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Aviation Lighting Assessment

Trinity Islands

Renaker Build Limited

June 2023

Z1-PPA-G540-RP-XX-001
P01







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ADMINISTRATION PAGE

Job reference:	10685B
Date:	August 2021
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First Reviewer:	Michael Sutton
Date:	August 2021
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Issue	Date	Detail of Changes
1	August 2021	Initial issue
2	June 2023	Updated with the final aviation lighting scheme agreed with MAG

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EXECUTIVE SUMMARY

Report Overview

Pager Power has been retained to produce an Aviation Lighting Scheme for the Trinity Islands development located at Water Street, Manchester. The development will consist of four towers with a maximum altitude of 207.55m above mean sea level (amsl) and 180.15m above ground level (agl). Following the completion of the Aviation Safety Assessment (10685A) it was deemed that a specific investigation into the aviation lighting requirement was necessary.

The lighting requirement was discussed with Manchester Airport through consultation. This updated report presents the agreed aviation lighting scheme.

Lighting Scheme Considerations

A lighting scheme for the Trinity Islands development is required due to the location of the towers, safeguarding impacts upon Manchester Airport's obstacle limitation surfaces (OLS) and the respective heights of the towers.

The following was completed to determine an overall recommended aviation lighting scheme[1]:

- A review of ANO 222 and EASA CS-ADR-DSN guidance as well as the CAA CAP 168[2];
- A comparison of the guidance with respect to obstacle lighting;
- An assessment of the proposed development with respect to the Manchester Airport's OLS;
- An examination of the lighting and height of existing structures surrounding the development;
- Planning and lighting precedence;
- Consideration of the surrounding environment;
- Consultation with Manchester Airport.

Lighting Requirement

The following is true regarding the development:

- Two of the four towers extend above 150m agl (D1 = 180.150m and D2 = 165.900m agl);
- Two of the four towers remain below 150m agl (C1 = 119.475m and C2 = 145.950 agl);

[1] Elements of the scope stated within the bullet points are presented in V1 of this report.
[2] Terminology/acronyms presented in Section 3.

- One of the towers infringes the outer horizontal surface (OHS) of Manchester Airport (D1 by 0.8572m);
- Three of the towers do not infringe the OLS (C1, C2 and D2).

Agreed Lighting Scheme

The lighting scheme proposed includes the addition of four obstacle lights (medium intensity steady red, Type C – 2000 candela) to be fitted on the corners of the roof of towers D1 and D2 and at intermediate levels. Lighting is not required for towers C1 or C2 due to their height.

Intermediate lights have been requested by Manchester Airport for towers D1 and D2. Any provision of shielding[3] for the intermediate lights to the adjacent towers should be reviewed and signed off by Manchester Airport before it is implemented.

The table below presents the agreed lighting scheme design.

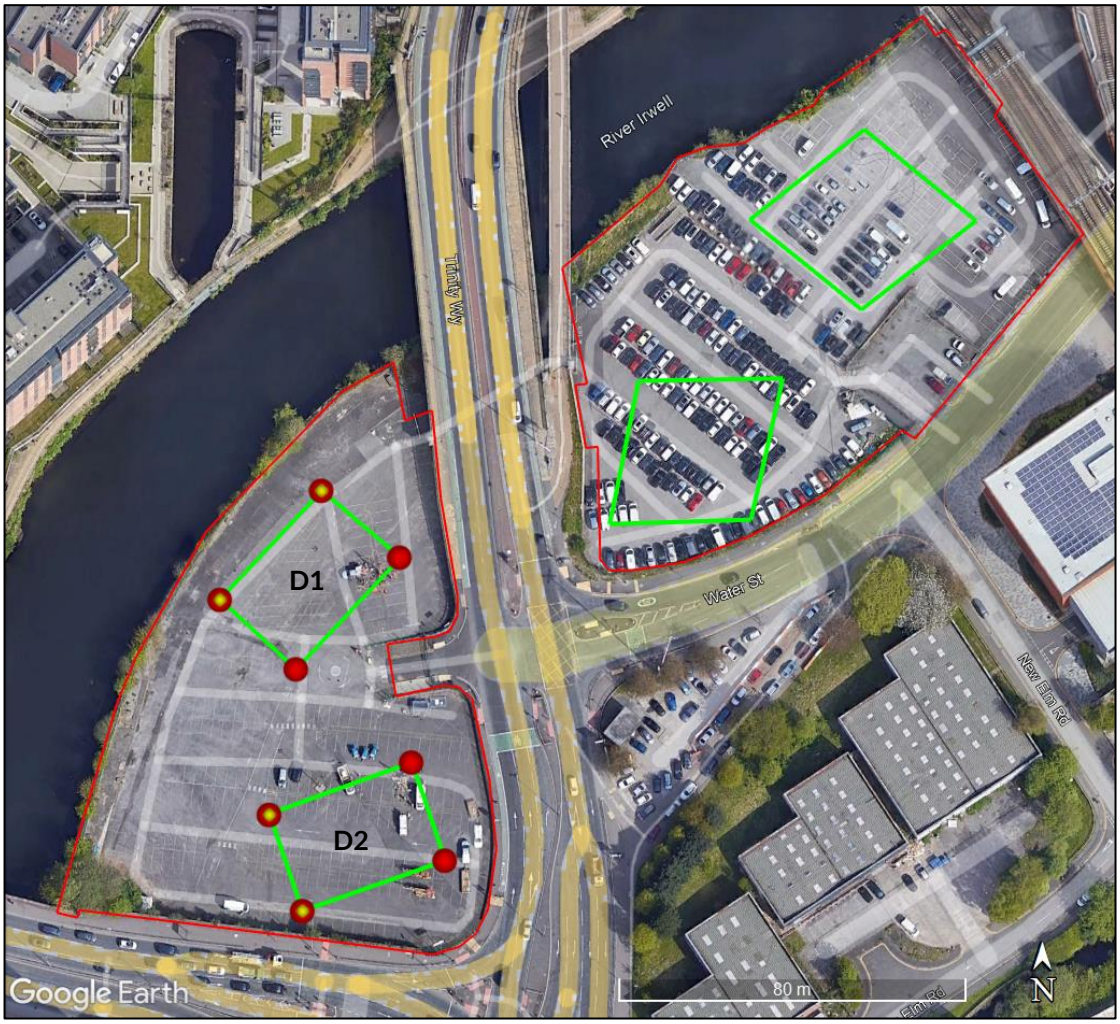
Building	Height agl	Type of Light	Position/ Number of Lights	Positioning of Lighting / Reason
C1	119.475 metres	No roof lights	-	No lighting is required.
		No intermediate lights	-	
C2	145.950 metres	No roof lights	-	No lighting is required.
		No intermediate lights	-	
D1	180.150 metres	Medium intensity steady red – 2000 candela (Type C).	At roof level = 4	Four omnidirectional lights, one on each corner at its edge.
			At intermediate level = 2	Two omnidirectional intermediate lights installed at the mid-point[4] of the northern and western vertices.
D2	165.900 metres		At roof level = 4	Four omnidirectional lights, one on each corner at its edge.

[3] To avoid light spill illuminating other residences within the adjacent towers.
[4] i.e. approximately 90m from ground level for this tower.

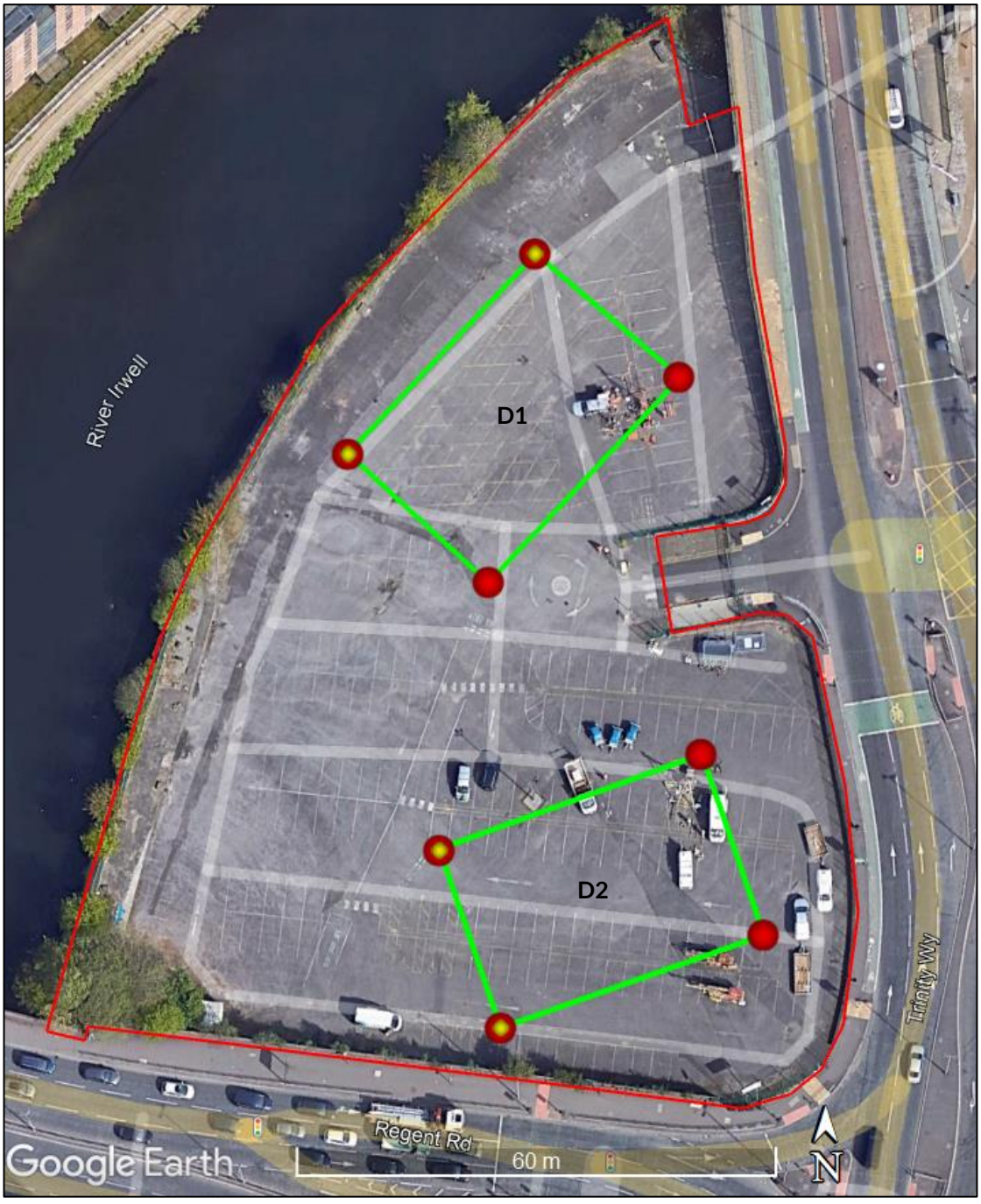
Building	Height agl	Type of Light	Position/ Number of Lights	Positioning of Lighting / Reason
		Medium intensity steady red – 2000 candela (Type C).	At intermediate level = 2	Two omnidirectional intermediate lights installed at the mid-point of the southern and western vertices.
Lights should be illuminated continuously.				

Recommended lighting scheme

The figures on the following page show a top-down representative image of the wider proposed development and the recommended lighting scheme. The second figure shows a zoomed in aerial image for towers D1 and D2 where lighting is required. The red circles indicate the proposed lighting positions for the lights at roof level. The overlaid yellow circles show where intermediate lights are required.



Agreed lighting scheme – top-down (whole development)



Agreed lighting scheme – top-down and zoomed

Shielding of Intermediate Lighting

The aviation lighting scheme presented above has been agreed with Manchester Airport. Any provision of shielding for the intermediate lights to the adjacent towers should be reviewed and signed off by Manchester Airport before it is implemented.

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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 South Africa, Europe, 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 Overview

Pager Power has been retained to produce an Aviation Lighting Scheme for the Trinity Islands development located at Water Street, Manchester. The development will consist of four towers with a maximum altitude of 207.55m above mean sea level (amsl) and 180.15m above ground level (agl).

Due to its location and height, an aviation lighting scheme is necessary. The lighting requirement was discussed with Manchester Airport through consultation. This updated report presents the agreed aviation lighting scheme. This report is intended to present the consolidated lighting scheme based on the analysis and consultation undertaken to date. Aviation lighting guidance is presented in a previous version of this report.

1.2 Coordinate System

Unless otherwise stated all coordinates used within this report are in British National Grid (OSGB36 datum) or WGS84 latitude and longitude.

2 DEVELOPMENT PLANS

2.1 Development Description

The Site comprises two distinct plots of land, 'Site C' (0.89 hectares) to the north and 'Site D' (0.89 hectares) to the south, divided by the A6042. The Site, until recently, was used as a compound for the Ordsall chord development, however it is currently being used as a surface level car park.

Site C comprises two residential towers of approximately 34 and 42 residential storeys, providing circa 900 residential units. Site D comprises two residential towers of approximately 48 and 57 residential storeys, providing circa 1000 residential units. Each tower sits above a two-deck podium with associated two-storey underground resident parking.

2.2 Development Elevations

The maximum height of each tower above ordnance datum (AOD) and above ground level (agl)[5] is presented below:

- C1: Maximum elevation AOD = 146.875m. Maximum elevation agl = 119.475m.
- C2: Maximum elevation AOD = 173.350m. Maximum elevation agl = 145.950m.
- D1: Maximum elevation AOD = 207.550m. Maximum elevation agl = 180.150m.
- D2: Maximum elevation AOD = 193.300m. Maximum elevation agl = 165.900m.

[5] Considering a ground level of 27.4m as per drawing 10364-Z1-SHP-G200-SE-0001.

2.3 Development Boundary

The red line boundary for the development is shown in Figure 1[6] below. The two boundaries are defined as Site C and Site D.

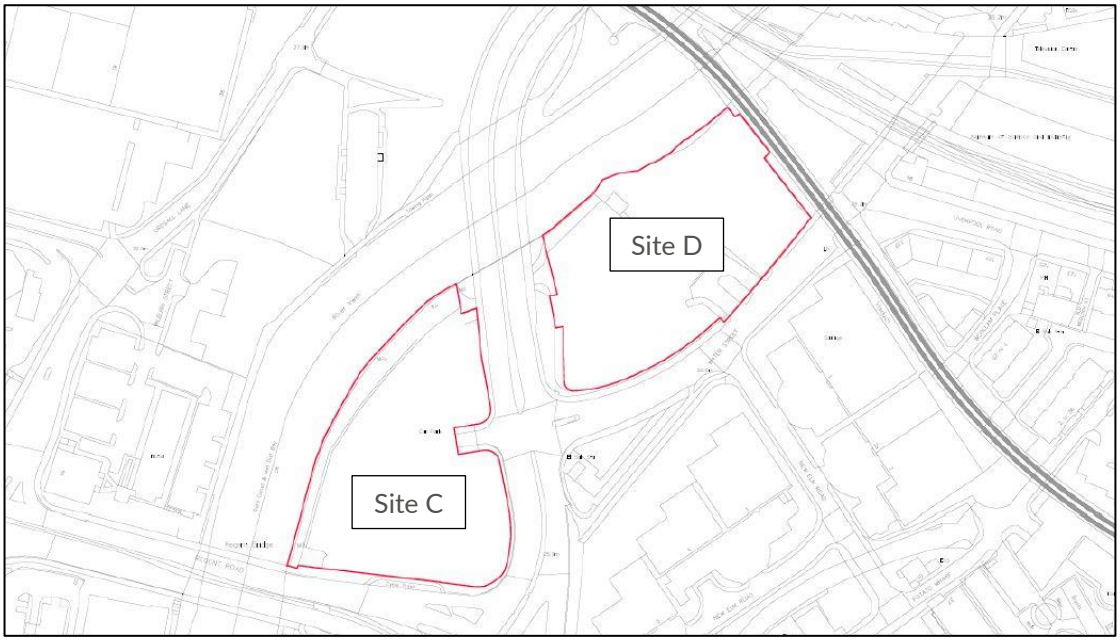


Figure 1 *Development red line boundary*

[6] Source: Simpsonhaugh (cropped).

2.4 Development Boundary

The red line boundary for the development overlaid on aerial imagery is shown in Figure 2 below.



Figure 2 *Development red line boundary overlaid on aerial imagery*

2.5 Development Ground Floor Plan and Elevation

The ground floor plan for the development is shown in Figure 3[7] below.

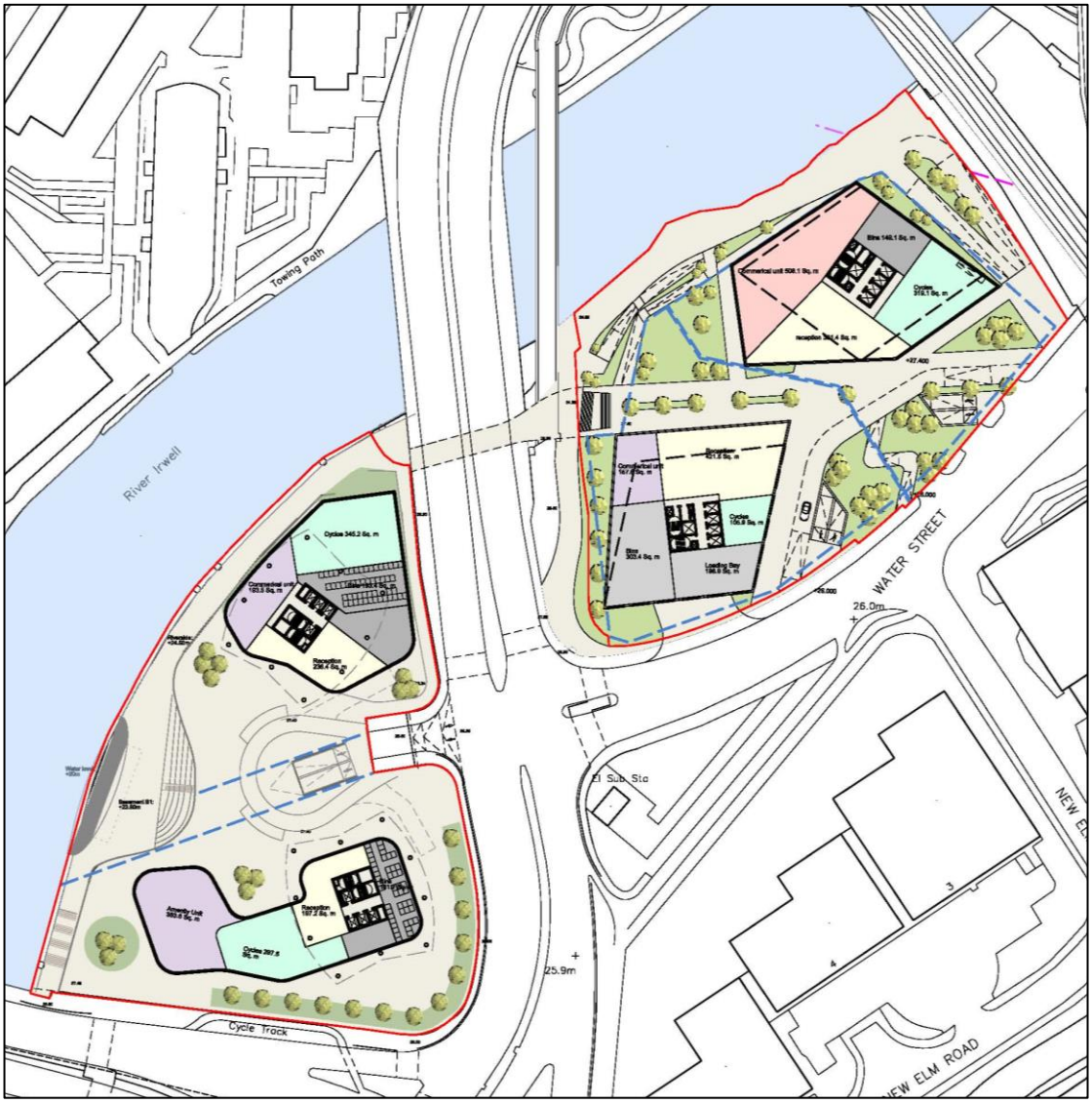


Figure 3 *Development ground floor plan*

[7] Source: Simpsonhaugh (cropped).

2.6 Development Footprint and Elevations

Figures[8] 4 and 5 below and on the following page show the footprints of each tower with co-ordinates. The maximum elevation of the towers AOD are also shown.

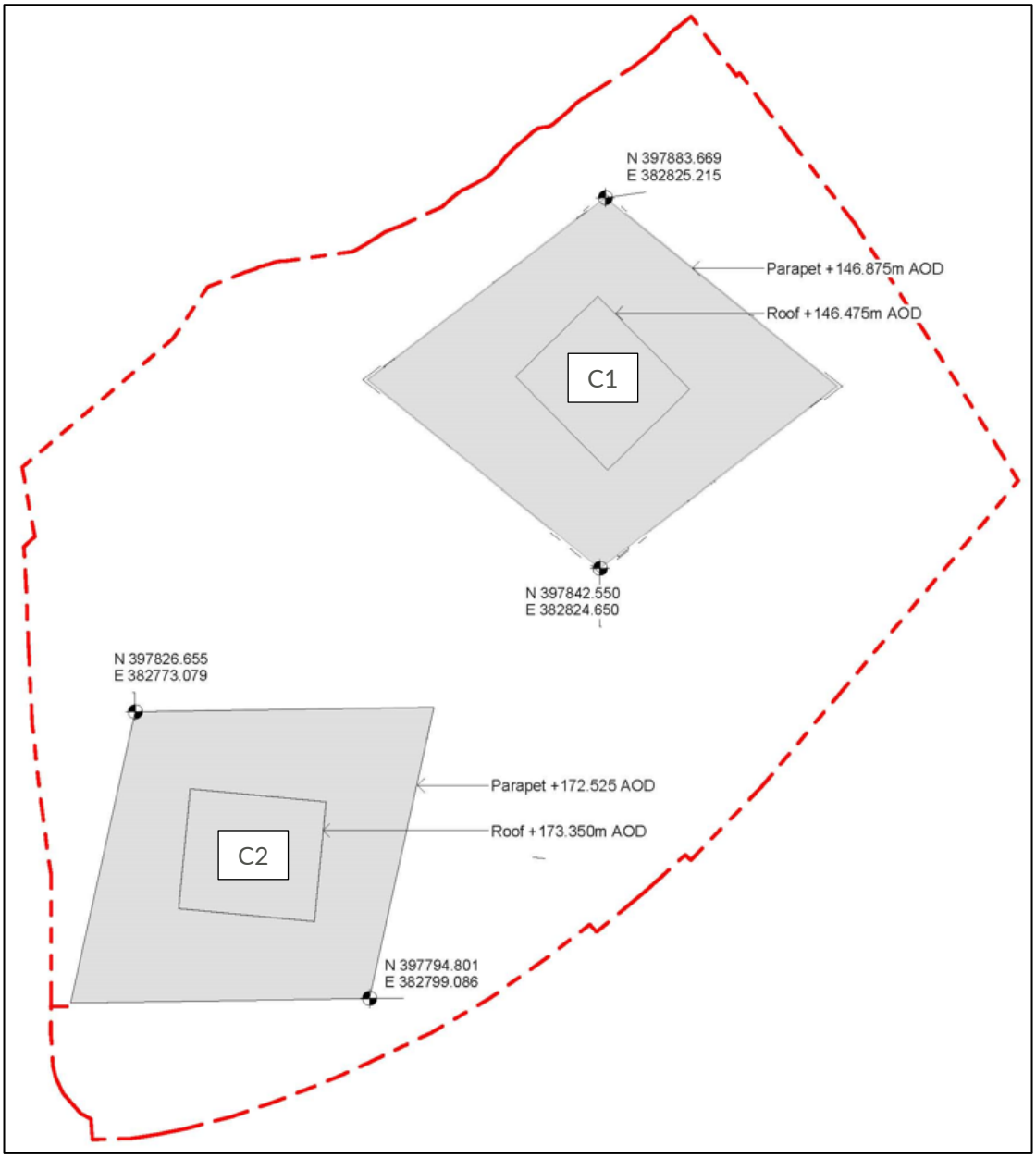


Figure 4 *Development footprint – Towers C1 and C2*

[8] Source: Simpsonhaugh (cropped).

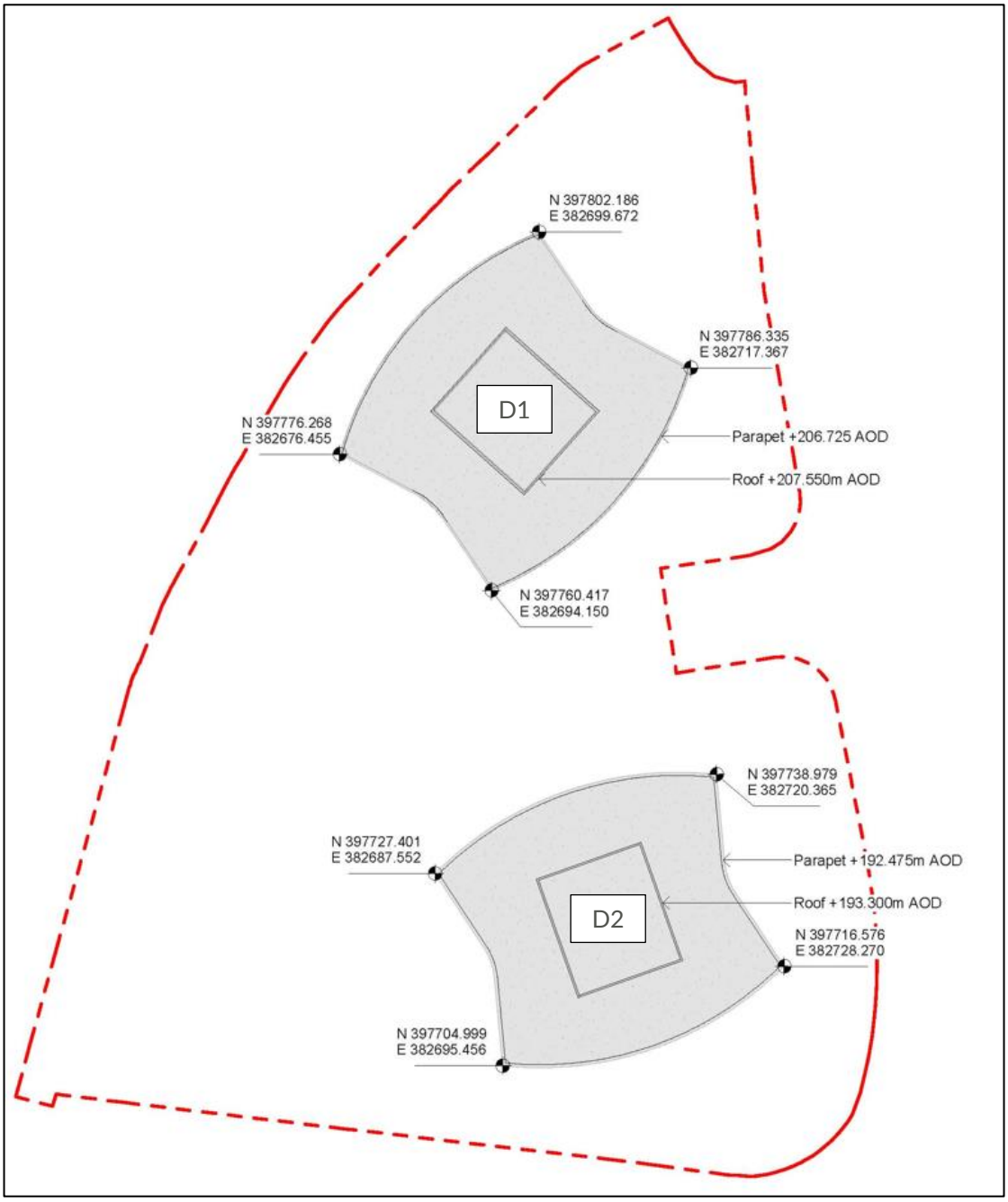


Figure 5 *Development footprint – Towers D1 and D2*

2.7 Development 3D Representation

Figure 6[9] below shows the 3D representation of the development.

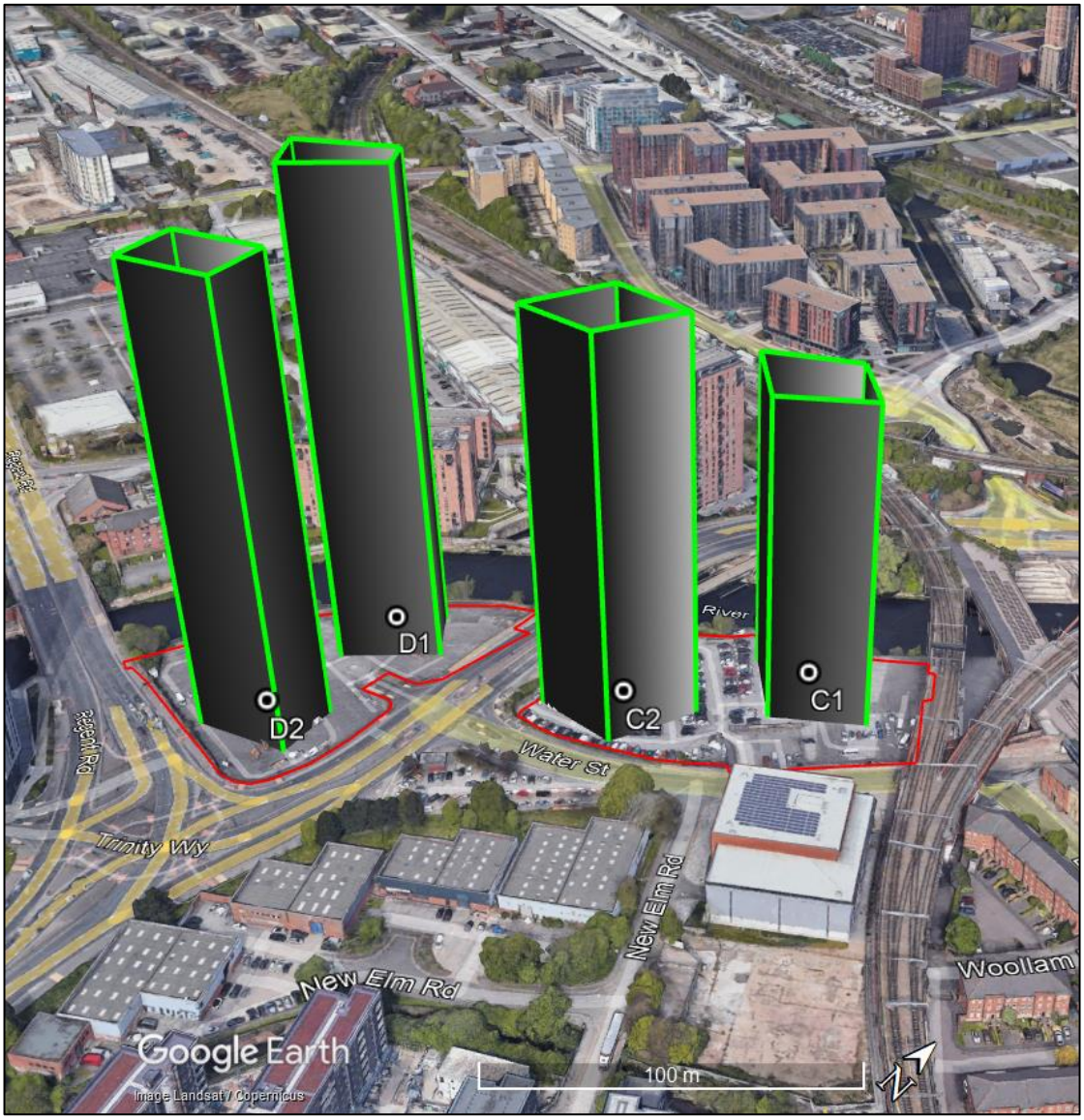


Figure 6 *Development 3D representation*

[9] Source: Simpsonhaugh (cropped).

3 AGREED LIGHTING SCHEME DESIGN

3.1 Overview

A lighting scheme has been designed and agreed in consultation with Manchester Airport based on the available guidance, specifically within ANO 222 and EASA CS-ADR-DSN. The recommended lighting scheme, along with the rationale, is presented in the following sub-section.

3.2 Rationale and Lighting Scheme Design

The following is true regarding the development:

- Two of the four towers extend above 150m agl[10] (D1 = 180.150m and D2 = 165.900m agl);
- Two of the four towers remain below 150m agl (C1 = 119.475m and C2 = 145.950 agl);
- One of the towers infringes the OHS of Manchester Airport (D1 by 0.8572m);
- Three of the towers do not infringe the OLS (C1, C2 and D2).

On this basis, aviation lighting is mandatory as per the associated CAA guidance and because of the infringement of the OLS (tower D1).

3.3 Agreed Lighting Scheme Design

The specific aviation lighting scheme for each tower is presented in Table 2 below.

Building	Height agl	Type of Light	Position/ Number of Lights	Positioning of Lighting / Reason
C1	119.475 metres	No roof lights	-	No lighting is required.
		No intermediate lights	-	
C2	145.950 metres	No roof lights	-	No lighting is required.
		No intermediate lights	-	

[10] Based on the ground heights provided within the development plans.

Building	Height agl	Type of Light	Position/ Number of Lights	Positioning of Lighting / Reason
D1	180.150 metres	Medium intensity steady red – 2000 candela (Type C).	At roof level = 4	Four omnidirectional lights, one on each corner at its edge.
			At intermediate level = 2	Two omnidirectional intermediate lights installed at the mid-point[11] of the northern and western vertices.
D2	165.900 metres	Medium intensity steady red – 2000 candela (Type C).	At roof level = 4	Four omnidirectional lights, one on each corner at its edge.
			At intermediate level = 2	Two omnidirectional intermediate lights installed at the mid-point of the southern and western vertices.
Lights should be illuminated continuously.				

Table 1 *Recommended lighting scheme*

Figures 7 and 8 on the following page shows a top-down and 3D representative image of the development and agreed lighting scheme. The red circles indicate the proposed lighting positions for the lights at roof level. The overlaid yellow circles show where intermediate lights are required.

[11] i.e. approximately 90m from ground level for this tower.

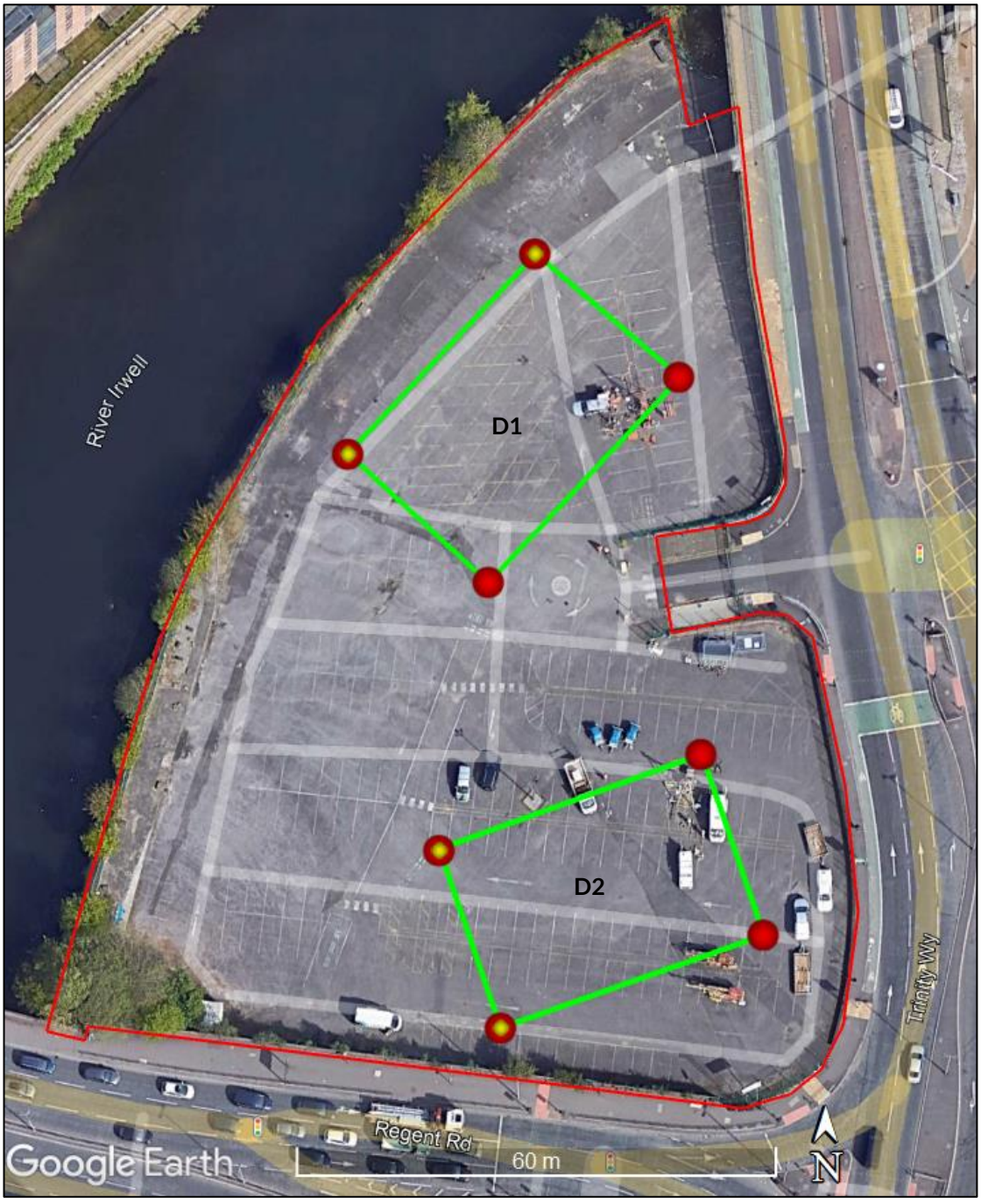


Figure 7 *Recommended lighting scheme – top-down*

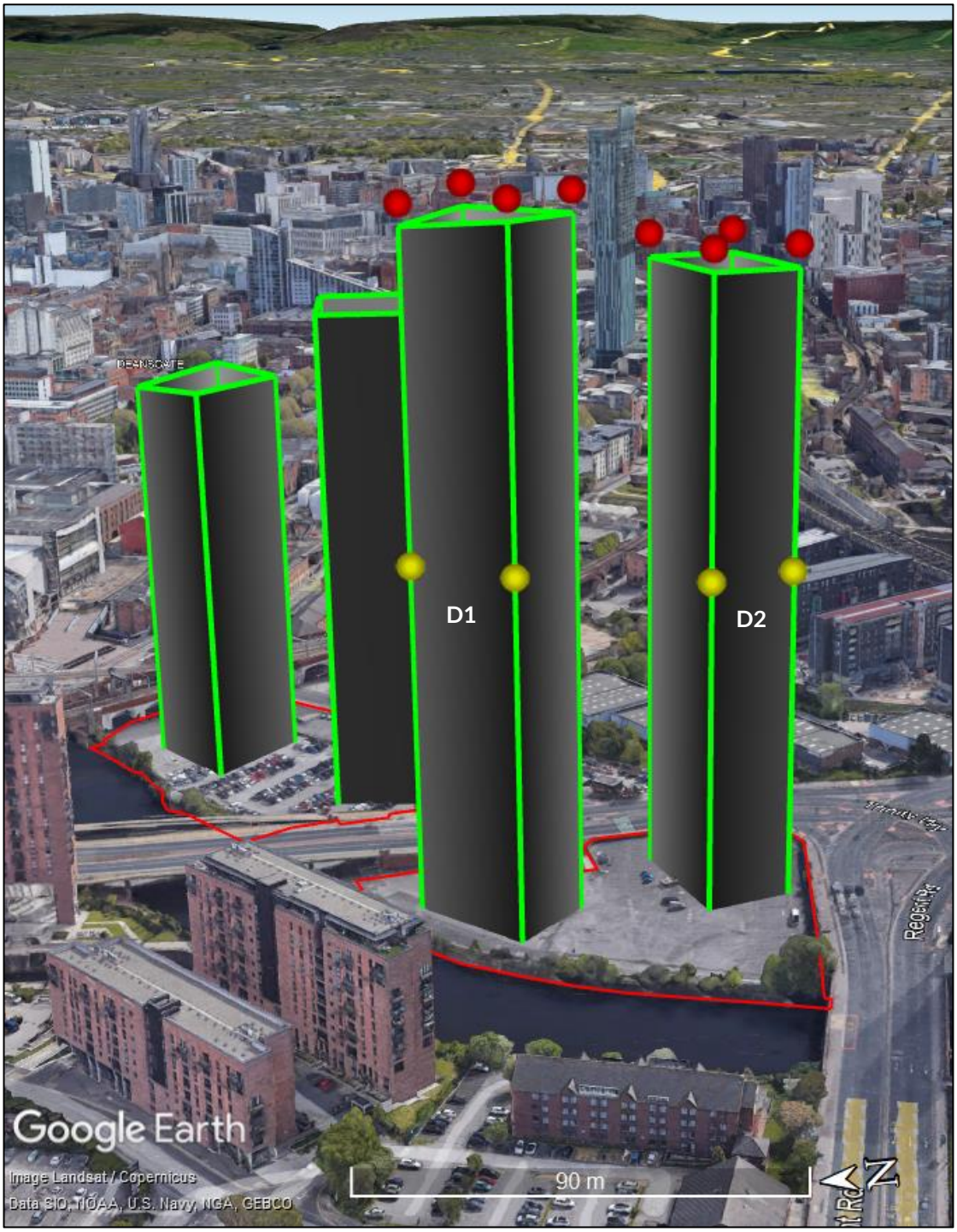


Figure 8 *Recommended lighting scheme – representative 3D image*

3.4 Shielding of Intermediate Lighting

The aviation lighting scheme presented above has been agreed with Manchester Airport. Any provision of shielding for the intermediate lights (to avoid light spill illuminating other residences within the adjacent towers) should be reviewed and signed off by Manchester Airport before it is implemented.

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