

Technical Aerodrome Safeguarding Assessment

Sparkle Street

Foras (Sparkle Street) Limited

April 2024

PLANNING SOLUTIONS FOR:

- Solar
- Defence
- Airports
- Telecoms
- Buildings
- Radar
- Railways
- Wind
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ADMINISTRATION PAGE

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1	June 2023	Initial issue
2	August 2023	Minor updates
3	April 2024	Minor updates

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EXECUTIVE SUMMARY

Report Purpose

Pager Power has been commissioned to investigate the potential impact of a proposed building development, located at Sparkle Street, Manchester, upon aviation infrastructure associated with Manchester Airport, which is located approximately 13.2km south-west of the proposed development.

The proposed development will consist of one building, with a maximum altitude of 124.25m above ordinance datum (AOD) and a maximum height of 86.25m above ground level (agl).

Overall Conclusions

The proposed development is not expected to be visible to the Secondary Surveillance Radar (SSR) at Manchester Airport, due to screening from an existing building near the airport, and no impact is predicted.

The results of the analysis revealed that the proposed development would not infringe the Obstacle Limitation Surfaces (OLS) at Manchester Airport, with a minimum 82.44m clearance, and therefore is not likely to present a collision risk.

The Instrument Flight Procedures (IFP) assessment indicates that no impact is predicted, and no detailed IFP assessment is recommended. It is possible however that this could still be requested by Manchester Airport Group (MAG), who safeguard Manchester Airport.

Considerations of aviation lighting and crane usage indicates that aviation lighting and a crane operations scheme are unlikely to be required, based on the proposed height of the development.

The results of this report have been shared with MAG, who have indicated that the report and its findings appear acceptable, though a full review will only be carried out upon submission of the planning application.

Technical Summary

Manchester Airport SSR

- The proposed development is located approximately 15.8km north-east of Manchester Airport's SSR;
- All assessed points of the proposed development are entirely visible considering bare earth terrain;
- Additional screening analysis has revealed that the radar line-of-sight is entirely obscured by an existing building;
- No impacts is predicted upon the SSR at Manchester Airport.

Manchester Airport's Obstacle Limitation Surfaces

- The proposed development site is beneath the Outer Horizontal Surface (OHS) of Manchester Airport;

- The analysis has shown that the proposed development, with a maximum altitude of 124.25m AOD, would not infringe the OHS. The minimum margin of clearance is 82.44m.

Instrument Flight Procedures at Manchester Airport – High-Level

A high-level review of the IFPs relative to the proposed development indicates sufficient clearances. There are also taller existing buildings in the immediate surrounding area that already co-exist with the current IFPs. Therefore, no impact upon the IFPs is predicted and no detailed IFP assessment is recommended. It is possible however that this could still be requested by MAG.

Aviation Lighting and Crane Usage

- The proposed development does not extend above 150m agl or infringe the OLS;
- As long as cranes do not extend 63.75m above the maximum height of the proposed development, they would not extend above 150m agl or infringe the OLS;
- Therefore, it is not expected that aviation lighting would be required for the proposed development or associated cranes;
- It is possible that MAG may request a crane operations scheme however it is unlikely given that the cranes are unlikely to breach the OLS.

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ABOUT PAGER POWER

Pager Power is a dedicated consultancy company based in Suffolk, UK. The company has undertaken projects in 58 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 BACKGROUND

1.1 Introduction

Pager Power has been commissioned to investigate the potential impact of a proposed building development, located at Sparkle Street, Manchester, upon aviation infrastructure associated with Manchester Airport, which is located approximately 13.2km south-west of the proposed development.

The proposed development will consist of one building, with a maximum altitude of 124.25m above ordinance datum (AOD) and a maximum height of 86.25m above ground level (agl).

Building developments have the potential to affect aviation operations in numerous ways. The most common impacts relate to building developments as physical obstructions both to aircraft and wireless signals used for radar and radio systems. This assessment has identified and assessed all the aviation constraints for the proposed development.

In detail the report includes:

- Proposed development details;
- Manchester Airport details;
- SSR impact assessment including:
 - Line of sight analysis;
 - Additional screening analysis;
- Obstacle Limitation Surfaces (OLS) assessment for Manchester Airport;
- High-level Instrument Flight Procedures (IFP) assessment;
- High-level comments regarding aviation lighting and crane usage.

Following the technical analysis, the overall conclusions and recommendations are presented.

1.2 Proposed Development Site Plan

The ground-floor plan and building elevations for the proposed development are shown in Figures 1 and 2 below.

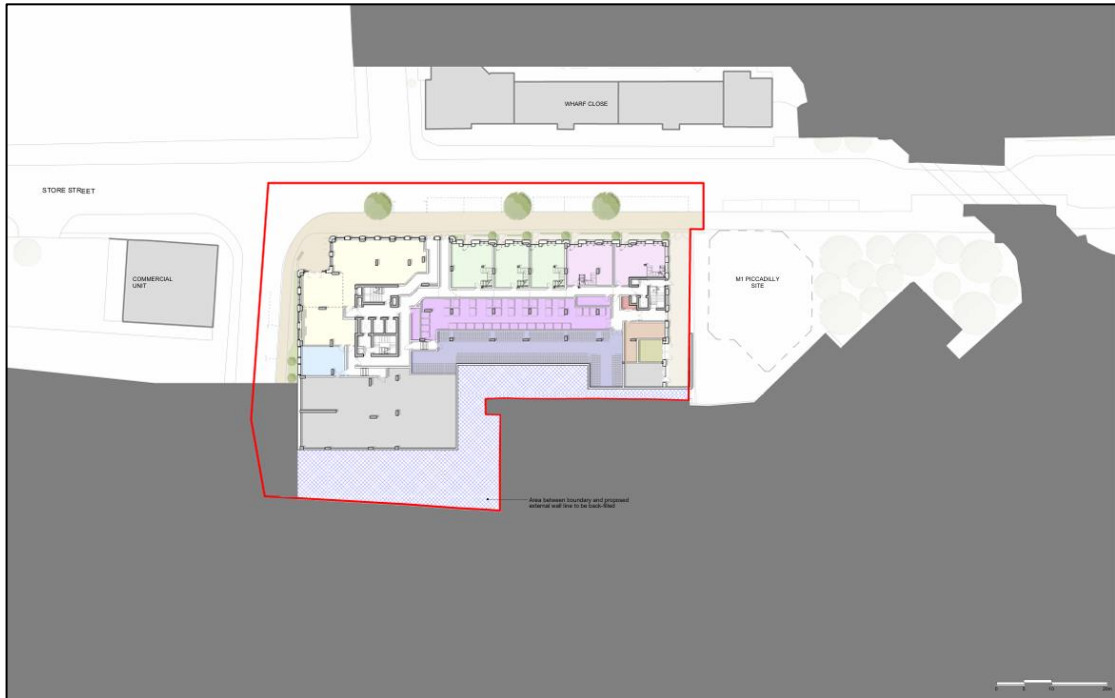


Figure 1 Proposed development site plan

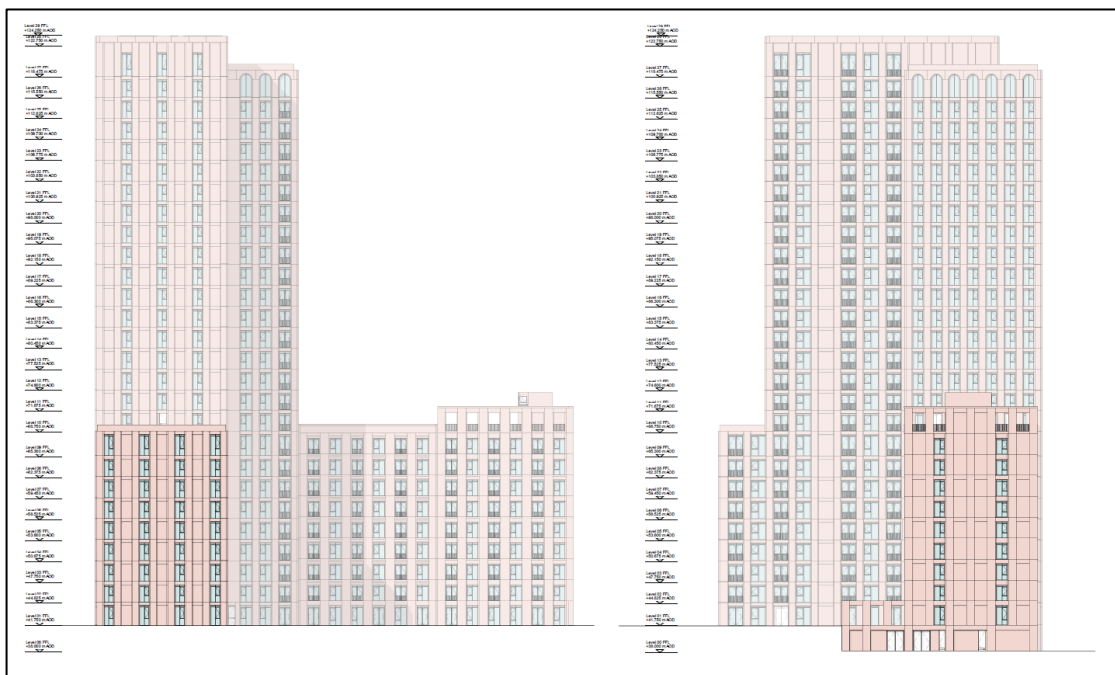


Figure 2 Proposed building elevations

1.3 Proposed Development Site Layout – Aerial Image

The approximate proposed development footprint overlaid on aerial imagery is shown in Figure 3 below. Figure 4 below shows the 3D model of the proposed development within the existing surrounding area. Building plot coordinates extrapolated from the site drawing are presented in Appendix A.

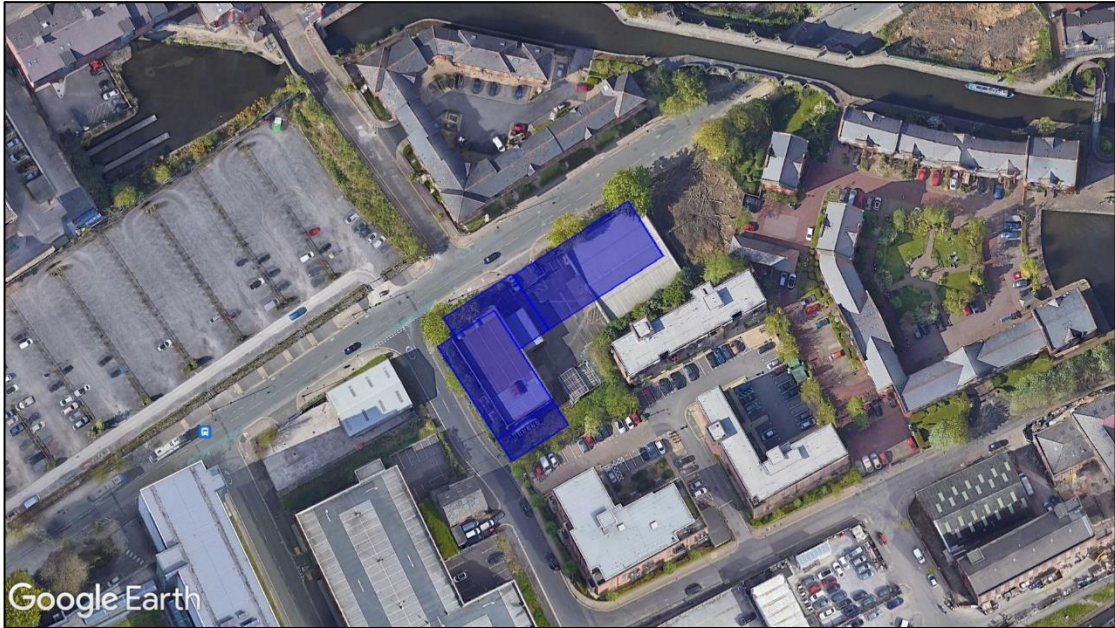


Figure 3 Proposed development site layout (blue) – aerial image

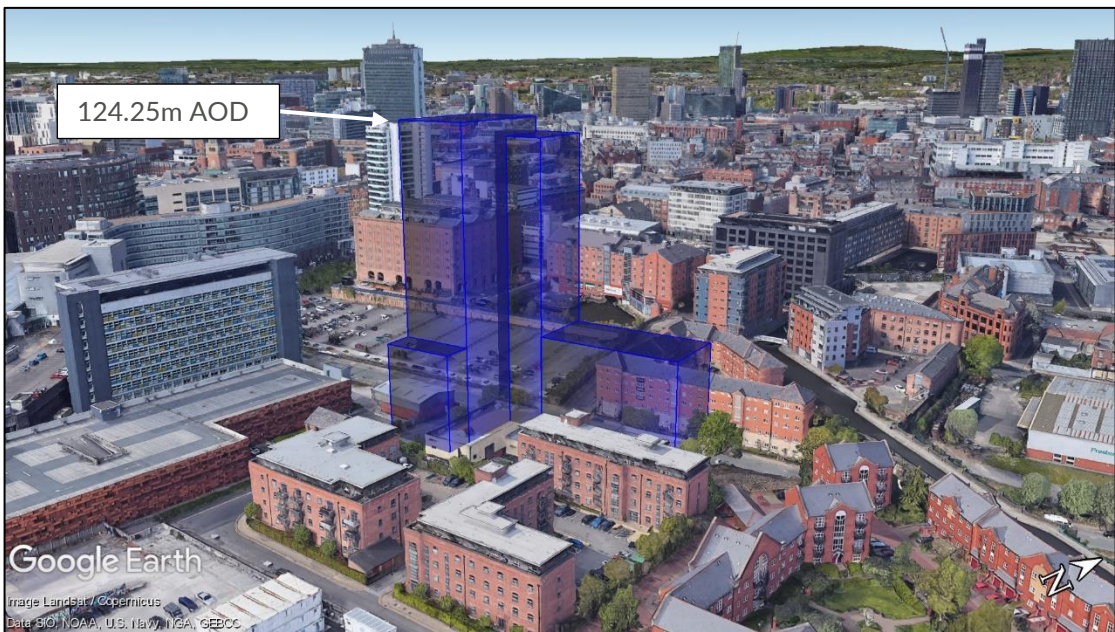


Figure 4 3D building representation

2 MANCHESTER AIRPORT DETAILS

2.1 Aerodrome Details

Manchester Airport is approximately 13.2km south-west of the proposed development. The location relative to the proposed development is shown in Figure 5 below.

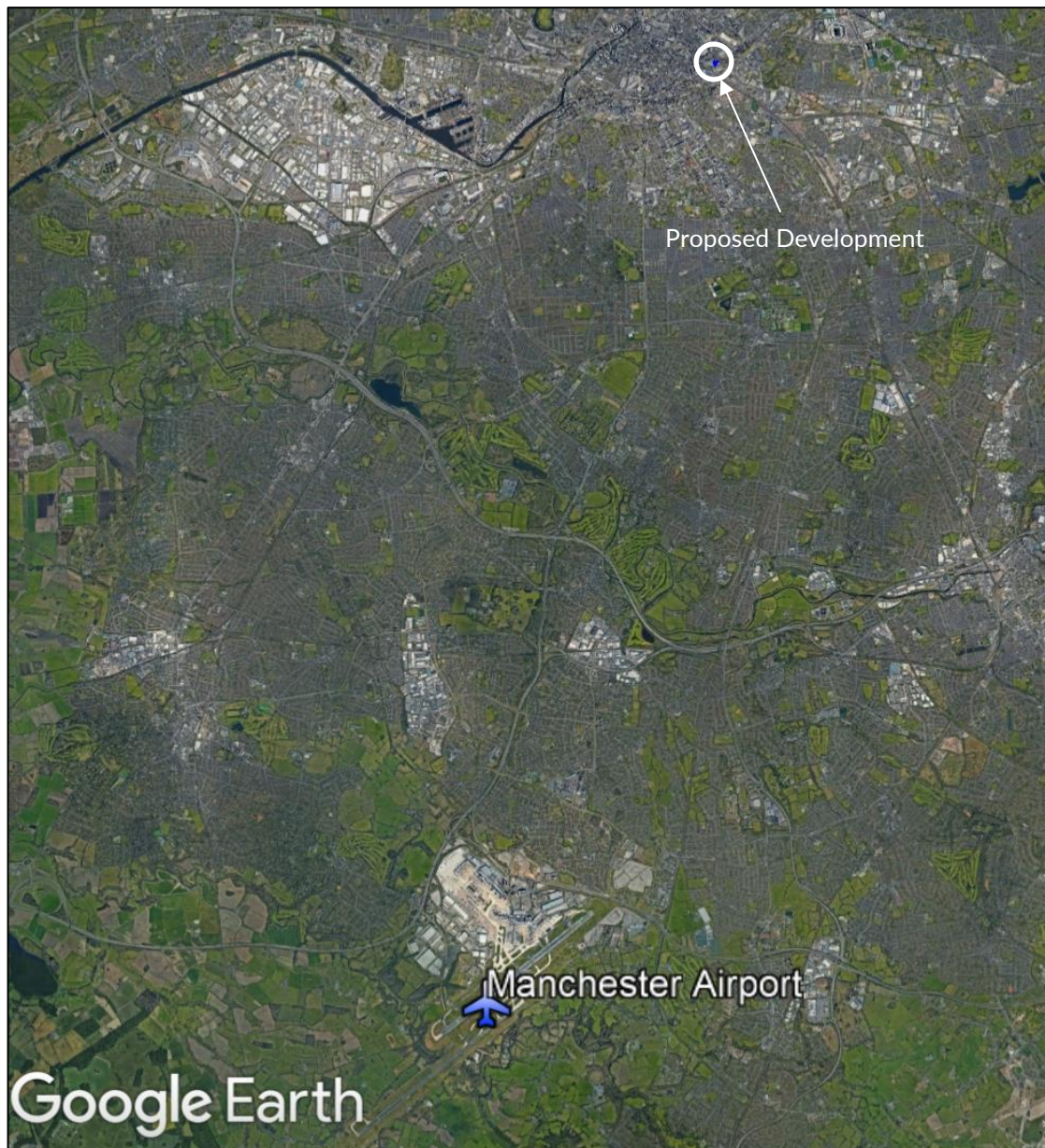


Figure 5 Location of Manchester Airport relative to the proposed development

Manchester Airport is a CAA licenced airport with an ATC Tower and two runways. The runway details¹ are presented below:

- 05L/23R measuring 3,048m by 45m (concrete and asphalt);
- 05R/23L measuring 3,050m by 45m (concrete and asphalt).

The aerodrome chart for Manchester Airport is shown in Figure 6 on the following page.

¹ NATS AIP, effective 15th June 2023
Technical Aerodrome Safeguarding Assessment

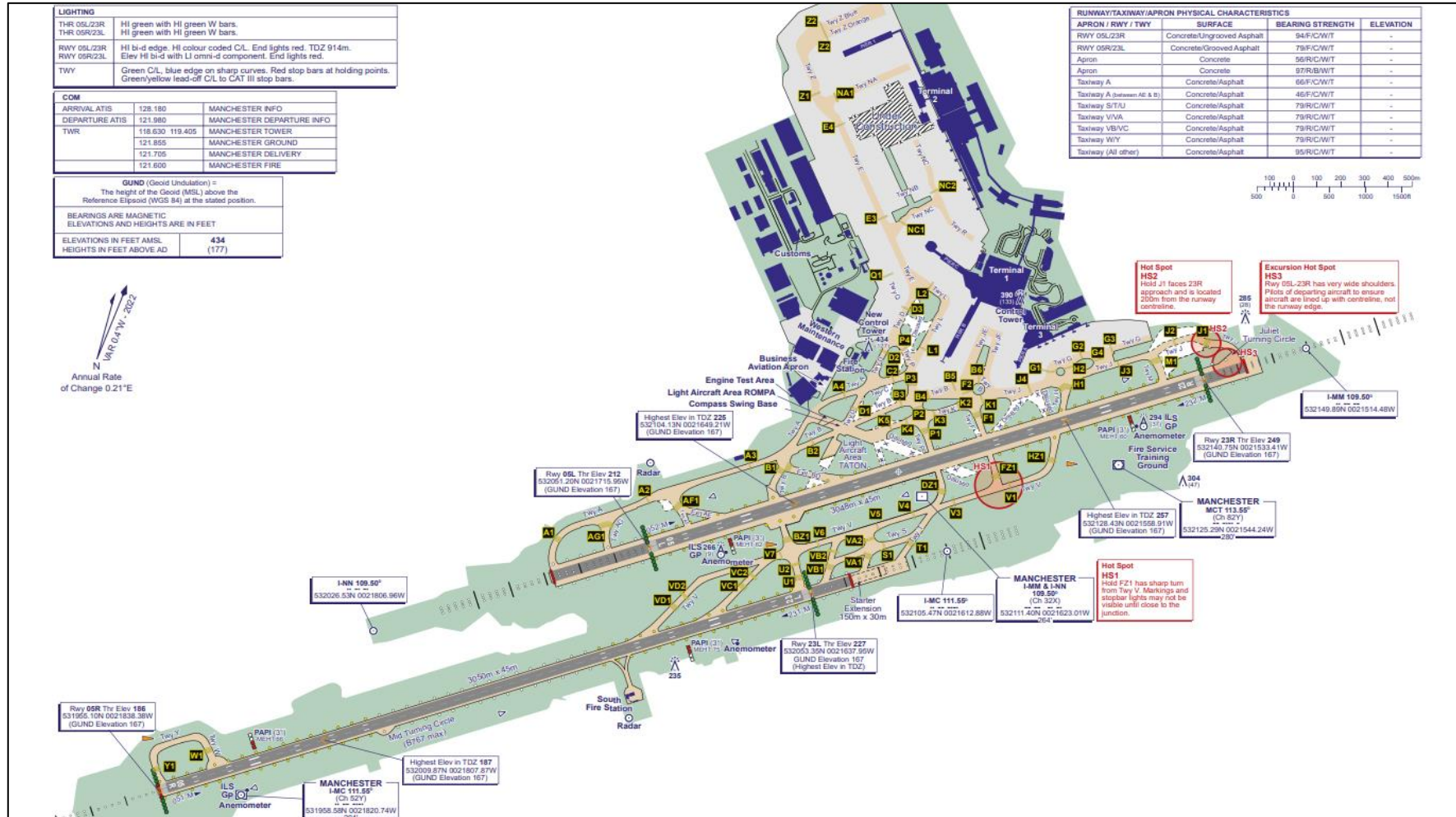


Figure 6 Aerodrome Chart for Manchester Airport

3 RADAR INFORMATION

3.1 Radar Data

Table 1 below provides the details for the assessed Manchester Airport SSR radar. All data has been provided by NATS.

Radar	Secondary Surveillance Radar (SSR)
Overall radar altitude above mean sea level	97 m
Distance between the proposed development and radar	15.8km
Average grid bearing from radar to proposed development	13.2°

Table 1 Manchester Airport SSR radar location details

3.2 Radar Types and Usage

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

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

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

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

3.3 SSR Location

The location of SSR within Manchester Airport is shown in Figure 7 on the following page.



Figure 7 Location of the SSR within Manchester Airport

4 RADAR INTERFERENCE

4.1 Overview

An overview of the various possible interference mechanisms is presented in the following subsections.

4.2 Interference

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

4.2.1 Reflections

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

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

4.2.2 Shadowing

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

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

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

4.3 SSR Capabilities

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

The radar is understood to be a Condor 300 dual channel system with Mode S capabilities. This radar has a range of advanced built-in capabilities for increasing its reliability and performance. Specific features that reduce the radar's susceptibility to interference from buildings are listed in Table 2 on the following page.

Feature	Form of interference	How feature reduces interference	Additional Information
Integral Tracking Function	Reflections	More likely to determine return is genuine if it moves as an aircraft return is expected to.	Ensures good false target suppression.
Refined Algorithms	Reflections and Shadowing	Experience on many sites used to enhance performance.	Ensures good performance in complex environments.
Identification and rejection of false replies	Reflections	False returns are rejected	If two or more replies are identified from the same source all but the first is rejected.
Side Lobe Suppression	Reflections	False returns arising from antenna sidelobes are rejected	P1 and P2 pulses are used. This is an encoding system which enables sidelobe signals to be detected by comparing pulse sizes.
Sensitivity Time Control (STC)	Reflections	Removes reflections	Removes relatively low amplitude replies
Minimum Detection Signal Level (MDS)	Shadowing	Maximises radar coverage whilst minimising noise detections	-
Dynamic Threshold	Shadowing	Weak signals stronger than any interference signals are detected.	-
Reply to Reply Correlation	Reflections	Multiple replies required for target processing	Single reply reports are rejected.
FRUIT ² Rejection	Reflections	Track initiation only allowed if report contains two or more correlating replies in the same SSR mode	e.g. two or more Mode A replies

² FRUIT – False Replies Unsynchronized in Time
Technical Aerodrome Safeguarding Assessment

Feature	Form of interference	How feature reduces interference	Additional Information
Track Processing	Reflections and Shadowing	Improvements are made in target location using history of target position.	Improvements made when confidence in location information is low
False Target Processing	Reflections	Advanced processing that applies a series of tests to identify and reject false returns	Techniques include: 1: Check whether Mode A code is unique 2: Check “known” reflection zones 3: Use geometric analysis for checking reflection zones 4: Self adaptive processing

Table 2 Radar features for reducing interference

5 RADAR LINE OF SIGHT ANALYSIS

5.1 Methodology

The approach taken within this report is presented in the following section.

5.1.1 Technical Assessment

- Radar line of sight assessment based on the tower co-ordinates assessed at their relative height above ground level;
- Screening assessment to determine whether existing buildings and/or landscape features would hide/shield the proposed development from the SSR;
- Consideration of the distance from the SSR.

5.1.2 Cumulative Assessment

- Assessment of the predicted impact in the context of the existing environment has been undertaken.

5.2 Radar Line of Sight Analysis

Figure 8 on the following page shows the line-of-sight chart for building point H (the point of the tallest section of the building which is located closest to the SSR). Information regarding the methodology or the additional line of sight charts can be provided upon request. The tower height above ground level has been adjusted to account for the terrain height based on OSGB36 terrain data at that particular location. The overall altitude of the proposed development is as assessed earlier in the report.

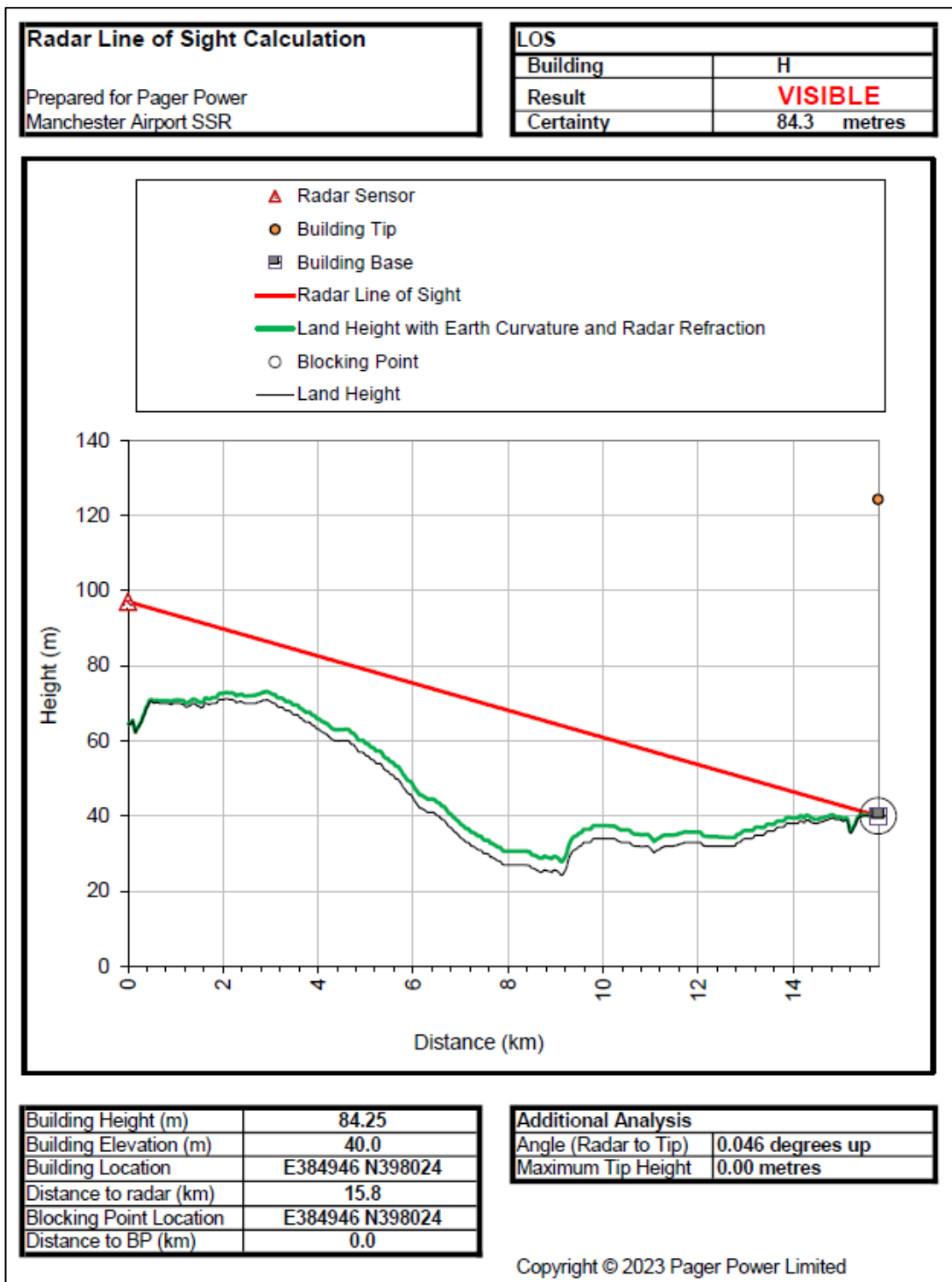


Figure 8 Radar line of sight chart – building point H

5.2.1 Line of Sight Chart Results Description

The box labelled 'certainty' in Figure 8 provides the distance (in metres) by which the proposed development is or is not within line of sight to the assessed radar.

In this case the proposed development would be fully visible considering bare earth terrain.

5.3 Line of Sight Results – Bare Earth Terrain

The overall results for the assessed points that outline the building footprint are presented in Table 3 below. All results are shown in the table, but in practice only points B, and E to I would be visible to the SSR, based on bare earth terrain, as these points will screen the remaining assessed points.

Building Points	Result (Bare earth terrain)
A	The building is visible by a margin of 30m
B	The building is visible by a margin of 30m
C	The building is visible by a margin of 80m
D	The building is visible by a margin of 84m
E	The building is visible by a margin of 84m
F	The building is visible by a margin of 30m
G	The building is visible by a margin of 30m
H	The building is visible by a margin of 84m
I	The building is visible by a margin of 84m
J	The building is visible by a margin of 84m
K	The building is visible by a margin of 80m
L	The building is visible by a margin of 80m

Table 3 Line of sight results for each assessed building point – bare earth terrain

5.4 Additional Screening Analysis

The modelling described in the sections above accounts for the intervening terrain. It does not account for additional obstructions on the ground along the radar line of sight e.g. buildings or vegetation. A review of additional screening has therefore been undertaken. Figure 9 on the following page shows the visibility towards the proposed development from the SSR. Figure 10 on page 24 shows a closer view of the existing building (4M Office Building) near the airport which would obscure visibility from the SSR to the proposed development.



Figure 9 Point-of-view from the SSR at Manchester Airport

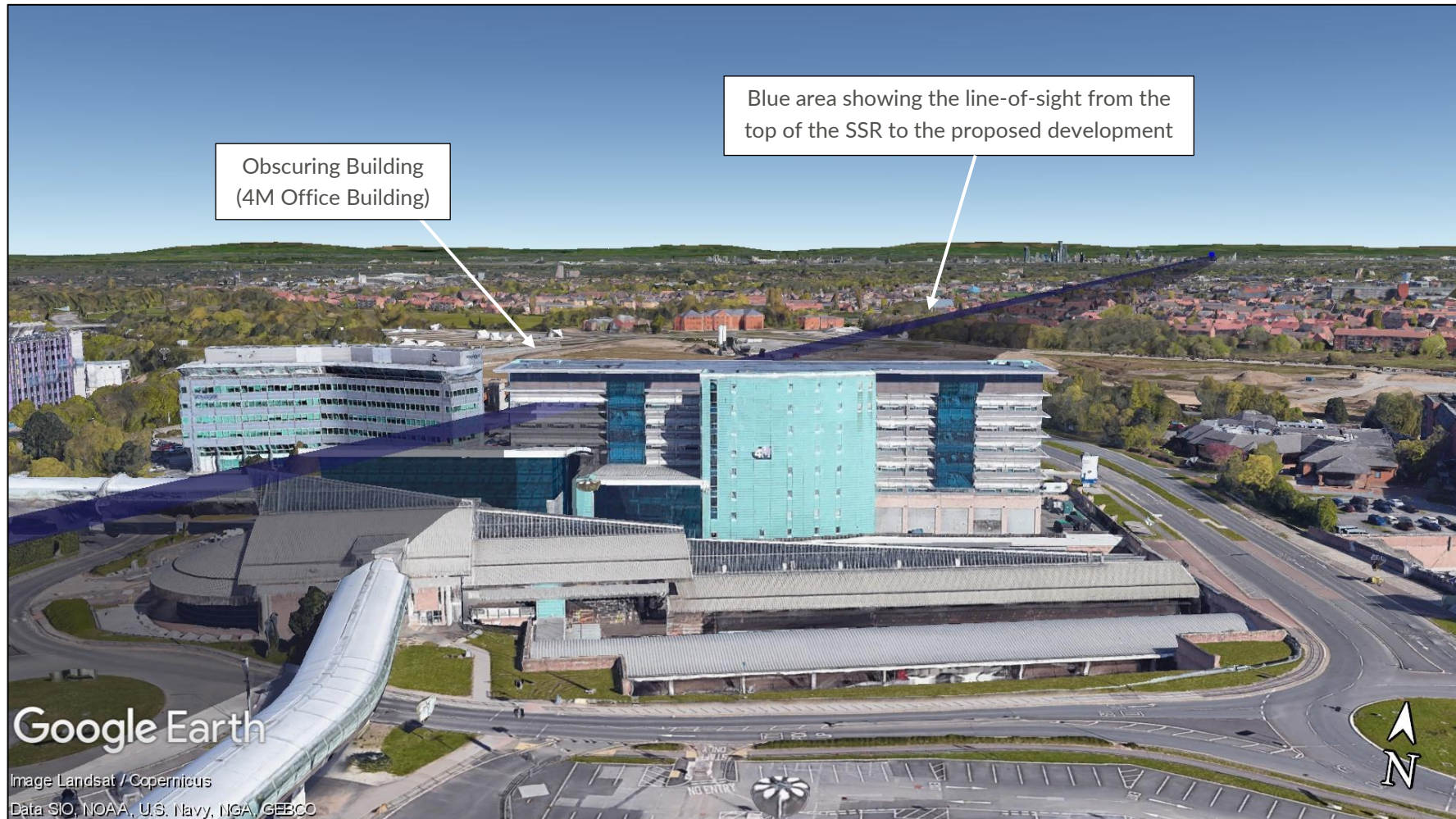


Figure 10 Close view of the existing building development obscuring line-of-sight from the SSR - 3D view

The radar line-of-sight is entirely obstructed by an existing building (4M Office Building) near the airport. Other existing or proposed developments may further screen the proposed development.

Overall, it is not expected that the proposed development could have a technical impact on the radar.

5.5 Radar Line of Sight Conclusions

The modelling has revealed that the proposed development will be entirely screened to the SSR at Manchester Airport due to an existing building. Other existing and proposed developments may further screen the proposed development. The development is also surrounded by developments which of a similar height and distance to the SSR.

No impact is predicted, and no mitigation is required.

6 OBSTACLE LIMITATION SURFACES ASSESSMENT

6.1 Overview

The Obstacle Limitation Surfaces (OLS) for Manchester Airport have been modelled with respect to the building plot coordinates. The aim is to identify whether the proposed development would infringe the OLS at Manchester Airport.

6.2 Manchester Airport 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 168. The size of the surfaces is dependent on the number of runways, their dimensions and the procedures carried out at the airfield.

The OLS for Manchester Airport are presented in Figure 15 below. The proposed development building plot coordinates are shown by the red crosses at the top of the chart – due to the scale these icons overlap.

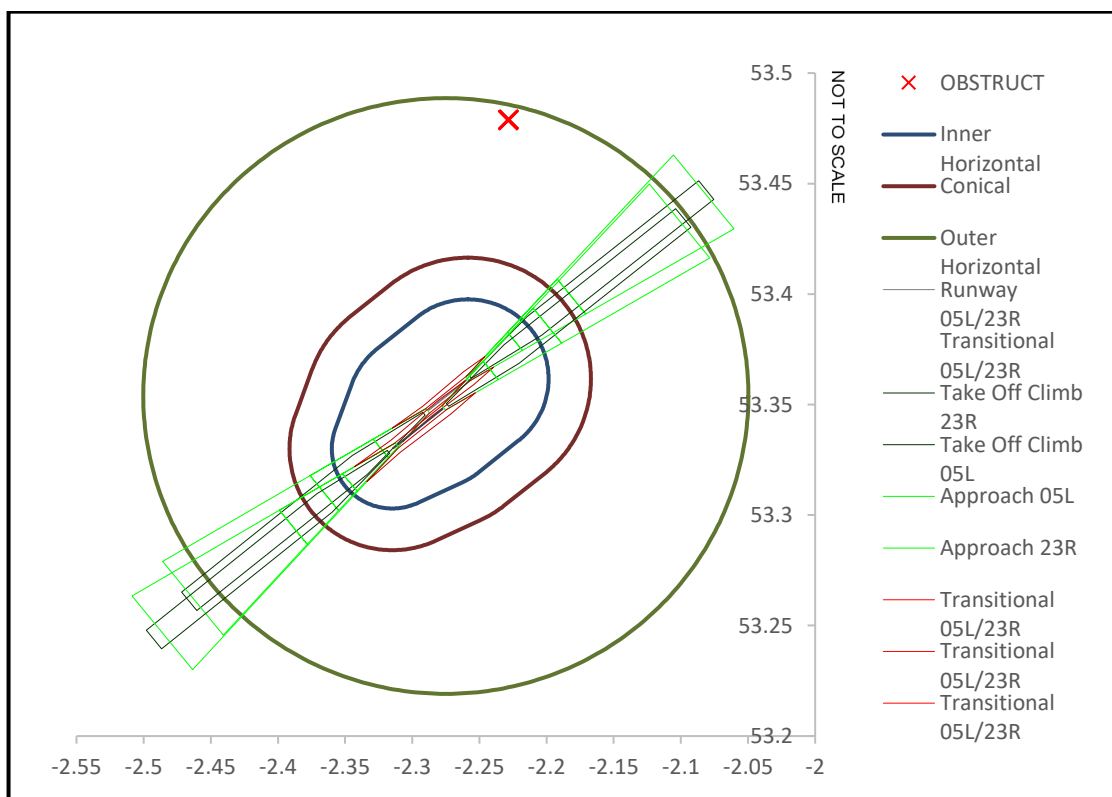


Figure 11 Manchester Airport Obstacle Limitation Surfaces chart

Table 2 below presents a summary of the OLS assessment results.

Building Points	Altitude above mean sea level (amsl) (m)	Relevant Surface	Vertical Clearance ^{3,4} (m)
A	70.00	Outer Horizontal Surface (OHS)	136.69
B	70.00		136.69
C	120.00		86.69
D	124.25		82.44
E	124.25		82.44
F	70.00		136.69
G	70.00		136.69
H	124.25		82.44
I	124.25		82.44
J	124.25		82.44
K	120.00		86.69
L	120.00		86.69

Table 4 OLS detailed results

6.3 Obstacle Limitation Surfaces Conclusions

The analysis has shown that the proposed development does not infringe the OLS at Manchester Airport. The building is clear of the most restrictive surface (OHS) by a minimum of 82 metres⁵. No physical safeguarding concerns with respect to the OLS and the building structure itself are predicted.

³ Vertical clearance between the top of the assessed building and the Outer Horizontal Surface.

⁴ These calculations have been based on an Outer Horizontal Surface of 206.6928m Above Ordnance Datum (AOD).

⁵ Rounded down to remain conservative

7 HIGH-LEVEL INSTRUMENT FLIGHT ANALYSIS

7.1 Overview

Aircraft flying Instrument Flight Rules (IFR) have been assessed at a high-level by considering:

- Impact on Maximum Elevation Figures (MEF) shown on national aeronautical charts;
- Impact on Manchester Airport Surveillance Minimum Altitude Chart (SMAC);
- Impact on current Manchester Airport Standard Instrument Departures;
- Impact on current Manchester Airport Standard Arrival Charts;
- Impact on current Manchester Airport Instrument Approach Charts.

This has been undertaken to determine whether an impact upon Instrument Flight Procedures (IFP) is likely or whether further, more detailed, analysis is required.

7.2 Area Minimum Altitude

The Area Minimum Altitude provides the minimum obstacle clearance above all obstacles (terrain and structures) in a particular quadrangle of an aeronautical chart. The Area Minimum Altitude shown for the quadrangle in which the development is located is 3,500 feet AOD. The proposed development has a maximum altitude of 407.6 feet which is 3,092.4 feet below the Area Minimum Altitude. The proposed development will therefore not affect the current Area Minimum Altitude.

7.3 Surveillance Minimum Altitude Chart (SMAC)

Surveillance Minimum Altitude Charts (SMAC)⁶ are published to show the lowest altitude a pilot will be instructed to fly whilst receiving an air traffic control service. The Manchester Airport SMAC shows that the minimum altitude for the sector above is 2,400 feet AOD. The proposed development has a maximum altitude of 407.6 feet. The vertical clearance between aircraft subject to a radar control service and the top of both buildings will be at least 1,992.4 feet. This is 1,008.4 feet greater than the specified clearance of 984 feet stated in the CAA publication (CAP 777) for designing SMACs. This means that aircraft flying IFR and receiving a radar control service will have an acceptably low collision risk. It should also be noted that taller and similarly sized structures are in the same area.

Figure 12 on the following page shows the ATC Surveillance Minimum Altitude Chart for Manchester Airport. It presents the approximate location of the proposed development (yellow dot) as well as the area of tall buildings present in the surrounding city centre (restricted airspace R319, which is restricted from surface to 1,700ft – therefore aircraft should not be flying in this area).

⁶ NATS AIP, AD 2.EGCC-5-1 (cropped)
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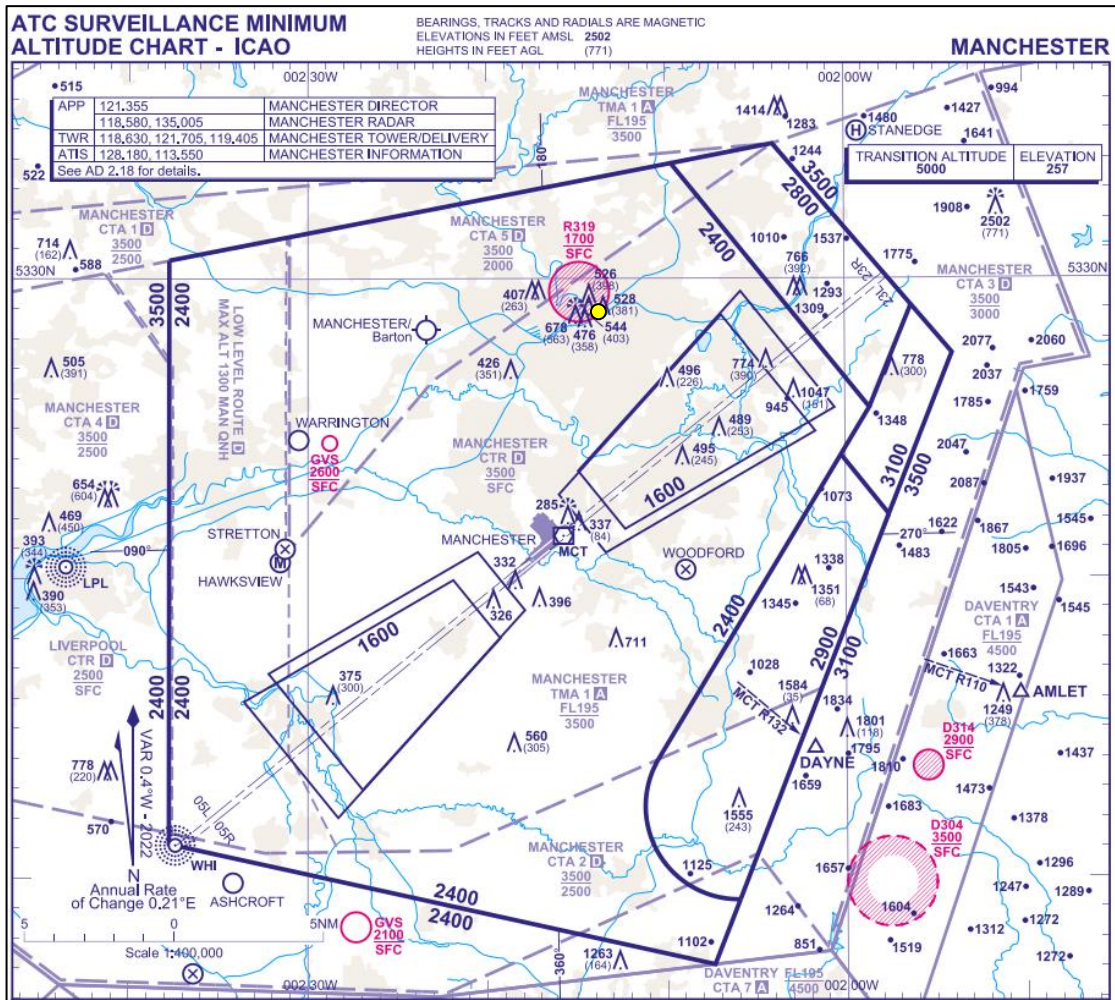


Figure 12 Manchester Airport ATC Surveillance Minimum Altitude Chart

7.4 High-level IFP Assessment – Obstacle Clearance Margins

As a general rule, Instrument Flight Procedures (IFP) are designed so that there are vertical and horizontal safety margins between the specified trajectory and surrounding terrain and obstacles. These margins vary depending on the phase of flight and whether UK, European or International rules are being considered. Nevertheless, the vertical margins are always 1,000 feet or less (except in particularly mountainous regions, which Manchester is not). This means that if the vertical clearance between an IFP route and the top of the proposed development exceeds 1,000 feet then it will not have a significant safety impact on aircraft flying the route. The maximum altitude of the proposed development is 408 feet⁷ amsl.

⁷ Rounded up to the nearest foot.

Therefore, aircraft subject to any IFP route or limit which is more than 1,408 feet will have an acceptably low collision risk. A detailed IFP assessment is not recommended considering the results of this high-level assessment.

7.5 Standard Instrument Departures (SIDs)

Manchester Airport has seven published Standard Instrument Departure procedures (SIDs). Each of these has been assessed with respect to the proposed development. Results of the assessment are shown in Table 5 below.

SID Name	Observations	Assessed Impact	Recommendation
MONTY 1R 1S 1Y 1Z	SID passes 3.5NM south-west of the proposed development Aircraft would be at a minimum altitude of 2,500ft at the closest section of the procedure	No impact. The development is vertically clear of this SID	No further action
ASMIM 1S 1Z/KUXEM 1R 1Y/EKLAD 1R 1Y	SID passes 3.5NM south-west of the proposed development Aircraft would be at a minimum altitude of 2,500ft at the closest section of the procedure	No impact. The development is vertically clear of this SID	No further action
LISTO 2S 2Z	SID passes 5NM south of the proposed development	No impact. The development is horizontally clear of this SID	No further action
LISTO 2R 2Y	Runway threshold is 8NM to the south-west. SID tracks south-west	No impact. The development is horizontally clear of this SID	No further action
POL 5R 4S 1Y 1Z	SID passes 4.5NM east of the proposed development Aircraft would be at a minimum altitude of 2,500ft at the closest section of the procedure	No impact. The development is horizontally clear of this SID	No further action

SID Name	Observations	Assessed Impact	Recommendation
SONEX 1R 1Y/DESIG 1S 1Z	SID passes within 1NM of the proposed development, Aircraft would be at a minimum altitude of 5,000ft at the closest section of the procedure	No impact. The development is vertically clear of this SID	No further action
SANBA 1R 1Y	Runway threshold is 8NM to the south-west. SID tracks south-west	No impact. The development is horizontally clear of this SID	No further action

Table 5 Standard Instrument Departure (SID) assessment results

The building is likely to present an acceptably low collision risk to aircraft flying all Standard Instrument Departure routes.

7.6 Standard Arrival Charts (STARs)

Manchester Airport has four published Standard Arrival (STARs) Charts. Each of these has been assessed with respect to the proposed development. Results of the assessment are shown in Table 6 below.

STAR Name	Observations	Assessed Impact	Recommendation
via ROSUN (north)	Minimum Altitude FL70	No impact due to vertical clearance	No further action
via ROSUN (east)	Minimum Altitude FL90	No impact due to vertical clearance	No further action
via MIRSI	Minimum Altitude 6,000 feet	No impact due to vertical clearance	No further action
via DAYNE	Minimum Altitude FL70	No impact due to vertical clearance	No further action

Table 6 Standard Arrival Chart (STARs) Assessment Results

Aircraft flying Manchester Airport's Standard Arrival Routes will be at least 5,592 feet vertically clear of the building. This means that such aircraft will have an acceptably low collision risk.

7.7 Instrument Approach Charts

Manchester Airport has 15 published Instrument Approach Charts. Each of these has been assessed with respect to the proposed development. For each, the following have been considered:

- The final approach phase;
- Earlier approach phases shown on the chart;
- Missed approach procedure;
- Decision heights and circling minima;
- Minimum Safe Altitude (MSA) within 25 nautical miles.

Results of the assessment are shown in Table 7 on the following page.

V = vertically and H = horizontally.

Name	Final Approach	Earlier Approach	Missed Approach	Decision and Circling	MSA	Assessed Impact	Recommended Action
ILS/DME (I-MC) RWY 05R	OK V,H	OK V,H	OK V,H	OK V,H	OK V	None	None
ILS/DME (MCT) RWY 05R	OK V,H	OK V,H	OK V,H	OK V,H	OK V	None	None
LOC/DME (I-MC) RWY 05R	OK V,H	OK V,H	OK V,H	OK V,H	OK V	None	None
VOR/DME RWY 05R	OK V,H	OK V,H	OK V,H	OK V,H	OK V	None	None
ILS/DME (I-MM) RWY 05L	OK V,H	OK V,H	OK V,H	OK V,H	OK V	None	None
ILS/DME (MCT) RWY 05L	OK V,H	OK V,H	OK V,H	OK V,H	OK V	None	None
LOC/DME RWY 05L	OK V,H	OK V,H	OK V,H	OK V,H	OK V	None	None
VOR/DME RWY 05L	OK V,H	OK V,H	OK V,H	OK V,H	OK V	None	None
ILS/DME (I-NN) RWY 23R	OK V,H	OK V,H	OK V,H	OK V,H	OK V	None	None

Name	Final Approach	Earlier Approach	Missed Approach	Decision and Circling	MSA	Assessed Impact	Recommended Action
ILS/DME (MCT) RWY 23R	OK V,H	OK V,H	OK V,H	OK V,H	OK V	None	None
LOC/DME RWY 23R	OK V,H	OK V,H	OK V,H	OK V,H	OK V	None	None
VOR/DME RWY 23R	OK V,H	OK V,H	OK V,H	OK V,H	OK V	None	None
VOR/DME RWY 23L	OK V,H	OK V,H	OK V,H	OK V,H	OK V	None	None
RNP RWY 23L	OK V,H	OK V,H	OK V,H	OK V,H	OK V	None	None

Table 7 Instrument Approach Charts assessment results

The building is likely to present an acceptably low collision risk to aircraft flying all Instrument Approach Procedures. No further action is recommended.

7.8 High-level IFP Assessment – Obstacle Clearance Margins Conclusions

As a general rule, IFPs are designed so that there are vertical and horizontal safety margins between the specified trajectory and surrounding terrain and obstacles. It is likely that if an obstacle does not infringe the OLS it will not adversely affect the IFP. The OLS will not be affected by the proposed development. A high-level review of the IFPs relative to the proposed development indicates sufficient clearances. There are also taller existing buildings in the surrounding area that already co-exist with the current IFPs. Therefore, no impact upon the IFPs is predicted and no detailed IFP assessment is recommended. It is possible however that this could still be requested by Manchester Airport.

8 HIGH-LEVEL AVIATION LIGHTING AND CRANE USAGE CONSIDERATIONS

8.1 Overview

Aviation lighting is required where an object becomes a collision risk. This is most likely where there is an infringement of the OLS. It also becomes mandatory to have lighting where an object extends to 150m above ground level or more⁸. The following section explores the requirement for aviation lighting at a high-level.

8.2 Lighting Requirements

The following is true regarding the proposed development:

- The building does not extend above 150m agl (the building has a maximum height of 86.25m agl);
- The building does not infringe the OLS;
- Cranes are not expected to be above 150m agl or infringe the OLS of Manchester Airport.

On this basis, aviation lighting is not mandatory for the proposed development as per the associated Air navigation Order guidance, and it is unlikely that cranes will require lighting.

8.3 Crane Operations Scheme

It is recommended that the developer applies for a crane permit from the CAA 8 weeks in advance. It is possible that MAG may request a crane operations scheme however it is unlikely given that the cranes are unlikely to breach the OLS.

⁸ Air Navigation Order, 2016. There is a requirement unless the CAA allow otherwise. Last accessed 26.10.22.

9 CONCLUSIONS

9.1 Manchester Airport SSR

- The proposed development is located approximately 15.8km north-east of Manchester Airport's SSR;
- All assessed points of the proposed development are entirely visible considering bare earth terrain;
- Additional screening analysis has revealed that the radar line-of-sight is entirely obscured by an existing building;
- No impacts is predicted upon the SSR at Manchester Airport.

9.2 Manchester Airport's Obstacle Limitation Surfaces

- The proposed development site is beneath the Outer Horizontal Surface (OHS) of Manchester Airport;
- The analysis has shown that the proposed development, with a maximum altitude of 124.25m AOD, would not infringe the OHS. The minimum margin of clearance is 82.44m.

9.3 Instrument Flight Procedures at Manchester Airport – High-Level

A high-level review of the IFPs relative to the proposed development indicates sufficient clearances. There are also taller existing buildings in the immediate surrounding area that already co-exist with the current IFPs. Therefore, no impact upon the IFPs is predicted and no detailed IFP assessment is recommended. It is possible however that this could still be requested by MAG.

9.4 Aviation Lighting and Crane Usage – High-Level

- The proposed development does not extend above 150m agl or infringe the OLS;
- As long as cranes do not extend 63.75m above the maximum height of the proposed development, they would not extend above 150m agl or infringe the OLS;
- Therefore, it is not expected that aviation lighting would be required for the proposed development or associated cranes;
- It is possible that MAG may request a crane operations scheme however it is unlikely given that the cranes are unlikely to breach the OLS.

9.5 Overall Conclusions

The proposed development is not expected to be visible to the Secondary Surveillance Radar (SSR) at Manchester Airport, due to screening from an existing building near the airport, and no impact is predicted.

The results of the analysis revealed that the proposed development would not infringe the Obstacle Limitations Surfaces (OLS) at Manchester Airport, with a minimum 82.44m clearance, and therefore is not likely to present a collision risk.

The Instrument Flight Procedures (IFP) assessment indicates that no impact is predicted, and no detailed IFP assessment is recommended. It is possible however that this could still be requested by Manchester Airport Group (MAG), who safeguard Manchester Airport.

Considerations of aviation lighting and crane usage indicates that aviation lighting and a crane operations scheme are unlikely to be required, based on the proposed height of the development.

The results of this report have been shared with MAG, who have indicated that the report and its findings appear acceptable, though a full review will only be carried out upon submission of the planning application.

APPENDIX A – COORDINATE DATA

Assessed Building Points

The assessed building has a maximum altitude of 115.37m above mean sea level (amsl). The coordinates outlining the building are given below.

Building Points	Longitude (°)	Latitude (°)	Assessed Height (m AOD)
A	-2.22848	53.47905	70.00
B	-2.22877	53.47894	70.00
C	-2.22856	53.47896	120.00
D	-2.22879	53.47886	124.25
E	-2.22854	53.47863	124.25
F	-2.22848	53.47858	70.00
G	-2.22824	53.47867	70.00
H	-2.22830	53.47872	124.25
I	-2.22845	53.47886	124.25
J	-2.22832	53.47891	124.25
K	-2.22783	53.47910	120.00
L	-2.22798	53.47923	120.00

Building Point Coordinates



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