PAGERPOWER
Urban & Renewables

Telecommunications Impact Assessment

Great Northern

GNW Developments Limited

November 2022







PLANNING SOLUTIONS FOR:

- Solar
- Telecoms
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- Radar
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ADMINISTRATION PAGE

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Issue	Date	Detail of Changes
1	July 2022	Initial issue
2	November 2022	Second issue – minor amendments

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EXECUTIVE SUMMARY

Report Purpose

Pager Power has been commissioned to investigate the potential impact of a proposed building development upon wireless telecommunications infrastructure (point-to-point links) in the surrounding area.

The proposed development is located at Great Bridgewater Street, Manchester. The proposed development will introduce new tall structures into an already built-up environment. The structure could interact with wireless telecommunications infrastructure and cause interference.

This report presents the results of stakeholder consultation and an impact assessment of any identified telecommunications infrastructure.

Results

Arqiva, British Telecom (BT), the Joint Radio Company (JRC), MBNL, and Virgin Media O2, have confirmed that they do not operate any communication links within close vicinity of the proposed development and therefore have no objections to the proposed development.

Vodafone provided details of their communications infrastructure in the area. The subsequent analysis has shown that the proposed development is clear of the exclusion zones associated with the Vodafone link paths.

Atkins has passed on the request for link information onto United Utilities. Pager Power is awaiting a response to the request for communication link details.

Airwave is a company that safeguards fixed communication links for the emergency services and does not provide link details due to confidentiality reasons. Airwave does offer their own assessment for a fee. Pager Power is in the process of obtaining such an assessment.

Mitigation

Determining the most suitable mitigation option is only possible if a specific impact has been identified. In the case of the proposed development, thus far, mitigation is not expected to be a requirement.

An overview of possible mitigation strategies has been provided for reference (See Section 4).

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ABOUT PAGER POWER

Pager Power is a dedicated consultancy company based in Suffolk, UK. The company has undertaken projects in 54 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 upon wireless communications infrastructure (point-to-point links) in the surrounding area.

The proposed development will introduce new tall structures into the urban environment – these could interact with wireless radio signals and cause interference in the surrounding area. This report has assessed the potential impacts following consultation with the appropriate link operators.

The proposed development is located at Great Bridgewater Street, Manchester, and will comprise three tall building plots.

1.2 Proposed Development Site Plan

The proposed site layout plan for the tall building plots is shown in Figure 1[1] below.

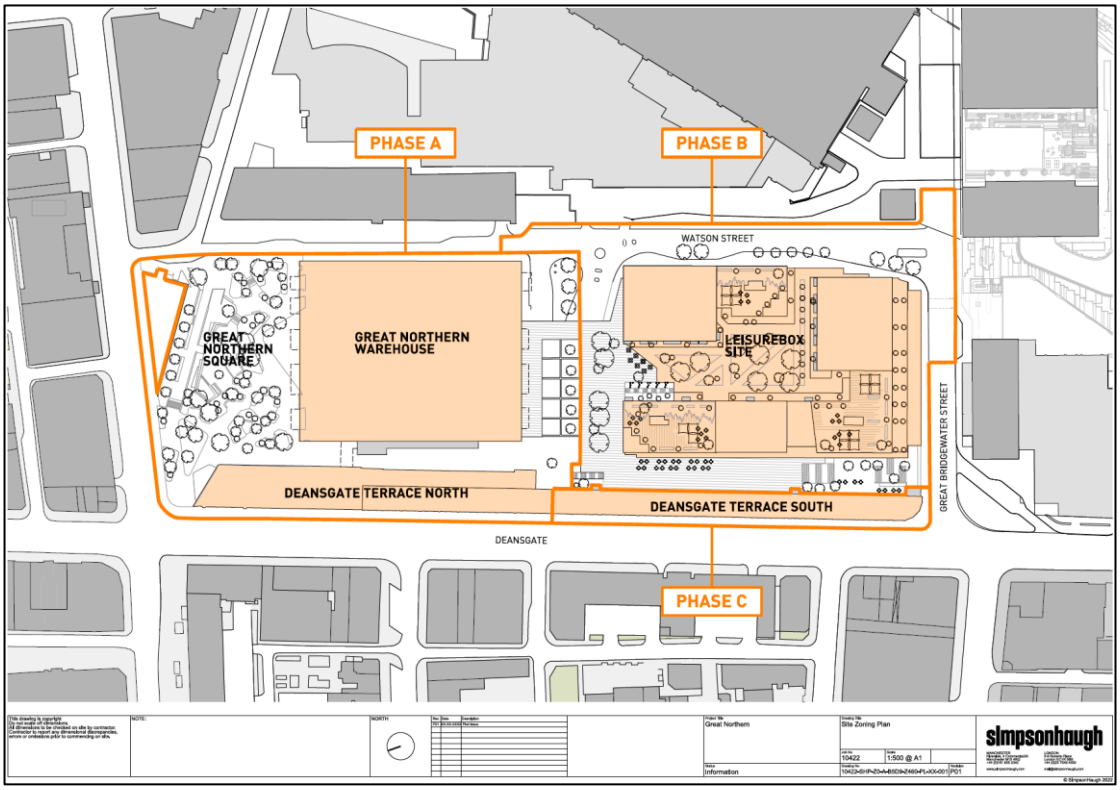


Figure 1 *Proposed development site plan*

[1] Source: GN Project Overview Crib Sheet 211022

1.3 Proposed Development Site Layout – Aerial Image

The approximate proposed development footprint overlaid on aerial imagery is shown in Figure 2 below. Building plot coordinates extrapolated from site drawings are presented in Appendix A.

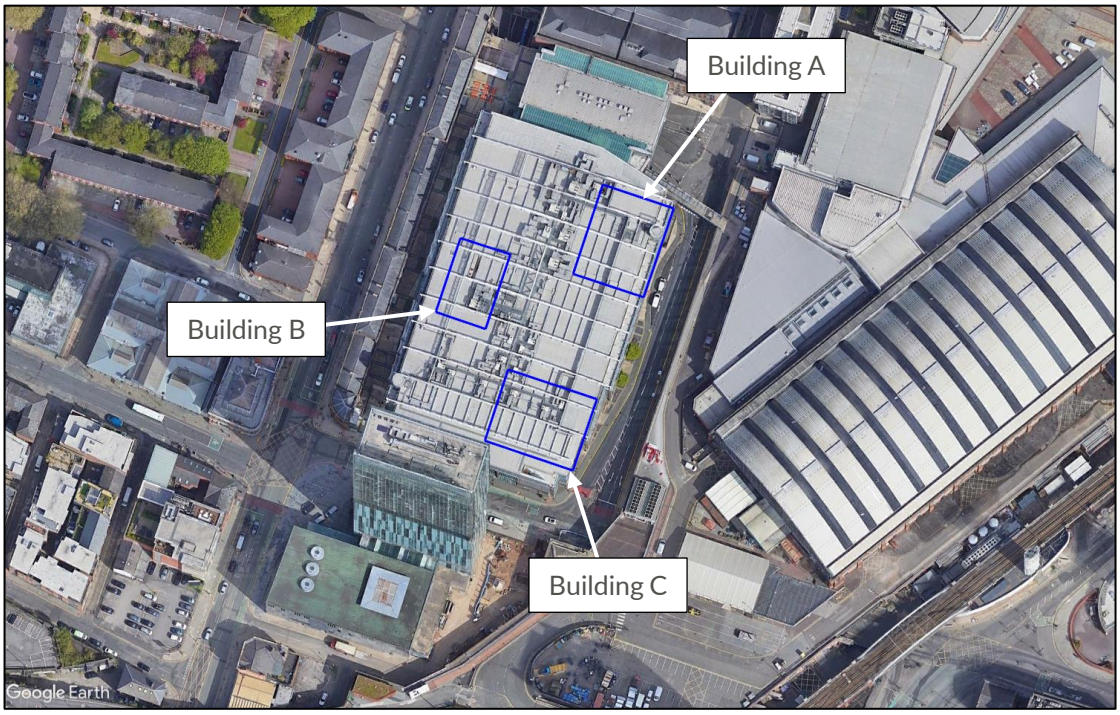


Figure 2 *Proposed development site layout (blue) – aerial image*

1.4 3D Building Representation

A 3D aerial image of the proposed development is shown in Figure 3 below.

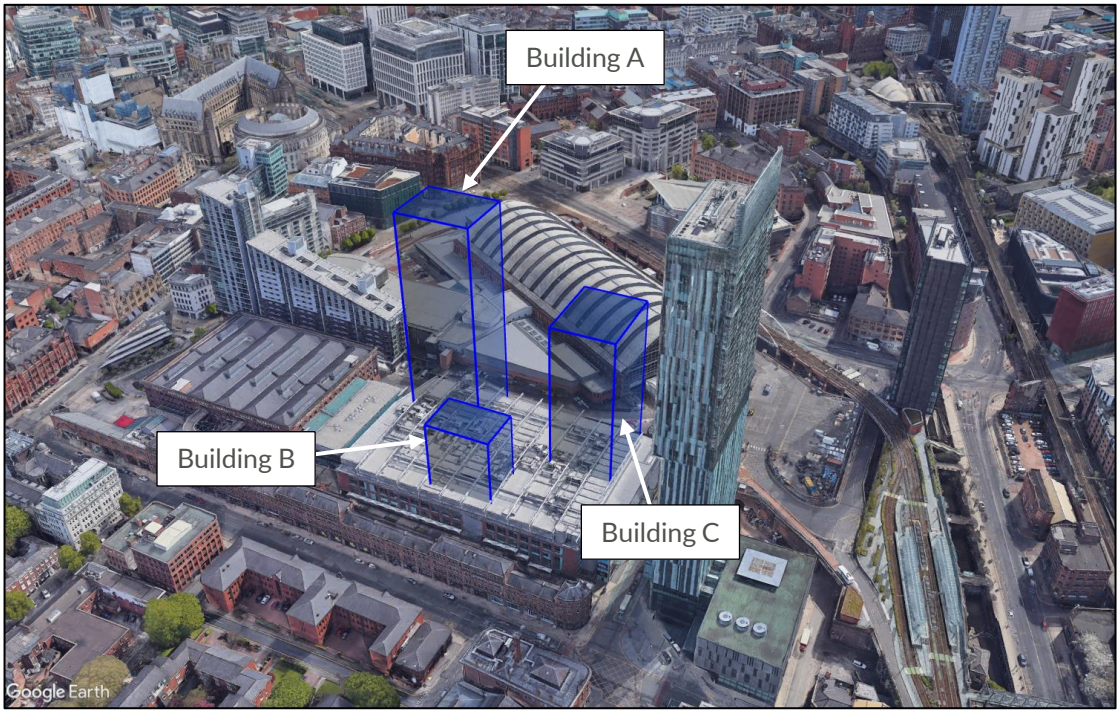


Figure 3 *3D building representation*

2 CONSULTATION

2.1 Overview

Pager Power has consulted wireless link operators to establish the most up to date wireless link network in the vicinity of the proposed development. Consultation was undertaken directly with the most prevalent operators[2] in order to obtain link details.

2.2 Consultation Overview

Table 1 below presents a summary of the consultation to date.

Party	Summary
Ofcom	Ofcom was not consulted as they are not currently responding to consultation requests.
Airwave (Motorola Solutions)	Airwave is a company that safeguards fixed communication links for the emergency services and does not provide link details due to confidentiality reasons. Airwave does offer their own assessment for a fee. Pager Power is in the process of obtaining such an assessment. 06/07/22 – Airwave assessment requested. 22/02/22 – Follow up message sent. 26/08/22 – Airwave request site and planning drawings with dimensions. **Awaiting details.**
Arqiva	06/07/22 – PP link request sent. 07/07/22 – Response received. **No objection.**
Atkins	06/07/22 – PP link request sent. 07/07/22 – Response received. Information has been passed on to United Utilities. 25/07/22 – Follow up message sent. 25/07/22 - United Utilities have forwarded the information on to the relevant internal team and Pager Power is awaiting a response. **Awaiting a response.**

[2] Based on Pager Power's experience and contacts database.

Party	Summary
British Telecom (BT)	06/07/22 – PP link request sent. 19/07/22 – Response received. **No objection.**
Joint Radio Company (JRC)	06/07/22 – PP link request sent. 18/07/22 – Response received. **No objection.**
MBNL[3]	06/07/22 – PP link request sent. 18/07/22 – Response received. **No objection.**
Virgin Media O2[4]	06/07/22 – PP link request sent. 07/07/22 – Response received. **No objection.**
Vodafone	06/07/22 – PP link request sent. 20/07/22 – Response received. **Link details provided.**

Table 1 *Telecommunications stakeholder consultation*

[3] Mobile Broadband Network Limited (MBNL) is a joint venture between Everything Everywhere (EE) and Three.
[4] Previously known as Telefonica.

3 TECHNICAL ASSESSMENT

3.1 Methodology

Microwave and UHF[5] wireless communication links are used to transmit information between two antennae via radio waves within a particular frequency band.

Obstructions sited between two link antennae can partially block the radio signal passing between them, thereby reducing the functionality of the link. This can occur even if the obstruction is in not directly between the antennae but close to the link boresight[6].

The exclusion zones associated with the identified links have been calculated based on the telecommunications data provided. Further 2-dimensionel clearance calculations have then been undertaken to determine the extent of any clearance or infringement of the proposed development. The following subsections present an overview of the interference mechanisms and methodology.

3.1.1 Fresnel Zones

A Fresnel Zone takes the form of an ellipsoid surrounding a link path and represents the area in which obstructions should not be sited in order to avoid diffraction losses. The width of the zone at any point along the link path is determined by the Fresnel Zone number, the frequency of the link and the distance from each link end. The width of the zone is maximal at the midpoint of the link path.

3.1.2 Diffraction – Microwave and UHF Links

Obstructions such as building developments which are sited in between two microwave link antennae can partially block the radio signal passing between them, thereby reducing the functionality of the link. This can occur even if the obstruction is not directly between the antennae but close to the link boresight. This kind of blocking is called 'diffraction'.

There are various approaches to safeguarding microwave links against from obstruction via building developments. The most common approaches are:

1. Implementation of a fixed stand-off distance around the link boresight;
2. Safeguarding the relevant Fresnel Zone (discussed below).

The first approach is used by many operators who request a set buffer distance. Set stand offs are occasionally conservative and produce a large exclusion zone distance. The second approach is to assess an obstruction on a case by case basis to calculate the most accurate exclusion zone.

[5] Ultra-High Frequency
[6] This is the straight line between the two antennae.

Pager Power considers 60% of the First Fresnel zone[7] when considering the effect of a static obstruction upon microwave and UHF links[8].

3.1.3 Reflections – UHF Links

Obstructions can affect UHF links by reflecting the signal between transmitter and receiver. This is not a significant concern for microwave links because they are highly directional. Reflection effects are unlikely to be significant because the link paths are already operating in a built-up area surrounded by many buildings. Diffraction effects are likely to be the most significant concern.

3.2 Identified Telecommunication Links

Table 2 below presents the details of the identified communications links.

Operator	Type	Link ID / Ref	Frequency	A End	B End
Vodafone	Microwave	0970238/1	23 GHz	380400E 395100N	384270E 398190N

Table 2 *Identified telecommunications links*

[7] 0.6th Fresnel zone for JRC links

[8] Manning, T. (1999), Microwave Radio Transmission Design Guide, Artech House Books

3.3 Microwave Link Exclusion Zone Chart

Figure 4 below shows the identified link path exclusion zone – which is shown by two lines, marking the edges of 60% of the First Fresnel zone plus an additional 10 metre buffer applied to allow for uncertainties in the coordinate data. The results of the 2D analysis confirm that all corners of the building plots are clear of the exclusion zones associated with the Vodafone links.

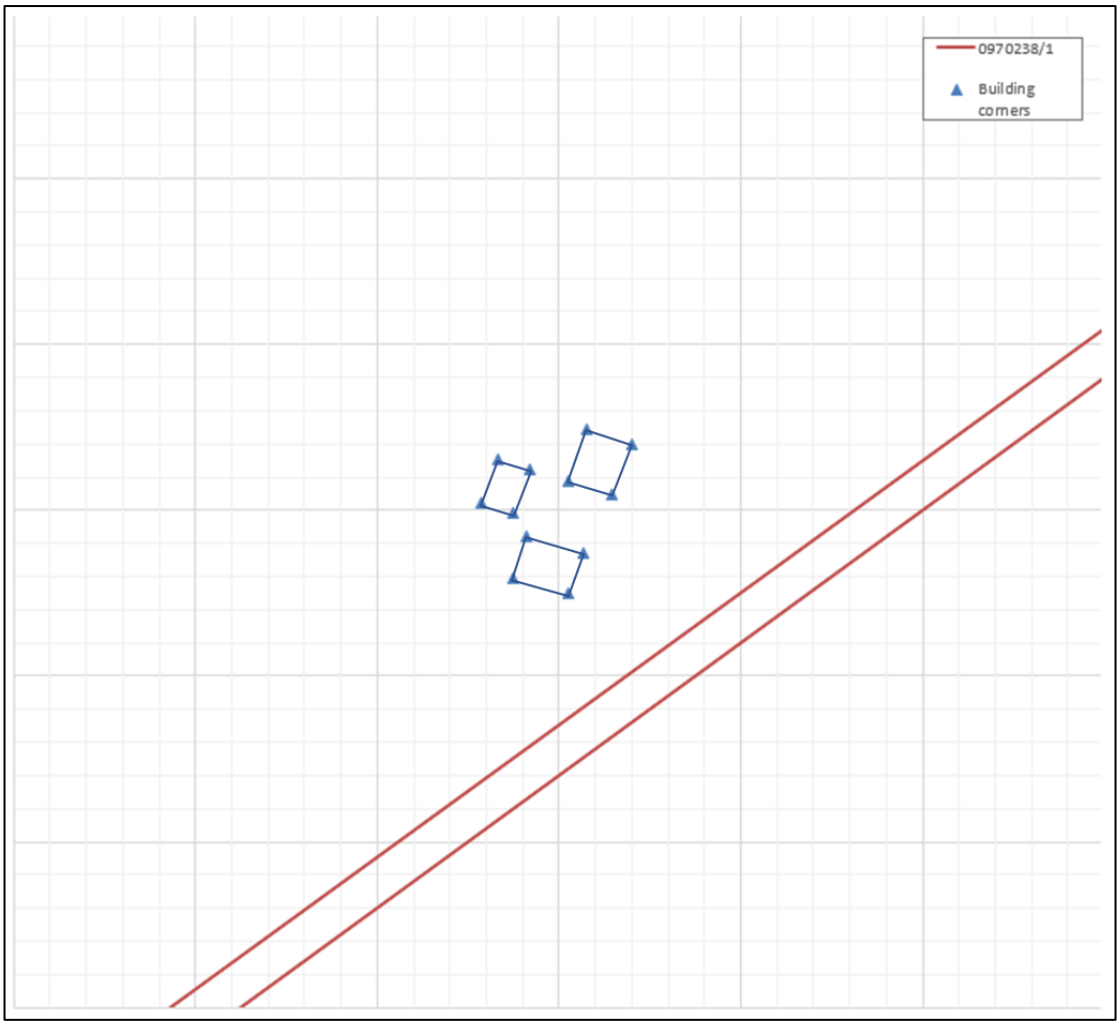


Figure 4 *Vodafone link path exclusion zone and building corners*

4 MITIGATION

4.1 Mitigation Requirement

In the case of the proposed development, thus far, mitigation is not expected to be a requirement. A high-level overview of the most common mitigation options is presented in this section for reference purposes.

4.2 Mitigation Options

The options below should be considered in the event that a potential impact is identified.

4.2.1 Re-networking the link

This is a solution whereby the link path is diverted via an additional mast so that it avoids the building development. The requirement for this solution is a suitably located telecommunications mast that has radio line of sight to both existing link ends. Ideally, the additional site would be a telecommunications mast already owned / utilised by the affected link operator.

4.2.2 Increasing the antenna height

This is a solution whereby the link path is diverted via an additional mast so that it avoids or reduces infringement from the new obstruction. The suitability of this solution depends on the level of link infringement in three dimensions.

4.2.3 Use of an alternative technology

This is a solution whereby the microwave link is replaced with an alternative that is not affected by the new building. The most common options are:

- A leased line (copper cable).
- A satellite link.
- A fibre-optic connection.
- UHF Telemetry.

5 CONCLUSIONS

5.1 Overall Results

Arqiva, British Telecom (BT), the Joint Radio Company (JRC), MBNL, and Virgin Media O2, have confirmed that they do not operate any communication links within close vicinity of the proposed development and therefore have no objections to the proposed development.

Vodafone provided details of their communications infrastructure in the area. The subsequent analysis has shown that the proposed development is clear of the exclusion zones associated with the Vodafone link paths.

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5.2 Mitigation

Determining the most suitable mitigation option is only possible if a specific impact has been identified. In the case of the proposed development, thus far, mitigation is not expected to be a requirement.

An overview of possible mitigation strategies has been provided for reference.

APPENDIX A – COORDINATE DATA

Building Plot 1

Boundary Point	Longitude (decimal degrees)	Latitude (decimal degrees)
1	-2.24899	53.47654
2	-2.24914	53.47626
3	-2.24951	53.47634
4	-2.24936	53.47661

Building Plot 2

Boundary Point	Longitude (decimal degrees)	Latitude (decimal degrees)
1	-2.24984	53.47640
2	-2.24997	53.47617
3	-2.25023	53.47622
4	-2.25010	53.47645

Building Plot 3

Boundary Point	Longitude (decimal degrees)	Latitude (decimal degrees)
1	-2.24939	53.47595
2	-2.24951	53.47572
3	-2.24998	53.47582
4	-2.24985	53.47604

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