (OLS)[4]. This assessment shows that the Proposed Development breaches the Conical Surface. This assessment has therefore been undertaken to determine whether the Proposed Development will have an impact on aviation safety.

It is quite common for physical structures to breach an Airport's Obstacle Limitation Surfaces. Civil Aviation Publication CAP168 sets out conditions[5] under which such breaches may be

[1] SERA, Air Navigation Order and Rules of the Air Regulations 2015 – UK Consolidation – Correct as at 1 June 2020
[2] Maximum altitude advised by developer
[3] Distance from Aerodrome Reference Point to tower 3 (tallest) is 3.44 kilometres
[4] Towers 2, 3 and BA breach the Conical Surface. Tower 3 breaches by 30.2 metres
[5] CAP168 paragraphs 4.1 to 4.3

acceptable. In this case the breaches may be considered acceptable because the Airport operates according to Visual Flight Rules (VFR) and because the proposed development is not in line with the extended runway centreline.

Fairoaks Airspace

The chart below shows a simplified[6] plan view of the airspace surrounding Fairoaks Airport with the Proposed Development. Fairoaks Airport lies within both the Fairoaks Aerodrome Traffic Zone (ATZ) as well as Class D Controlled Airspace operated by Heathrow[7]. The Proposed Development lies within the Fairoaks ATZ and Class G Uncontrolled Airspace.

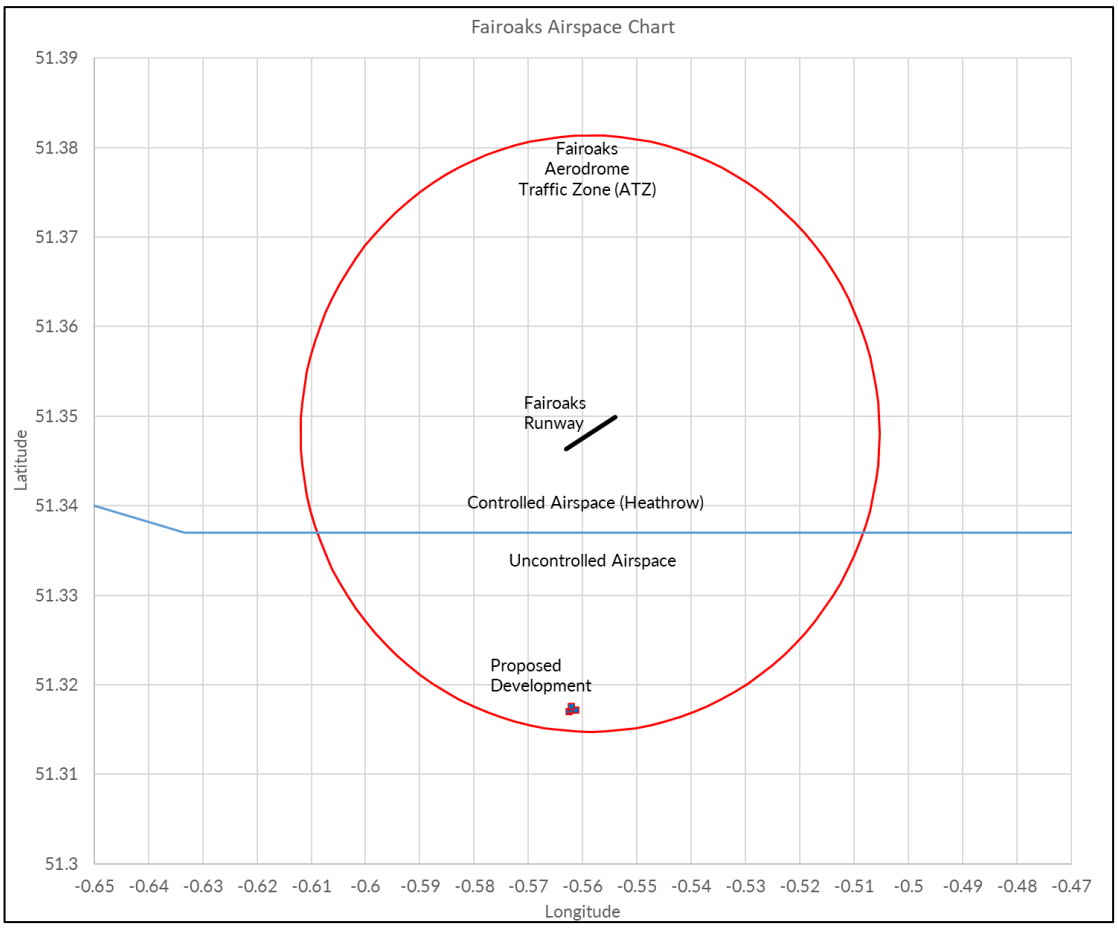

Figure 1 Chart showing Fairoaks Airspace and Proposed Development

Visual Flight Rules

The safety of Visual Flight Rules (VFR) flights is ensured through the see and avoid principle whereby pilots ensure their aircraft do not collide with the ground, structures or other aircraft

[6] Airspace above 1,500 feet and the Fairoaks Local Flying Area (LFA) are not described here (they are described later in the report) as they are complex and have little bearing on this assessment

[7] The Heathrow CTR also known as the Heathrow Control Zone

because they see them in time and avoid them. To ensure safe flights there are minimum visibility requirements as well as a 140 knot[8] speed limit and the requirement to fly clear of cloud and in sight of the ground.

Minimum Visibility

The specific minimum requirements for such flights vary significantly and depend on many factors[9]. In this case VFR rules apply in the Uncontrolled airspace to the south and Special VFR rules apply in the Controlled airspace to the north. The minimum visibility requirement at Fairoaks Airport is 3,000 metres[10]. The minimum visibility requirement at the Proposed Development is 1,500 metres for aeroplanes and 800 metres for helicopters during the day and 5,000 metres for both types of aircraft at night. This means that in practice aircraft depart from or arrive at Fairoaks Airport when visibility is at least 3,000 metres (just under 2 miles).

Obtaining Visibility Data

When flying or planning flights pilots can assess visibility by contacting Fairoaks Airport, obtaining visibility data from neighbouring Heathrow and Farnborough airports or by confirming that known landmarks are visible from the Airport.

Pilot Responsibilities

Pilots are responsible for planning their flights and ensuring they are conducted safely. If conditions are not safe when departure is planned the flight should be abandoned. If conditions are not safe when arriving the flight should divert to an alternate aerodrome or return to the departure aerodrome. Pilots planning to fly into or from an ATZ are obliged to obtain information from the airport to ensure the safety of their flight.

Airport Responsibilities

Licensed aerodromes are obliged to provide pilots with information to enable them to conduct their flight safely. This can include meteorological information including visibility and cloud cover. When the visibility is less than 3,000 metres the Airport should advise pilots that visibility is less than the applicable minima for the Airport which should mean pilots elect not to depart from or land at the Airport.

Collision Risk

Pilots using the Airport fly in accordance with Visual Flight Rules (VFR) on a see and avoid basis. They can only legally land or take off when flight visibility is 3,000 metres or more – giving them plenty of opportunity to see and avoid the Proposed Development safely. The risk of collision is

[8] 140 knots = 161 miles per hour = 260 kilometres per hour

[9] This topic is complex and is dealt with in more depth later in this report

[10] This is the minimum specified for Special VFR flights in (a) the Fairoaks Aeronautical Information Publication (AIP) EGTF AD 2.22 2 e. v.; (b) page 52 of the consolidated rules and (c) CAA ORS 4 No. 1321 General Authorisation Standardised European Rules of the Air – Special VFR Flights withing the Brooklands, Denham, Fairoaks and White Waltham Local Flying Areas.

extremely low given that pilots should see the Proposed Development at least forty seconds before they get to it in worst-case conditions.

Neighbouring Tall Structures

There are two other significant tall building developments in the immediate vicinity of the Proposed Development. These are the Victoria Square development consisting of three towers having a maximum altitude of 144.4 metres[11] and a mast on top of the Export House building having a maximum altitude of 119.8 metres[12]. Additionally there are three cranes[13], in central Woking, having maximum altitudes of 191.1 metres above mean sea level.

Obstacle Shielding

Civil Aviation Authority Publication CAP168 establishes the principle of obstacle shielding[14] for managing obstacles whereby developments may be shielded by tall structures that lie closer to the airport than the shielded structure. The sectional diagram on the following page shows the Proposed Development, the Obstacle Limitation Surface (Conical Surface), Victoria Square Tower 1 and the tallest crane.

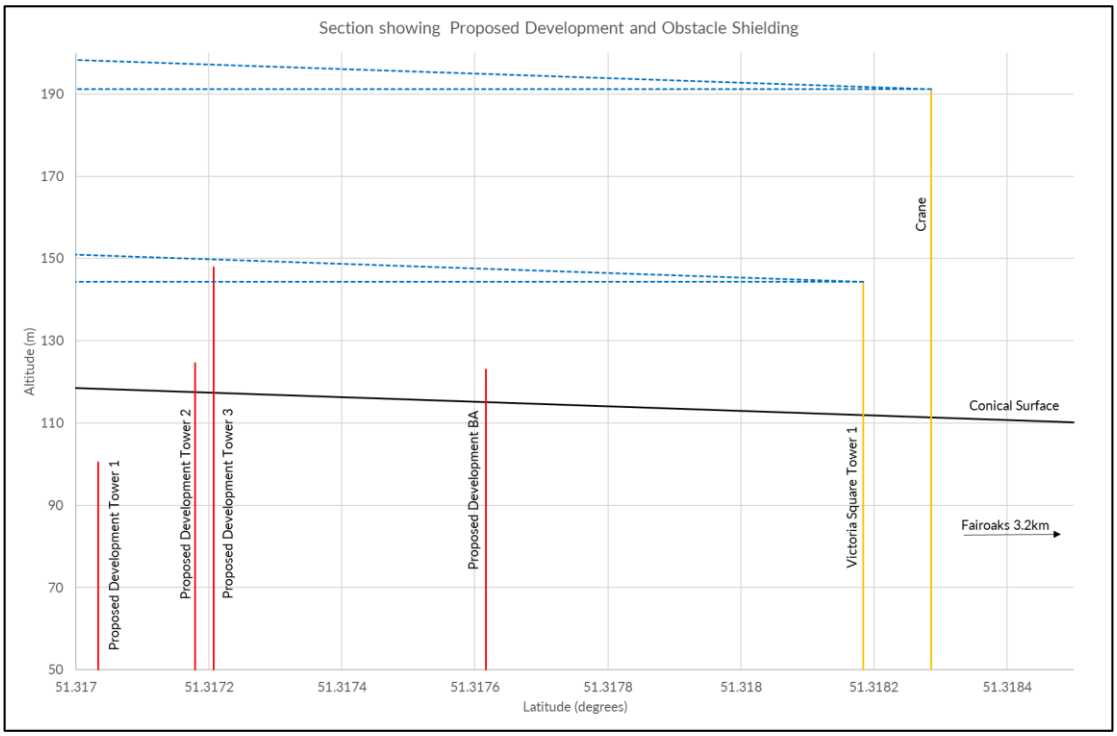

Figure 2 Section showing Proposed Development and Obstacle Shielding

[11] Data obtained from Woking planning application PLAN/2018/0444
[12] Listed as a Tower Block with Mast having an altitude of 393 feet in Fairoaks AIP EGTF AD 2.10
[13] Listed in Civil Aviation Authority VFR Obstacle databases with unique identifiers UK27246145F, UK18637503F and UK28210369F
[14] CAP168 Chapter 4 Pages 174-176

The chart shows that the principle of obstacle shielding applies with the Proposed Development being shielded by the tallest tower at Victoria Square (Tower 1) and the tallest construction crane in central Woking.

Fairoaks Circuits

Aircraft fly in a circuit pattern[15] when using the runway at Fairoaks Airport. The airport determines whether aircraft use the southern[16] or northern[17] circuit on a particular day. At Fairoaks the published circuit altitude for aeroplanes is 1,100 feet and the published circuit altitude for helicopters is 800 feet. The nominal circuit[18] patterns for both aeroplanes and helicopters are shown on the plan below together with the locations of the Proposed Development and the Victoria Square Development.

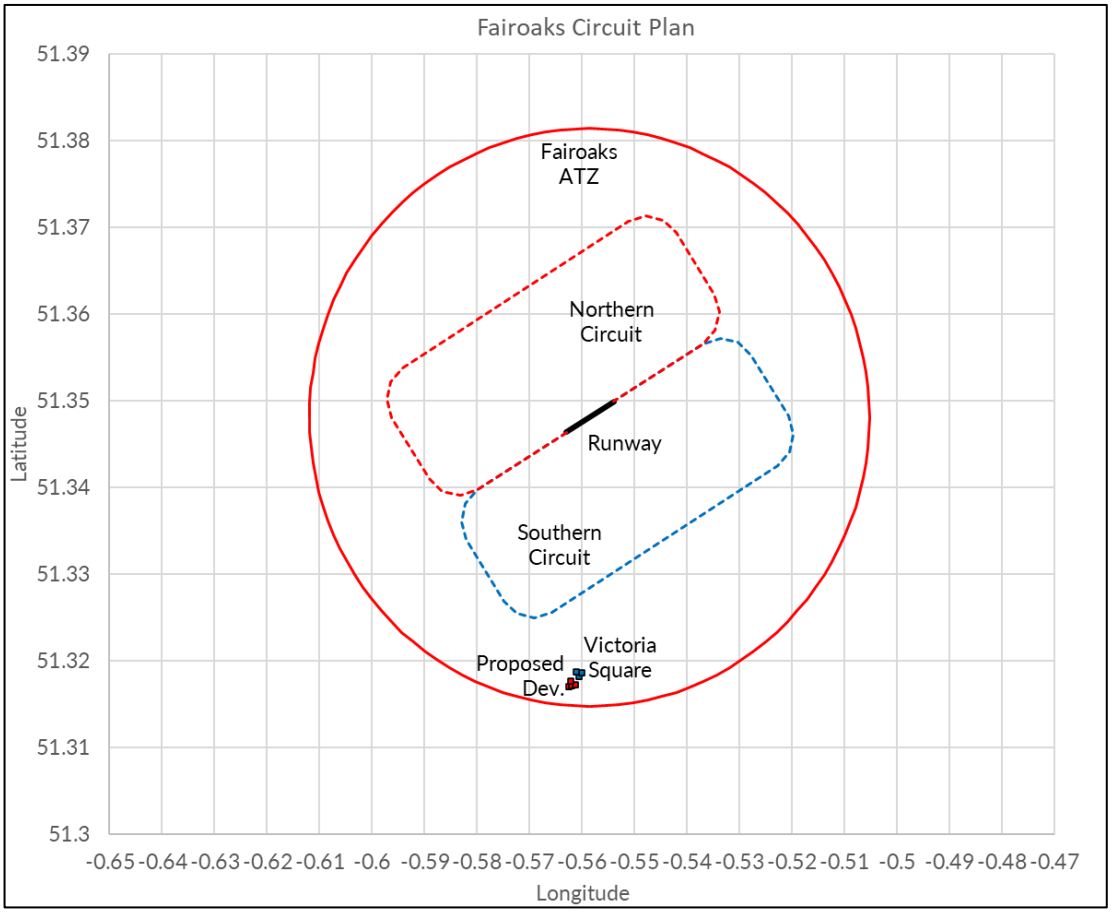

Figure 3 Fairoaks Circuit Plan

[15] Fairoaks AIP EGTF AD 2.22 Flight Procedures 1. Circuits
[16] Referred to as 06RH (Right Hand) and 24LH (Left Hand)
[17] Referred to as 06LH (Left Hand) and 24RH (Right Hand)
[18] Based on a standard horizontal separation distance of 1 nautical mile between the downwind leg and the runway. Helicopter circuits are likely to be smaller in practice.

Circuit Clearance Calculations

The horizontal distances between the nominal circuits and the Proposed and Victoria Square Developments are shown in the table below. Note that aircraft flying the northern circuit are much further from the Proposed Development than aircraft flying the southern circuit.

Nominal Circuit	Minimum horizontal distance to Proposed Development (km)	Minimum horizontal distance to Victoria Square (km)
Northern Circuit	2.80	2.73
Southern Circuit	0.95	0.88

Table 1 Circuit horizontal separation calculations

The north-south[19] section chart below shows a "side-on" view of the developments and circuits.

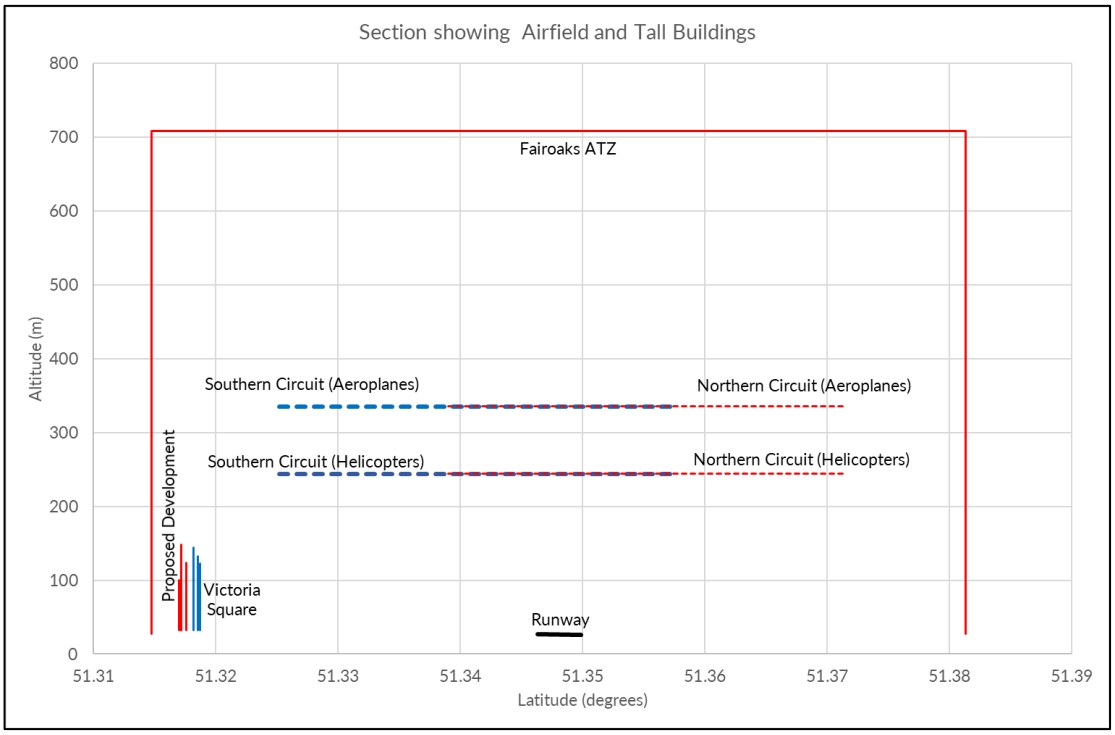

Figure 4 Section showing Airfield, Circuits and Tall Buildings

The vertical distances between the nominal circuits and the Proposed and Victoria Square Developments are shown in the table on the following page.

[19] The section runs from due north to due south passing through the Aerodrome Reference Point (ARP)

Nominal Circuit	Vertical distance above Proposed Development		Vertical distance above Victoria Square development	
	metres	feet	metres	Feet
Aeroplanes	187.5	615.0	190.9	626.2
Helicopters	96.0	315.0	99.4	326.2

Table 2 Circuit vertical clearance calculations

Aeroplanes and helicopters flying all standard circuits will be at least 950 metres[20] horizontally clear and 96 metres[21] vertically clear of the Proposed Development. Fairoaks Airport can maximize the clearance between aircraft flying in the circuit and the Proposed Development by electing to operate the northern rather than the southern circuit.

Low Cloud

When the cloud ceiling is low the circuit altitude for aeroplanes and helicopters may be reduced as low as 600 feet. In these circumstances, aircraft flying visual circuits will still be horizontally and vertically clear of the Proposed Development. In these circumstances, Fairoaks Airport can increase the horizontal clearance between all aircraft and the Proposed Development by operating the northern circuit.

Cumulative Assessment

A cumulative assessment has considered the Proposed Development, the Victoria Square development, the Export House building and three tall cranes in central Woking. The Proposed Development will add to the existing tall buildings and cranes in central Woking making them more visible to aircraft. The Proposed Development will not significantly increase aviation collision risk. Furthermore the Proposed Development will be shielded by existing tall buildings and cranes.

Mitigation

The aviation impact of the Proposed Development will be mitigated. Aviation lights will ensure that the Proposed Development is visible at night. Details of the Proposed Development will be submitted to the Civil Aviation Authority (CAA) so that it will be shown on all relevant charts and publications making pilots aware of the Proposed Development when they plan their flights, and also as they fly.

Fairoaks Airport could also take action to mitigate any impacts of the Proposed Development. Specific actions include (1) using the northern circuit, rather than the southern one, (2) providing information regarding tall building developments in central Woking to arriving and departing aircraft and (3) promulgating visibility information.

[20] See Table 1 above
[21] See Table 2 above

Safety Assessment

In isolation the impact of the Proposed Development on aviation safety would be acceptable. The cumulative aviation safety impact of the Proposed Development will be negligible due to the impact of the existing towers and cranes. Any residual impact will be mitigated by aeronautical lighting and the update of aeronautical information publications.

Conclusions

Pilots use Fairoaks on a See and Avoid basis and can only fly when there is sufficient visibility to see obstacles and other aircraft. They will therefore be able to see and avoid the Proposed Development safely.

The Proposed Development is shielded by the Victoria Square development and tall cranes in central Woking which means the Proposed Development should not be regarded as an aeronautical obstacle.

Aircraft flying circuits will fly both horizontally and vertically clear of the Proposed Development.

The cumulative impact of the Proposed Development is negligible because it simply becomes an addition, in aeronautical obstacle terms, to the existing tall building developments and cranes in central Woking.

Any impact of the Proposed Development will be mitigated by fitting aeronautical lights and by ensuring the Proposed Development is shown on aeronautical charts.

Fairoaks Airport can mitigate impacts of the Proposed Development by directing aircraft to fly northern circuits, rather than southern circuits, and by making sure its pilots are fully aware of the Proposed Development.

The Proposed Development will have no significant impact on the safety of aircraft using Fairoaks Airport.

LIST OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABOUT PAGER POWER

Pager Power is a dedicated consultancy company based in Suffolk, UK. The company has undertaken projects in 48 countries within Europe, Africa, America, Asia and Australasia.

The company comprises a team of experts to provide technical expertise and guidance on a range of planning issues for large and small developments.

Pager Power was established in 1997. Initially the company focus was on modelling the impact of wind turbines on radar systems. Over the years, the company has expanded into numerous fields including:

- Renewable energy projects.
- Building developments.
- Aviation and telecommunication systems.

Pager Power prides itself on providing comprehensive, understandable and accurate assessments of complex issues in line with national and international standards. This is underpinned by its custom software, longstanding relationships with stakeholders and active role in conferences and research efforts around the world.

Pager Power's assessments withstand legal scrutiny and the company can provide support for a project at any stage.

1 INTRODUCTION

1.1 Scope

Pager Power has been commissioned to assess the potential aviation impacts associated with a proposed building development at Goldsworth Road in Woking, UK on Fairoaks Airport.

1.2 Applicable Guidance

The United Kingdom is in a state of change with aviation being regulated by the European Aviation Safety Agency (EASA) and the United Kingdom Civil Aviation Authority (CAA) with rules and regulations from both agencies being applicable.

This assessment has been undertaken in accordance with the consolidated Rules of the Air applicable to United Kingdom Aviation in 2020. The Consolidated Rules contain applicable rules and guidance from the European Aviation Safety Agency (EASA) and the Civil Aviation Authority (CAA). Other applicable rules and guidance include the UK Aeronautical Information Publication (AIP), specifically the entries for Fairoaks, Farnborough and Heathrow, as well as Civil Aviation Publication 168 Licensing of Aerodromes.

1.3 Scope

This assessment considers the potential impact of the Proposed Development on aeroplanes and helicopters departing from and landing at Fairoaks Airport during the day and at night.

2 FAIROAKS AIRPORT

2.1 Introduction

Fairoaks Airport has a single runway which is oriented North East / South West and is licensed by the Civil Aviation Authority. Flights to and from the airport operate in accordance with Visual Flight Rules (VFR).

2.2 Airspace

The Airspace at Fairoaks is complex. The plan below shows the structure of airspace at 1,500 feet and below.

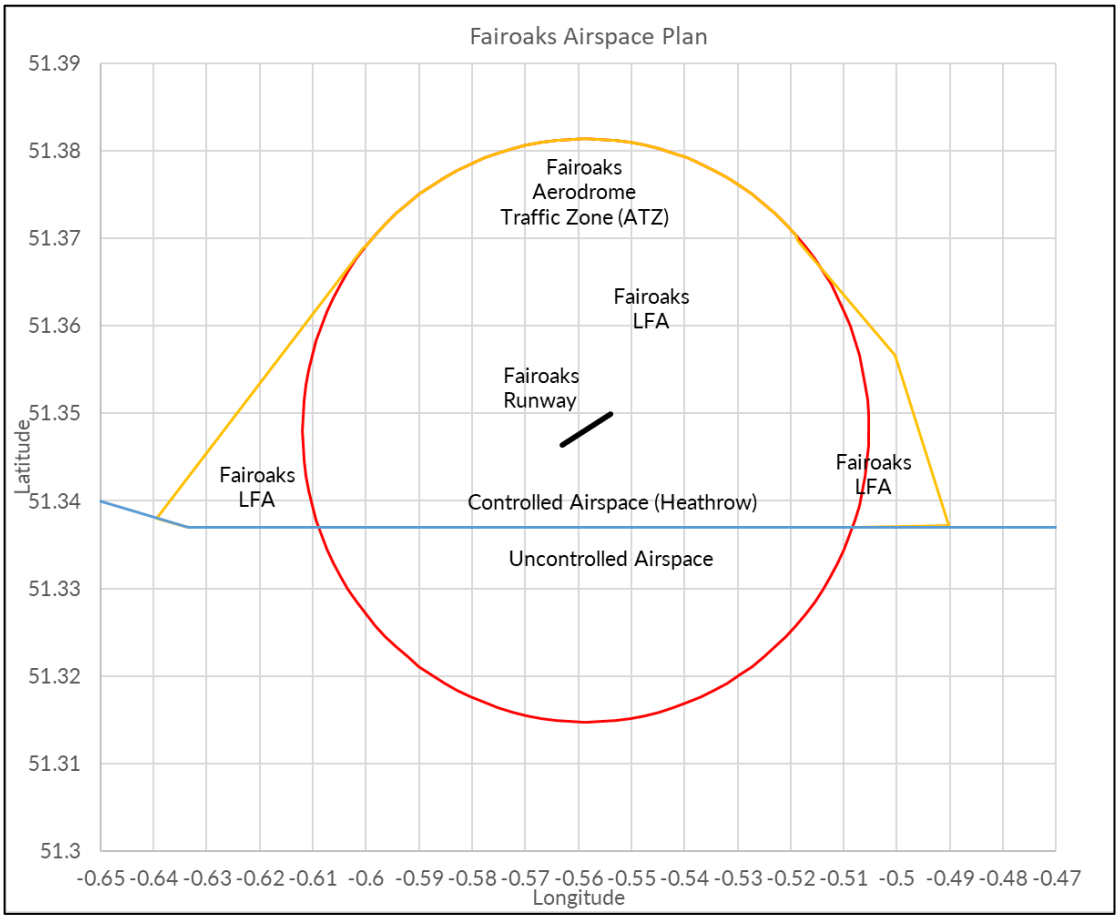

Figure 5 Plan showing Fairoaks Airspace

The runway lies at the centre of the Fairoaks Aerodrome Traffic Zone (ATZ) which is circular having a radius of 2 nautical miles (3.70 kilometres). The runway also lies in Class D Controlled Airspace which is part of the Heathrow Control Zone (CTR). Furthermore, Fairoaks has a zone defined as a Local Flying Area (LFA) shown in yellow above. The LFA is part of the Heathrow

CTR where control of air traffic is effectively delegated to aircraft using Fairoaks. The southern section of the ATZ consists of Class G Uncontrolled Airspace. The sectional chart below shows the vertical structure of Fairoaks Airspace.

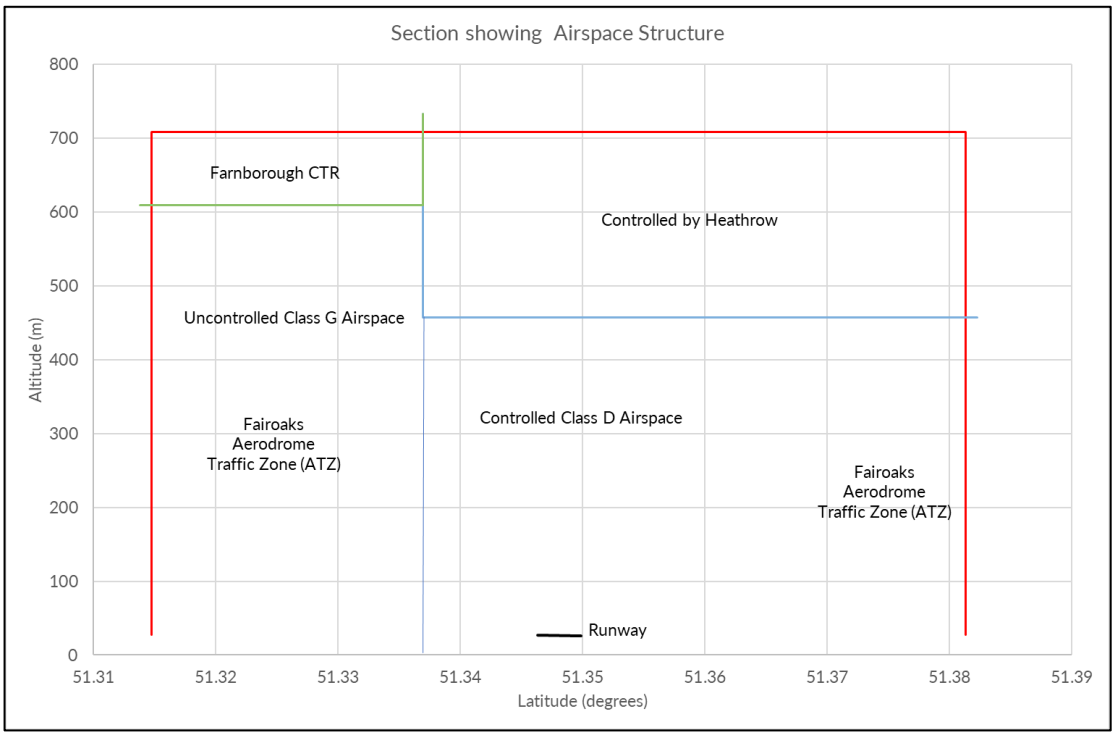

Figure 6 Section showing Airspace structure – Fairoaks

2.3 Fairoaks Circuits

Aircraft fly in a circuit pattern when using the runway at Fairoaks Airport. The airport determines whether aircraft use the southern or northern circuit on a particular day. At Fairoaks the published circuit altitude for aeroplanes is 1,100 feet and the published circuit altitude for helicopters is 800 feet. The nominal circuit patterns for both aeroplanes and helicopters are shown on the plan on the following page together with the locations of the Proposed Development and the Victoria Square Development.

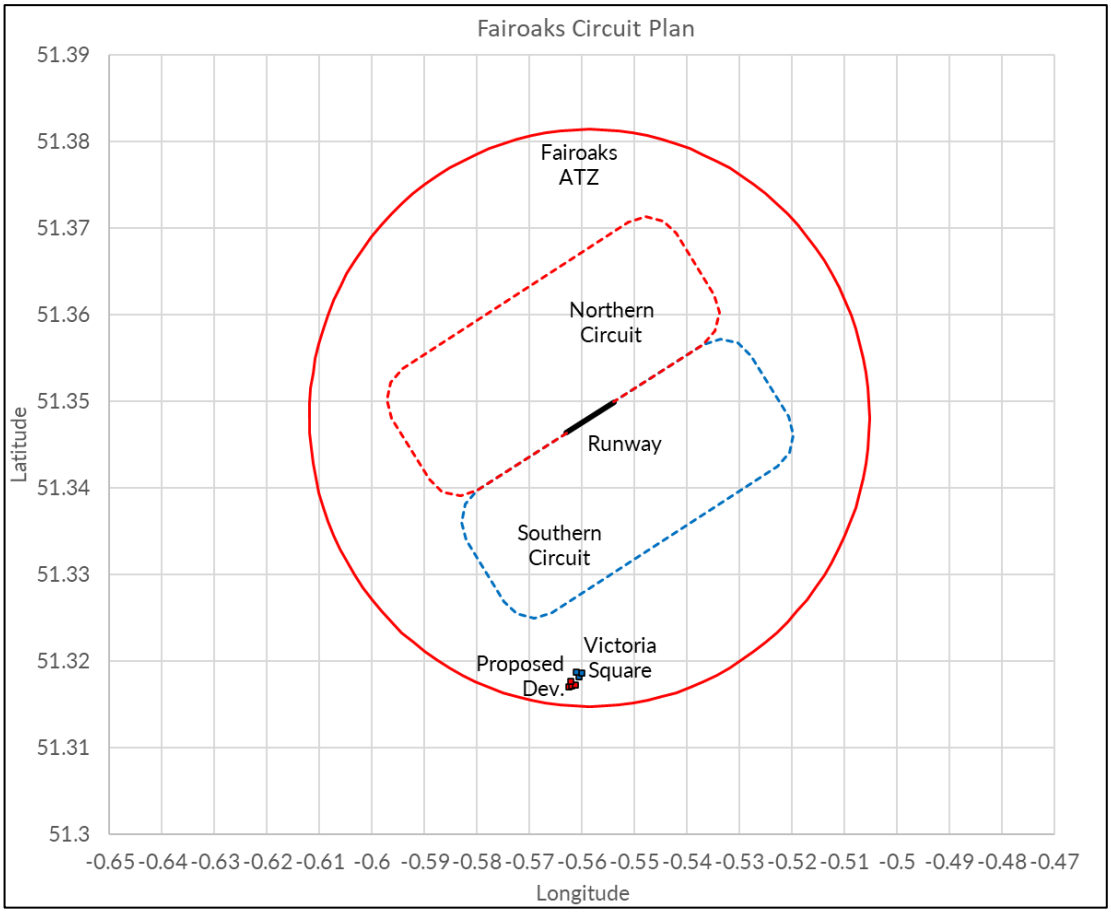

Figure 7 Fairoaks Circuit Plan

3 DESCRIPTION OF DEVELOPMENT

3.1 Overview

Demolition of the existing buildings and erection of a phased, mixed-use development comprising residential (Class C3), ground floor retail/commercial uses (Class A1-A4, B1, D1-D2), homeless shelter (sui generis) along with public realm and highways alterations to Goldsworth Road, associated car parking and landscaping.

3.2 Proposed Development Details

Figures 1 and 2 below and on the following page[22] show the proposed development redline and elevations above mean sea level.

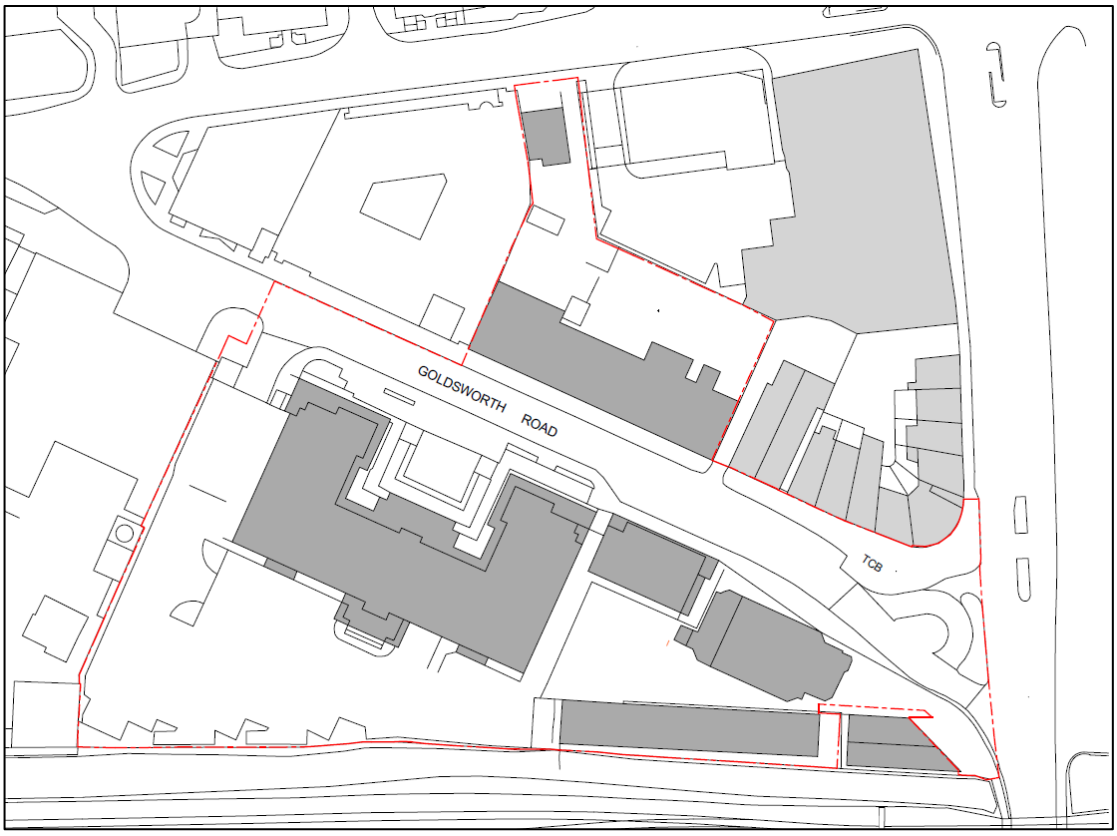

Figure 8 *Development redline*

[22] Provided to Pager Power by Eco World (cropped).

Figure 9 *Elevations of proposed development buildings*

The maximum altitudes are:

- Tower 3 – 147.83 metres above mean sea level (easternmost building of the southern row in Figure 9.
- Tower 2 – 124.65 metres above mean sea level (middle building of the southern row in Figure 9.
- BA – 123.1 metres (northern building in Figure 9.
- Tower 1 – 100.5 metres above mean sea level (westernmost building of the southern row in Figure 9.

Figure 10 below[23] shows the approximate building footprints as blue polygons overlaid on aerial imagery of Woking city centre for context purposes.

Figure 10 *Approximate building footprints*

[23] Copyright © 2020 Google.

4 OLS ASSESSMENT – FAIROAKS AIRPORT

4.1 Obstacle Limitation Surfaces

4.1.1 Definition of Obstacle Limitation Surfaces

Obstacle limitation surfaces are 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 licensed airfields. The dimensions and geometry of the surfaces are constructed based on detailed rules defined in the UK Civil Aviation Authority's Civil Aviation Publication[24] (CAP) 168. The size of the surfaces is dependent on the number of runways, their dimensions and the procedures carried out at the airfield.

4.1.2 Obstacle Limitation Surfaces at Fairoaks Airport

The obstacle limitation surfaces for Fairoaks Airport have been modelled with respect to the proposed development. The OLS chart is shown in Figure 11 on the following page. The boundary points are shown by the red crosses on the chart.

The innermost (purpose) circle represents the Inner Horizontal Surface (IHS). The outermost (blue) circle represents the Conical Surface – this surface extends over the proposed development.

[24] At the time of writing, version 11 was in force (dated March 2019).

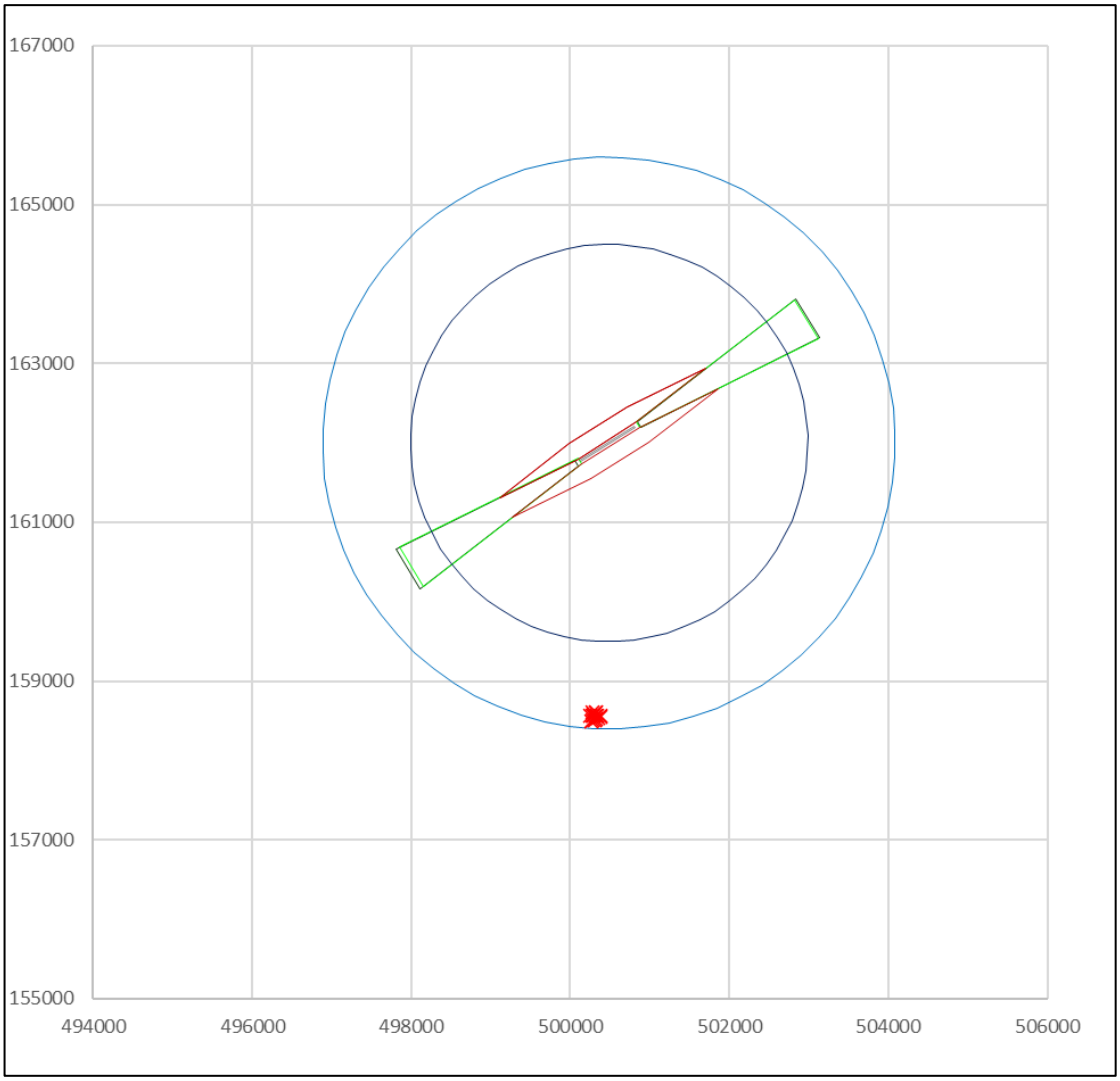

Figure 11 *Fairoaks Airport OLS chart (proposed development)*

The entire site boundary lies beneath the Conical Surface. The Conical surface is a sloped surface that increases in elevation with distance from the airport. The development buildings have elevations ranging from 100.5 to 147.83 metres. Tower 1, which is the shortest, does not breach the surface.

The remaining three buildings (Tower 2, Tower 3 and BA) breach the Conical Surface by margins of between 10.5 and 30.2 metres. A surface breach is a technical impact and its significance should be determined. Further considerations pertaining to the surface breach itself are presented below.

4.2 Civil Aviation Authority Guidance – Breaching an OLS

4.2.1 Extracts from CAP 168

"In ideal circumstances all the surfaces will be free from obstacles but when a surface is infringed, any safety measures required by the CAA will have regard to:

1. the nature of the obstacle and its location relative to the surface origin, to the extended centreline of the runway or normal approach and departure paths and to existing obstructions;

2. the amount by which the surface is infringed;

3. the gradient presented by the obstacle to the surface origin;

4. the type of air traffic at the aerodrome; and

5. the instrument approach procedures published for the aerodrome.

…

Safety measures could be as follows:

1. promulgation in the UK AIP of appropriate information

2. marking and/or lighting of the obstacle

3. variation of the runway distances declared as available

4. limitation of the use of the runway to visual approaches only

5. restrictions on the type of traffic"

…

"New objects or additions to existing objects should not extend above an inner horizontal surface, a conical surface or an outer horizontal surface, except when in the opinion of the CAA the object would be shielded by an existing immovable object or it is determined that the object would not adversely affect the safety or significantly affect the regularity of aircraft operations."

4.2.2 Relevant factors – safety measures

With reference to the safety measures:

1. Promulgation in the UK Aeronautical Information Publication (AIP) should be progressed for the proposed development.
2. Lighting of the development is being progressed.
3. Variation of the runway distances is not judged to be necessary due to the minimal predicted operational impact (see below).
4. Fairoaks Airport already utilises visual approaches only.
5. Restrictions on the type of traffic are not judged to be necessary given the minimal predicted operational impact and the type of aircraft that currently use the airport.

4.3 Operations at Fairoaks Airport

The potential impact associated with an OLS breach pertains to collision avoidance. The proposed development is not on the airport's extended centreline. This means aircraft in the first stage of departure or the last stage of landing would not overfly the proposed development.

Circuits are available at the airport – whereby aircraft could fly towards the proposed development location. The circuit altitude as per the NATS AIP for Fairoaks Airport is 1,100 feet above mean sea level for aeroplanes and 800 feet for helicopters.

The building's maximum elevation is 485.0 feet. This means that under any circumstances, an aeroplane in the circuit would have a minimum of 615.0 feet of vertical clearance (315.0 feet for a helicopter).

The minimum obstacle clearance for circling approaches specified by the International Civil Aviation Organisation (ICAO) within their publication Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS) are:

- 295 feet for Category A and B aircraft.
- 246 feet for helicopters.

The level of clearance maintained for the proposed development is therefore likely to be sufficient.

4.4 Practical Examples – Breaches

There are examples in the UK of tall developments breaching an OLS. These include Heathrow Airport, where the ATC tower itself causes a breach of the IHS, and tall buildings in Manchester City Centre which breach the Manchester Airport OHS.

There are existing obstructions in the area of the development, and in more operationally sensitive areas, that breach Conical Surface and the IHS at Fairoaks Airport. These are:

- A church to the east of the runway (IHS breach of 16.26 metres).
- An aerial on top of a building in Woking City Centre (Conical Surface breach of 13.30 metres).

5 APPLICABLE FLIGHT RULES

The applicable visual flight rules are dependent on:

- The type of aircraft
- The classification of airspace
- Whether it is daytime or night-time
- Specific rules for the airspace

The applicable rules are summarised in the table below:

Condition	Minimum Visibility (m)	Cloud Clearance (m)	Surface	Other Conditions
Class G Aeroplane VFR Day	1500	Clear of cloud	In sight	Below 900m and slower than 140 knots
Class G Aeroplane VFR Night	5000	Cloud ceiling needs to be 450m or above	In sight	
Class G Helicopter VFR Day	800	Clear of cloud	In sight	Below 900m and slower than 140 knots
Class G Helicopter VFR Night	5000	Cloud ceiling needs to be 450m or above	In sight	
Class D Aeroplane VFR Day	5000	300m Vertically and 1500m horizontally		Aircraft below 3050m. Cloud ceiling at landing aerodrome needs to be 450m or above
Class D Aeroplane VFR Night	5000	300m Vertically and 1500m horizontally	In sight when flying below 900m	Cloud ceiling needs to be 450m or above
Class D Helicopter VFR Day	5000	300m Vertically and 1500m horizontally		Aircraft below 3050m. Cloud ceiling at landing aerodrome needs to be 450m or above

Condition	Minimum Visibility (m)	Cloud Clearance (m)	Surface	Other Conditions
Class D Helicopter VFR Night	5000	300m Vertically and 1500m horizontally	In sight when flying below 900m	Cloud ceiling needs to be 450m or above
Class D Aeroplane Special VFR Day	1500	Clear of cloud	In sight	Slower than 140 knots
Class D Aeroplane Special VFR Night	1500	Clear of cloud	In sight	Slower than 140 knots
Class D Helicopter Special VFR Day	800	Clear of cloud	In sight	Slower than 140 knots. (Advisory down to 50 knots)
Class D Helicopter Special VFR Night	800	Clear of cloud	In sight	Slower than 140 knots. (Advisory down to 50 knots)
Class D Aeroplane and Helicopter Special VFR Day (Fairoaks LFA)	3000	Clear of cloud	In sight	
Class D Aeroplane and Helicopter Special VFR Night (Fairoaks LFA)	Not available			

Figure 12 Applicable Flight Rules Summary

In this case VFR rules apply in the Uncontrolled airspace to the south and Special VFR rules apply in the Controlled airspace to the north. The minimum visibility requirement at Fairoaks Airport is 3,000 metres[25]. The minimum visibility requirement at the Proposed Development is 1,500 metres for aeroplanes and 800 metres for helicopters during the day and 5,000 metres for both types of aircraft at night. This means that in practice aircraft depart from or arrive at Fairoaks Airport when visibility is at least 3,000 metres (just under 2 miles).

[25] This is the minimum specified for Special VFR flights in (a) the Fairoaks Aeronautical Information Publication (AIP) EGTF AD 2.22 2 e. v.; (b) page 52 of the consolidated rules and (c) CAA ORS 4 No. 1321 General Authorisation Standardised European Rules of the Air – Special VFR Flights withing the Brooklands, Denham, Fairoaks and White Waltham Local Flying Areas.

6 WOKING – OTHER STRUCTURES

Figure 13 *Victoria Square development under construction in Woking city centre*

There are two other significant tall building developments in the immediate vicinity of the Proposed Development. These are the Victoria Square development consisting of three towers having a maximum altitude of 144.4 metres[26] and a mast on top of the Export House building having a maximum altitude of 119.8 metres[27]. Additionally there are three cranes[28], in central Woking, having maximum altitudes of 191.1 metres above mean sea level.

These are detailed in the table below.

Structure	Longitude	Latitude	Altitude (m)	Additional Information
Crane 1	-0.5565	51.3185	129.8448	UK27246145F
Crane 2	-0.556372222	51.3171	146.304	UK18637503F
Crane 3	-0.560838889	51.31828611	191.1096	UK28210369F
Mast on Export House	-0.5602	51.31876667	119.7864	Listed in Fairoaks AIP
Victoria Square Tower 1	-0.560654	51.318184	144.4	
Victoria Square Tower 2	-0.559974	51.318566	132.4	
Victoria Square Hilton	-0.561126	51.318715	122.4	

Table 3 Existing Tall Structures - Central Woking

The relative position of these structures is shown on the plan on the following page.

[26] Data obtained from Woking planning application PLAN/2018/0444
[27] Listed as a Tower Block with Mast having an altitude of 393 feet in Fairoaks AIP EGTF AD 2.10
[28] Listed in Civil Aviation Authority VFR Obstacle databases with unique identifiers UK27246145F, UK18637503F and UK28210369F

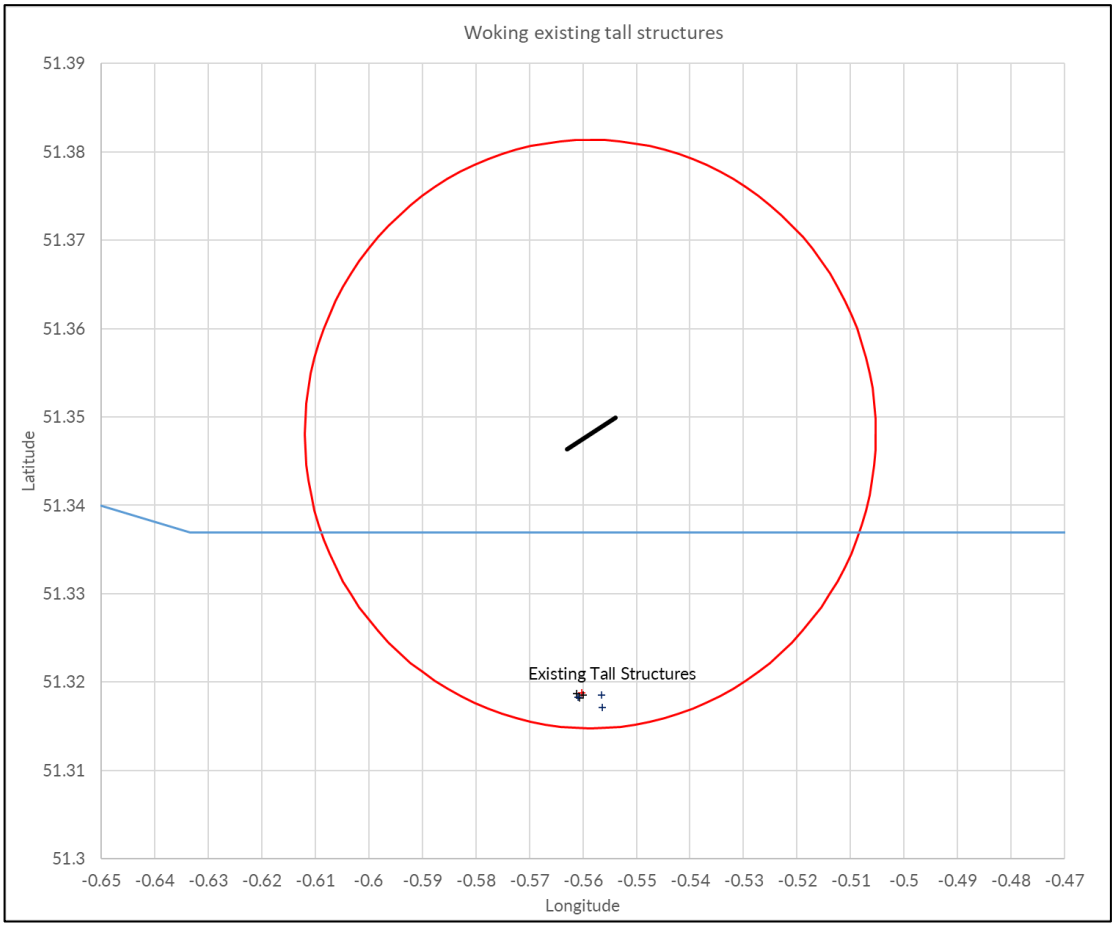

Figure 14 Plan showing existing tall structures

The existing tall structures are shown on the sectional elevation below.

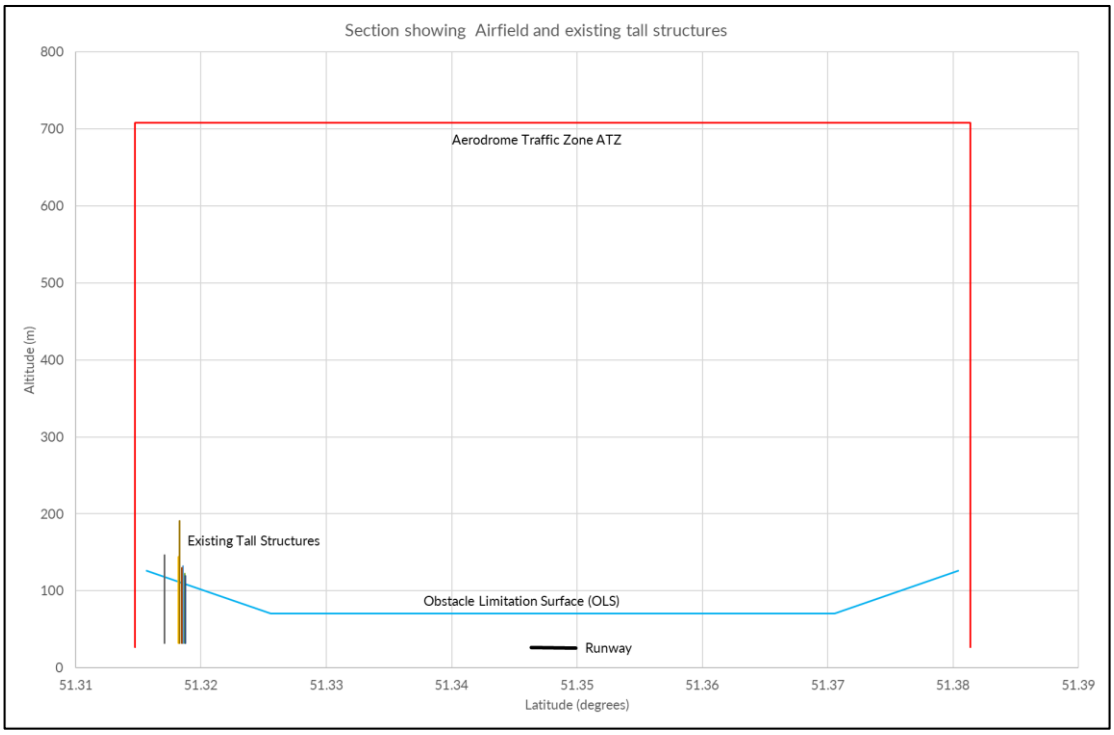

Figure 15 Elevation showing Airfield and existing structures

Note that these existing structures breach the Airport's Obstacle Limitation Surfaces.

These existing tall structures are shown on the image[29] on the following page.

[29] Copyright © 2020 Google

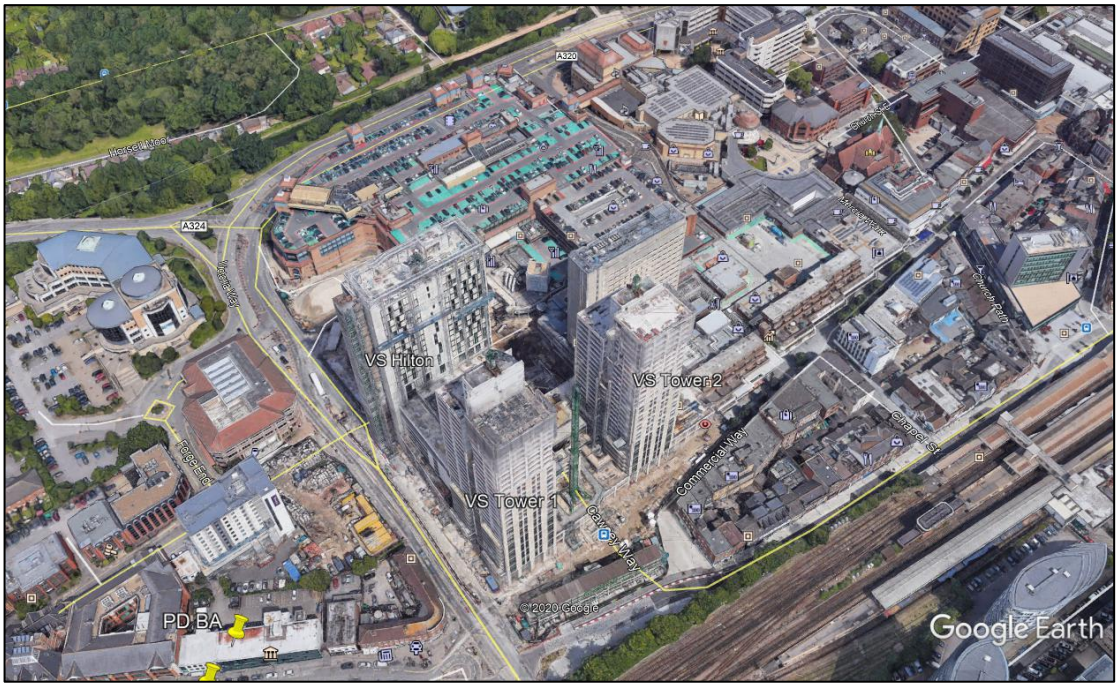

Figure 16 Existing tall buildings in central Woking

7 OBSTACLE SHIELDING ASSESSMENT

Civil Aviation Authority Publication CAP168 establishes the principle of obstacle shielding for managing obstacles whereby developments may be shielded by tall structures that lie closer to the airport than the shielded structure. The sectional diagram below shows the Proposed Development, the Obstacle Limitation Surface (Conical Surface), Victoria Square Tower 1 and the tallest crane.

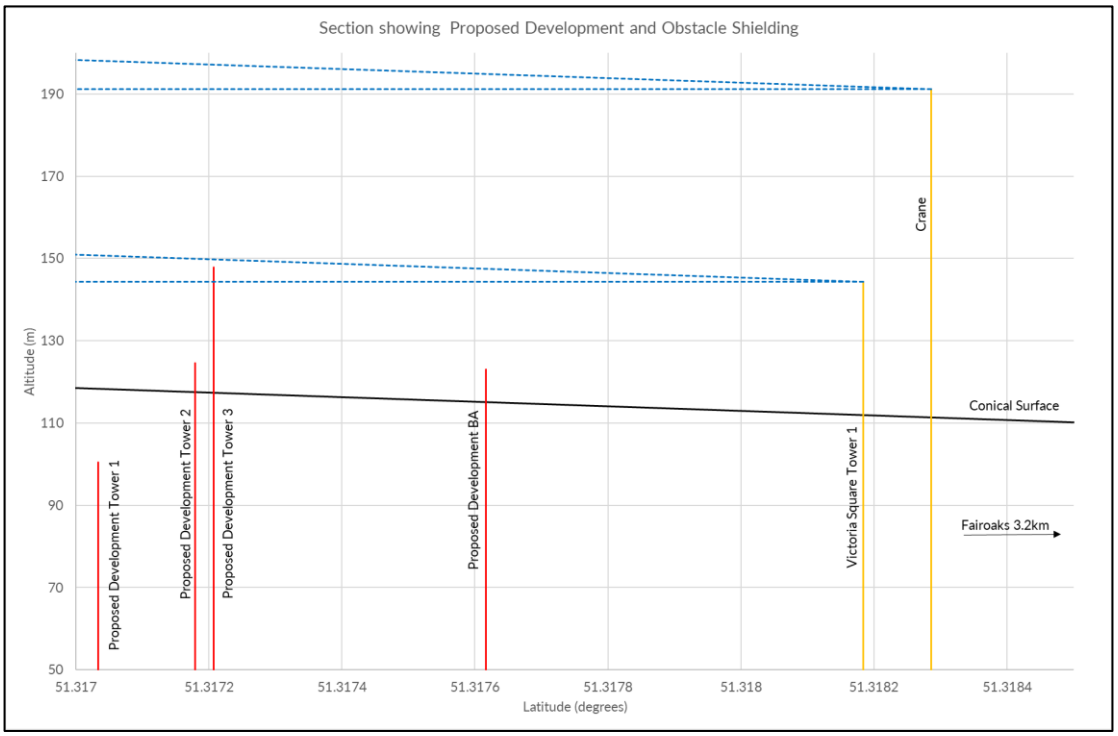

Figure 17 Section showing Proposed Development and Obstacle Shielding

The chart shows that the principle of obstacle shielding applies with the Proposed Development being shielded by the tallest tower at Victoria Square (Tower 1) and the tallest construction crane in central Woking.

The chart on the following page shows the relative locations of the Proposed Development and the existing tall structures.

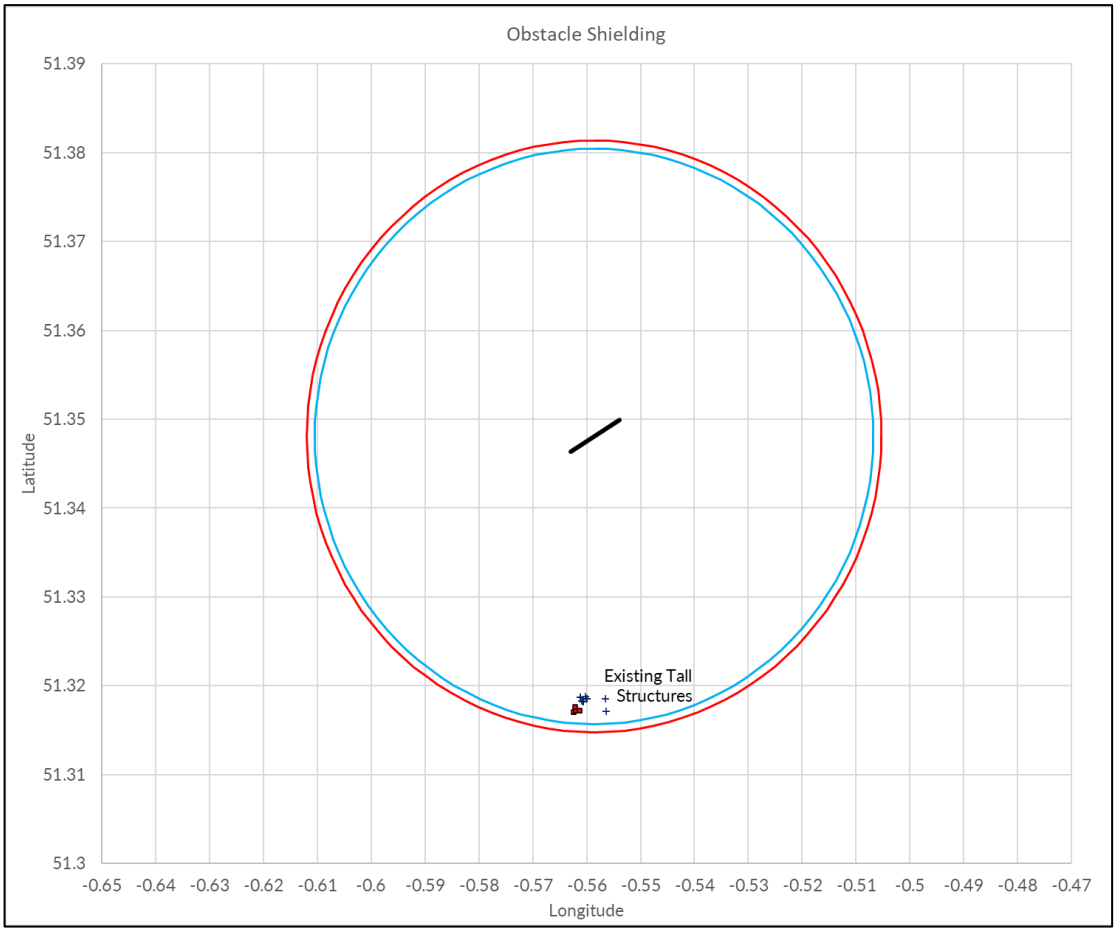

Figure 18 Plan showing Proposed Development and existing obstacles

The light blue line is the outer edge of the Conical surface.

8 CONCLUSIONS

8.1 Applicable Guidance

This assessment has been undertaken in accordance with the consolidated Rules of the Air applicable to United Kingdom Aviation in 2020. The consolidated rules contain applicable rules and guidance from the European Aviation Safety Agency (EASA) and the Civil Aviation Authority (CAA). Other applicable rules and guidance include the UK Aeronautical Information Publication (AIP), specifically the entries for Fairoaks, Farnborough and Heathrow, as well as Civil Aviation Publication 168 Licensing of Aerodromes.

8.2 Fairoaks Airport

Fairoaks Airport has a single runway and is licensed by the Civil Aviation Authority. Flights to and from the airport operate in accordance with Visual Flight Rules (VFR).

8.3 Physical Safeguarding Assessment

A physical safeguarding assessment has been undertaken to determine whether the proposed development breaches the Airport's Obstacle Limitation Surfaces (OLS). This assessment shows that the Proposed Development breaches the Conical Surface. This assessment has therefore been undertaken to determine whether the Proposed Development will have an impact on aviation safety.

It is quite common for physical structures to breach an Airport's Obstacle Limitation Surfaces. Civil Aviation Publication CAP168 sets out conditions under which such breaches may be acceptable. In this case the breaches may be considered acceptable because the Airport operates according to Visual Flight Rules (VFR) and because the proposed development is not in line with the extended runway centreline.

8.4 Visual Flight Rules

The safety of Visual Flight Rules (VFR) flights is ensured through the see and avoid principle whereby pilots ensure their aircraft do not collide with the ground, structures or other aircraft because they see them in time and avoid them. To ensure safe flights there are minimum visibility requirements as well as a 140 knot speed limit and the requirement to fly clear of cloud and in sight of the ground.

8.5 Minimum Visibility

The specific minimum requirements for such flights vary significantly and depend on many factors. In this case VFR rules apply in the Uncontrolled airspace to the south and Special VFR rules apply in the Controlled airspace to the north. The minimum visibility requirement at Fairoaks Airport is 3,000 metres. The minimum visibility requirement at the Proposed Development is 1,500 metres for aeroplanes and 800 metres for helicopters during the day and

5,000 metres for both types of aircraft at night. This means that in practice aircraft depart from or arrive at Fairoaks Airport when visibility is at least 3,000 metres (just under 2 miles).

8.6 Pilot Responsibilities

Pilots are responsible for planning their flights and ensuring they are conducted safely. If conditions are not safe when departure is planned the flight should be abandoned. If conditions are not safe when arriving the flight should divert to an alternate aerodrome or return to the departure aerodrome. Pilots planning to fly into or from an ATZ are obliged to obtain information from the airport to ensure the safety of their flight.

8.7 Airport Responsibilities

Licensed aerodromes are obliged to provide pilots with information to enable them to conduct their flight safely. This can include meteorological information including visibility and cloud cover. When the visibility is less than 3,000 metres the Airport should advise pilots that visibility is less than the applicable minima for the Airport which should mean pilots elect not to depart from or land at the Airport.

8.8 Collision Risk

Pilots using the Airport fly in accordance with Visual Flight Rules (VFR) on a see and avoid basis. They can only legally land or take off when flight visibility is 3,000 metres or more – giving them plenty of opportunity to see and avoid the Proposed Development safely. The risk of collision is extremely low given that pilots should see the Proposed Development before they get to it.

8.9 Neighbouring Tall Structures

There are two other significant tall building developments in the immediate vicinity of the Proposed Development. These are the Victoria Square development consisting of three towers having a maximum altitude of 144.4 metres and a mast on top of the Export House building having a maximum altitude of 119.8 metres. Additionally there are three cranes, in central Woking, having maximum altitudes of 191.1 metres above mean sea level.

8.10 Obstacle Shielding

Civil Aviation Authority Publication CAP168 establishes the principle of obstacle shielding for managing obstacles whereby developments may be shielded by tall structures that lie closer to the airport than the shielded structure. The sectional diagram on the following page shows the Proposed Development, the Obstacle Limitation Surface (Conical Surface), Victoria Square Tower 1 and the tallest crane.

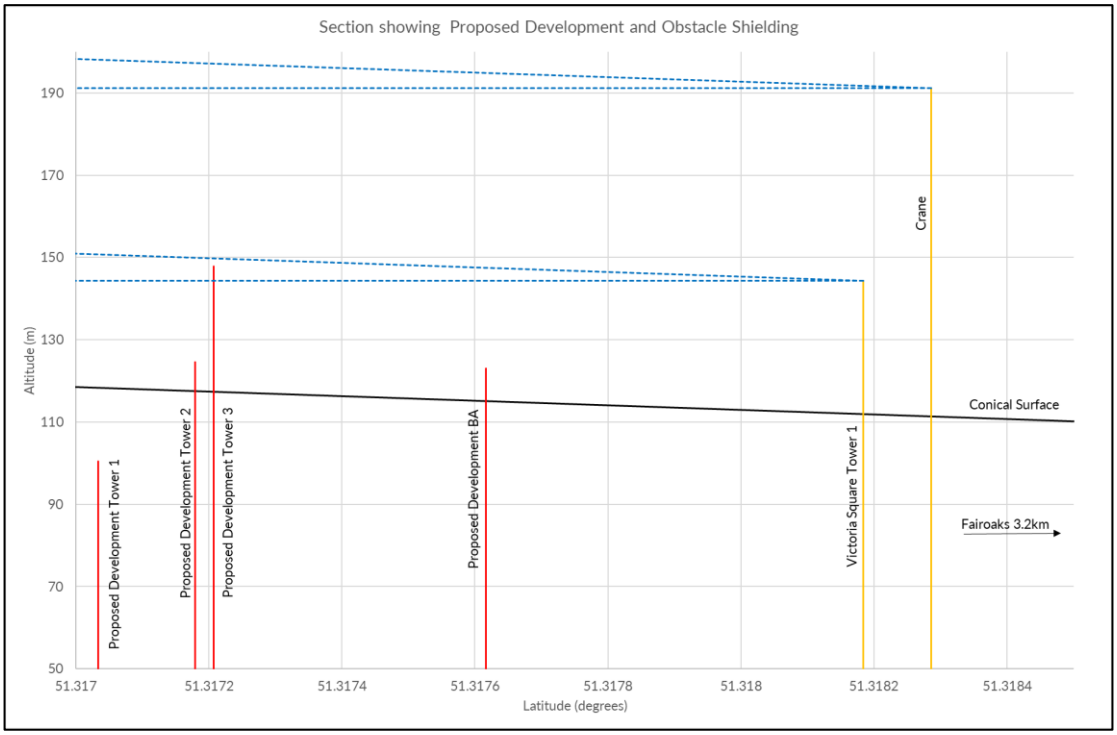

Figure 19 Section showing Proposed Development and Obstacle Shielding

The chart shows that the principle of obstacle shielding applies with the Proposed Development being shielded by the tallest tower at Victoria Square (Tower 1) and the tallest construction crane in central Woking.

8.11 Fairoaks Circuits

Aircraft fly in a circuit pattern when using the runway at Fairoaks Airport. The airport determines whether aircraft use the southern or northern circuit on a particular day. At Fairoaks the published circuit altitude for aeroplanes is 1,100 feet and the published circuit altitude for helicopters is 800 feet.

8.12 Circuit Clearance Calculations

The horizontal distances between the nominal circuits and the Proposed and Victoria Square Developments are shown in the table below. Note that aircraft flying the northern circuit are much further from the Proposed Development than aircraft flying the southern circuit.

Nominal Circuit	Minimum horizontal distance to Proposed Development (km)	Minimum horizontal distance to Victoria Square (km)
Northern Circuit	2.80	2.73
Southern Circuit	0.95	0.88

Table 4 Circuit horizontal separation calculations

The vertical distances between the nominal circuits and the Proposed and Victoria Square Developments are shown in the table below.

Nominal Circuit	Vertical distance above Proposed Development		Vertical distance above Victoria Square development	
	metres	feet	metres	Feet
Aeroplanes	187.5	615.0	190.9	626.2
Helicopters	96.0	315.0	99.4	326.2

Table 5 Circuit vertical clearance calculations

Aeroplanes and helicopters flying all standard circuits will be at least 950 metres horizontally clear and 96 metres vertically clear of the Proposed Development. Fairoaks Airport can maximize the clearance between aircraft flying in the circuit and the Proposed Development by electing to operate the northern rather than the southern circuit.

8.13 Low Cloud

When the cloud ceiling is low the circuit altitude for aeroplanes and helicopters may be reduced as low as 600 feet. In these circumstances aircraft flying visual circuits will still be horizontally and vertically clear of the Proposed Development. In these circumstances Fairoaks Airport can increase the horizontal clearance between all aircraft and the Proposed Development by operating the northern circuit.

8.14 Cumulative Assessment

A cumulative assessment has considered the Proposed Development, the Victoria Square development, the Export House building and three tall cranes in central Woking. The Proposed Development will add to the existing tall buildings and cranes in central Woking making them more visible to aircraft. The Proposed Development will not significantly increase aviation collision risk. Furthermore the Proposed Development will be shielded by existing tall buildings and cranes.

8.15 Mitigation

The aviation impact of the Proposed Development will be mitigated. Aviation lights will ensure that the Proposed Development is visible at night. Details of the Proposed Development will be submitted to the Civil Aviation Authority (CAA) so that it will be shown on all relevant charts and publications making pilots aware of the Proposed Development when they plan their flights, and also as they fly.

Fairoaks Airport could also take action to mitigate any impacts of the Proposed Development. Specific actions include (1) using the northern circuit, rather than the southern one, (2) providing information regarding tall building developments in central Woking to arriving and departing aircraft and (3) promulgating visibility information.

8.16 Safety Assessment

In isolation the impact of the Proposed Development on aviation safety would be acceptable. The cumulative aviation safety impact of the Proposed Development will be negligible due to the impact of the existing towers and cranes. Any residual impact will be mitigated by aeronautical lighting and the update of aeronautical information publications.

8.17 Summary

Pilots use Fairoaks on a See and Avoid basis and can only fly when there is sufficient visibility to see obstacles and other aircraft. They will therefore be able to see and avoid the Proposed Development safely.

The Proposed Development is shielded by the Victoria Square development and tall cranes in central Woking which means the Proposed Development should not be regarded as an aeronautical obstacle.

Aircraft flying circuits will fly both horizontally and vertically clear of the Proposed Development. The cumulative impact of the Proposed Development is negligible because it simply becomes an addition, in aeronautical obstacle terms, to the existing tall building developments and cranes in central Woking.

Any impact of the Proposed Development will be mitigated by fitting aeronautical lights and by ensuring the development is shown on aeronautical charts.

Fairoaks Airport can mitigate impacts of the Proposed Development by directing aircraft to fly northern circuits, rather than southern circuits, and by making sure its pilots are fully aware of the Proposed Development.

The Proposed Development will have no significant impact on the safety of aircraft using Fairoaks Airport.

APPENDIX A – COORDINATE DATA

Site Footprint Coordinates (British National Grid)

Boundary Point	Easting	Northing
1	500376.144	158565.931
2	500340.440	158568.910
3	500345.590	158537.520
4	500376.144	158555.658
5	500315.990	158568.200
6	500298.680	158565.530
7	500304.000	158513.590
8	500321.390	158523.810
9	500326.449	158613.368
10	500282.769	158608.433
11	500287.226	158581.799
12	500328.110	158602.242
13	500274.230	158561.040
14	500255.972	158558.795
15	500266.998	158492.916
16	500284.300	158502.730

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