

Northern Gateway (JPA1.1)

Outline Planning Application

Television & Radio Reception Outline Planning Statement



Television and Radio Reception Outline Planning Statement

Northern Gateway Development Vehicle LLP

Northern Gateway

February 2025

PLANNING SOLUTIONS FOR:

- Solar
- Telecoms
- Railways
- Defence
- Buildings
- Wind
- Airports
- Radar
- Mitigation

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1 INTRODUCTION

1.1 Purpose of this Document

This Planning Statement has been prepared on behalf of Northern Gateway Development Vehicle to accompany an application for outline planning permission for the proposed employment-led development named 'Northern Gateway', located across the boundary of Bury and Rochdale. The application is submitted in outline with all matters reserved. Therefore the layout of the proposed buildings is not yet known.

This document sets out the approach and the methodology for the assessment of Terrestrial Television and Radio signal strength and reception for building developments, and the potential mitigation solutions which could be employed in the event of television or radio interference being experienced and found attributable to the proposed development.

In the event that effects are reported (post-construction), it is recommended that a reception measurement is undertaken to investigate the likely cause of the interference. Mitigation measures should be installed if reported effects are found to be attributable to the proposed development. Solutions are likely to be readily available if required, the most common options are presented in Section 5. No requirement for pre-emptive mitigation has been identified.

1.2 Description of Development

The proposed development will comprise a mix of different uses; a breakdown of the currently planned usage is given below¹:

- Up to 600,000 sqm of Storage & Distribution (Use Class B8) and Industrial (Use Classes B2); and Research and Development/Light Industrial (Use Class E(g)(ii))
- Up to 5,000 sqm of supporting ancillary uses including Hotel (Use Class C1), Commercial, Business & Service (Uses Class E(a-g)), Education (Use Class F1(a)), Local Community (Use Class F2(a-c) and Sui Generis uses.

1.3 Proposed Development Site Plan and Location

The proposed development red-line boundary² is shown in Figure 1 on the following page. This has been overlaid onto aerial imagery on Figure 2 on the following page.

¹ Based on information received from Russell LDP in February 2025

² Source: NORM3018_Northern Gateway_Application Boundary.pdf

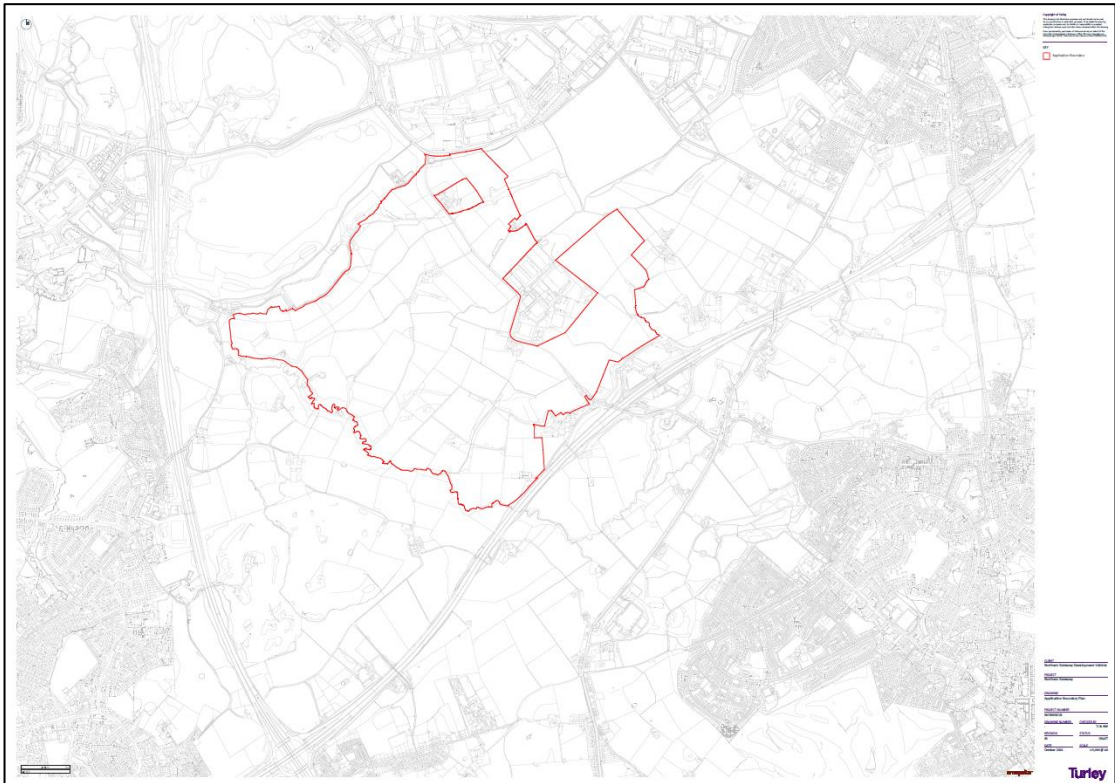


Figure 1 Proposed development site boundary (red)



Figure 2 Proposed development site boundary (red) – aerial image

2 TRANSMITTER DETAILS

2.1 Relevant Transmitter

Winter Hill is one of the UK's main television transmitters located approximately 18km northwest of the development. The Winter Hill transmitter is expected³ to serve the area around the development.

Digital television services are broadcast via Ultra High Frequency (UHF) signals; no analogue television signals are broadcast. The transmitter information is presented below⁴.

2.2 Winter Hill Main Transmitter

The main Winter Hill television transmissions are shown in Table 1 below.

	Public (PSB)			Commercial (COM)		
Service	BBC A	Digital 3&4	BBC B	SDN	Arqiva A	Arqiva B
Channel	32	34	35	29	31	37
Power	100 kilo-Watts (kW)					

Table 1 Winter Hill main transmissions

Additional local Winter Hill TV transmissions are shown in Table 2 below.

	Local Multiplexes	
Service	LTVmux	Glmux
Channel	24	27
Power	2 kW	1 kW

Table 2 Winter Hill additional transmissions

2.3 Radio Transmissions

Radio services in the UK are broadcast from a variety of main and local transmitters. Services are currently broadcast as both analogue and digital transmissions and in many cases are broadcast from television transmitter towers. Receivers are typically mobile or portable devices with omnidirectional aerials. The relevant transmitter is dependent on the receiver's exact position

³ Checked using a postcode contained within the red line boundary of the proposed development (OL10 2RE)

⁴ Source: Ofcom

and the radio channel that is being received. Therefore, radio signals tend to be more robust compared to television signals.

Radio transmissions from Winter Hill are shown in Table 3 below.

	Digital			FM
Service	SDL National	Digital One	BBC National DAB	Various Services
Frequency	216.65MHz	220.352MHz	225.648MHz	88.8 – 105.8MHz
Power	20kW	8.7kW	10kW	Max 4 kW

Table 3 *Winter Hill radio transmissions*

3 BUILDINGS AND INTERFERENCE MECHANISMS

3.1 Technical Overview

3.1.1 Television

Terrestrial television services are provided by means of UHF radio waves which propagate from transmitters to receiving aerials which then relay the signal to a television set.

The quality of the image and sound on a television set is dependent on both the strength of the signal received directly from the transmitter (carrier signal) and the strength of any interference signals from other sources.

To achieve good quality reception an aerial must receive a strong carrier signal but weak interference signals.

3.1.2 Radio

Radio services are also received from fixed transmitters, much like terrestrial television signals. However, radio services are typically available from numerous transmitters, particularly in a dense urban environment. Services can be digital or analogue.

The quality of the received signal is dependent on its strength and the level of interference, although radio services are typically more robust to interference than television signals.

3.2 Television Interference Mechanisms

There are two ways that buildings can cause interference to television reception, these are described in the following sub-sections.

3.2.1 Obstruction of the Signal

This is caused by the building physically blocking the transmitted television signal, reducing the strength of the carrier signal in the shadow of the building. In the case of Winter Hill transmissions, this would affect residences to the southwest of the proposed development. Specifically:

- The highest losses (greatest interference) will be located immediately behind the building.
- Losses near the edge of the shadow zone will be less significant due to diffraction effects (bending of the signal).

The Ofcom document states that:

"In general, there will be three 'zones' behind the structure:

Zone A - close behind the structure (typically a few tens of metres) there may be a large reduction in signal level with a possible complete loss of reception

Zone B - further away (typically a few hundred metres) the signal reduction is less severe and the shadow will be smaller as diffraction effects partially fill in the shadow. Depending on the size of the structure, some locations could still lose reception completely

Zone C - some distance away (1-5km) the shadow will effectively have disappeared.”

The zones mentioned are illustrated in Figure 3 below⁵, taken from Section 3.2 of an Ofcom paper⁶ regarding the impact of buildings on broadcast signals.

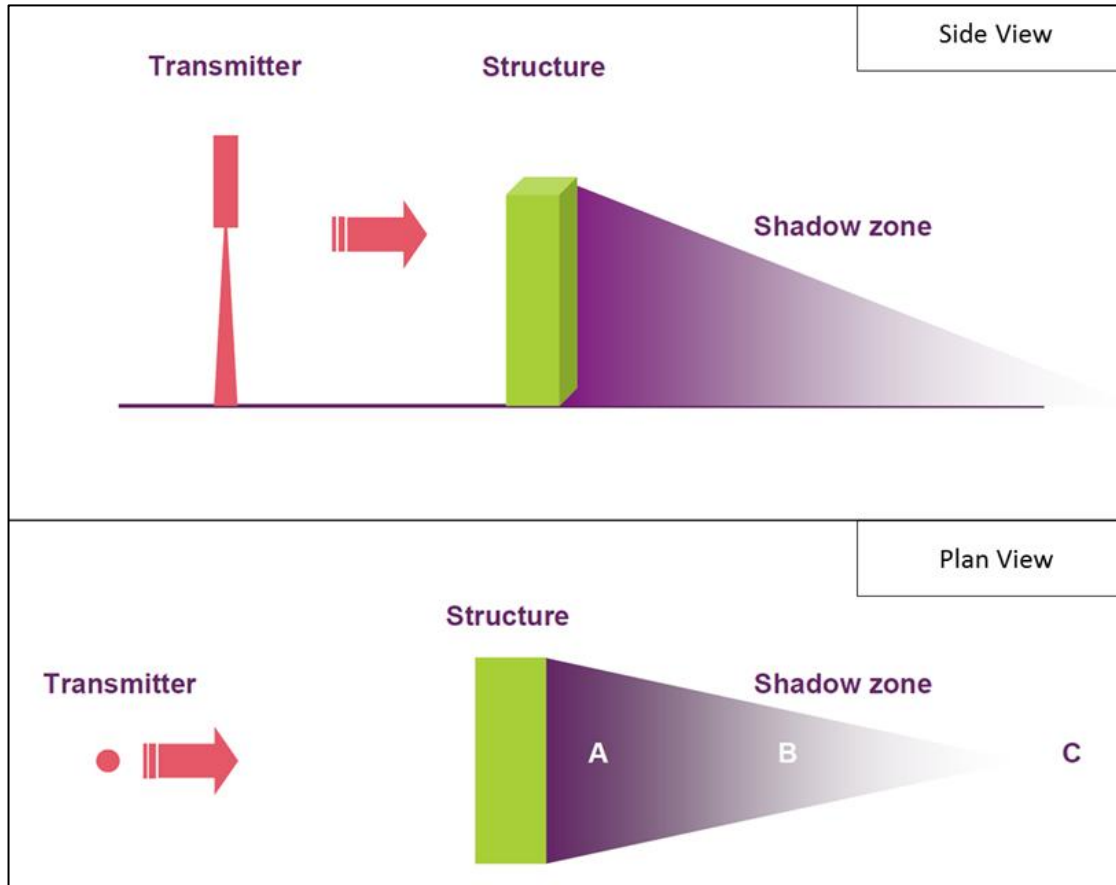


Figure 3 Diffraction loss zones

⁵ Source: Ofcom (2009): Tall Structures and their impact on broadcast and other wireless services.

⁶ Reference as above.

3.2.2 Reflection of the Signal

For large developments with straight edges, the transmitted signal can be reflected by the building itself. This causes an effect known as 'multipath interference' whereby the signal is received twice by an aerial at different times. The direct signal arrives first because it has a shorter distance to travel.

Figure 4 below (taken from Section 3.3 of the Ofcom document referenced above) illustrates this effect.

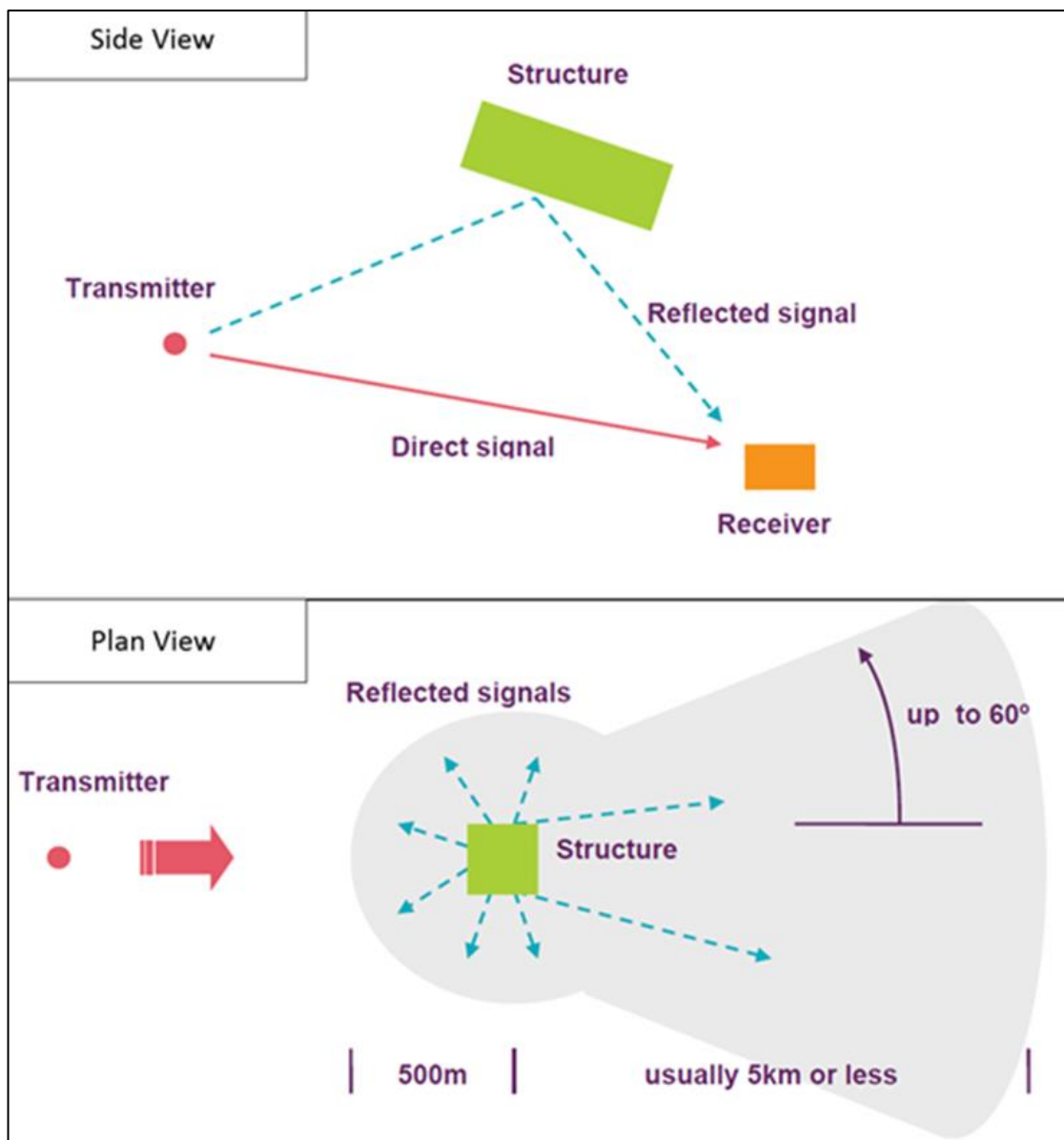


Figure 4 Reflection zones

In practice, it is considered highly unlikely that reflections will have an effect for receivers in front of the building or on either side when viewed from the location of the transmitter. For digital transmissions in particular, it is unlikely that issues will occur if the angle between the direct signal and the reflected signal is more than 30 degrees⁷.

The reflection zone will be constructed in accordance with the Ofcom approach, however the angle considered is 30 degrees rather than 60 degrees. This is in order to represent a more realistic scenario for digital transmissions.

Reflection issues are most likely to cause a noticeable impact if:

- The direct signal from transmitter to receiver is weak (e.g. obstructed by terrain or buildings).
- The reflected signal from the building is strong (e.g. clear radio line of sight from the transmitter to the building and the building to the receiver).

The worst-case scenario is for both of the above conditions to be satisfied. The best-case scenario is for neither of the above conditions to be satisfied.

3.3 Radio Interference Mechanisms

There is less specific guidance for radio interference within the Ofcom guidance. The following information is given:

Although reports of new structures causing problems to radio reception are rare, the possibility of difficulties cannot be ruled out entirely. Broadcast radio (FM, AM and DAB digital radio) are transmitted on lower frequencies than those used by terrestrial TV signals. Lower frequency signals tend to pass through obstructions more easily than the higher frequency TV signals, and diffraction effects also become more significant at lower frequencies. Both these factors will tend to lessen the impact of new structures on radio reception.

Strong signal reflections will reduce the quality of FM reception leading to fluttering noises or sound distortion. In contrast, the signal format used for DAB digital radio is designed to offer high levels of robustness in difficult conditions and it is not materially affected by reflections. FM and DAB reception can be affected where a structure blocks signals and both may cease to function if signals are reduced below a certain threshold.

It is Pager Power's experience that reported interference to radio services is significantly less common than reported interference to television services. Potential impacts on radio will nevertheless be considered within the analysis for completeness.

⁷ This is known to be the angle that Arqiva considers when safeguarding its Television Re-Broadcast Links with regard to reflections from wind turbines – whilst wind turbines cause issues that are different to buildings this particular issue is similar for the two.

4 TECHNICAL ASSESSMENT OVERVIEW

4.1 Overview of Environmental Impact Assessment (EIA) Sensitivity

Television and Radio Reception would be considered as a receptor of moderate sensitivity in EIA terms. This means that the receptor has moderate capacity to absorb change without significantly altering its present character, or is of high importance. The significance of an environmental impact is determined by the interaction of magnitude and sensitivity, whereby the impacts can be positive or negative.

It is generally the case that if adverse impacts to television and/or radio reception are experienced due to a new building, these could be mitigated using one or more of the solutions outlined in Section 5 of this report. The optimal solution would need to be assessed on a case-by-case basis. The process for investigating and dealing with TV interference is well-known and is frequently covered by a planning condition.

4.2 Potential Interference Areas

The shadow and reflection zones will be defined based on the geometry as set out in the previous section. Both zones extend to a distance of 5km beyond the proposed development location in accordance with the Ofcom guidance.

In the case of the shadow zone, this will be modelled as having straight sides in order to be conservative. In actuality, due to diffraction effects, the zone would have a more triangular shape as shown in Figure 3 in the previous section.

4.3 Potential Diffraction Issues – Terrestrial Television

The location of the Winter Hill transmitter relative to the location of the proposed development is shown in Figure 5 on the following page.

Urban areas closest to the proposed development are at the highest risk of experiencing television interference. The shadow zone will pass over urban areas to the south-east that contain residential properties and tall buildings, some of which appear to be blocks of flats.

The shadow zone will pass over some sections of non-residential areas, including commercial areas and green spaces. No diffraction issues are predicted in these areas as no television services will be required.



Figure 5 High-level overview of potential interference area – aerial image

4.4 Potential Reflection Issues – Terrestrial Television

Reflection effects are most likely if the transmitter does not have direct radio line of sight to the receiving aerial. The predicted coverage of the Winter Hill transmitter is generally good in the surrounding area. Interference due to reflections are most likely when:

- The receiving aerial is unobstructed by existing obstacles.
- The reflected signal path via the proposed development is unobstructed.
- The angle between the reflected signal via the proposed development and the direct signal is small.

Interference is most likely if all of the above criteria are met. Interference is least likely if none of the above criteria are met.

In practice it is unlikely that all of the above criteria would be met for the proposed development. In particular, locations that are below radio line of sight from the transmitter are unlikely to have an unobstructed path to the proposed development, due to their relative heights. Impacts due to reflections are considered unlikely.

4.5 Interference Areas – Radio Services

Due to the number of potential transmitters and the nature of most radio receivers (mobile), the potential interference areas are less well defined than for television services. In general terms, interference is more likely at small distances from the proposed development.

4.6 Overview of Baseline Survey Process

A baseline survey can be conducted to establish the current signal strength and quality in the area. The baseline survey serves three main purposes, these are:

1. It confirms which transmitter is serving most homes in the areas surveyed (for television).
2. It provides an indicator regarding the likelihood of interference. If current signals are of good quality, minor degradation is less likely to have a noticeable effect.
3. It allows a 'before and after' comparison to be made in the event that a complaint is received.

Locations would be selected considering potential residential areas within the building's shadow zone. Survey measurements are taken with a wideband UHF aerial connected to a television analyser to record the signal strength and stability. The strength of the recorded signals is categorised in accordance with Table 4 below.

Average Signal Strength (dB)	Subjective Signal Strength Definition
<35	Low
35-45	Moderate
45-55	Good
55+	Very Good

Table 4 Television signal strength categories

5 OVERVIEW OF MITIGATION OPTIONS

5.1 Mitigation Overview

If an adverse effect on television or radio services occurs and is attributable to the proposed development, mitigation may be required.

The most effective form of mitigation is dependent on the specific impact. Common options are shown below.

Mitigation options for terrestrial television include:

- Replacement of receiving aerial with a more directional or higher gain aerial.
- Repositioning the receiving aerial so that the received signal is stronger.
- Directing the receiving aerial to an alternative transmitter that covers the area and retuning the television accordingly.
- Upgrading antenna cabling and connections.
- Installation of signal amplifiers.
- Development of a bespoke local solution using a receiving aerial some distance from the dwelling.
- A combination of the above.
- Replacing terrestrial reception equipment with satellite reception equipment or cable.

Mitigation options for radio include:

- Re-tuning the radio.
- Relocation of the radio.
- Upgrading the aerial or the radio itself.
- Provision of an external aerial for receiving radio services.

5.2 Recommended Options

5.2.1 Terrestrial Television

If interference were to occur for a small number of dwellings it is likely that installation of satellite television receiver would be the most suitable option.

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

It is also possible that the television services could be supplied by an alternate transmitter in the surrounding area.

5.2.2 Radio

The most appropriate solution if radio services at residences are affected may be provision of a new radio or an external aerial.

REFERENCES

The following published works have been considered in the process of devising Pager Power's modelling approach:

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