

Television Post-Construction Reception Survey

Siemens Campus, Didsbury

January, 2021

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ADMINISTRATION PAGE

Job Reference:	10370A
Date:	January, 2021
Author:	Kai Frolic
Telephone:	01787 319 001
Email:	kai@pagerpower.com

Reviewer:	Aaron Williams
Date:	January, 2021
Telephone:	01787 319 001
Email:	aaron@pagerpower.com

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1	January, 2021	Initial issue

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Pager Power Limited, Stour Valley Business Centre, Sudbury CO10 7GB

T: +44 (0)1787 319001 E: info@pagerpower.com W: www.pagerpower.com

EXECUTIVE SUMMARY

Report Purpose

The Siemens Campus building development in Didsbury, Manchester, UK, has been completed. One of the planning conditions required assessment of the development's impact on terrestrial television reception in the surrounding area. A baseline reception survey was undertaken in 2016 prior to construction of the development. Reception survey measurements have been undertaken at similar locations in January 2021 to evaluate the difference post-construction.

Wider Context

There have been many changes since 2016, numerous buildings have been constructed in the city centre which could affect coverage in general. In addition, the Winter Hill transmitter at the time of the survey provided services on different channels (frequencies) than it did in 2017. Nevertheless, the effect of the Siemens Campus development has been evaluated based on the survey data.

Conclusions

The majority of television services were received with good picture quality and sound within the development shadow zone.

The received signal strength has decreased since 2016, this is likely to be due to multiple developments and not the Siemens Campus development in isolation. It is possible that the development has contributed to a reduced signal strength at close range (within approximately one kilometre to the south-southeast).

It is possible that the effects of the development have not been observable and the changes in coverage quality are predominantly due to other factors such as wider development between the transmitter and the receivers.

Recommendation

In the event that interference to local multiplexes was to be reported in the shadow zone for Siemens Campus development within approximately 1 km of the building, the reported effects should be evaluated in the context of the survey results. It would be good practice to arrange for a local aerial installer to visit the reported interference location if the affected channels corresponded to one of the weaker multiplexes with a view to restoring this if possible, most likely via remedial aerial works.

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ABOUT PAGER POWER

Pager Power is a dedicated consultancy company based in Suffolk, UK. The company has undertaken projects in 48 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 INTRODUCTION

1.1 Report Purpose

The Siemens Campus building development in Didsbury, Manchester, UK, has been constructed. One of the planning conditions required assessment of the development's impact on terrestrial television reception in the surrounding area. A baseline reception survey was undertaken in 2016 prior to construction of the development. Reception survey measurements have been undertaken at similar locations in January 2021 to evaluate the difference.

1.2 Development

Figure 1 below¹ shows the development location.

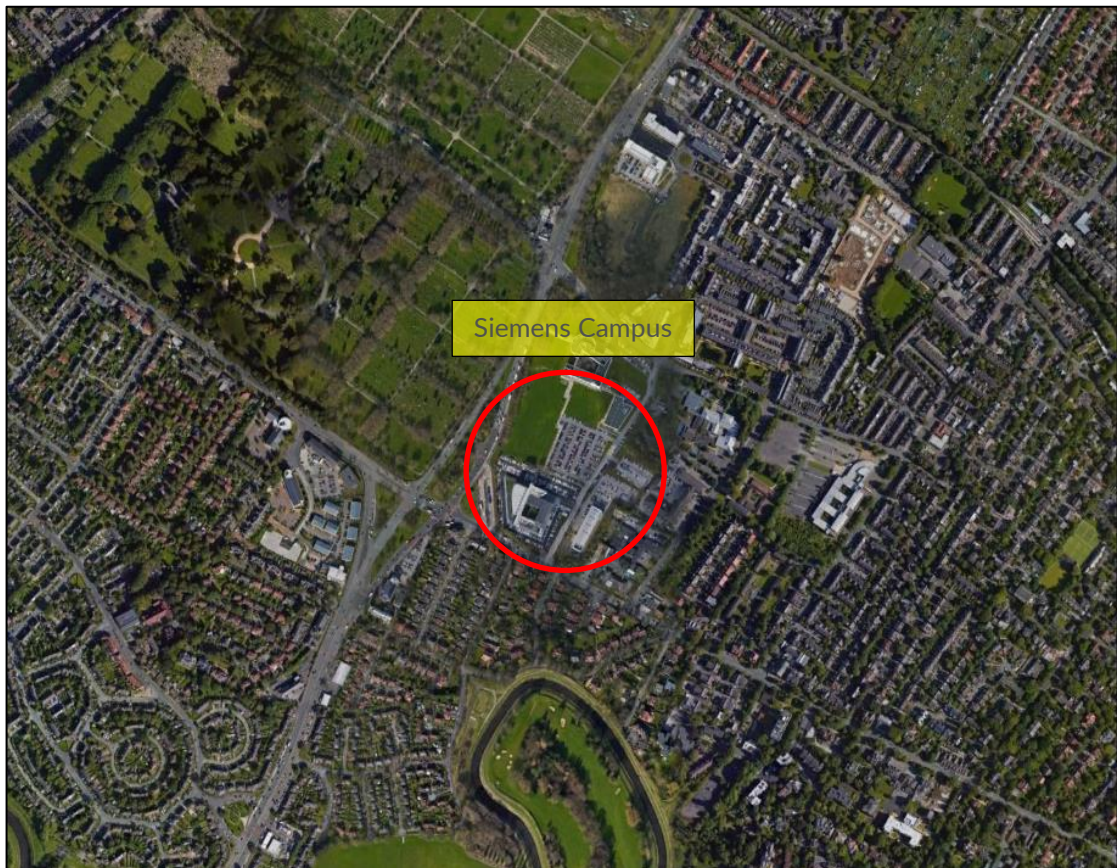


Figure 1 *Siemens Campus*

¹ Copyright © 2021 Google.

2 TERRESTRIAL TELEVISION TRANSMITTER DETAILS

2.1 Relevant Transmitter

The television transmitter serving the area around the development is Winter Hill. This is based on its coverage area and the results of both surveys (which confirmed that the vast majority of household aerials are directed towards this transmitter).

During the baseline survey in 2016, Winter Hill broadcast main multiplexes on channels 49, 50, 54-, 55, 58 and 59.

More recently, there have been works on the Winter Hill transmitter and services have moved to different channels. At the time of the post-construction survey (26 January 2021), services were available on channels 21, 24, 27, 29, 31, 32, 34, 35, 37 and 55.

2.2 Terrestrial Television Transmitter Location

Figure 2 below shows the location of the development relative to the transmitter².



Figure 2 Transmitter and development relative location

² Copyright © 2021 Google.

3 INTERFERENCE MECHANISMS

3.1 Technical Overview

Terrestrial television services are provided by means of electromagnetic waves in the Ultra High Frequency (UHF) range which propagate from land-based transmitters to receiving aerials. 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.

3.2 Interference Mechanisms

3.2.1 Obstruction of the signal

This is caused by the building physically blocking the transmitted 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 southeast of the proposed development. The following is true for television signals:

- The highest losses (greatest interference) will be located immediately behind the development relative to the transmitter 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).

Ofcom has produced a document offering guidance on this issue. Relevant extracts from the documents are presented below.

"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 on the following page, taken from Section 3.2 of the Ofcom guidance regarding the effect of buildings on broadcast signals.

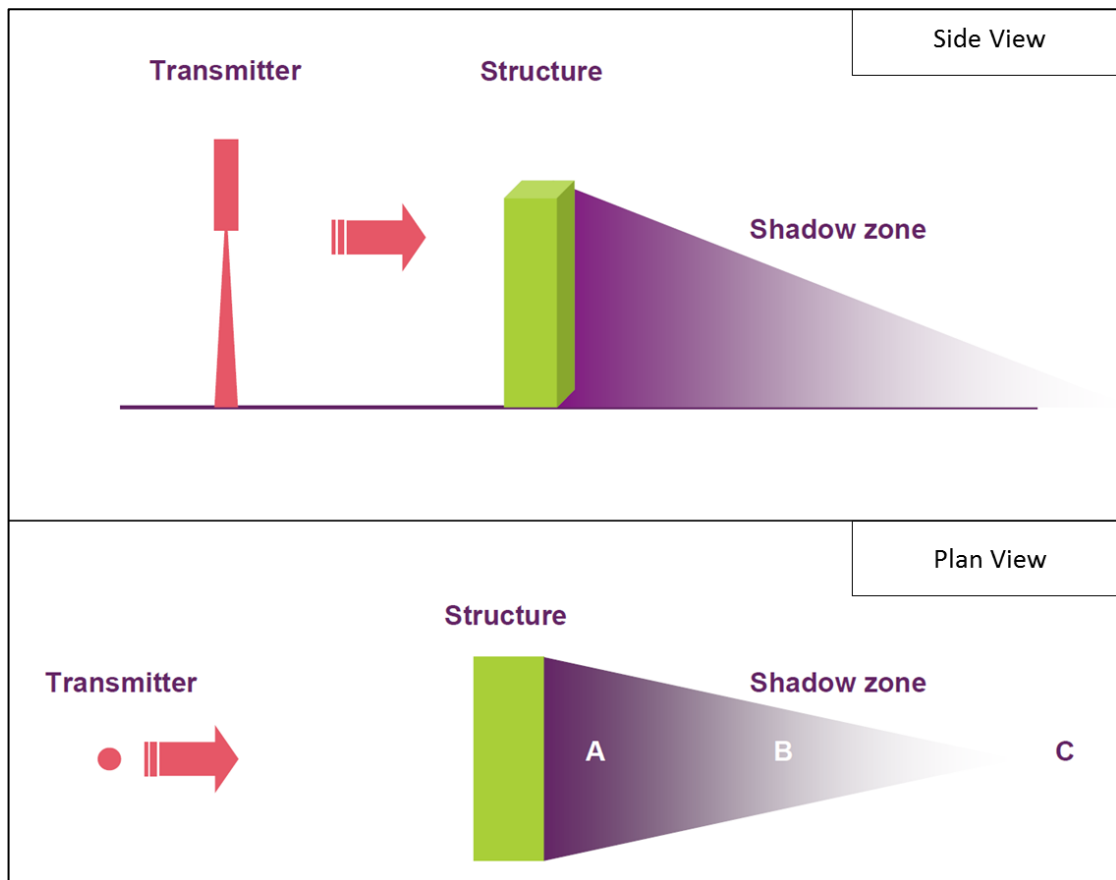


Figure 3 Diffraction loss zones

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 on the following page (taken from Section 3.3 of the Ofcom guidance referenced above) illustrates this effect.

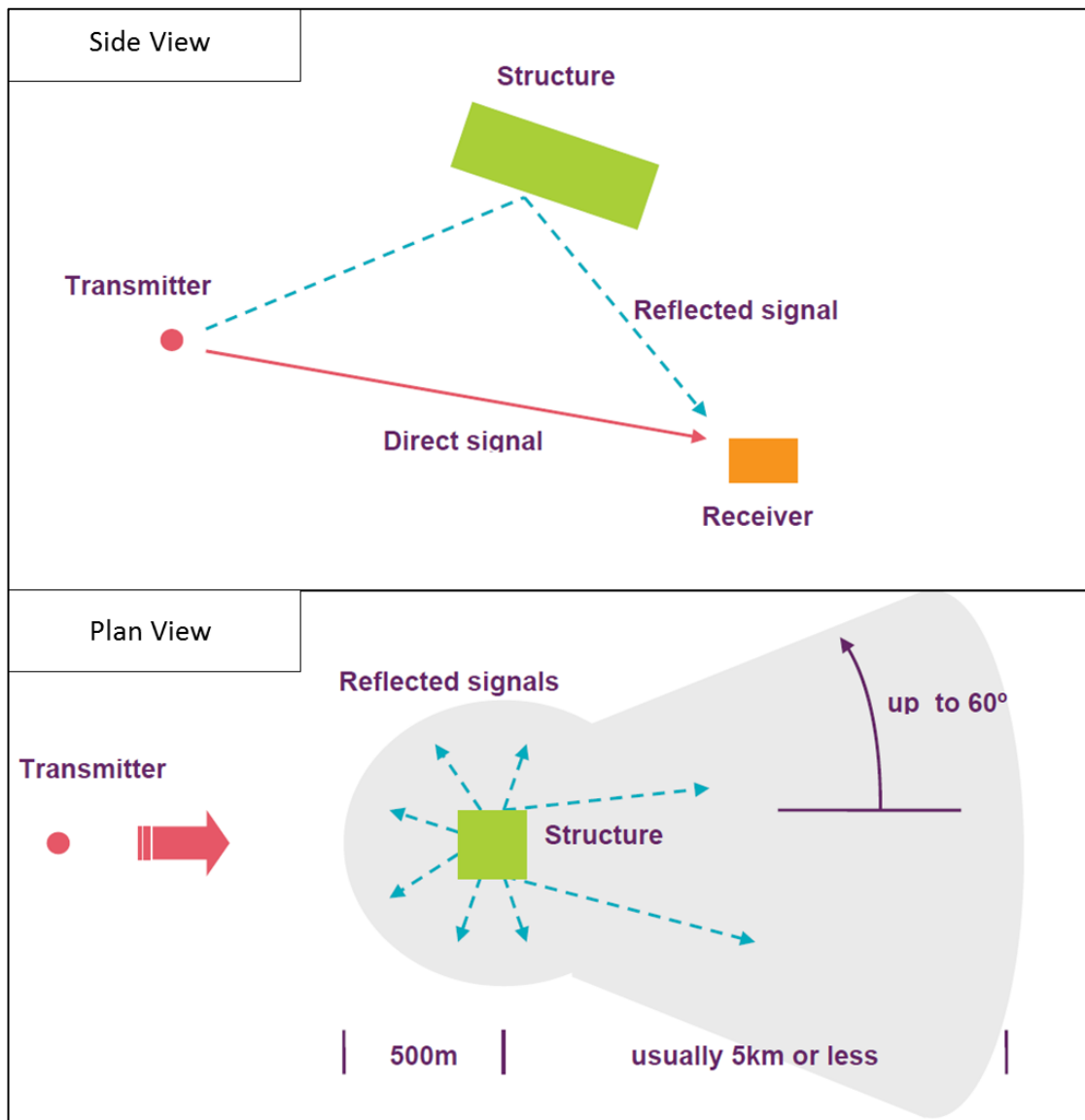


Figure 4 Diffraction loss zones

In practice, it is considered highly unlikely that reflections will have an effect for receivers in front of the Proposed Development 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 degrees.

The reflection zone has been 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 effect if:

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

4 RECEPTION SURVEY

4.1 Locations

Figure 5 below³ shows the surveyed locations as numbered pink icons. The figure also shows the locations surveyed in 2016 as white radial icons for reference purposes. The development shadow zone is also shown by the yellow zone. Location 7 is located outside the zone, this was originally surveyed due to its predicted poor direct coverage (based on radio line of sight between the transmitter and this location) in order to remain conservative.

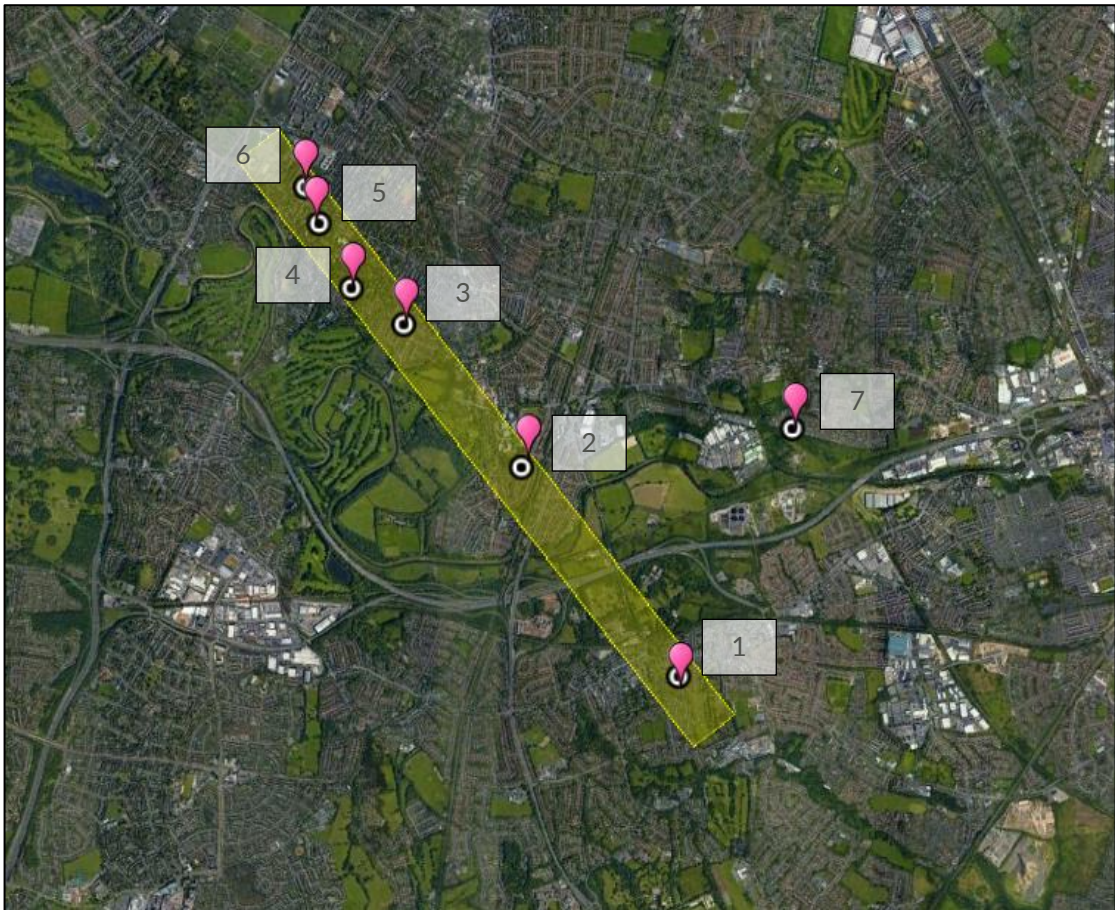


Figure 5 Survey locations

³ Copyright ©2021 Google.

4.2 Survey Results

Table 1 below summarises the survey results and compares them to the 2016 readings. Detailed measurements are presented in Appendix A. Survey photographs are shown in Appendix B.

Location	Approximate distance from development (km)	Results summary	Conclusions
1	4.6	All multiplexes were received with good picture and audio quality. The main multiplexes in 2016 showed a comparable received strength to the current multiplexes.	The development is unlikely to be having a noticeable effect on receivers in the area.
2	2.8	Four multiplexes were received with good picture and audio quality. One channel showed intermittent interference. Five were not received. The main multiplexes in 2016 showed significantly higher signal strength and quality.	Signal quality in this area appears significantly worse than it was in 2016. Many aerials on houses in this area were significantly elevated above the roof, indicative of poor general coverage. Based on the separation distance and the improved coverage closer to the development, it is judged that the development is highly unlikely to be the main contributor to any signal loss in this area.
3	1.5	All multiplexes were received with good picture and audio quality. The main multiplexes in 2016 showed a slightly higher received strength than the current multiplexes.	The development was not found to be having a noticeable effect on receivers in the area.

Location	Approximate distance from development (km)	Results summary	Conclusions
4	1.1	All multiplexes were received with good picture and audio quality, with the exception of one local channel. The main multiplexes in 2016 showed a broadly comparable received strength to the current multiplexes.	The development was not found to be having a noticeable effect on receivers in the area. Data for the local multiplexes at this location was not recorded in 2016. The overall signal levels remain consistent and it is unlikely that the development is causing observable interference.
5	0.6	Two local multiplexes and one HD multiplex were not received at this location. The remaining multiplexes were received with good picture and audio quality. The main multiplexes in 2016 showed a significantly higher received strength to the current multiplexes.	It is possible that the new development has been a contributory factor to the decrease in received signal strength at this location. Reported interference from this location should be evaluated in the context of the survey results and be investigated/mitigated.
6	0.4	Two local multiplexes and one HD multiplex were not received at this location. The remaining multiplexes were received with good picture and audio quality. The main multiplexes in 2016 showed a significantly higher received strength to the current multiplexes.	It is possible that the new development has been a contributory factor to the decrease in received signal strength at this location. Reported interference from this location should be evaluated in the context of the survey results and potentially be investigated/mitigated.

Location	Approximate distance from development (km)	Results summary	Conclusions
7	4.0 (reflection zone measurement)	Two local multiplexes and one HD multiplex were not received. All remaining multiplexes were received with good picture and audio quality. The main multiplexes in 2016 showed a significantly higher received strength to the current multiplexes.	The reduction in signal strength is not consistent with reflection effects, suggesting the development is not the main contributor to reduced coverage in this area. It is highly unlikely that reflection effects are having any observable effect.

Table 1 Survey results

4.3 Conclusions

The signal strength and quality has decreased noticeably since 2016 within the shadow zone. For locations closest to the campus, effects may be attributable to the development to some extent. It is also possible that other developments in the city centre between the transmitter and the survey locations are having an effect.

Overall, the effects of the Siemens Campus, Didsbury may not have had noticeable impacts on receivers, because the vast majority of multiplexes showed good picture and audio quality at all survey locations.

If interference to local multiplexes was to be reported in the shadow zone for Siemens Campus, Didsbury within approximately 1 km of the building, the reported effects should be evaluated in the context of the survey results. It would be good practice to arrange for a local aerial installer to visit the reported interference location if the affected channels corresponded to one of the weaker multiplexes. The zone in which interference reports should be considered the most carefully is illustrated in Figure 6 on the following page⁴.

If effects are reported within this zone and they coincide with services provided on the multiplexes that were not received, it would be reasonable to conclude that the development is a contributory factor.

⁴ Copyright © 2021 Google.



Figure 6 Zone of interest for interference reports

APPENDIX A DETAILED SURVEY RESULTS

Location 1

GPS Coordinates: -2.209439 53.393415				
Channel	Signal Strength (dBμV)	BER	Picture Quality	Audio Quality
21 Tiny pop	27.9 ± 0.2	8e-7	Fine	Fine
24 Tiny pop	40.9 ± 0.1	1e-7	Fine	Fine
27 Clubland	35.9 ± 0.1	1e-7	Fine	Fine
29 CCXTV	56.5 ± 0.2	1e-8	Fine	Fine
31 Sky Arts	56.6 ± 0.2	1e-8	Fine	Fine
32 BBC 1 NW	55.3 ± 0.2	1e-8	Fine	Fine
34 ITV 3	54.9 ± 0.1	1e-8	Fine	Fine
35 BBC 2 HD	55.8 ± 0.2	-	Fine	Fine
37 Yesterday	56.5 ± 0.2	1e-8	Fine	Fine
55 BBC News HD	45.5 ± 0.2	-	Fine	Fine

Notes: Horizontally Polarise (HP) Ultra High Frequency (UHF) aerials directed towards Winter Hill and satellite dishes were observed.

Location 2

GPS Coordinates: -2.224881 53.407190				
Channel	Signal Strength (dBμV)	BER	Picture Quality	Audio Quality
21 Tiny pop	29.0 ± 0.3	DND ⁵	DND	DND
24 Tiny pop	29.5 ± 0.2	DND	DND	DND
27 Pop max	29.7 ± 0.3	DND	DND	DND
29 5 Star	41.1 ± 0.3	2e-8	Fine	Fine
31 Challenge	39.6 ± 0.2	5e-7	Fine	Fine
32 BBC 1 NW	35.2 ± 0.2	2e-3	Fine	Fine
34 ITV	35.4 ± 0.2	1e-3	Fine	Fine
35 BBC 1 HD	36.3 ± 0.2	DND	DND	DND
37 Ideal World	37.1 ± 0.2	6e-3	Some interference	Some interference
55 CBeebies HD	36.1 ± 0.2	DND	DND	DND

Notes: HP UHF aerials directed towards Winter Hill were observed. Many were elevated significantly above the roof.

⁵ Did Not Decode.

Location 3

GPS Coordinates: -2.237279 53.415458				
Channel	Signal Strength (dBμV)	BER	Picture Quality	Audio Quality
21 Tiny pop	37.5 ± 0.2	1e-8	Fine	Fine
24 Tiny pop	50.0 ± 0.2	1e-8	Fine	Fine
27 Clubland	40.9 ± 0.2	1e-8	Fine	Fine
29 5 Star	63.9 ± 0.3	1e-8	Fine	Fine
31 Sky Arts	64.4 ± 0.2	1e-8	Fine	Fine
32 BBC 2	63.9 ± 0.2	1e-8	Fine	Fine
34 ITV 3	64.9 ± 0.2	1e-8	Fine	Fine
35 BBC 1 HD	64.0 ± 0.2	1e-8	Fine	Fine
37 Yesterday	64.0 ± 0.2	1e-8	Fine	Fine
55 BBC News HD	52.8 ± 0.2	1e-8	Fine	Fine

Notes: HP UHF aerials directed towards Winter Hill were observed.

Location 4

GPS Coordinates: -2.242670 53.417580				
Channel	Signal Strength (dBμV)	BER	Picture Quality	Audio Quality
21 Tiny pop	29.9 ± 0.2	3e-5	Fine	Fine
24 Tiny pop	36.7 ± 0.2	1e-8	Fine	Fine
27 Clubland	29.9 ± 0.2	2e-2	DND	DND
29 Create and Craft	52.9 ± 0.3	1e-8	Fine	Fine
31 Pick	56.4 ± 0.3	1e-8	Fine	Fine
32 BBC News	55.9 ± 0.3	1e-8	Fine	Fine
34 ITV	54.0 ± 0.2	1e-8	Fine	Fine
35 ITV HD	56.3 ± 0.2	1e-8	Fine	Fine
37 Ideal World	57.4 ± 0.2	1e-8	Fine	Fine
55 Quest HD	46.3 ± 0.2	1e-8	Fine	Fine

Notes: HP UHF aerials directed towards the Winter Hill transmitter and some satellite dishes were observed.

Location 5

GPS Coordinates: -2.246370 53.421572				
Channel	Signal Strength (dBμV)	BER	Picture Quality	Audio Quality
21 Tiny pop	25.1 ± 0.2	DND	DND	DND
24 That's TV	32.3 ± 0.2	1e-8	Fine	Fine
27 Pop max	27.5 ± 0.2	DND	DND	DND
29 5Star	43.4 ± 0.2	4e-7	Fine	Fine
31 Sky Arts	46.0 ± 0.1	1e-8	Fine	Fine
32 BBC 1 NW	44.8 ± 0.2	1e-8	Fine	Fine
34 ITV 3	41.3 ± 0.2	3e-8	Fine	Fine
35 ITV HD	43.8 ± 0.2	1e-8	Fine	Fine
37 Ideal World	46.0 ± 0.3	1e-8	Fine	Fine
55 Quest HD	32.4 ± 0.3	DND	DND	DND

Notes: HP UHF aerials directed towards the Winter Hill transmitter were observed. There is a large multistorey building directly between the survey location and the transmitter.

Location 6

GPS Coordinates: -2.247485 53.423837				
Channel	Signal Strength (dBμV)	BER	Picture Quality	Audio Quality
21 Tiny pop	24.9 ± 0.11	DND	DND	DND
24 That's TV	29.1 ± 0.1	1e-8	Fine	Fine
27 Pop max	26.5 ± 0.2	DND	DND	DND
29 CCXTV	40.9 ± 0.2	1e-8	Fine	Fine
31 Sky News	45.1 ± 0.2	1e-8	Fine	Fine
32 BBC 1 NW	42.0 ± 0.2	1e-8	Fine	Fine
34 ITV	43.3 ± 0.2	1e-8	Fine	Fine
35 BBC 1 HD	43.8 ± 0.3	1e-8	Fine	Fine
37 Yesterday	44.0 ± 0.3	1e-8	Fine	Fine
55 BBC News HD	31.7 ± 0.3	DND	DND	DND

Notes: HP UHF aerials directed towards the Winter Hill transmitter and satellite dishes were observed.

Location 7

GPS Coordinates: -2.197796 53.409104				
Channel	Signal Strength (dBμV)	BER	Picture Quality	Audio Quality
21 Tiny pop	25.4 ± 0.1	DND	DND	DND
24 That's TV	34.3 ± 0.2	1e-8	Fine	Fine
27 Pop max	28.5 ± 0.2	DND	DND	DND
29 Create and Craft	47.3 ± 0.2	1e-8	Fine	Fine
31 (Sky News)	48.4 ± 0.1	1e-8	Fine	Fine
32 BBC 1 NW	46.7 ± 0.2	1e-8	Fine	Fine
34 ITV	40.6 ± 0.2	1e-8	Fine	Fine
35 BBC 2 HD	43.3 ± 0.2	1e-8	Fine	Fine
37 Ideal World	43.8 ± 0.2	1e-8	Fine	Fine
55 QVC HD	31.3 ± 0.3	DND	DND	DND

Notes: HP UHF aerials directed towards the Winter Hill transmitter and satellite dishes were observed.

APPENDIX B SURVEY PHOTOGRAPHS

Location 1



Location 2



Location 3



Location 4



Location 5



Location 6



Location 7





Pager Power Limited
Stour Valley Business Centre
Sudbury
Suffolk
CO10 7GB

Tel: +44 1787 319001 **Email:** info@pagerpower.com **Web:** www.pagerpower.com