

interference could occur. If interference does occur, easy to implement mitigation (discussed in Chapter 6) is likely to restore the reception of digital satellite television services for any impacted viewer.

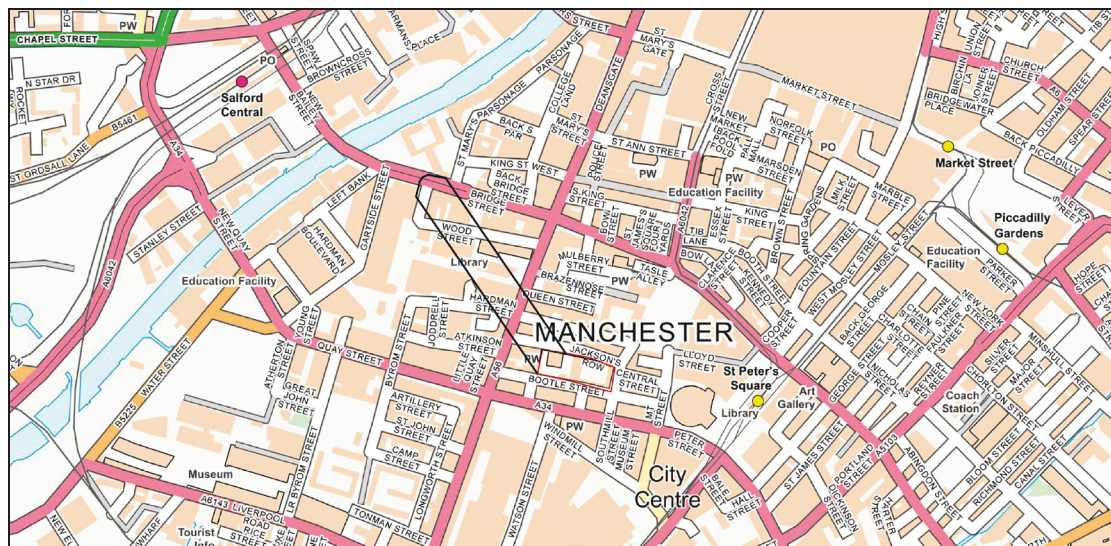


Figure 9 - Theoretical Digital Satellite Television Signal Shadow

Predicted Effects Considering Survey Findings

The predicted effects are discussed below and summarised in Table 1.

Digital Terrestrial Television - Freeview

Whilst widespread interference to DTT service reception is not expected, the Proposed Development could cause interference to properties adjacent to the Site (Bootle Street and beyond) receiving Winter Hill transmissions. Antenna betterment / repositioning should restore all services and is the simplest and most cost-effective mitigation solution. If this is required, it is advised that a registered antenna installer undertakes all required work. This mitigation solution is detailed in Chapter 6.

Digital Satellite Television - Freesat & Sky

The Proposed Development may cause interference issues for the reception of digital satellite television services in areas to the immediate northwest of the Site, up to 338m to the immediate northwest from the base of the Proposed Development. The use of tower cranes could also cause signal disruption in similar areas. Should satellite dishes be located in this area, repositioning satellite dishes to new locations where views of the south-eastern skies are no longer obscured should restore the reception of services for any affected user. If satellite dishes cannot be relocated out of any signal shadow zone, the use of DTT receiving equipment or TV via cable / fibre could also offer viewers alternative sources of broadcasts. If any antenna

work is required, it is advised that a registered antenna installer conducts all required work, as further detailed in Chapter 6.

Broadcast platform	Area(s) of predicted interference	Risk of interference & reasoning	Mitigation
DTT (Freeview)	Adjacent to the Site on Bootle Street and beyond	Possible interference	Antenna betterment (if interference occurs)
Digital Satellite TV (Freesat and Sky)	Up to 338m to the immediate northwest from the base of the proposed building	Possible, only if satellite dishes are located in the area and in use	Satellite dish relocation or the use of DTT receiving equipment. Alternatively, TV over broadband or fibre

Table 1 - Summary of Predicted Interference

Predicted Effects - Conclusions

Whilst widespread interference to DTT service reception is not expected, the Proposed Development could cause interference to properties adjacent to the Site (Bootle Street and beyond) receiving Winter Hill transmissions. Antenna betterment / repositioning should restore reception and is most simple and most cost-effective mitigation solution. If this is required, it is advised that a registered antenna installer undertakes all required work. This mitigation solution is detailed further in Chapter 6.

The Proposed Development may cause interference for the reception of digital satellite television services in areas to the immediate northwest of the Site, up to 338m to the immediate northwest from the base of the proposed building. The use of tower cranes could also cause signal disruption in similar areas. Should satellite dishes be located in this area, repositioning satellite dishes to new locations where views of the south-eastern skies are no longer obscured should restore the reception of services for any affected user. If satellite dishes cannot be relocated out of any signal shadow zone(s), the use of DTT receiving equipment or TV via cable / fibre could also offer viewers alternative sources of broadcasts. If any antenna work is required, it is advised that a registered antenna installer conducts all required work, as further detailed in Chapter 6.

6 - Mitigation Circumstances & Measures

For any affected Freeview viewers to the immediate southeast of the Site, the betterment of antennas is likely to restore good reception. Betterment of antenna systems could include the following;

- Replacement of components not fit for purpose (damaged, water ingress in cables / antennas, electrically faulty, old brown type coaxial etc.)
- Replacement or installation of a mast head amplifier and new antenna
- Replacement of old coaxial cable to better signal throughput and to reduce unwanted external electrical pickup
- Installation of a higher gain antenna
- Good earthing on antenna systems and associated components to help reduce unwanted electrical system noise and unwanted electrical pickup
- Installation of a higher antenna (above ground level) in a location as far away from the Site as possible i.e. on another chimney stack etc.

For any affected digital satellite television user located to the northwest of the Site (within 338m to the immediate northwest from the base of the proposed building), relocating satellite dishes to different locations where views to the southeast horizon are no longer obscured should restore the reception of digital satellite television services. Affected digital satellite television viewers could also use DTT reception equipment to restore services. Additionally, some satellite television broadcasts may now be available via broadband, fibre or cable.

These are common and simple mitigation solutions suggested for similar situations where local television reception conditions have been affected by adjacent construction work and new development. A registered installer should be able to advise on the most effective mitigation measures once the existing installed antenna system has been inspected and construction-generated interference has been identified.

It is recommended that all antenna work (antenna betterment, satellite dish moving, relocating etc.) is undertaken by a registered installer (Confederation of Aerial Industries (CAI) accredited³) and any system components used must be CAI benchmarked. More information regarding the CAI can be found on the following website⁴.

3 - <https://www.getmeviewing.org.uk/>

4 - <http://www.cai.org.uk/index.php>

The CAI's benchmarking scheme ensures that the cables and antennas have passed minimum requirements for the use of DTT and digital satellite television reception. The use on non-benchmarked products in an antenna system would degrade overall performance and effectiveness of the system, increasing the risk from interference. More information on CAI benchmarked products can be found on the CAI's website⁵.

It should be noted that because tower cranes are normally taller than the structure being built and tower cranes operate over a wide area, moving dishes to different locations may not resolve all reception issues. To reduce tower crane interference, it is advised that the crane jibs / arms are positioned in a northwesterly to southeasterly facing orientation at the end of crane lifting operations, hence reducing the overall cross-sectional area presented to the incoming satellite signals. This action reduces disruption because the signals come in at a bearing of 145 degrees with respect to true north (for Freesat and Sky digital satellite television services), and so encounter less of the crane's structure if parallel to the direction of the incoming satellite signals.

5 - <https://www.cai.org.uk/index.php/services/product-certification-scheme>

7 - Conclusions

A desktop study and reception survey have been performed to assess the possible effects and impacts on the reception of television broadcast services from the proposed Jackson's Row development. The study has focused on the reception of the two television broadcast platforms that could possibly be impacted by the Proposed Development - digital terrestrial television and digital satellite television services.

Digital Terrestrial Television (DTT) - Freeview

Whilst widespread interference to Freeview reception is not expected, the Proposed Development may cause reception degradation for properties immediately southeast of the Site on Bootle Street and beyond. If any interference occurs, simple and cost-effective antenna betterment should restore the reception of all DTT services. This is a standard and easy to adopt mitigation solution. If any antenna betterment is required, it is advised that a registered antenna installer undertakes the work.

Digital Satellite Television - Freesat & Sky

The use of tower cranes and the Proposed Development itself is likely to cause disruption to the reception of digital satellite television services in areas in the immediate northwest of the Site, within 338m to the immediate northwest from the base of the proposed building. Here, the use of tower cranes and the Proposed Development could obscure the receive dishes' views of the southern skies, resulting in interference. If this does occur, the repositioning of the signal receive dishes to locations without an obscured line of sight view to the serving satellites would restore all services. If this were not possible, the use of DTT receiving equipment would offer any affected viewer an alternative source of digital television broadcasts.

Overall, the use of tower cranes and the Proposed Development itself may cause disruption to the reception of DTT services to the immediate southeast of the Site and interference to the reception of digital satellite television services in areas to the immediate north and northwest of the Site's boundary, within 338m from the base of the Proposed Development. With respect to digital satellite television reception, in impacted areas the required clear views of the southeastern skies could be obscured, resulting in interference. If interference does occur, the repositioning of satellite dishes to new locations without an obscured line-of-sight view to the serving satellites should restore all services. If satellite dish relocations are not possible, the use of DTT receiving equipment would also offer any affected viewer an alternative source of digital television broadcasts. This assessment has been prepared to support the planning application submission.

APPENDIX

Television Transmission Frequencies

Signal Measurements

An Overview of Signal Measurements

Survey Equipment

Calculation of Received Field Strength

References

Mapping Data

Planning Policies - Regional and Local Planning Policies and Guidance

Television Transmission Frequencies⁶

Digital TV Multiplex	Multiplex Operator	UHF Channel Number ⁷	Channel Frequency Fc (MHz) ⁸	Transmitter Power (kW)
BBC A	BBC	32	562.00	100.0
D3&4	Digital 3 & 4	34	578.00	100.0
BBC B (HD)	BBC	35	586.00	100.0
SDN	SDN	29	538.00	100.0
Arqiva A	Arqiva	31	554.00	100.0
Arqiva B	Arqiva	37	602.00	100.0

Table A - Winter Hill Digital Terrestrial Television Services

Public Service Broadcaster (PSB) Digital Multiplexes
Commercial (COM) Digital Multiplexes

6 - Information correct at time of writing. Information provided by DigitalUK and Arqiva

7 - Digital multiplexes with a "+" or "-" sign operate with a frequency offset making the channel frequency + or - 167 kHz

8 - The nominal channel frequency, Fc (in Megahertz) of the multiplex can be calculated using $F_c = 8n + 306$, where 'n' is the UHF channel number

Signal Measurements

Measurement Point Number	Channel Frequency Service	32 562.00 BBC A	34 578.00 D3&4	35 586.00 BBC B	29 538.00 SDN	31 554.00 Arqiva A	37 602.00 Arqiva B
1	FS	83.0	87.8	84.1	85.4	87.2	84.6
	CSI	22.4	20.6	-	24.4	30.2	24.8
	MER	30.1	30.7	-	30.6	30.6	31.2
2	FS	84.2	91.4	91.7	89.4	84.2	90.9
	CSI	21.1	21.6	-	16.9	20.9	24.1
	MER	30.8	31.0	-	30.6	30.1	30.5
3	FS	83.2	84.3	84.6	86.0	81.5	83.9
	CSI	21.1	18.3	-	24.4	25.4	18.5
	MER	28.7	31.7	-	29.8	30.4	31.4
4	FS	87.5	78.0	82.9	83.1	86.1	77.9
	CSI	25.3	29.1	-	24.6	22.3	20.0
	MER	31.3	31.6	-	30.9	30.4	30.8
5	FS	85.8	79.6	89.7	86.4	85.0	78.4
	CSI	27.6	23.2	-	20.1	18.4	28.7
	MER	31.1	29.9	-	28.3	29.9	30.8
6	FS	82.3	84.6	84.3	82.0	86.3	79.0
	CSI	22.9	22.3	-	21.1	23.8	25.0
	MER	29.5	31.8	-	32.1	30.9	30.1
7	FS	78.0	86.2	81.7	88.1	87.1	84.8
	CSI	21.2	19.3	-	25.8	25.1	18.8
	MER	29.0	29.0	-	31.6	27.5	29.7
8	FS	87.4	86.1	88.1	89.8	86.8	86.0
	CSI	26.2	29.2	-	26.0	23.4	21.4
	MER	32.9	29.8	-	29.4	28.3	29.9
9	FS	84.4	81.5	82.8	82.4	83.2	84.2
	CSI	27.4	26.2	-	20.7	23.8	30.2
	MER	31.1	29.9	-	29.7	31.8	31.3
10	FS	85.2	78.2	89.8	82.4	82.3	85.5
	CSI	25.3	28.0	-	23.7	22.0	31.4
	MER	29.6	29.0	-	30.6	31.3	31.0
11	FS	83.9	76.0	80.2	80.6	82.3	81.3
	CSI	27.2	25.0	-	19.2	22.6	29.7
	MER	29.6	29.0	-	28.0	29.8	30.2
12	FS	85.0	76.3	87.1	82.3	77.0	84.1
	CSI	23.4	26.2	-	23.5	21.2	30.8
	MER	29.5	28.2	-	29.2	30.4	30.0

Table B - Winter Hill Digital Television Services

Frequencies listed are in MHz

Field strength (FS) values are indicated in dB μ V/m

CSI Channel Status Information (%)

MER Modulation Error Ratio (dB)

An Overview of Signal Measurements

The first and easiest parameter to check is signal level (also referred to as amplitude or terminated signal strength). In many cases this gives a good indication of the available decoding margin, or the extent of any shortfall.

At the receiver input, the terminated level of a DTT signal is measured in the usual units of dB μ V (a maximum signal level of 70 dB μ V and a minimum signal level of 50 dB μ V). It is helpful to understand that the level of a DTT signal represents the total power of all the carriers in the Coded Orthogonal Frequency Division Multiplexing (COFDM) signal and not the level of each individual COFDM carrier. For satisfactory reception of digital signals, it is important the signals applied to the receiver are within these ranges. These maximum and minimum levels define a so-called window of operation for the receiver.

Common practice dictates that in order to measure the quality of a received DTT signal we have to look at one or more of the following parameters: Bit-Error Rate (BER), Channel BER (CBER), Carrier-to-Noise Ratio (CNR) and Modulation Error Ratio (MER). The Channel State Information (CSI) feature available in DTT measurement equipment is a very valuable tool providing additional insight into the quality of reception in a typical domestic or professional DTT installation.

Using the BER alone is an ill-advised “hit-or-miss” strategy because of the 'cliff-edge effect' characteristic of any digital TV system. A BER reading below the reference quasi error free (QEF) value of 2×10^{-4} might wrongly lead us to conclude that the receiving conditions are satisfactory.

However, the BER provides a very narrow signal measurement range. Even for vanishingly small BER readings, a small drop in the level of received DTT signal can push the DTT receiver over the digital cliff edge beyond the point of system failure. The CBER is closely related to the BER providing a wider signal measurement range. Depending on the type(s) of unknown disturbance(s) affecting our DTT installation (noise, co-channel or adjacent PAL, co-channel DTT, etc.), the CBER corresponding to the reference QEF BER of 2×10^{-4} varies between 4 and 7 in 100. Unfortunately, the CBER is not a reliable indicator of how far the digital cliff edge is.

DTT engineers need a tool with a wide measurement range that solves the shortcomings of the BER and CBER. This measurement tool should provide some estimate of the noise margin of the DTT installation. A first candidate comes to mind: CNR or, alternatively, its sibling the MER.

The CNR is defined as the ratio of the average RF power of the DTT signal to the power of the noise present in the UHF channel. Similarly, the MER is defined as the ratio of the average power of the DTT signal to the average power of the constellation errors. It can therefore be used to give a more

direct indication of decoding margin when, as is often the case, there is co-channel interference as well as noise in the channel. The higher the MER value, the **better** the reception conditions.

In situations where there is no multipath propagation so that the channel frequency response remains reasonably flat, CNR and MER are in principle the same thing. In practice, the accuracy of the measured CNR is limited by the noise floor of the measurement equipment and by the presence of other disturbances on adjacent UHF channels. Likewise, both the receiver's noise floor and other issues resulting from its practical implementation degrade the MER estimate.

Channel State Information (CSI)

Some flavour of CSI is used internally by all commercial DTT receivers to achieve the recommended target system performance⁹. The CSI counts the effect of both the noise present in the channel and the shape of the transmission channel itself. In other words, the CSI gives a measure of the reliability of the received DTT signal. We measure the average of the CSI across the UHF channel occupied by the DTT signal. The higher the percentage value of CSI, the **less** reliable DTT reception is.

As explained, the CSI can be used as a means to measure the noise margin in a DTT installation. Let us call CSI_{QEF} the percentage CSI measured at the point where the measurement equipment displays the reference QEF BER. The noise margin in dB is then approximately given by –

$$\text{NM (dB)} = \frac{\text{CSI}_{\text{QEF}} - \text{CSI}}{2.6}$$

This empirical approximation represents a good estimate for NM below 8dB. The CSI alone, on the other hand, has a wider measurement range, providing meaningful results for NM of up to 15dB.

⁹ - J. Lago-Fernández, "Using Channel State Information (CSI) to Characterize DVB-T Reception", IBC, Amsterdam, 12-17 September 2002

Survey Equipment

1 x Promax Prolink 4C Premium – Serial Number PK4COPAB11B /
060419030005 Running firmware version 2.47

1 x Sony Wide screen CRT Reference Receiver KV–16TIU – Serial Number
4014480

1 x Professional Broadcast Wideband Log Periodic 8 element antenna
(Amphenol Jaybeam (details below))

**Amphenol JAYBEAM**

468-860 MHz

A Log Periodic antenna designed for UHF Broadcast, TETRA and Cellular communications applications. This antenna is often used in a stacked array to form a rugged, high power, extended range antenna. Produced to the highest quality standards, these robust antenna designs will insure reliable operation in harsh environmental conditions.

Replace "x" with desired model number option.

Electrical Characteristics

Frequency band	468-860 MHz	
Model number options (x)	Model Number LPU/R-N LPU/R-7/16	Connector type N-Female 7/16-DIN Female
Polarization	Vertical or Horizontal	
Horizontal beamwidth	70°	
Gain	7.9 dBd	
Impedance	50Ω	
VSWR	<1.3:1	
Maximum power	250 W	
Connector type	see model number options above	
Lightning protection	DC grounded	

Mechanical Characteristics

Materials	Aluminium Alloy	
Dimensions (Length x Width)	1210 x 320 mm	47.6 x 12.6 in
Weight without bracket	3.5 kg	7.7 lbs

Mounting Options

Mounting	Mounting bracket included to fit 38-50 mm dia. pipe.	
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LPU/Rx

V-Pol or H-Pol | Log Periodic | 70° | 7.9 dBd



Technical Specification for an Amphenol Jaybeam Professional Broadcast Wideband Log Periodic 8-Element Antenna

All RF cables, interconnects and systems of professional quality and calibrated to determine feeder losses and antenna gains. These are factored into the results, providing accurate descriptions of actual field strength values – see *Calculation of Received Field Strength*

Calculation of Received Field Strength

The Field Strength (dBμV/m) is derived from the Terminated Level (dBμV) as measured at the input of the measurement receiver.

Field Strength (dBμV/m) = Terminated Level (dBμV) – Aerial Gain (a) + Dipole Factor (b) + Feeder Loss (c)

where -

Dipole Factor (to matched load)	(b)	$20\text{Log}\left(\frac{2\pi}{\lambda}\right)$ <i>Where λ = Transmission Wavelength (m)</i>
Feeder Loss	(c)	3 dB
Aerial Gain (dB _{dipole})	(a)	10 dB

References

The building information found in Chapter 2 was sourced from the following Ofcom document¹⁰.

Mapping Data

This report includes mapping and mapping data provided by Ordnance Survey (OS), under the terms of the Open Government Licence, OS data Crown copyright and database copyright (2023).

10 - http://licensing.ofcom.org.uk/binaries/spectrum/fixed-terrestrial-links/wind-farms/tall_structures.pdf

Planning Policies - Regional and Local Planning Policies and Guidance

Manchester City Council (MCC), "Full, Outline, Reserved Matters & Variation/Removal of Conditions Planning Applications - Is Your Application Valid?", September 2018 (revised January 2020), MCC

Broadband Connectivity Assessment

All new build residential developments must incorporate measures to facilitate digital connectivity for all new build residential properties having regard to the Data Ducting Infrastructure Guidance produced by the Department for Communities and Local Government. (Section 10 NPPF, above)

Television Reception

MCC planning guidance, any development over four storeys requires a TV reception impact assessment.

Information on TV and radio reception and interference. Please provide a report on the possible interference created by the proposed development on TV and radio reception within the area. You may wish to contact the Office of Communications (Ofcom) on tel. 0207 981 3000 for suggestions of companies who may be able to carry out such work. (Core Strategy Policy EN2)

Tall Buildings

*If the proposed building is considered to be a 'Tall Building', you will need to make a case for the height of the tall element and take into consideration Historic England and Design Council guidance on 'Tall Buildings'. The design statement should make reference to Design Council guidance to assess its impact on the surrounding area. A visual impact assessment with visualisations of the building form key views needs to be included. The statement should include details of pre-application discussions held with local residents and the outcome of these discussions. If the Proposal is a Tall Building, it may require an Environmental Statement, as it would have the potential to generate significant impacts over and above the existing use(s) on site. Most notably impacts relating to visual impact; wind microclimate; sunlight / daylight / shading / solar dazzle / privacy and overlooking; transport issues; noise and vibration; air quality; ground conditions and contamination; water resources hydrology; **radio and television interference**; and sustainability. (Core Strategy Policy EN2)*

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The UK's terrestrial television and radio networks are highly complex engineering systems and are constantly being modified, re-designed, upgraded and maintained. The reception conditions detailed in this report were those prevailing at the time of the survey in the study area. Engineering work at transmitter sites, weather conditions and the time of the year will influence the quality and coverage of terrestrial services and their susceptibility to interference. Whilst every effort was made to accurately measure and assess the available television and radio transmissions and services at the time of the survey, GTech Surveys Limited cannot assume that any part of the television or radio broadcast network or transmission from any transmitter was operating in required specification or correctly to any design criteria. The signal measurements undertaken during the survey work were used to define the possible impacts to television and radio reception for this project. Although best practice has been applied in understanding the potential impacts, due to the complex nature of the subject, GTech Surveys Limited is not accountable in anyway whatsoever if unpredicted impacts occur at any location anywhere in the study area.

Modelling parameters assume that all installed UHF antenna systems are mounted at least 10m AGL and installed to a modern standard, with all components meeting CAI quality standards. Antennas mounted at lower heights and poor-quality installations will be more prone to the effects of interference from external sources and as such, reception conditions to installations with the aforementioned characteristics have not been accounted for in any impact modelling. Consequently, properties with such installations may be prone to interference effects that have not been identified. Such installations are commonly found in camping and caravan parks, on bungalows and properties where it is not possible to attach an antenna to the exterior roof. Antennas mounted in lofts are also more prone to interference effects arising from the signal attenuation caused by roofing materials. Again, reception conditions to properties with the aforementioned antenna installation characteristics have not been accounted for in any impact modelling and as such, properties with these installations may be prone to interference effects that have not been identified.

Digital terrestrial television (Freeview) coverage may vary as a result of engineering works or any frequency changes authorised by Ofcom. We advise that consumers always check future reception predictions (<http://www.digitaluk.co.uk/coveragechecker/>) before buying TV equipment. GTech Surveys Limited, Ofcom and Digital UK are not responsible for household TV reception arrangements.

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