



APPENDIX F:

BASELINE TELEVISION SIGNAL
SURVEY & TELEVISION
RECEPTION IMPACT ASSESSMENT

GTech Surveys Limited

Baseline Television Signal Survey & Television Reception Impact Assessment

Jackson's Row, Manchester

CHANGE HISTORY

Issue	Date	Details of Changes
1.0	19/10/2016	Working draft
1.0	21/10/2016	First draft issue
1.0	10/01/2017	First draft issue - addition of Chapter 8 and minor editing
1.0	11/05/2017	Second draft issue - effects and impacts revised following amendments to the Proposed Development. General editing
2.0	11/08/2023	Second issue - effects and impacts revised following amendments to the Proposed Development. Baseline updated. Significant editing and document revisions
Author: G Phillips		Reviewer: O Lloyd

Issue: 2.0

Contents	Page
Executive Summary	
1 - Introduction	9
2 - The Mechanisms of Interference to Television Broadcast Services	9
3 - Available Television Broadcast Services	13
4 - Survey Methodology & Description of Baseline	15
5 - Predicted Impacts and Effects	17
6 - Mitigation Measures	20
7 - Conclusions	22
Appendix	23
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	

GTech Surveys Limited

GTech Surveys Limited is a Midlands based broadcast and telecommunications consultancy conducting projects throughout the entire UK. We undertake mobile phone network, television and radio reception surveys (pre- and post-construction signal surveys), conduct broadcast interference and reception investigations, and support telecommunications planning work for wind energy developers, construction companies, architects, broadcasters and Local Planning Authorities.

In addition to radio interference modelling services and television reception surveys, we produce EIA and ES Telecommunications Chapters (also known as an 'Electronic Interference Chapter'); satisfying the requirements of Part 5, Regulation 18 (Parts 5a and 5b) of The Town and Country Planning EIA Regulations 2017. We peer review ES and EIA work, liaising with telecommunications providers (Arqiva, BT etc.) and advise developers with respect to associated Section 106 (Town and Country Planning Act 1990) and Section 75 (Town and Country Planning (Scotland) Act 1997) agreements.

GTech Surveys Limited is a consultant member of the Trade Association for Content Delivery - (Confederation of Aerial Industries Ltd - CAI) and the RDI - the digital sector's professional body and trade organisation. We are listed on Constructionline and verified as a Safety Schemes in Procurement (SSIP) member by Safety Management Advisory Services (SMAS), making us compliant with the industry standard PAS 91:2013 + A1:2017.

Professional broadcast trained project engineers deliver, and supply QBE insured technical products to support planning applications, discharge planning conditions (including S106 Agreements) and for due diligence. For more information about GTech Surveys Limited please visit our website - www.gtechsurveys.com



GTech Surveys Ltd.
Accountancy House,
4 Priory Road,
Kenilworth,
Warwickshire,
CV8 1LL.

T: +44(0) 1926 744771



Executive Summary

A signal survey and reception impact assessment have been undertaken to determine the potential effects on the local reception of television broadcast services from the proposed Jackson's Row development in Manchester. As requested by Manchester City Council (MCC) planning guidance, any development over four storeys requires a TV reception impact assessment. Consequently, this report has been produced to support the planning application submission and to provide the existing reception data to assist with any further studies. Accordingly, impacts to the reception of digital terrestrial television (DTT also known as Freeview) and digital satellite television services (such as Freesat and Sky), have been assessed. Impacts to the reception of analogue television services have not been assessed in this study because analogue terrestrial television services were switched off in Manchester (Granada TV region) during 2009 and throughout the rest of the UK by 2012.

Consequently, this assessment has been produced to assist with the planning application and to provide the baseline data to assist with any further studies. Accordingly, impacts to the reception of analogue terrestrial television, digital terrestrial television (DTT commercially known as 'Freeview') and digital satellite television services (such as Freesat and Sky), have been assessed.

Whilst widespread interference to digital terrestrial television (DTT is commercially known as '*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 required, simple and cost-effective antenna betterment or antenna relocation should enable the optimal reception of all services. These are standard and easy to adopt mitigation solutions in situations where new development or construction work has degraded local DTT coverage. If any antenna betterment is required, it is advised that a registered professional antenna installer conducts the work.

The Proposed Development may cause interference to the reception of digital satellite television services (such as Freesat and Sky) in areas to the immediate northwest of the Proposed Development, up to 338m from the base of the proposed building. Additionally, in similar areas, the use of tower cranes could also obscure satellite dish views of the southern skies, resulting in minor and sporadic interference occurring during crane lifting operations. If any interference does occur, the repositioning of impacted satellite dishes to new or different locations without obscured line-of-sight views to the serving satellites should restore optimal reception. If satellite dish relocation is not possible, the use of TV over cable / fibre equipment or DTT receiving equipment could offer any affected satellite television viewer an alternative source of some digital television broadcasts.

Overall, the use of tower cranes and the Proposed Development itself is likely to cause disruption to the reception of DTT and digital satellite television services in areas to the immediate southeast and northwest of the Site. With respect to digital satellite television reception, in this identified area, clear line-of-sight 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 reception. If satellite dish relocations are not possible, the use of TV over cable / fibre equipment or DTT receiving equipment is likely to offer any affected satellite television viewer an alternative source of some digital television broadcasts. With respect to DTT reception, the massing and built form of the Proposed Development could reduce signal propagation, resulting in interference. Antenna betterment should restore DTT reception if interference has occurred.

1 - Introduction

This report outlines the findings of a comprehensive reception impact assessment and baseline signal reception survey to determine the viewing preference of residents located around the proposed Jackson's Row development, Manchester, and identifies what impacts and effects the Proposed Development may have on the reception of television broadcast services for local receptors.

This assessment focuses on the material amendments and changes made to Block A. There have been no material amendments made to Block B since the approved Section 96a (reference:135828/NMC/2022) and the Section 73 application (reference: 135827/JO/2022).

The key changes include;

1. The addition of 2 storeys of residential apartments, increasing the height of the tower by 7m
2. Reconfiguration of ground floor, basement level 01 to accommodate the changes in cycle and residential bin provision.
3. Amendment of Basement Level 02 internal layout as part of detailed design.
4. Amendment of Level 06 internal layout as part of detailed design.

With respect to this assessment, the change in building height is the only major consideration.

The Assessment

Manchester City Council (MCC) requires applications for developments over four storeys in height to include a TV and radio reception impact assessment. Further guidance can be found in the document; *"Full, Outline, Reserved Matters & Variation/Removal of Conditions Planning Applications - Is Your Application Valid?"*, September 2018 (revised January 2020), MCC. The requirement states;

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. (Core Strategy Policy EN2)

A desktop study was first undertaken, based on broadcast transmission information, plans of the Proposed Development and maps of the area. The relevant TV signal survey area for the Proposed Development was identified and a site visit was then subsequently conducted to establish the baseline television reception conditions. Modelling techniques and field assessments of viewers' choice of television transmitter were then used to predict the potential effects upon television broadcast reception in the area. The impacts from the Proposed Development are consequently analysed, and together with various mitigation options, conclusions are drawn on the overall effects of the Proposed Development on television broadcast service reception for local residents.

With respect to impacts on VHF (FM) radio and digital radio broadcast services such as DAB (Digital Audio Broadcasting), structures and buildings rarely cause reception disruption. This is due to the lower frequencies used for the transmission of radio services (with respect to television) and the technologies and methods used for encoding, reception and signal decoding. Based on professional judgement and experience, VHF (FM) and DAB radio reception is considered robust in urban environments and the Proposed Development is unlikely to alter coverage significantly. Consequently, VHF (FM) and DAB radio reception has not be considered in the assessment.

This study was undertaken to investigate whether the Proposed Development could cause interference to local television broadcast reception. The effects on digital terrestrial television (DTT) and digital satellite television service reception are discussed. The report also details the baseline reception conditions for future reference. Figure 1 shows the location of the Site.

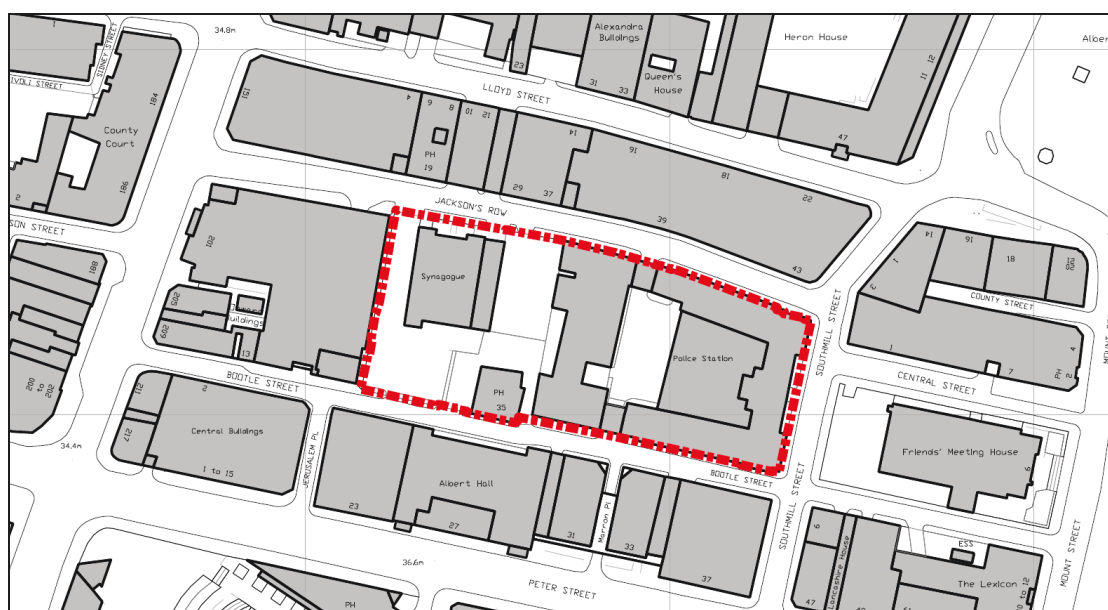


Figure 1 - The Location of the Site

This report follows the following structure:

Chapter 1 introduces the work, the Proposed Development, the Site and format of the assessment

Chapter 2 discusses the different forms of structure generated television interference and how these can impact the reception of different television broadcast platforms

Chapter 3 describes the available television services in the survey area

Chapter 4 describes the pre-construction television reception conditions around the Site

Chapter 5 describes the predicted impacts of the Proposed Development upon television broadcast reception before any mitigation measures are applied

Chapter 6 describes any suitable mitigation measures for any affected TV viewer

Chapter 7 presents the conclusion

This assessment was first conducted during October 2016 to investigate whether the Proposed Development could cause interference to local television broadcast reception. The report was last updated during August 2023 as a result of amendments to the Proposed Development. The report also details the baseline reception conditions for future reference.

2 - The Mechanisms of Interference to Television Broadcast Services

Terrestrial Television Services

Any structure will produce two zones of potential disruption to television reception. One zone is where the development creates a 'shadow' (affects all television broadcast platforms) and the other where it gives rise to a 'reflection'. At the frequencies used for broadcasting, the processes of creating a 'shadow' or a 'reflection' are somewhat more complicated than with visible light but thinking of the problem in these terms is still a helpful way of approaching the matter.

Signal 'Shadowing' Effects

In the area behind the structure, the television transmitter is effectively screened from the viewer and the strength of the signal is reduced - Figures 2 and 3.

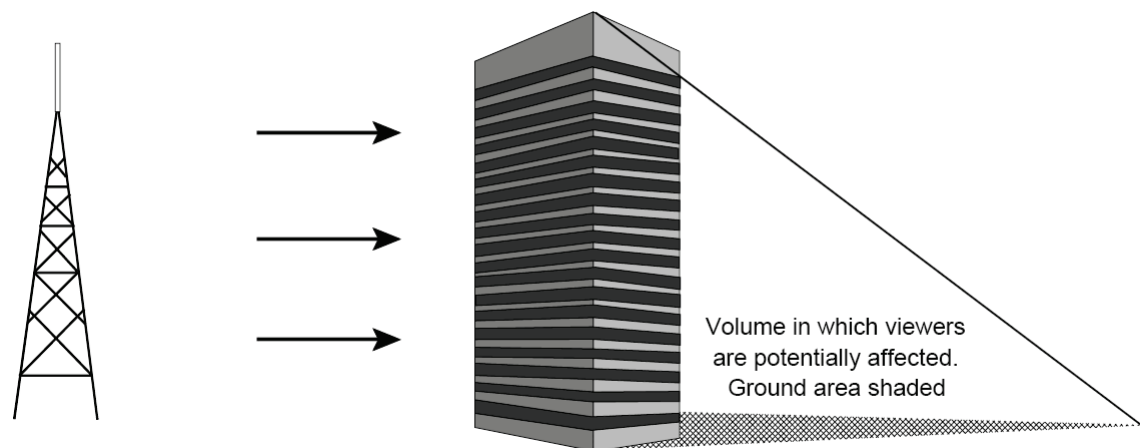


Figure 2 - Affected area in the 'shadow' zone behind the structure

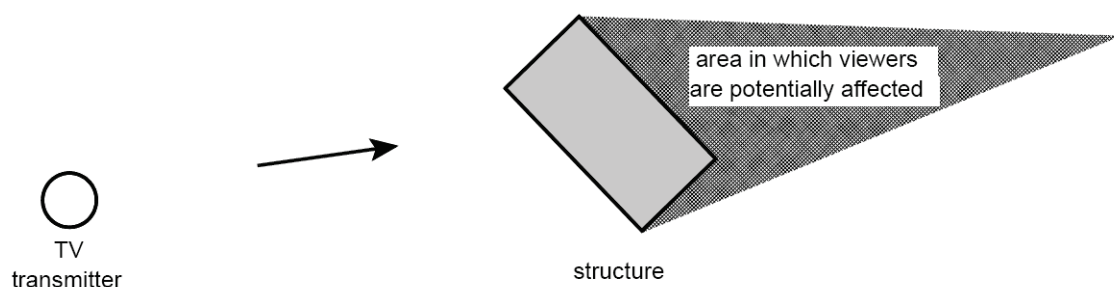


Figure 3 - Plan view of the 'shadow' zone

Television signals do not create such a 'hard' shadow as visible light, and for the purposes of explanation, a 'shadow' zone must be considered which is divided into three sub-zones.

i. Within a few tens of metres from a solid structure, over the region where optical view of the transmitter is lost, the reduction in signal strength is critically dependent on the specific design and composition of the structure. For most brick and concrete buildings, the reduction can be severe and, in some cases, almost total if existing reception conditions are poor.

ii. Further away from the structure (e.g. beyond 25 to 50 metres, but this varies depending on its size) the limit of the 'shadow' zone and signal reduction are determined by diffraction at the edges of the structure and reflection off surrounding structures. The simple condition of whether or not a location has an optical view of the transmitter is not enough to classify the potential interference zone adequately. In general, the effect is that the signal appears to bend around the sides of the structure; the shadow zone reduces in size and the signal strength is reduced by much less than simple ray optics would suggest.

iii. Even further away from the structure (e.g. 250m) complex multiple reflections and diffraction, caused by structures in the locality, may result in the 'shadow' zone becoming almost non-existent, against interfering signals that arrive on significantly different bearings. This can result in an increase in the ratio of wanted to unwanted signal as presented to the television receiver.

Signal 'Reflection' Effects

The second zone of potential interference is produced by 'reflection' or 'scattering' of the incident signal, see Figure 4.

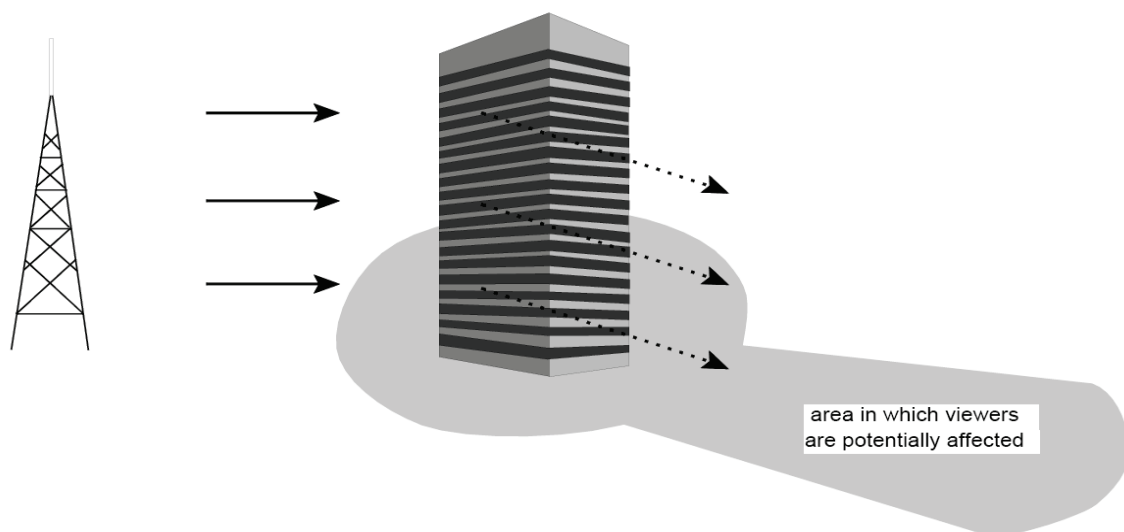


Figure 4 - Affected areas in the 'reflected' zone of the structure

Consider Figure 5, the direct signal travels a distance P1 to the viewer, whilst the signal reflected from the structure travels slightly further, distance (P2 + P3). Although travelling at the speed of light, the different path lengths can mean that one signal arrives with a significant delay relative to the other. This results in a degradation in signal quality.

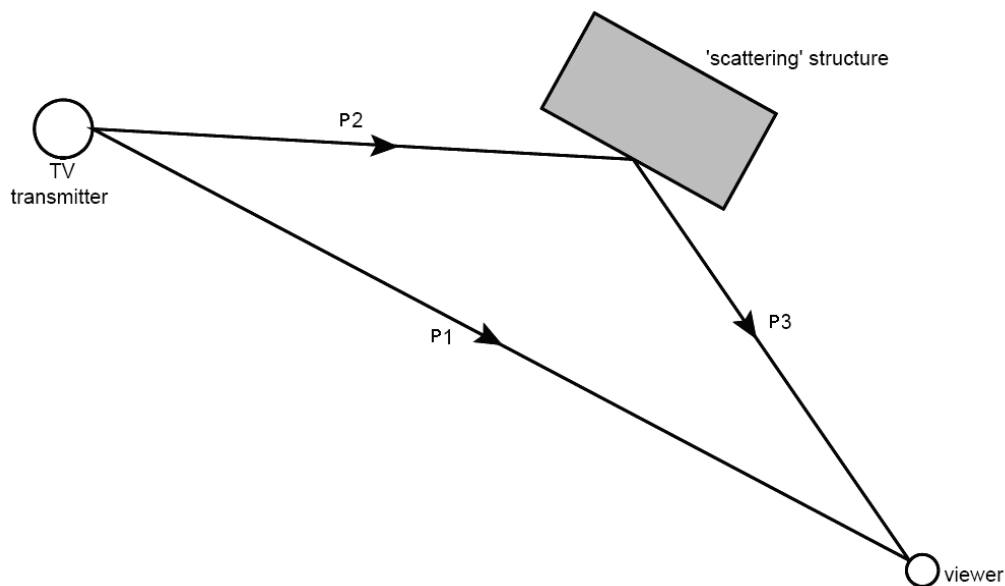


Figure 5 - Direct and Indirect Signal Paths

To avoid interference, it is necessary to ensure that the ratio of wanted signal along the direct path (P1) to the unwanted signal along indirect paths (P2+P3) is sufficiently high. Domestic TV receiving antennas generally have a significant directional response to incoming signals, which means that the antenna may discriminate against interfering signals that arrive on significantly different bearings. This can result in an increase in the ratio of wanted to unwanted signal, as presented to the television receiver.

Digital Terrestrial Television (DTT) - Freeview

The digital television broadcast platform offers many advantages over older analogue broadcast technologies. Due to the way picture signals are encoded and broadcast, digital television offers a much more resilient platform against interference. The construction of digital signals ensures that they are much more impervious to the effects of interference from indirect secondary reflections, which consequently ensures good quality and coherent data stream integrity at the receiver, resulting in an interference free picture. Disruption to DTT services is normally caused by a poor-quality receiving antenna system or locally generated wideband electrical noise. Signal blocking caused by buildings can also degrade received signal quality.

Digital Satellite Television Services - Freesat & Sky

Digital satellite television services are provided by geo-stationary earth orbiting satellites positioned above the equator. To ensure good reception of digital satellite television services, satellite receive antennas (satellite dishes) are normally positioned away from trees and other clutter and are orientated to face the southeastern horizon.

Disruption to digital satellite television services is normally caused by an obstruction on the line-of-sight from the satellite to the receive antenna e.g. a tall building or tall trees. Adverse weather can also influence reception. In the United Kingdom, Freesat and Sky services come from the 28.2 degrees east ASTRA satellite cluster.

Figure 6 below shows typical clearance distances and obstruction heights for interference free satellite television reception.

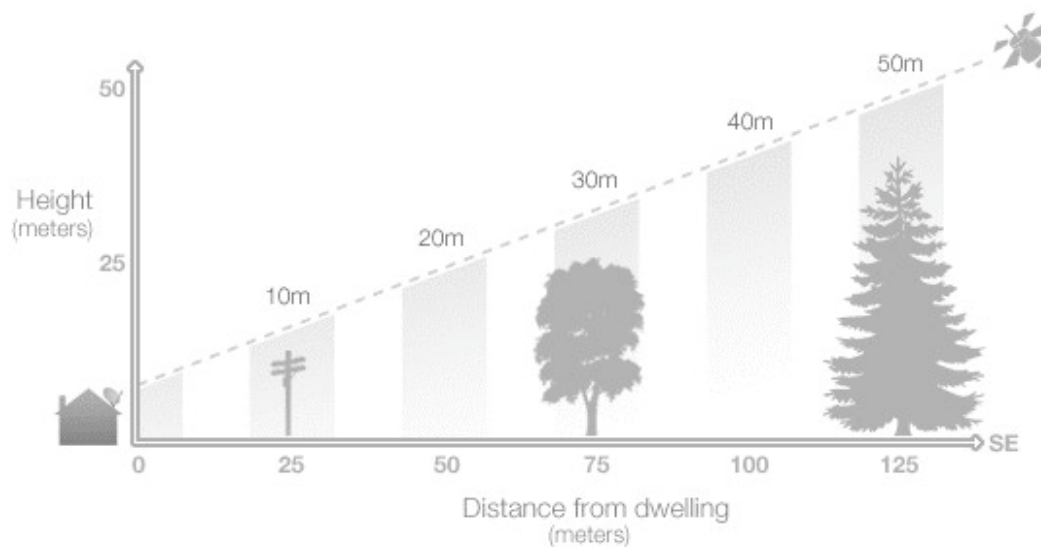


Figure 6 - Typical Clearance Distances and Obstruction Heights for Interference Free Satellite Television Reception

3 - Available Television Broadcast Services

Terrestrial Television Services

The area around the Site is no longer served by analogue television transmissions due to the completed Digital Television Switchover. All analogue services were switched off in the Granada television region during 2009.

Digital Terrestrial Television (DTT) - Freeview

The survey area is served by DTT services (Granada TV region) from the Winter Hill transmitter (grid reference SD 66053 14463), on a bearing of 312° (with respect to true north) and 24km away. The Winter Hill transmitter is shown with respect to the Site in Figure 7.

Technical transmission information for each DTT service broadcast from the Winter Hill transmitter site is detailed in Table A, found in the Appendix - *Television Transmission Frequencies*.

Up to date technical information regarding the Granada TV region and Winter Hill transmitter group can be found on the Digital UK website¹.

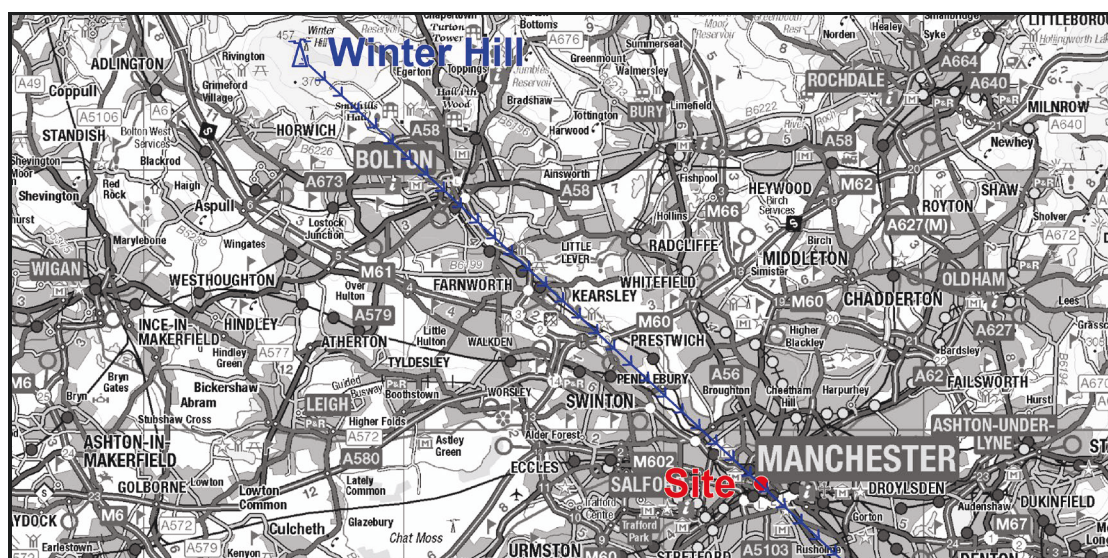


Figure 7 - The Locations of the Winter Hill Transmitter, the Site and the direction of the incoming DTT signals at the Site (indicated by the blue arrowed line)

1 - <http://www.digitaluk.co.uk>

Non-Terrestrial Television Services (Digital Satellite Television)

For the reception of the 28.2 degrees east ASTRA satellite cluster (Freesat and Sky services), dish elevations of 22.9 degrees are required at this latitude. Optimal receive dish azimuths are 143.8 degrees with respect to true north (approximately southeast).

4 - Survey Methodology & Description of Baseline

Due to the complex nature of television interference in cluttered urban environments, field investigations must be undertaken in the general area around a site to fully evaluate any potential effects. In this study, measurements were undertaken up to one kilometre from the Site, however, the survey mainly focused around the Site and areas to the immediate northwest and southeast. Additionally, investigations are carried out in all areas where predicted (modelled) interference may occur. These are identified in Figure 8, and the measurements are detailed in Table B, found in the Appendix - *Signal Measurements*. The following data was recorded:

- Field strength and technical signal measurements of DTT transmissions from the main serving transmitter
- Viewing preference (choice of television transmitter) of residents in all areas visited

All television measurements were carried out using a UHF log-periodic receive antenna, industry standard height for such work. During the survey, no assessment was made of reception conditions within viewers' homes. Equipment details are detailed in the Appendix - *Survey Equipment*.

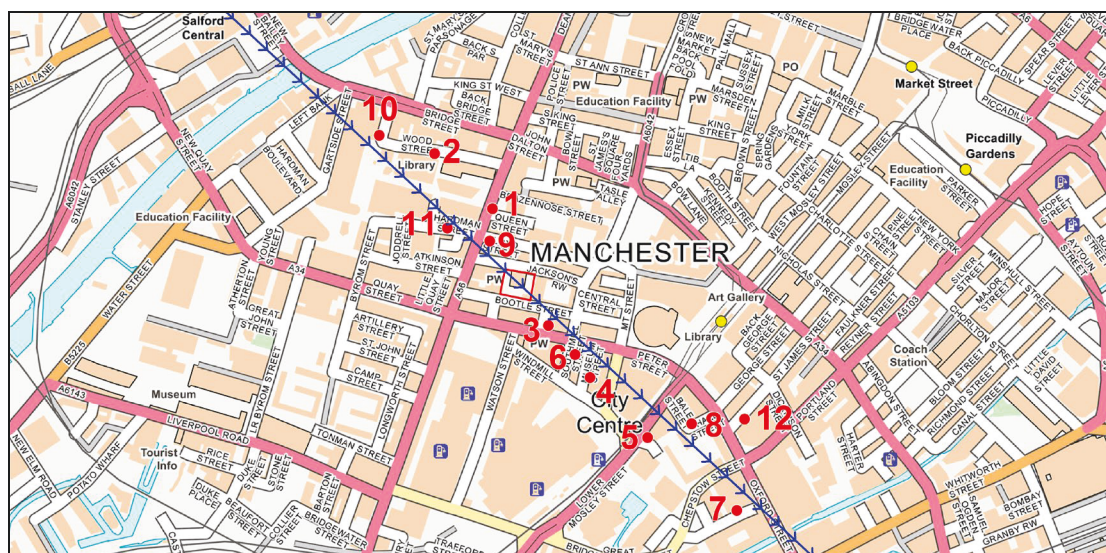


Figure 8 - Surveyed Locations. The blue arrows indicate the direction of the incoming DTT signals from Winter Hill transmitter. The Site is delineated in red

Survey Results and Observations

In general, building use around the Site is mainly for commercial use. There are a number of significantly tall and wide buildings in the wider area around the Site.

Digital Terrestrial Television (DTT) - Freeview

Few antennas were seen during the survey, due to the typical building use in the study area around the Site. Additional antennas may have been mounted on the rooftops of existing tall buildings. DTT services were available at all surveyed locations from the Winter Hill transmitter. At all locations, received signal levels were in excess of recommended minimum amounts and the technical quality of received signals was found to be good². DTT services currently provide very good coverage and service throughout the study area.

All signal receiving antenna systems are mounted on rooftops, ensuring optimal reception conditions. All terrestrial television antennas observed are directed towards the Winter Hill transmitter.

Digital Satellite Television - Freesat & Sky

Due to the building use within the study area, few satellite dishes were seen. Additional satellite dishes may have been mounted on rooftops and at the rear of properties; however, these would not be visible from any publicly accessible location.

² - Signal levels as specified by the CAI - Association for Audio Visual Professionals Code of Practice (COP) For the Installation of Aerials/Antennas & Receiving Equipment in the Single Dwelling Unit CAI COP 2: September 2022

Additional technical information regarding the Freeview signal can be found in the Appendix - An Overview of Signal Measurements

5 - Predicted Impacts and Effects

Methodology

To assess the effects of the Proposed Development upon television broadcast service reception, the structures were considered to create interference to services in the immediate areas around the Site, in signal reflection areas and in the signal shadow zones. These methods, used in conjunction with broadcast transmission information, development plans, maps of the study area and modelling techniques, contribute towards predicting the potential effects upon television broadcast reception in the study area.

The field survey then investigated the areas identified as being at risk of interference and assessed all available services and the transmitter viewing preferences of residents in order to determine if the computed risk is practically valid. The collected data was finally used to determine what actual risks exist and what viable solutions are available to minimise any adverse effects.

Predicted Effects from Modelling

Digital Terrestrial Television - Freeview

Widespread interference is not expected to occur due to the existing good coverage in the study area. However, the Proposed Development may cause signal disruption for properties adjacent to the Site, located to the immediate southwest on the Bootle Street (including the Sir Ralph Abercromby public house) and beyond, where signal levels from the Winter Hill transmitter could be attenuated (reduced) by the Proposed Development. However, easy to implement mitigation, as discussed in Chapter 6, is likely to restore the reception of Freeview services for any affected viewer.

Digital Satellite Television - Freesat and Sky

Tall structures, trees and buildings can disrupt digital satellite television reception by causing obstructions on the line-of-sight to the signal receive dish from the serving satellite. This is discussed further in Chapter 2. Using trigonometry, the approximate maximum height of the proposed building and the angle and orientation of the incoming satellite signals, theoretical signal shadow zones for the 28.2E ASTRA satellite cluster are as indicated;

Element	Max. Signal Shadow Length (m)
Proposed Development	338

This area extends in a northwesterly direction (323.8 degrees with respect to true north) from the Proposed Development's base. The affected area is shown in Figure 9. It is not certain if satellite dishes are in use on the rooftops of existing buildings in the identified area, but if satellite dishes are in use,