

Desk-Based Satellite Television Interference Assessment

ID Manchester Ltd and University of Manchester

Sister – Plot C

April 2025

PLANNING SOLUTIONS FOR:

- Solar
- Telecoms
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ADMINISTRATION PAGE

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EXECUTIVE SUMMARY

Overview

Pager Power has been commissioned to investigate the potential impact of a proposed building development upon satellite television services in its surrounding area. The proposed development is located in Manchester city centre, Plot C (Sister). The proposed development comprises two buildings with a maximum height of 84.55m above ground.

The report has determined the potential for effects upon satellite television reception by identifying the relevant transmitters and satellites, and modelling appropriate diffraction and reflection zones, and diffraction loss calculations as appropriate.

Assessment Conclusions

The overall conclusions for satellite television transmissions are:

- The modelled shadow zone for satellite television services is limited to 230m northwest of the proposed development's location;
- The shadow zone covers buildings along Fairfield Street, Whitworth Street, Cobourg Street, and Granby Row. 15 buildings have been identified for assessment and are understood to be a mix of residential and commercial;
- No significant impacts are predicted as a result of the proposed development upon 14 of the assessed buildings due to a combination of the following:
 - A lack of observed satellite dishes;
 - Rooftops extending above the 3D shadow zone;
 - The predicted usage of the building; and
 - The presence of other tall building developments predicted to shadow existing dishes.
- The potential for impacts upon one building (building 13) cannot be reliably ruled out. If any report of interference is received from these buildings, it should be investigated.

Recommendations

Any reported television interference should be investigated to analyse if interference is attributable to the proposed development. This may be carried out in coordination with a local satellite engineer to survey the existing dish. The investigation can then be considered to determine whether the effect is attributable to the development.

Mitigation

No requirement for pre-emptive mitigation has been identified.

Technical mitigation solutions (outlined in Section 4) could be implemented in the event that a significant impact occurs.

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ABOUT PAGER POWER

Pager Power is a dedicated consultancy company based in Suffolk, UK. The company has undertaken projects in 61 countries within Europe, Africa, America, Asia and Oceania.

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 upon satellite television services in its surrounding area. The proposed development is located in Manchester city Centre, Plot C (Sister). The proposed development comprises two buildings with a maximum height of 84.55m above ground.

The Site is in Manchester City Centre and is bound by the Manchester South Junction and Altrincham Railway (MSJ&AR) Viaduct to the north, London Road to the east, The Mill to the south and the Renold Building to the west.

The Site currently comprises the landscaped area known as the Bowling Green, the Barnes Wallis and Wright Robinson Building, Manchester Meeting Place and Morton Labs all associated with the former UMIST Campus of the University of Manchester. Although not listed these buildings are of heritage interest. The Site also contains the Grade II Holloway Wall and the MSJ&AR Viaduct. The Moffat Building is also contained within the Plot C boundary, this building is not considered to yield any heritage interest, however it is physically connected to the Holloway Wall.

The report has determined the potential for effects upon satellite television reception by identifying the relevant transmitters and satellites, and modelling appropriate diffraction and reflection zones, and diffraction loss calculations as appropriate.

1.2 Assessment Requirement

The proposed development will introduce a new tall structure into the urban environment which have the potential to interact with satellite television signals and cause interference in the surrounding area. This report has been completed to investigate potential issues arising from its development.

1.3 Proposed Development Details

The red line boundary¹ of the proposed development is shown in Figure 1 below.



Figure 1 *Proposed development plan*

The red line boundary and footprint (shown in blue) of the proposed development is shown in Figure 2 on the following page, overlaid upon aerial imagery.

¹ Source: SISCO-SLA-LA-ZZ-DR-LA-00001.pdf

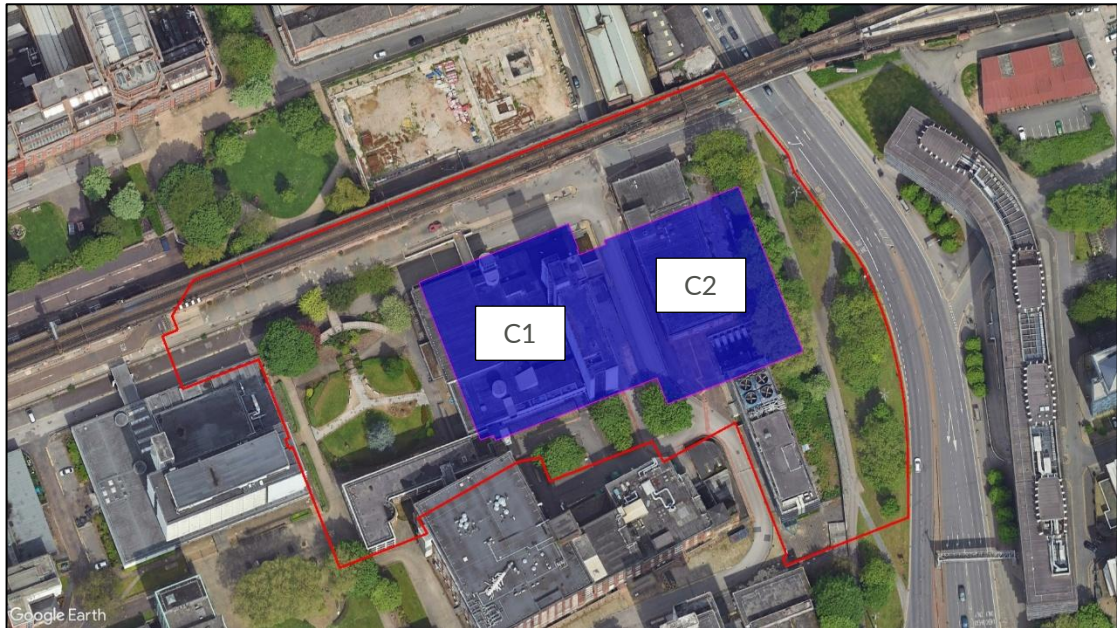


Figure 2 Proposed development location

1.4 Elevation Diagrams

The development consists of two buildings: C1 and C2, which have a maximum height above ground of 53.1m and 84.55m respectively. Figures 3 and 4 show the elevation diagrams of the two buildings.

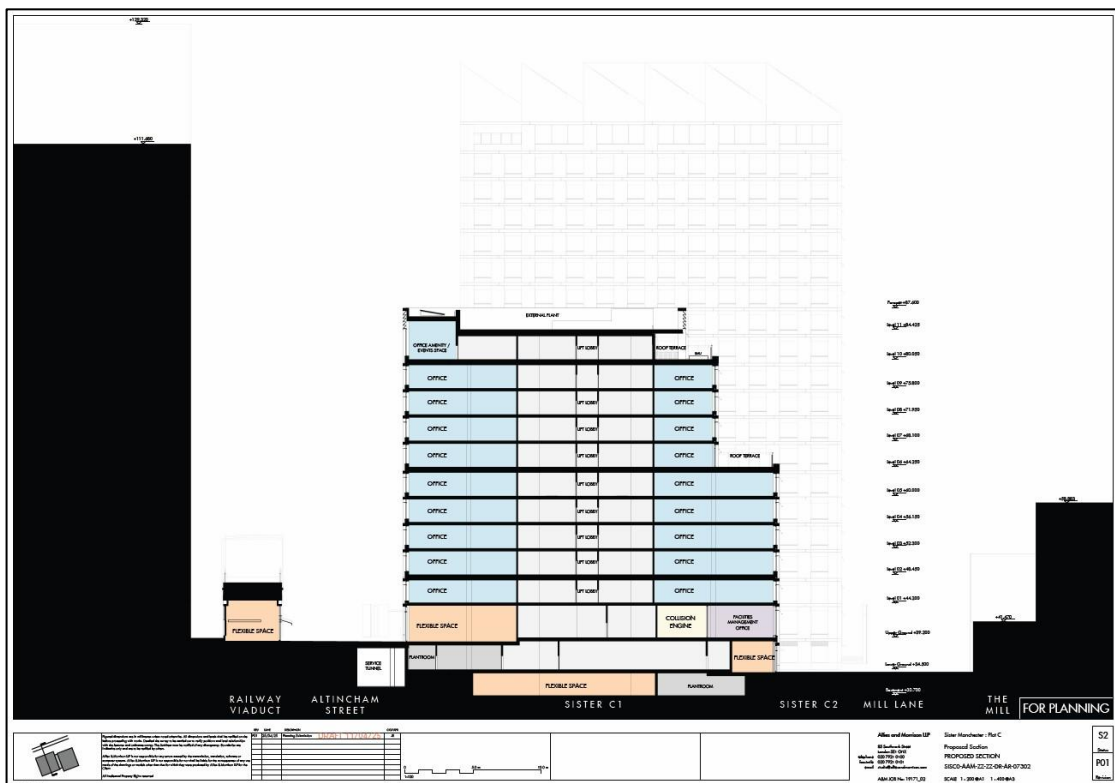


Figure 3 Elevation diagram - C1



2 INTERFERENCE MECHANISMS

2.1 Satellite Television

It is understood that satellite television services in the UK are predominantly provided by Astra satellites, which is a group of geostationary satellites at longitudes between 19.2 degrees and 31.5 degrees. Satellite dishes are typically mounted externally with a vertical elevation angle that varies based on latitude. In the UK, elevation angles are typically around 21 to 27 degrees².

2.2 Obstruction of the Signal – Television Services

This is caused by the building physically blocking the transmitted signal, reducing the strength of the carrier signal in the shadow of the building. For satellite television reception, all interference areas are north of an obstruction in the northern hemisphere. The following is true for satellite television signals:

- The highest losses (greatest interference) will be located immediately behind the building relative to the transmitter or satellite i.e. in the shadow zone;
- Losses near the edge of the shadow zone will be less significant due to diffraction effects (bending of the signal);
- Some tolerance is built into receiving equipment, and it is possible that a satellite signal may still be maintained even if line of sight were blocked.

2.3 Satellite Television Interference

The principle of shadowing (diffraction) is applicable to satellite transmissions. Signals from a satellite tend to come from a much steeper angle than those from a terrestrial transmitter, however receivers that are located in close proximity to an obstruction could still be affected. The Ofcom guidance³ states:

'Satellite TV reception is not generally affected by new structures unless the development blocks the 'line-of-sight' between a dish antenna and the satellite in the sky. While terrestrial TV aerials are generally mounted to receive signals in line with the horizon, and are therefore liable to be blocked by taller structures, satellite signals are received from a much higher elevation. This means that disruption to satellite reception is usually limited only to cases where a tall building is erected very close to an existing building.'

Figure 5 on the following page, taken from the Ofcom guidance, shows an example of a receptor that is in the shadow zone for a terrestrial transmitter but outside the shadow zone for a satellite.

² <https://www.hitch-n-pitch.co.uk/dish-alignment-for-sky-digital/>

³ Source: Ofcom (2009): Tall Structures and their impact on broadcast and other wireless services.

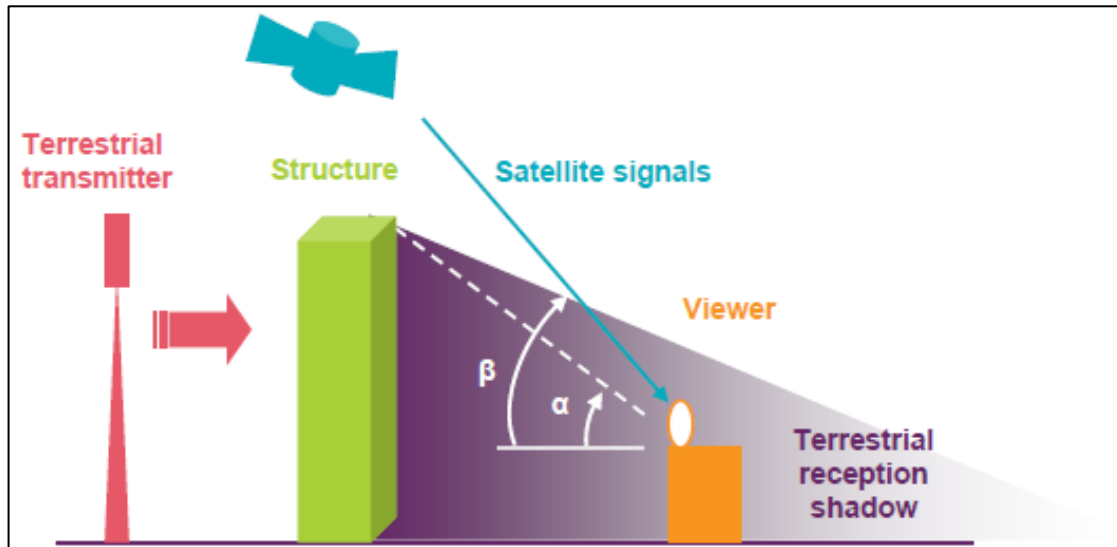


Figure 5 Satellite reception not affected by a new structure

The dimensions of the shadow zone for a satellite are dependent on:

- The relative height of the satellite dish and the building.
- The vertical angle from the satellite dish to the satellite itself – this is assumed to be 25 degrees.

3 SATELLITE TELEVISION TECHNICAL ASSESSMENT

3.1 Shadow Zones

Shadow zones have been modelled for five satellite locations, based on the longitude of the main ASTRA satellites.

These zones have been constructed based on a maximum development height of 84.55 above ground level across the entire development area. Note that the tallest part of the development will not encompass the whole area, therefore the shadow zones may in practice not extend as far as the model shows and are therefore conservative. An assumed dish height of 5 metres above ground level has been used considering a conservative review of the buildings in the development's immediate shadow (within 100-200m).

Figures 6 and 7 below and on the following page shows the individual shadow zones for five commonly used satellites and their positions, for buildings C1 and C2 respectively.

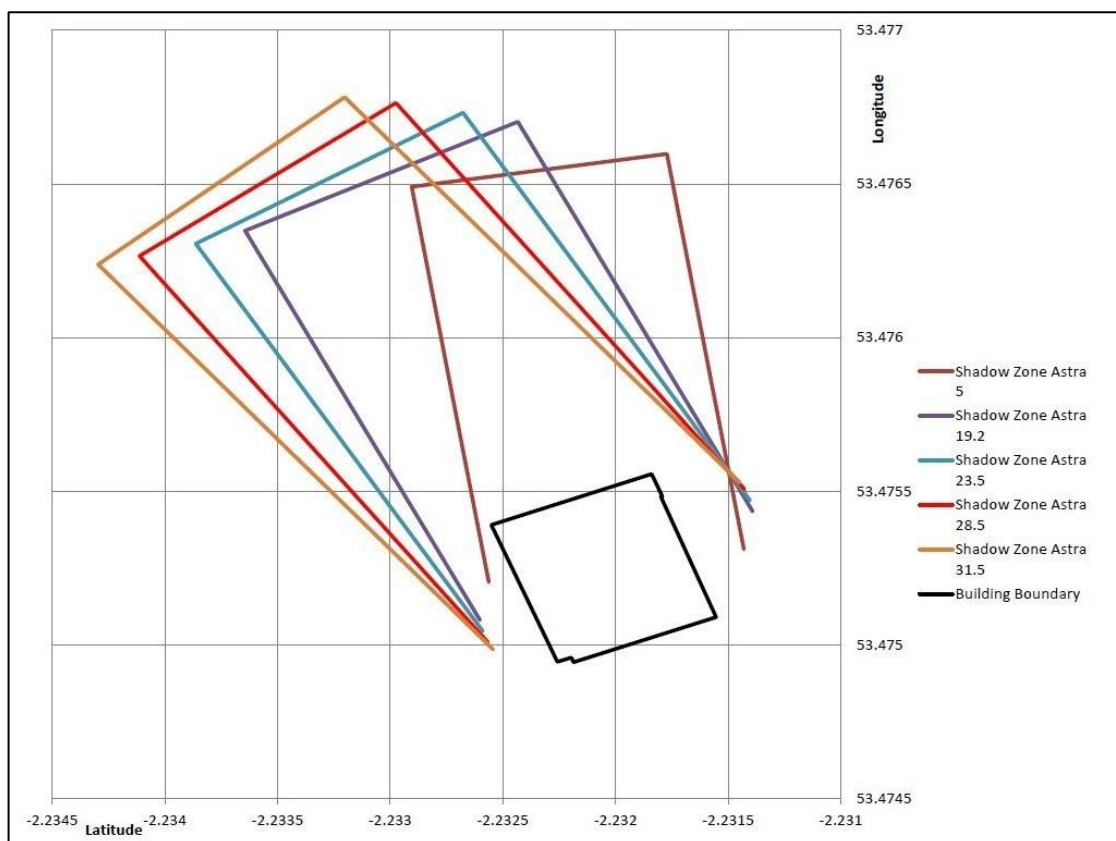


Figure 6 Satellite television interference zones – Building C1

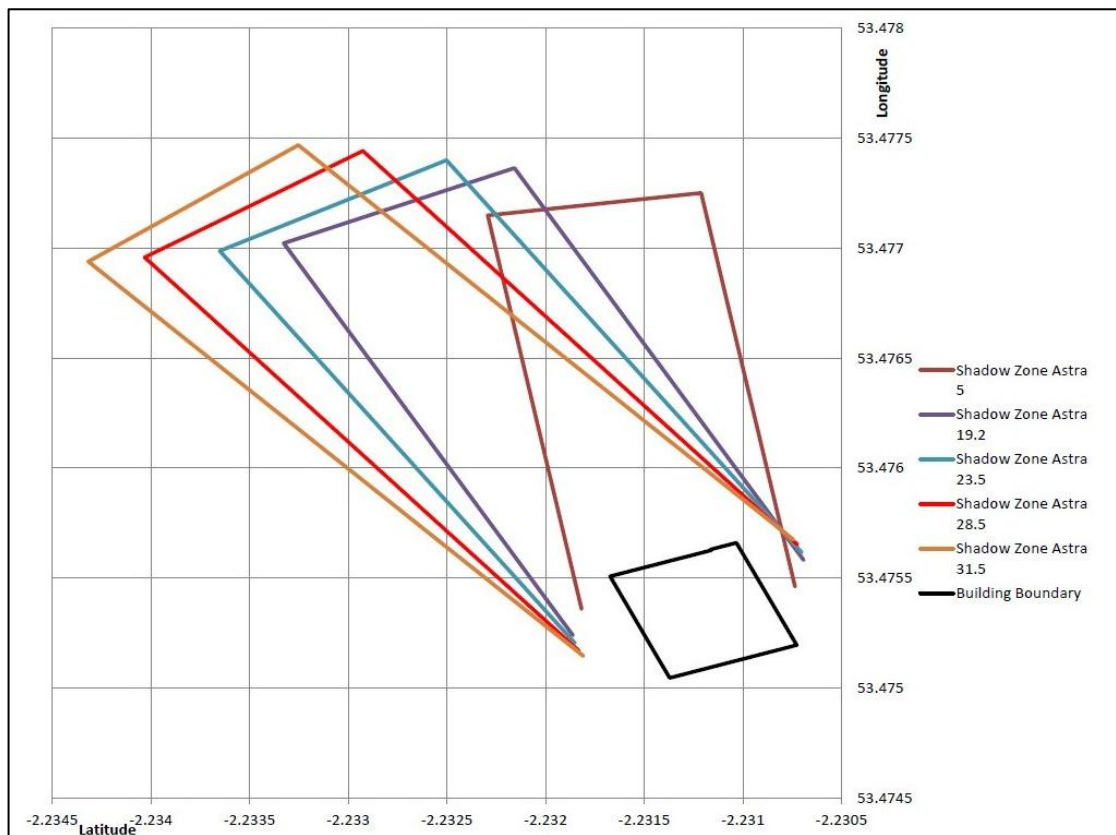


Figure 7 Satellite television interference zones – Building C2

Figure 8 below shows the combined satellite shadow zones overlaid onto aerial imagery.

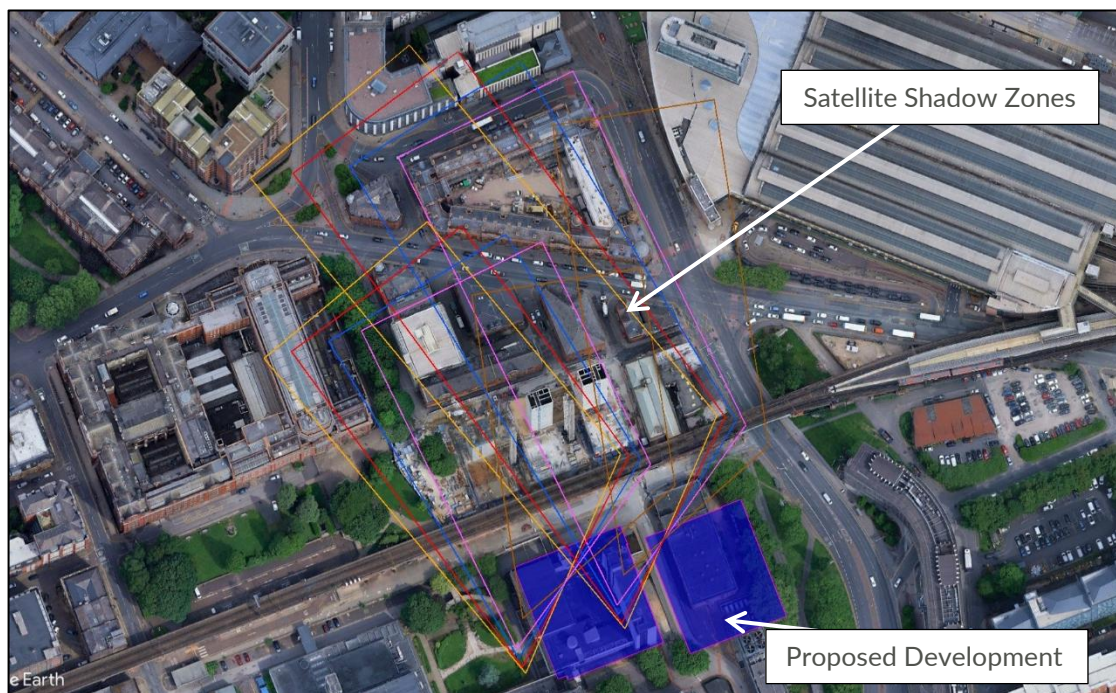


Figure 8 Satellite television interference zones (aerial image)

Figure 9 below shows the combined satellite shadow zone overlaid onto a 3D aerial image.

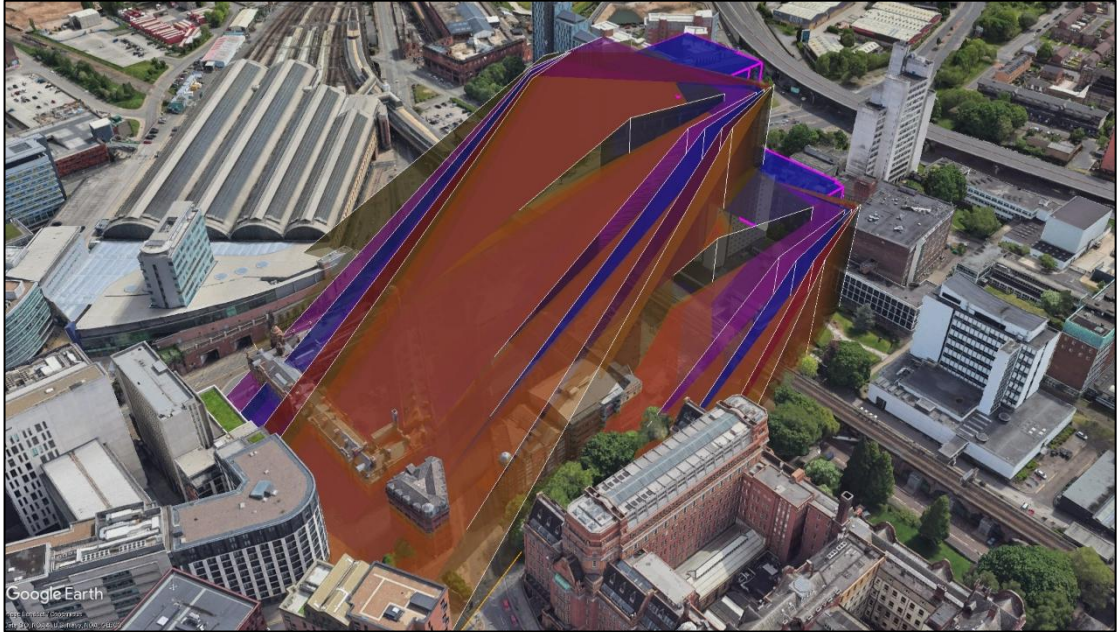


Figure 9 3D Satellite television interference zones (aerial image)

The assessment has considered the maximum lateral and vertical extent of the sum of the zones.

3.1 Key Considerations

The following considerations are made when determining the impacts upon a building located within the shadow zone;

- Usage (commercial and residential) – Residential amenity from the use of satellite television is expected to be likely within a residential building. Within commercial buildings, residential amenity is not a primary consideration. As such, greater weight is provided for satellite dishes observed upon residential buildings;
- Whether the roof is vertically within the shadow zone – if a roof extends above the 3D shadow zone, any satellite dishes located upon the rooftop would not be predicted to receive interference;
- The number of observed dishes – buildings without existing dishes are not able to receive interference. The number of dishes observed can inform the potential cost of mitigation, the greater the number of dishes the highly the potential cost;
- Existing developments – where tall buildings exist south of a dish, and between the dish and the proposed development; an observed dish may be shadowed already and thus interference is not predicted to attributable to the proposed development.

An expert assessment of the likelihood of significant interference as a result of the proposed development is made upon the considerations presented.

3.2 Identified Buildings

Fifteen buildings have been identified within the shadow zone of the proposed development and have been considered for potential interference. Figure 10 below shows the identified buildings within the maximum lateral extent of the shadow zones (in green).

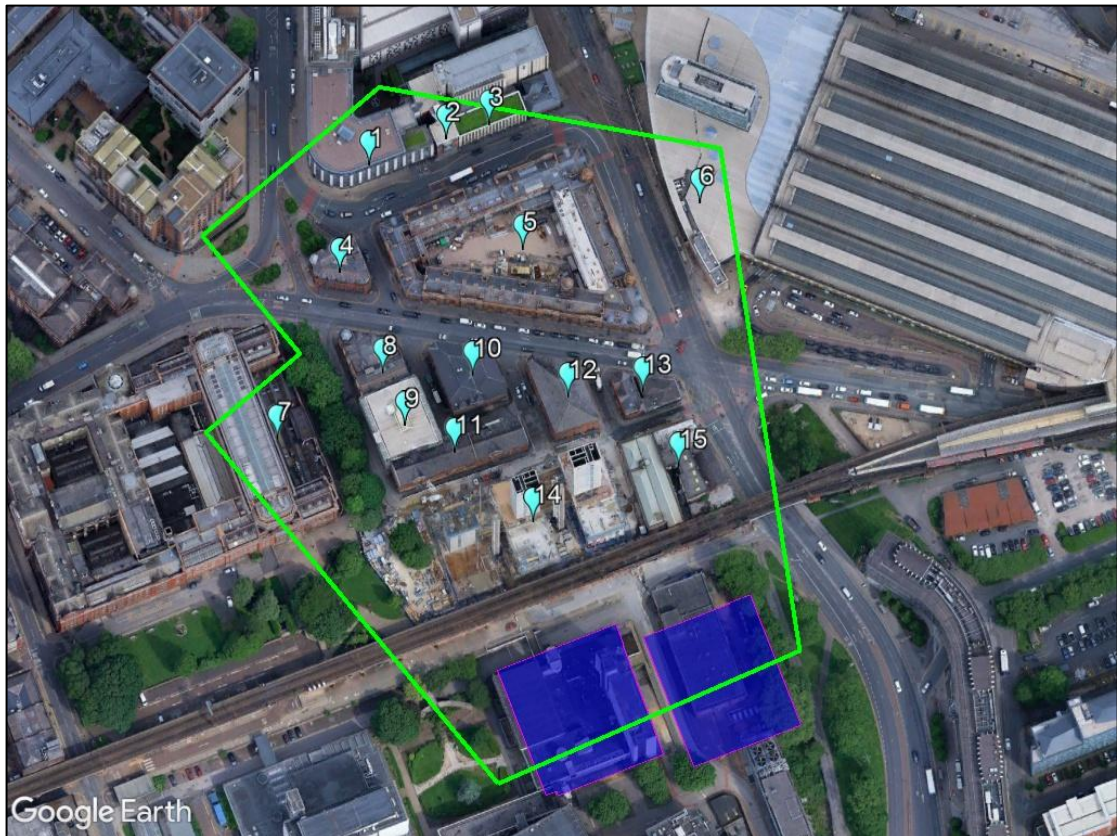


Figure 10 Buildings identified within the shadow zones

Table 1 on the following page presents details on the buildings and the impact prediction based upon the building heights, uses, and available imagery.

Number	Building name	Commercial / Residential	Whether roof extends above the shadow zone	Dishes observed	Predicted likelihood of interference
1	Colony Picadilly	Commercial (Office)	The entire roof extends above the shadow zone	None	Low
2	14-16 Whitworth St.	Residential (Apartments)	The entire roof extends above the shadow zone	None	Low
3	Motel One Picadilly	Commercial (Hotel)	The entire roof extends above the shadow zone	None	Low
4	IQ Hollingworth House	Residential (Student Accommodation)	The entire roof extends above the shadow zone	None	Low
5	Coroner's Court	Commercial (Courthouse)	The building's roof is expected to be vertically within the shadow zone	None	Low
6	Piccadilly Railway Station	Commercial (Railway Station)	A high proportion of the building's roof is expected to extend above the shadow zone	None	Low
7	Sackville St. Building	Commercial (University Department)	The entire roof extends above the shadow zone	None	Low

Number	Building name	Commercial / Residential	Whether roof extends above the shadow zone	Dishes observed	Predicted likelihood of interference
8	Cedar House	Residential (Apartments)	The building's roof is expected to be vertically within the shadow zone	None	Low
9	Stonebridge House	Residential (Apartments)	The building's roof is expected to be vertically within the shadow zone	One	Low
10	Fletcher House	Residential (Student Accommodation)	The building's roof is expected to be vertically within the shadow zone	None	Low
11	Lambert House	Residential (Student Accommodation)	The building's roof is expected to be vertically within the shadow zone	Two	Low
12	Fairfield Hall	Residential (Student Accommodation)	The building's roof is expected to be vertically within the shadow zone	One	Low
13	Rahman Hostle & Bulls Head Hotel	Commercial (Hotel)	The building's roof is expected to be vertically within the shadow zone	One	Moderate

Number	Building name	Commercial / Residential	Whether roof extends above the shadow zone	Dishes observed	Predicted likelihood of interference
14	Echo Street, IQ Student Accommodation	Residential (Student Accommodation)	The roofs of the taller towers are predicted to extend above the shadow zone. Lower rise tower sections are predicted to be vertically within the shadow zone.	N/A ⁴	Low
15	Capcis House & Brain Bridge House	Residential (Assumed ⁵)	The building's roof is expected to be vertically within the shadow zone	None	Low

Table 1 Predicted impacts upon identified buildings

3.3 Desk-Based Review of Available Imagery

Figures 11 to 14 on the following pages present Google Streetview imagery of the identified satellite dishes.

⁴ This building is currently under construction and thus a review of existing dishes cannot be made.

⁵ The use of this building cannot be reliably determined. As residential use cannot be reliably ruled out, and as part of conservative approach, it is assumed at least part of the building is used for residential purposes.



Figure 11 Streetview imagery of observed satellite dish upon Building 9



Figure 12 Streetview imagery of observed satellite dishes upon Building 11



Figure 13 Streetview imagery of observed satellite dish upon Building 12



Figure 14 Streetview imagery of observed satellite dish upon Building 13

3.4 Results Discussion

For buildings 1 to 8, 10, and 15, the rooftop extends above the predicted shadow zone and/or no satellite dishes have been observed upon the building. Where no satellite dishes are present, no impact is predicted. Satellite dishes may exist on rooftops which cannot be observed from a ground-based observer. As such, a low likelihood of interference is predicted with respect to these buildings.

For buildings 9, 11, and 12, satellite dishes have been observed within the predicted shadow zone of the proposed development. However, the consented⁶ and under construction “Echo Street, IQ student accommodation” (building 14) is located directly north of the proposed development and is predicted to obstruct line of sight from the dishes to the proposed development. As such, interference as a result of the proposed development is not predicted.

For building 13, one satellite dish has been observed within the shadow zone. Interference effects are considered possible. If interference from the proposed development is reported post-construction, it is recommended to be investigated⁷ and suitably mitigated if found to be attributable to the proposed development. Raising the height of the dish may not be suitable for this building as the entire rooftop is vertically within the shadow zone.

For building 14 is under construction and thus a review of existing satellite dishes is not possible. From a review of materials available via the planning portal⁶, the rooftops of the taller towers are predicted to extend above the shadow zone, where dishes would not be predicted to receive interference. As such, a low likelihood of interference is predicted with respect to these buildings.

Considering the above, no significant impacts are predicted upon satellite television reception at 14 of the assessed buildings. The potential for interference upon one building (building 13) cannot be reliably ruled out. If any report of interference is received from these buildings, it should be investigated. Pre-emptive mitigation is not recommended.

⁶ Planning reference: 136874/FO/2023

⁷ This may entail a local satellite engineer undertaking a survey and providing input on an appropriate solution.

4 MITIGATION

4.1 Mitigation Requirement

If an adverse effect on satellite television services occurs and is attributable to the proposed development, mitigation may be required. Pre-emptive mitigation requirement has not been identified.

4.2 Satellite Television Mitigation Options

Below is a list of actions that can mitigate satellite television reception issues caused by building development:

- Increase the height of the receiving dish;
- Provision of cable television;
- Provision of a bespoke receiving solution e.g. a system to receive and re-distribute the satellite television signal.

4.3 Recommended Options

If effects are experienced for dwellings with poor quality or low receiving aerials/dishes, the best option may be to upgrade and/or elevate the existing aerial/dish.

It may also be possible for television services to be supplied by an alternate transmitter in the surrounding area.

4.4 Recommended Process

It is possible that no adverse effects will occur due to the existing buildings and their use type in the shadow zone of the proposed development.

It is therefore recommended to investigate any reports of interference in order to determine whether these are attributable to the proposed development. If this is found to be the case, mitigation can be applied.

5 CONCLUSIONS

5.1 Assessment Conclusions

The overall conclusions for satellite television transmissions are:

- The modelled shadow zone for satellite television services is limited to 230m northwest of the proposed development's location;
- The shadow zone covers buildings along Fairfield Street, Whitworth Street, Cobourg Street, and Granby Row. 15 buildings have been identified for assessment and are understood to be a mix of residential and commercial;
- No significant impacts are predicted as a result of the proposed development upon 14 of the assessed buildings due to a combination of the following:
 - A lack of observed satellite dishes;
 - Rooftops extending above the 3D shadow zone;
 - The predicted usage of the building; and
 - The presence of other tall building developments predicted to shadow existing dishes.
- The potential for impacts upon one building (building 13) cannot be reliably ruled out. If any report of interference is received from these buildings, it should be investigated.

5.2 Recommendations

Any reported television interference should be investigated to analyse if interference is attributable to the proposed development. This may be carried out in coordination with a local satellite engineer to survey the existing dish. The investigation can then be considered to determine whether the effect is attributable to the development.

5.3 Mitigation

No requirement for pre-emptive mitigation has been identified.

Technical mitigation solutions (outlined in Section 4) could be implemented in the event that a significant impact occurs.

APPENDIX A – COORDINATE DATA

Assessed Building Points

Buildings C1 and C2 have a maximum height above ground of 53.1m and 84.55m respectively. The coordinates outlining the assessed buildings are given below.

No.	Longitude (°)	Latitude (°)	No.	Longitude (°)	Latitude (°)
1	-2.23255	53.47539	6	-2.23179	53.47547
2	-2.23226	53.47494	7	-2.23180	53.47548
3	-2.23220	53.47496	8	-2.23179	53.47548
4	-2.23219	53.47494	9	-2.23184	53.47556
5	-2.23155	53.47509			

Building coordinate points – C1

No.	Longitude (°)	Latitude (°)	No.	Longitude (°)	Latitude (°)
1	-2.23142	53.47512	5	-2.23116	53.47563
2	-2.23137	53.47505	6	-2.23116	53.47563
3	-2.23073	53.47519	7	-2.23167	53.47551
4	-2.23103	53.47566	8	-2.23166	53.47550

Building coordinate points – C2



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