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Television Post-Construction Survey Report

Renaker Build Limited

Trinity Islands

September 2025







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Issue	Date	Detail of Changes
1	February 2024	Initial issue
2	September 2025	Updated mitigation measures

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EXECUTIVE SUMMARY

Report Purpose

Pager Power has been commissioned to undertake a post-construction terrestrial television reception survey for the proposed Trinity Islands development located at Water Street, Manchester, which consists of four towers with a maximum altitude of 210.40m above mean sea level (amsl) and 183m above ground level[1] (agl). The post-construction survey has been completed due to reports of terrestrial television reception interreference for a residential building within Slate Wharf. Locations within Slate Wharf have been surveyed. Comparisons between adjacent locations within the baseline and the post-construction survey have also been made to determine whether there has been a significant impact upon terrestrial television signals in the surrounding area. This assessment has been undertaken based on guidance produced by Ofcom.

Conclusions

For six locations[2] adjacent to a terrestrial television aerial within Slate Wharf with reported interference, a reduction in the average main multiplex signal strength was not observed; however, interference was observed for two of these six locations[3]. For each of these two locations, up to two of the main multiplexes either displayed intermittent audio and picture quality or did not decode. In general, it was observed that when trains passed by the adjacent railway the signal was partially affected. The development may have contributed further to the interference at Slate Wharf.

Although four of the six locations adjacent to the aerial within Slate Wharf maintained fine audio and picture quality, this may have been due to the local environment at that time i.e. the presence or absence of trains. Effects are potentially partly influenced by the passing of trains, with two of the six locations adjacent to Slate Wharf demonstrating that interference is possible.

For four locations not within Slate Wharf[4], a reduction in the average main multiplex signal strength was not observed. Furthermore, the main multiplexes maintained fine picture and audio quality.

Overall, interference may have already been partially affected by the passing of adjacent trains and the development may have exacerbated this for the terrestrial television services received at Slate Wharf.

Mitigation

Mitigation for the terrestrial television reception at Slate Wharf has been agreed (see Section 6).

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[1] Considering a ground level of 27.4m as per drawing 10364-Z1-SHP-G200-SE-0001.
[2] Post-construction survey locations 1 to 6.
[3] Post-construction survey locations 4 and 6.
[4] Post-construction survey locations 7 to 10.

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ABOUT PAGER POWER

Pager Power is a dedicated consultancy company based in Suffolk, UK. The company has undertaken projects in 62 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 undertake a post-construction terrestrial television reception survey for the proposed Trinity Islands development located at Water Street, Manchester, which consists of four towers with a maximum altitude of 210.40m above mean sea level (amsl) and 183m above ground level[5] (agl). The post-construction survey has been completed due to reports of terrestrial television reception interreference for a residential building within Slate Wharf. Locations within Slate Wharf have been surveyed. Comparisons between adjacent locations within the baseline and the post-construction survey have also been made to determine whether there has been a significant impact upon terrestrial television signals in the surrounding area. This assessment has been undertaken based on guidance produced by Ofcom.

1.2 Development Description

The Site comprises two distinct plots of land, 'Site C' (0.89 hectares) to the north and 'Site D' (0.89 hectares) to the south, divided by the A6042.

Site C comprises two residential towers of 39 and 48 storeys, providing 907 residential units. Site D comprises two residential towers of approximately 55 and 60 storeys, providing circa 1015 residential units. Each tower sits above a two-deck podium with associated two-storey underground resident parking.

1.3 Proposed Development Elevations

The tower maximum elevation above ordnance datum (AOD) and above ground level (agl) are presented below:

- C1: Maximum elevation AOD = 146.875m. Maximum elevation agl = 119.575m.
- C2: Maximum elevation AOD = 173.350m. Maximum elevation agl = 145.950m.
- D1: Maximum elevation AOD = 210.400m. Maximum elevation agl = 183.000m.
- D2: Maximum elevation AOD = 196.150m. Maximum elevation agl = 168.750m.

[5] Considering a ground level of 27.4m as per drawing 10364-Z1-SHP-G200-SE-0001.

1.4 Proposed Development Boundary

The red line boundary for the proposed development is shown in Figure 1[6] below. The two boundaries are defined as Site C and Site D.

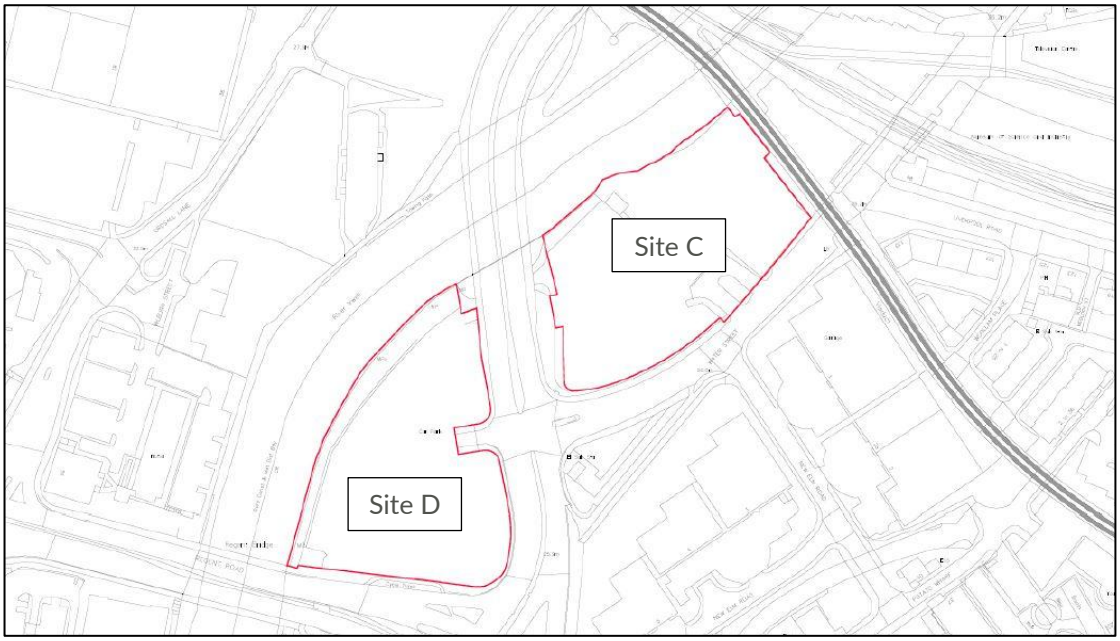


Figure 1 *Proposed development red line boundary*

[6] Source: Simpsonhaugh (cropped).

1.5 Proposed Development Boundary – Aerial Image

The red line boundary for the proposed development overlaid on aerial imagery is shown in Figure 2 below.



Figure 2 *Proposed development red line boundary overlaid on aerial imagery*

1.6 Proposed Development Ground Floor Plan and Elevation

The ground floor plan for the proposed development is shown in Figure 3[7] below.

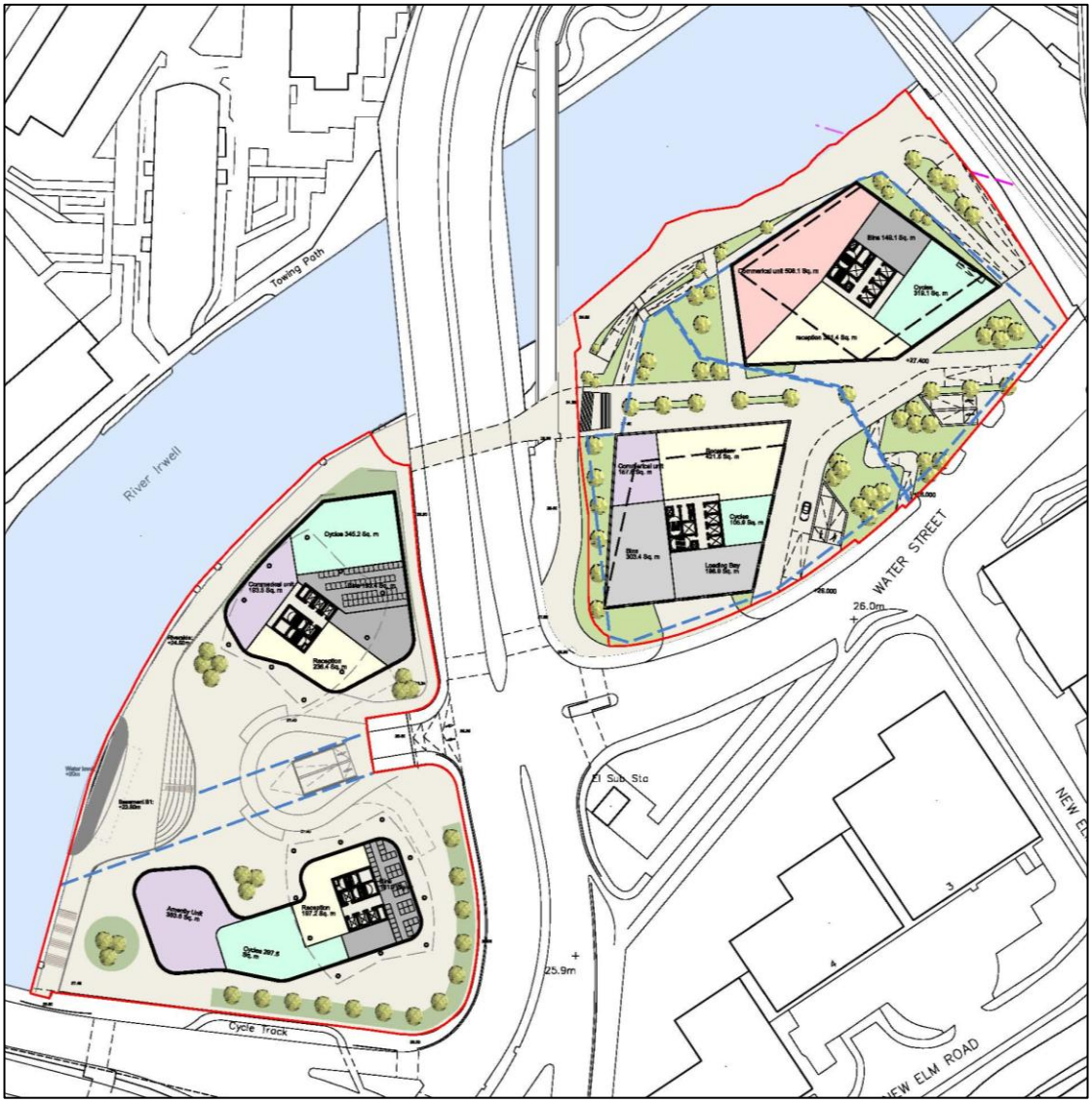


Figure 3 *Proposed development ground floor plan*

[7] Source: Simpsonhaugh (cropped).

1.7 Proposed Development Footprint and Elevations

Figures[8] 4 and 5 below and on the following page show the proposed footprints of each tower with co-ordinates. The maximum elevation of the towers AOD are also shown.

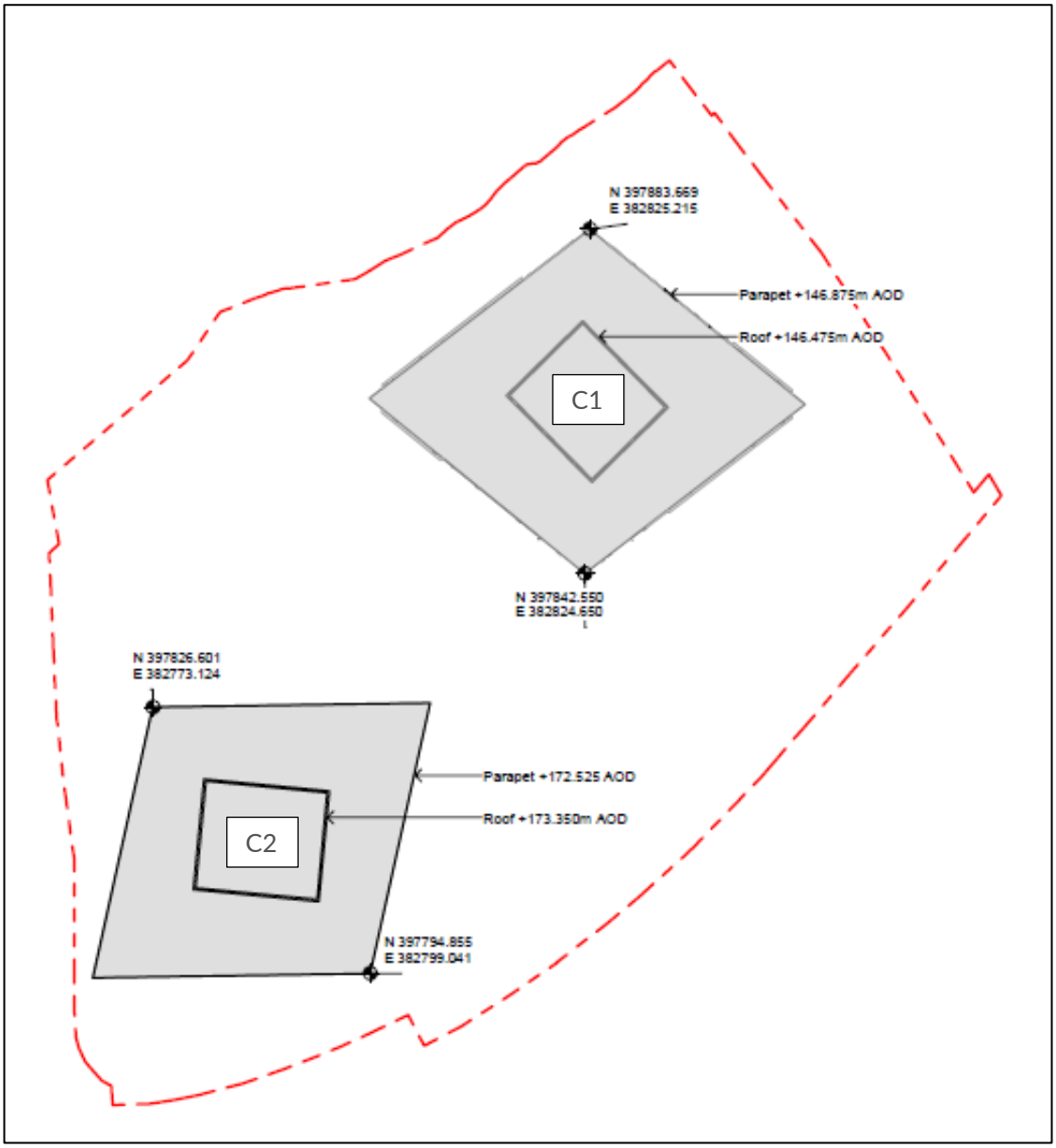


Figure 4 *Proposed development footprint – Towers C1 and C2*

[8] Source: Simpsonhaugh (cropped).

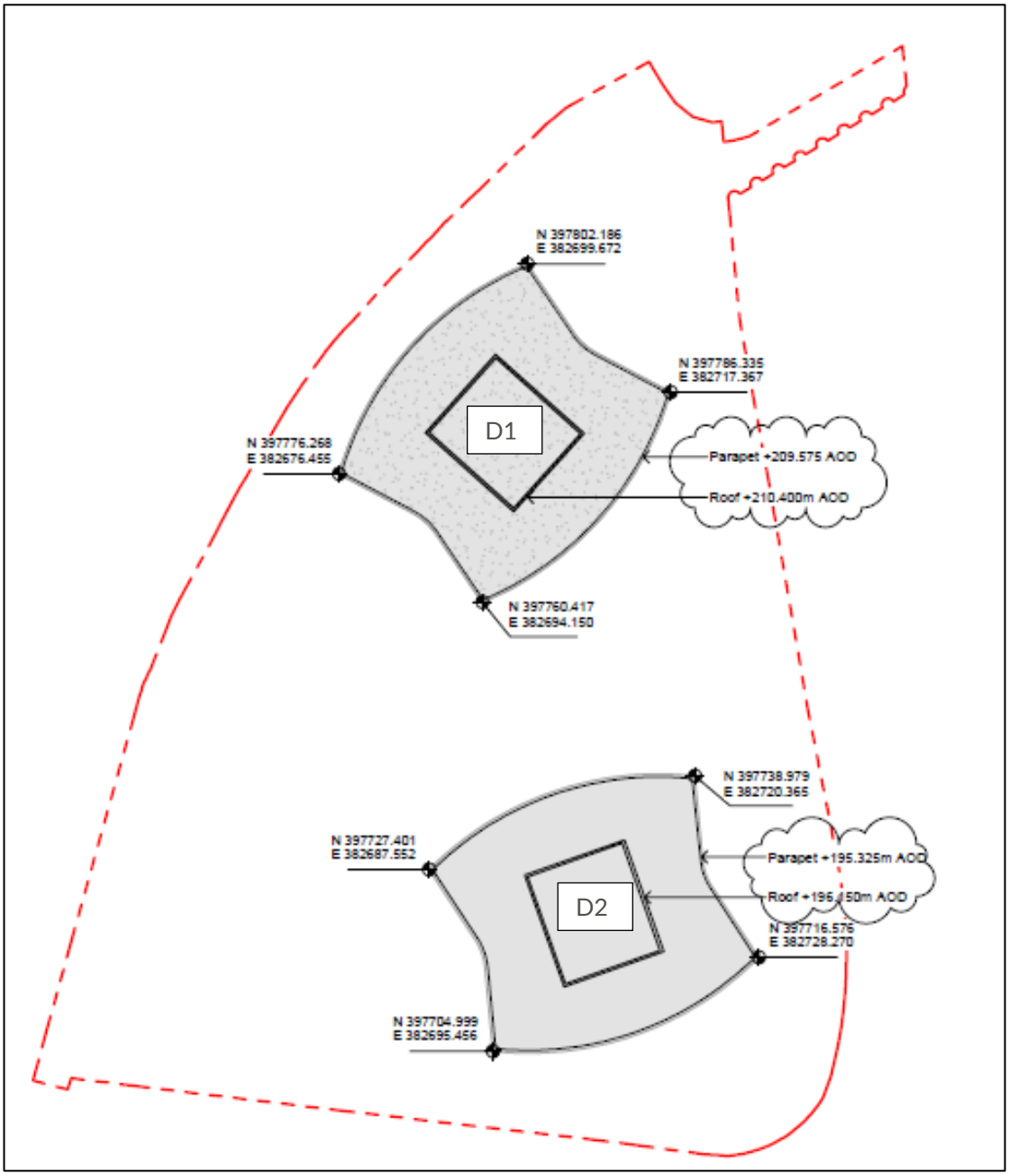


Figure 5 *Proposed development footprint – Towers D1 and D2*

1.8 Proposed Development 3D Representation

Figure 6[9] below shows the 3D representation of the proposed developments. The image is aligned approximately west.



Figure 6 *Proposed development 3D representation*

[9] Source: Simpsonhaugh (cropped).

2 TELEVISION TRANSMITTER DETAILS

2.1 Relevant Transmitter

The Winter Hill transmitter predominantly serves the area around the development[10]. Digital television services are broadcast via Ultra High Frequency (UHF) signals.

2.2 Winter Hill Main Transmitter

Winter Hill is one of the UK's main television transmitters located approximately 23.6km northwest of the development. Channel 55 (COM7) is no longer providing services. All other channels remain the same as the baseline survey.

2.2.1 Baseline Survey Channels

The channels broadcast by Winter Hill during the baseline survey are presented in Tables 1 and 2 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*

	Local Multiplexes		
Service	COM 7	LTVmux	Glmux
Channel	55	24	27
Power	25.7kW	2 kW	1 kW

Table 2 *Winter Hill additional transmissions (local multiplexes)*

[10] Based on coverage maps and Digital UK information.

2.2.2 Post-Construction Survey Channels

The channels broadcast by Winter Hill during the post-construction survey are presented in Tables 3 and 4 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 3 *Winter Hill main transmissions*

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

Table 4 *Winter Hill additional transmissions (local multiplexes)*

3 BUILDINGS AND TELEVISION INTERFERENCE

3.1 Technical Overview

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.

3.2 Interference mechanisms

There are two ways that buildings can cause interference to television reception, these are described below.

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 southeast of the 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 7 on the following page[11], taken from Section 3.2 of an Ofcom paper[12] regarding the impact of buildings on broadcast signals.

[11] Source: Ofcom (2009): Tall Structures and their impact on broadcast and other wireless services.
[12] Reference as above.

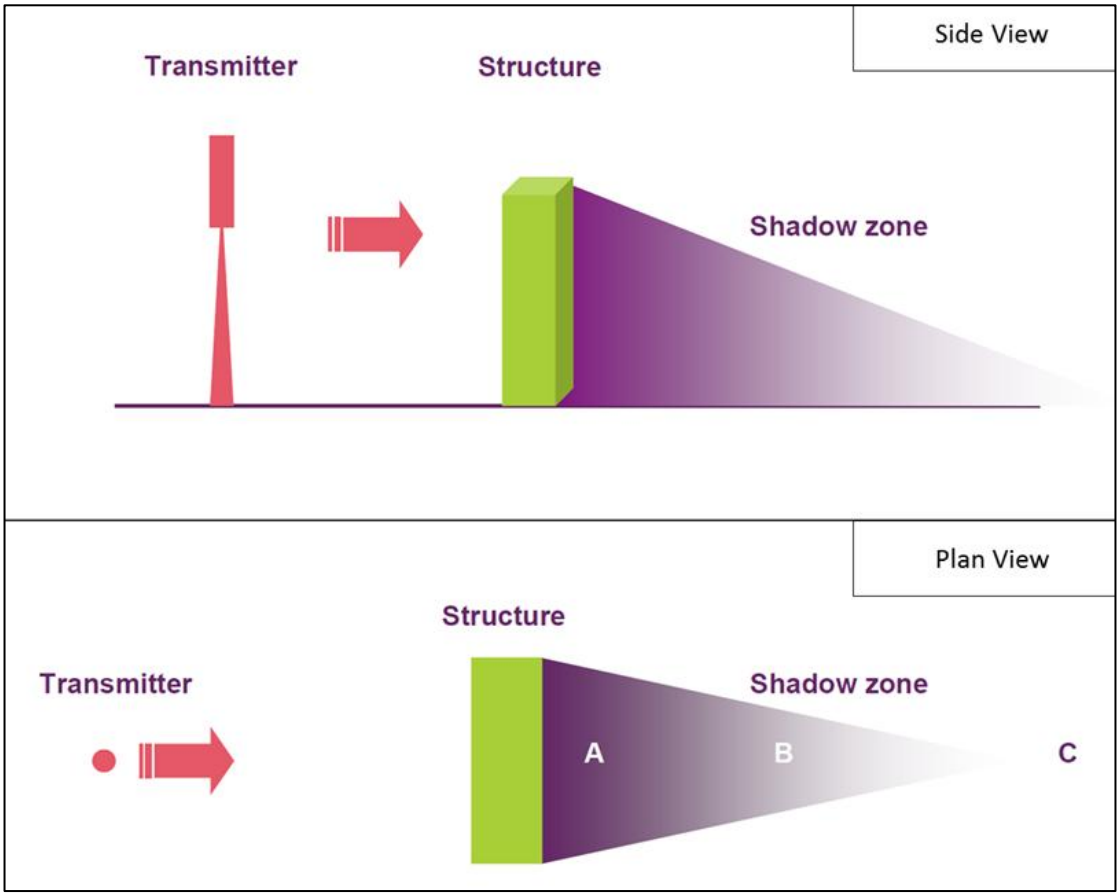


Figure 7 *Diffraction loss zones*

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

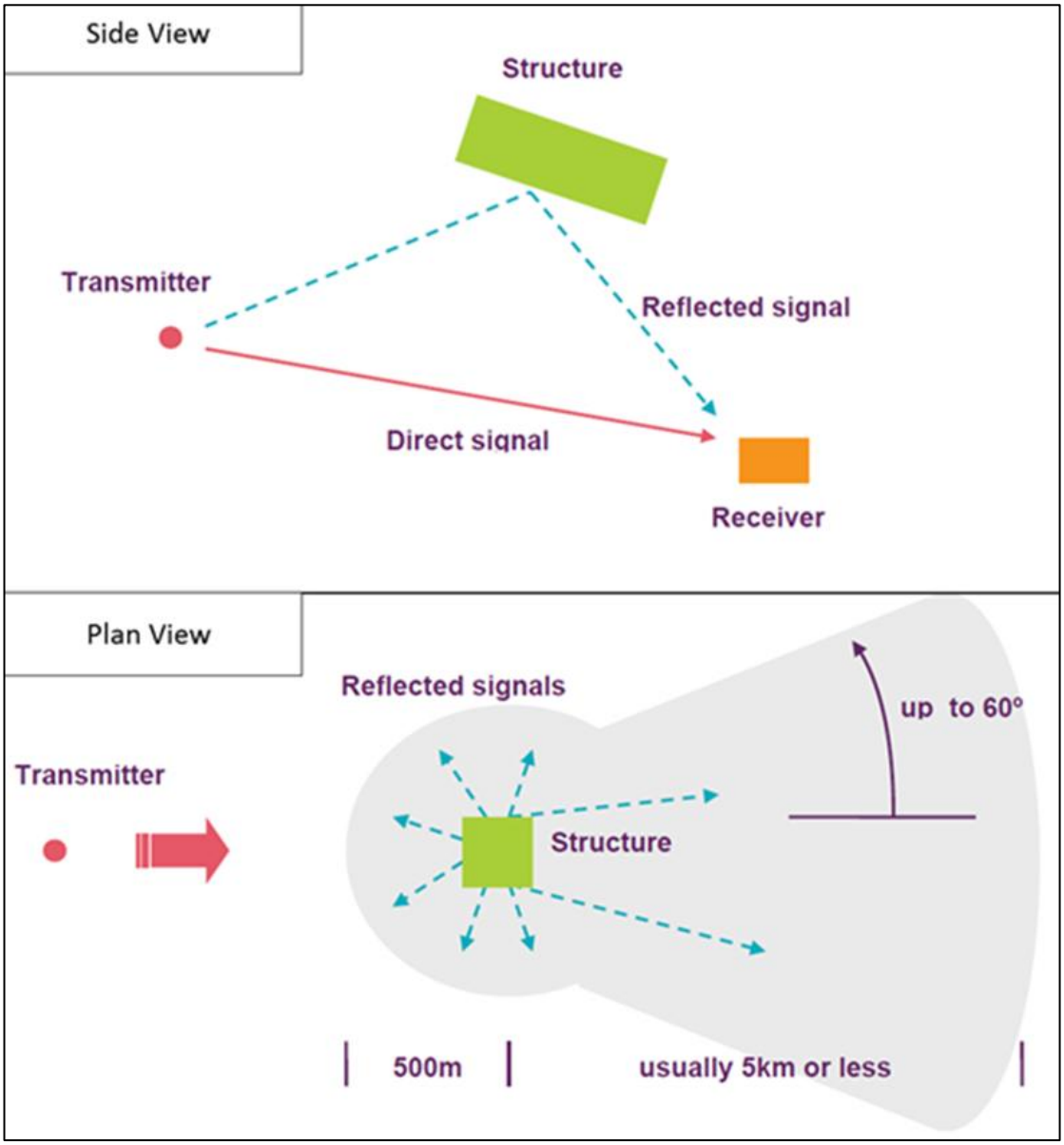


Figure 8 *Reflection zones*

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 degrees[13].

[13] 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.

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 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.

4 TECHNICAL ASSESSMENT

4.1 Potential Interference Areas

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

In the case of the shadow zone, this has been 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 7 in the previous section. Figure 9 below shows the potential interference areas associated with the development.

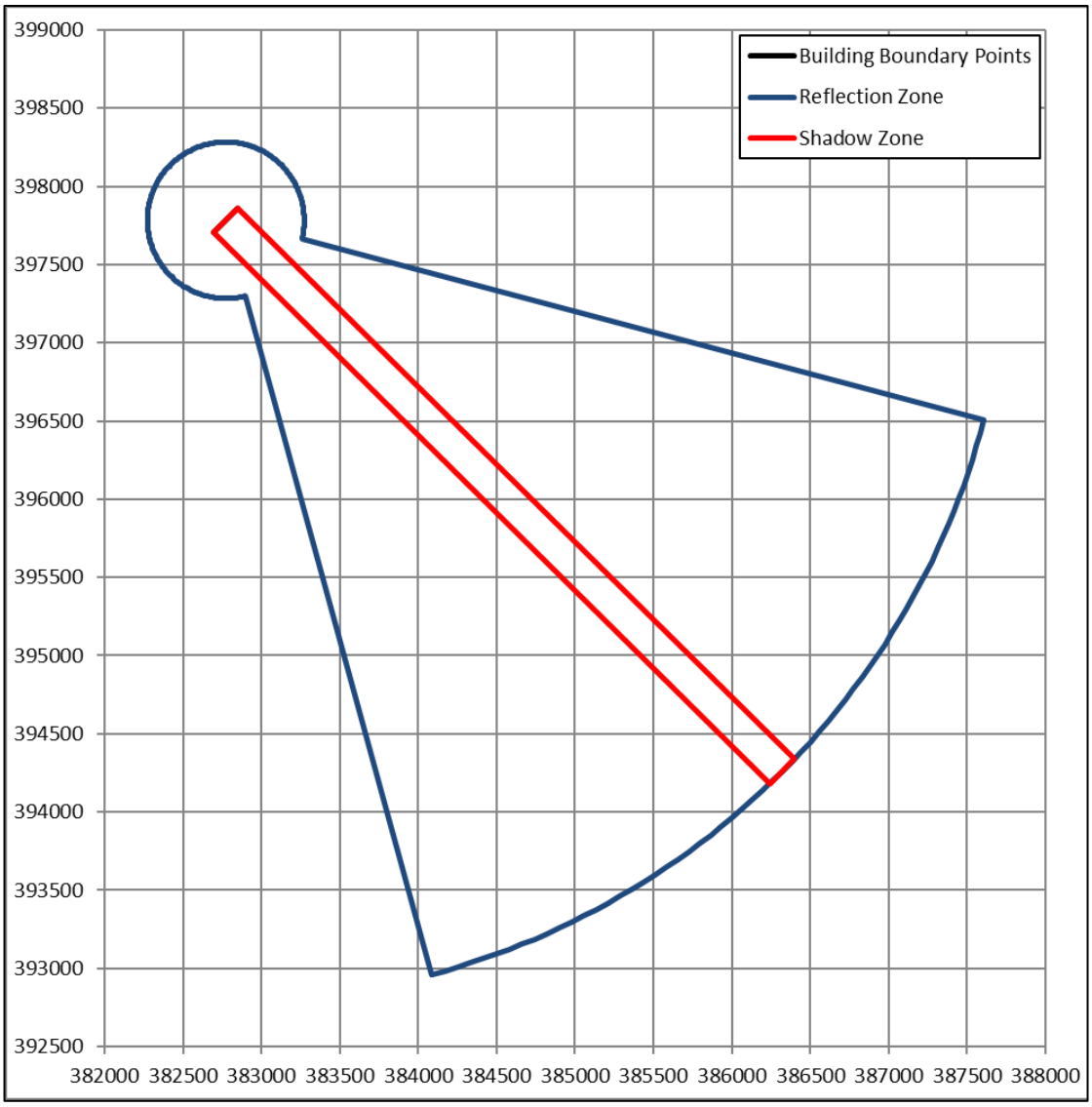


Figure 9 *Interference areas*

Figure 10 below shows the interference zones overlaid onto an aerial image of the area. The purple zone shows the combined shadow zone for D1 and D2. The turquoises zone shows the combined shadow zone for C1 and C2. The clearance between the two shadow zones is approximately 40m. There remains a small clearance between tower C1 and C2 relative to the Winter Hill transmitter however these towers were assessed as a single obstruction to remain conservative. The combined reflection zone for all towers is defined by the blue line.

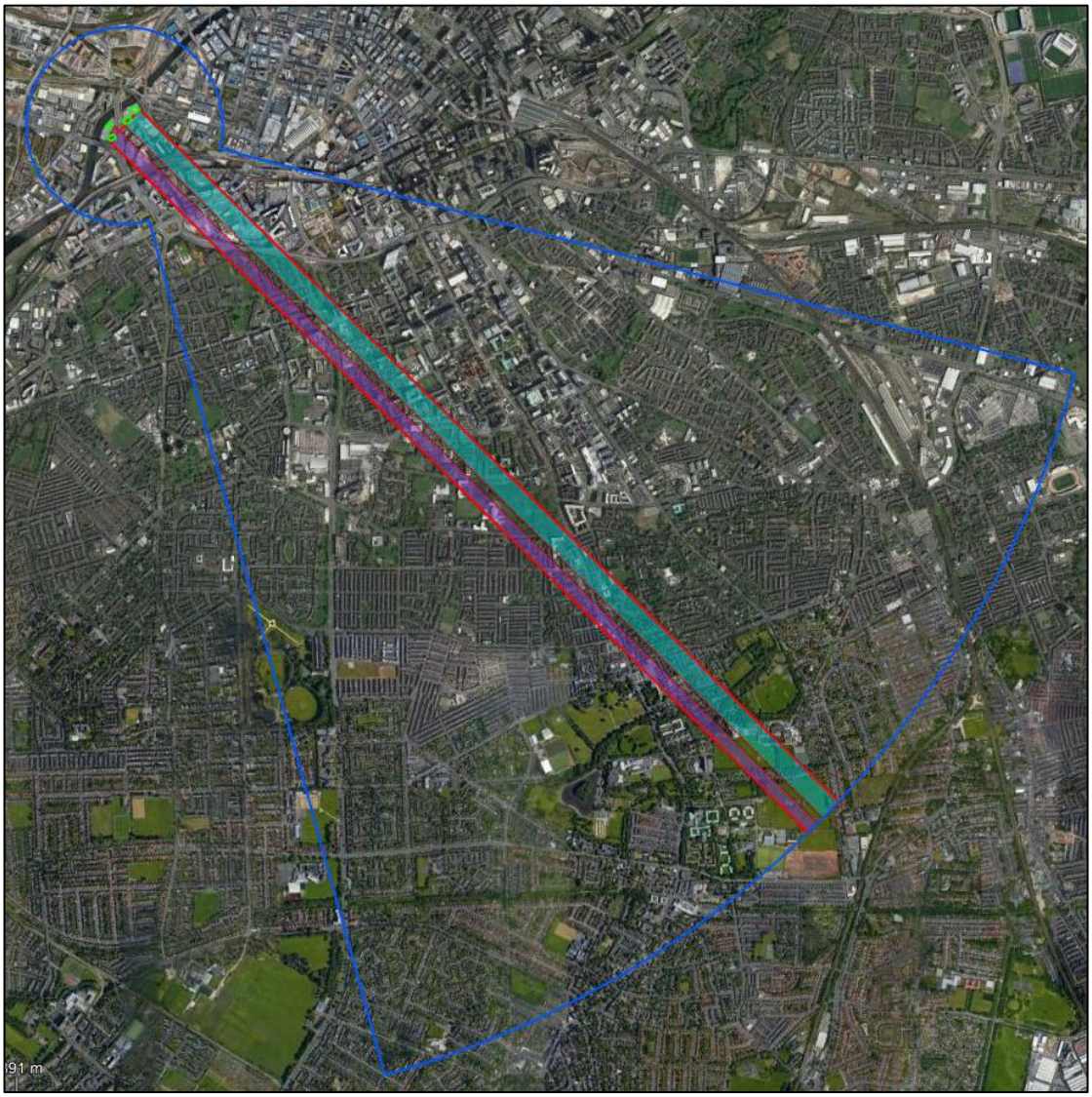


Figure 10 *Interference zones map*

Figure 11 below shows the interference zones overlaid onto an aerial image of the area zoomed in on approximately the first 1.5km of the shadow zone for all towers. The footprints of the towers are shown, defined by the green lines.



Figure 11 *Interference zones map zoomed in – approx. first 1.5km*

4.2 Potential Diffraction Issues

The shadow zone passes over urban areas that contain commercial and residential buildings. Areas closest to the development are at the highest risk of experiencing television interference. This is typically limited to 1km based on Pager Power's assessment experience. Commercial buildings, multi-storey flats, and three to five-storey residential properties (Slate Wharf) are located within 1km of the development shadow zone.

4.3 Potential Reflection Issues

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 development is unobstructed.

- The angle between the reflected signal via the 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 development. In particular, locations that are below radio line of sight from the transmitter are unlikely to have an unobstructed path to the development, due to their relative heights. Impacts due to reflections are considered unlikely.

5 TELEVISION BASELINE AND POST-CONSTRUCTION SURVEY

5.1 Overview

The purpose of the baseline survey was to establish signal strength and quality in the area before the development was built. The baseline survey serves three 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.

The post-construction survey has been undertaken to determine if interference has occurred for terrestrial television services received at Slate Wharf and whether it is attributable to the development.

A baseline television reception survey was undertaken for the development on the 20th October 2020. The post-construction survey was undertaken for the development on the 12th of February 2024.

Survey measurements were taken using Pager Power's custom survey vehicle with a wideband UHF aerial extended to a height of 10 metres above ground level. This was connected to television analyser to record the signal strength and stability.

The strength of the recorded signals is categorised in accordance with Table 5 below.

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

Table 5 *Signal strength categories*

5.2 Survey Locations

Figures 12 and 13 on the following pages show the survey locations overlaid onto aerial photography. The development location and the shadow zone are also shown. The orange radial icons show the post-construction survey locations, the red squares show the baseline survey locations from 2020.

The post-construction survey has been completed due to reports of terrestrial television reception interreference for a residential building within Slate Wharf. Post-construction survey locations 1 to 6 were chosen within close vicinity to Slate Wharf. Locations 1 to 3 and 6 are located within the shadow zone whereas locations 4 and 5 are located between the two shadow zones. Survey location 2 is located closest to the horizontally polarized terrestrial television aerial which is reported to have experienced interference. The signal from this aerial located on Slate Wharf is relayed to residents within the adjacent residential buildings (blue outlined area). A railway line is located adjacent to the north of the proposed development. Figures 14 and 15 on the pages 31 and 32 show the aerial that pertains to the reported interference.

Post-construction survey locations 6 to 8 and 10 re-visit baseline survey locations 2 to 5 for comparative purposes. These baseline survey locations were revisited as best as possible for the post-construction survey[14].

Post-construction survey location 9 is located outside of the shadow zone and was surveyed for comparative purposes.

[14] Safe and available access influenced the specific position on the day.

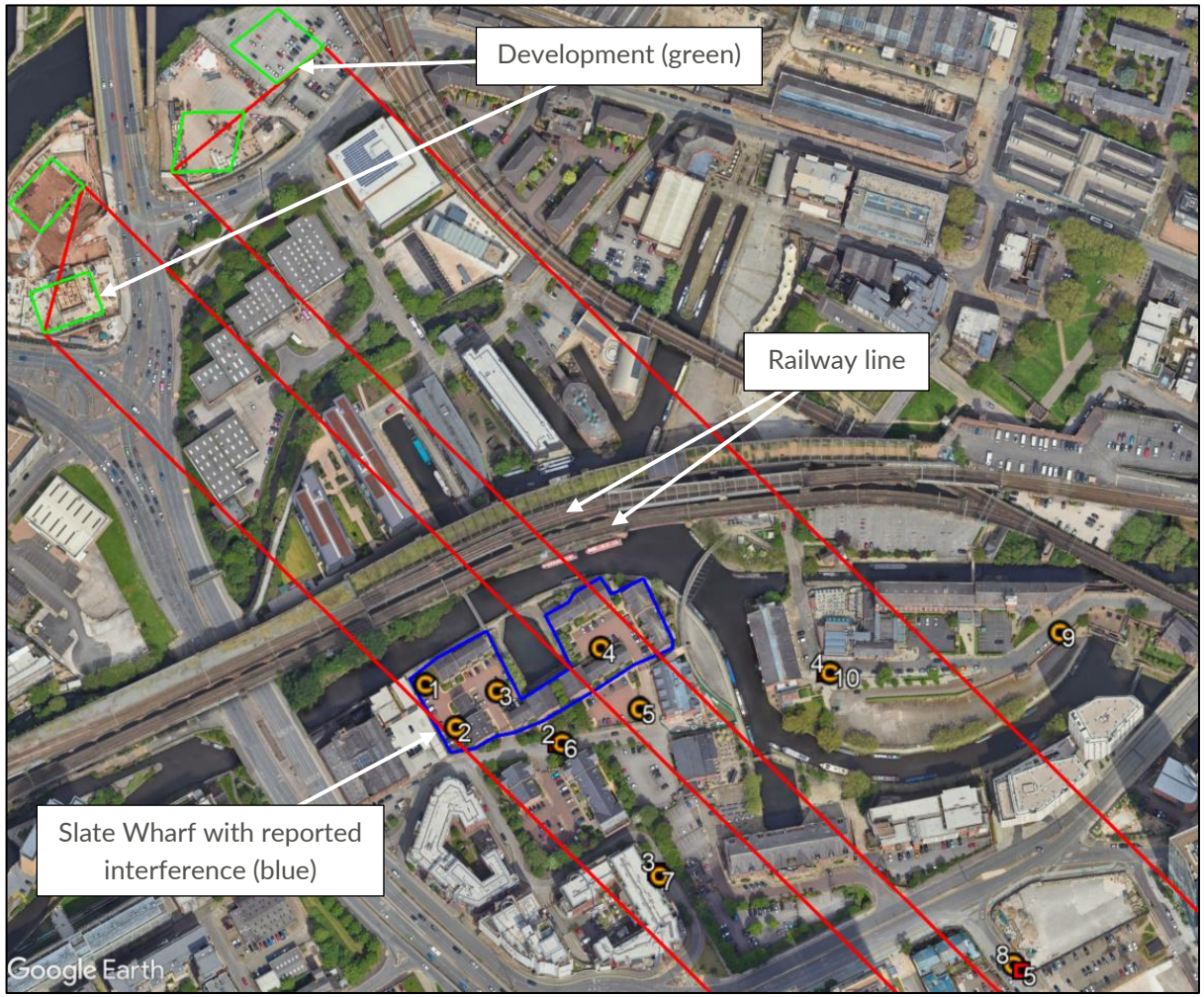


Figure 12 *Survey locations*



Figure 13 *Survey locations (zoomed in)*

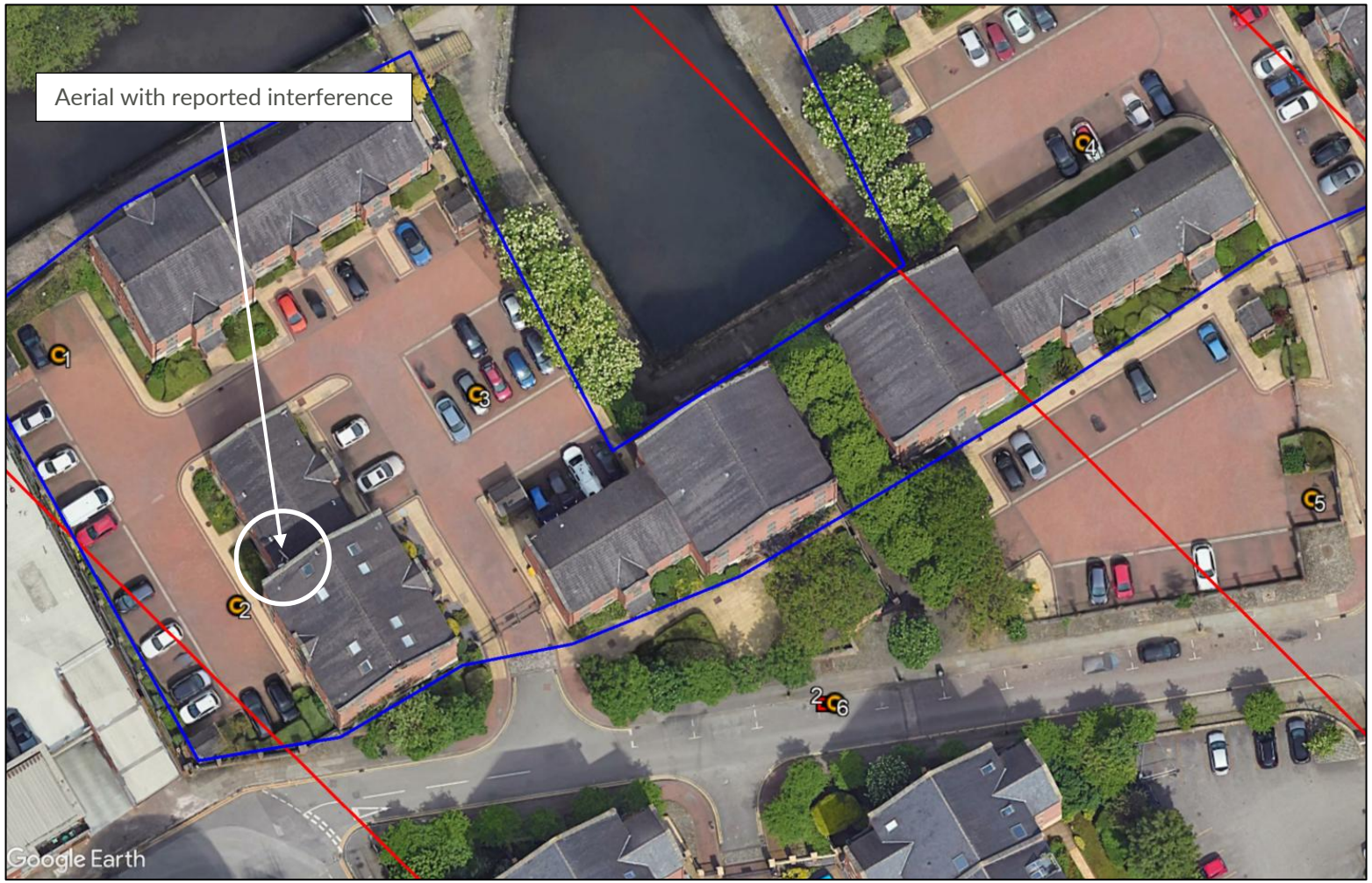


Figure 14 *Survey locations 1 to 6 and aerial with reported interference*



Figure 15 *Survey location 2 and aerial with reported interference*

5.3 Survey Results

A summary of the television survey results is presented in Table 4 below. Full post-construction survey results are shown in Appendix A. Post-construction survey photographs are shown in Appendix B. Full baseline surveys results and survey photographs are shown in Appendix C and D.

Most Relevant Baseline Survey Location	Post-Construction Location	Baseline Average Measured Signal Strength (dB)	Post-Construction Average Measured Signal Strength (dB)	Remarks
2	1	Main TV MUX: 44 (Moderate) Local TV MUX: 31 (Low) All main multiplexes displayed fine picture and audio quality, with signal fluctuations of less than 1dB and no signs of interference. Two local multiplexes were not decoded at this location.	Average: 48.3 (Good) Main TV MUX: 52.7 (Good) Local TV MUX: 35.1 (Moderate) All main multiplexes displayed fine picture and audio quality. An average of good signal strength and signal fluctuations of less than or equal to 2dB. One local multiplex displayed fine picture and audio quality. One local multiplex did not decode. An average of moderate signal strength and signal fluctuations of less than or equal to 0.5dB.	A reduction in the average main multiplex signal strength was not observed. Some signs of interference were observed when trains passed by; however, the main multiplexes maintained fine picture and audio quality.

Most Relevant Baseline Survey Location	Post-Construction Location	Baseline Average Measured Signal Strength (dB)	Post-Construction Average Measured Signal Strength (dB)	Remarks
2	2	Main TV MUX: 44 (Moderate) Local TV MUX: 31 (Low) All main multiplexes displayed fine picture and audio quality, with signal fluctuations of less than 1dB and no signs of interference. Two local multiplexes were not decoded at this location.	Average: 47.7 (Good) Main TV MUX: 50.6 (Good) Local TV MUX: 39.1 (Moderate) All main multiplexes displayed fine picture and audio quality. An average of good signal strength and signal fluctuations of less than or equal to 1dB. Both local multiplexes displayed fine picture and audio quality. An average of moderate signal strength and signal fluctuations of less than or equal to 0.3dB.	A reduction in the average main multiplex signal strength was not observed. Some signs of interference were observed when trains passed by; however, the main multiplexes maintained fine picture and audio quality.

Most Relevant Baseline Survey Location	Post-Construction Location	Baseline Average Measured Signal Strength (dB)	Post-Construction Average Measured Signal Strength (dB)	Remarks
2	3	Main TV MUX: 44 (Moderate) Local TV MUX: 31 (Low) All main multiplexes displayed fine picture and audio quality, with signal fluctuations of less than 1dB and no signs of interference. Two local multiplexes were not decoded at this location.	Average: 46.2 (Good) Main TV MUX: 49.7 (Good) Local TV MUX: 35.7 (Moderate) All main multiplexes displayed fine picture and audio quality. An average of good signal strength and signal fluctuations of less than or equal to 1dB. One local multiplex displayed fine picture and audio quality. One local multiplex did not decode. An average of moderate signal strength and signal fluctuations of less than or equal to 0.5dB.	A reduction in the average main multiplex signal strength was not observed.

Most Relevant Baseline Survey Location	Post-Construction Location	Baseline Average Measured Signal Strength (dB)	Post-Construction Average Measured Signal Strength (dB)	Remarks
2	4	Main TV MUX: 44 (Moderate) Local TV MUX: 31 (Low) All main multiplexes displayed fine picture and audio quality, with signal fluctuations of less than 1dB and no signs of interference. Two local multiplexes were not decoded at this location.	Average: 45.1 (Good) Main TV MUX: 48.8 (Good) Local TV MUX: 34.2 (Low) Four of the six main multiplexes displayed fine picture and audio quality. One main multiplex displayed intermittent picture and audio. One main multiplex did not decode. An average of good signal strength and signal fluctuations of less than or equal to 3dB. One local multiplex displayed fine picture and audio quality. One local multiplex displayed intermittent picture and audio. An average of low signal strength and signal fluctuations of less than or equal to 2dB.	A reduction in the average main multiplex signal strength was not observed. However, interference was observed for two main multiplexes when trains passed by which either displayed intermittent audio and picture or did not decode. **The development may have contributed a small amount to this interference because this location is not within the shadow zone.**

Most Relevant Baseline Survey Location	Post-Construction Location	Baseline Average Measured Signal Strength (dB)	Post-Construction Average Measured Signal Strength (dB)	Remarks
2	5	Main TV MUX: 44 (Moderate) Local TV MUX: 31 (Low) All main multiplexes displayed fine picture and audio quality, with signal fluctuations of less than 1dB and no signs of interference. Two local multiplexes were not decoded at this location.	Average: 48.4 (Good) Main TV MUX: 53.4 (Good) Local TV MUX: 33.7 (Low) All main multiplexes displayed fine picture and audio quality. An average of good signal strength and signal fluctuations of less than or equal to 5dB. One local multiplex displayed intermittent picture and audio. One local multiplex did not decode. An average of low signal strength and signal fluctuations of less than or equal to 1dB.	A reduction in the average main multiplex signal strength was not observed.

Most Relevant Baseline Survey Location	Post-Construction Location	Baseline Average Measured Signal Strength (dB)	Post-Construction Average Measured Signal Strength (dB)	Remarks
2	6	Main TV MUX: 44 (Moderate) Local TV MUX: 31 (Low) All main multiplexes displayed fine picture and audio quality, with signal fluctuations of less than 1dB and no signs of interference. Two local multiplexes were not decoded at this location.	Average: 46.2 (Good) Main TV MUX: 49.9 (Good) Local TV MUX: 35.1 (Moderate) Five of the six main multiplexes displayed fine picture and audio quality. One main multiplex did not decode. An average of good signal strength and signal fluctuations of less than or equal to 0.5dB. One local multiplex displayed intermittent picture and audio. One local multiplex did not decode. An average of moderate signal strength and signal fluctuations of less than or equal to 1dB.	A reduction in the average main multiplex signal strength was not observed. However, interference was observed for one main multiplex which did not decode. **The development may have contributed to this interference because this location is within the shadow zone and all main multiplexes displayed fine audio and picture quality during the baseline survey.**

Most Relevant Baseline Survey Location	Post-Construction Location	Baseline Average Measured Signal Strength (dB)	Post-Construction Average Measured Signal Strength (dB)	Remarks
3	7	Main TV MUX: 47 (Good) Local TV MUX: 31 (Low) All main multiplexes displayed fine picture and audio quality, with signal fluctuations of less than 1dB and no signs of interference. Two local multiplexes were not decoded at this location.	Average: 45.2 (Good) Main TV MUX: 49.1 (Good) Local TV MUX: 33.3 (Low) All main multiplexes displayed fine picture and audio quality. An average of good signal strength and signal fluctuations of less than or equal to 0.3dB. One local multiplex displayed fine picture and audio quality. One local multiplex did not decode. An average of low signal strength and signal fluctuations of less than or equal to 0.4dB.	A reduction in the average main multiplex signal strength was not observed.

Most Relevant Baseline Survey Location	Post-Construction Location	Baseline Average Measured Signal Strength (dB)	Post-Construction Average Measured Signal Strength (dB)	Remarks
5	8	Main TV MUX: 49 (Good) Local TV MUX: 35 (Moderate) All main multiplexes displayed fine picture and audio quality, with signal fluctuations of less than 1dB and no signs of interference. One local multiplex was not decoded at this location.	Average: 50.1 (Good) Main TV MUX: 54.4 (Good) Local TV MUX: 37.3 (Moderate) All main multiplexes displayed fine picture and audio quality. An average of good signal strength and signal fluctuations of less than or equal to 0.5dB. Both local multiplexes displayed fine picture and audio quality. An average of moderate signal strength and signal fluctuations of less than or equal to 0.3dB.	A reduction in the average main multiplex signal strength was not observed.

Most Relevant Baseline Survey Location	Post-Construction Location	Baseline Average Measured Signal Strength (dB)	Post-Construction Average Measured Signal Strength (dB)	Remarks
4	9	Main TV MUX: 51 (Good) Local TV MUX: 37 (Moderate) All main and local multiplexes displayed fine picture and audio quality, with signal fluctuations of less than 1dB and no signs of interference.	Average: 48.7 (Good) Main TV MUX: 52.0 (Good) Local TV MUX: 38.8 (Moderate) All main multiplexes displayed fine picture and audio quality. An average of good signal strength and signal fluctuations of less than or equal to 1dB. One local multiplex displayed fine picture and audio quality. One local multiplex displayed intermittent picture and audio. An average of moderate signal strength and signal fluctuations of less than or equal to 2dB.	A reduction in the average main multiplex signal strength was not observed.

Most Relevant Baseline Survey Location	Post-Construction Location	Baseline Average Measured Signal Strength (dB)	Post-Construction Average Measured Signal Strength (dB)	Remarks
4	10	Main TV MUX: 51 (Good) Local TV MUX: 37 (Moderate) All main and local multiplexes displayed fine picture and audio quality, with signal fluctuations of less than 1dB and no signs of interference.	Average: 52.9 (Good) Main TV MUX: 57.6 (Very Good) Local TV MUX: 38.8 (Moderate) All main multiplexes displayed fine picture and audio quality. An average of very good signal strength and signal fluctuations of less than or equal to 0.4dB. Both local multiplexes displayed fine picture and audio quality. An average of moderate signal strength and signal fluctuations of less than or equal to 0.2dB.	A reduction in the average main multiplex signal strength was not observed.

Table 6 *Television survey results*

5.4 Survey Results Conclusions

For six locations[15] adjacent to a terrestrial television aerial within Slate Wharf with reported interference, a reduction in the average main multiplex signal strength was not observed; however, interference was observed for two of these six locations[16]. For each of these two locations, up to two of the main multiplexes either displayed intermittent audio and picture quality or did not decode. In general, it was observed that when trains passed by the adjacent railway the signal was partially affected. The development may have contributed further to the interference at Slate Wharf.

Although four of the six locations adjacent to the aerial within Slate Wharf maintained fine audio and picture quality, this may have been due to the local environment at that time i.e. the presence or absence of trains. Effects are potentially partly influenced by the passing of trains, with two of the six locations adjacent to Slate Wharf demonstrating that interference is possible.

For four locations not within Slate Wharf[17], a reduction in the average main multiplex signal strength was not observed. Furthermore, the main multiplexes maintained fine picture and audio quality.

Overall, interference may have already been partially affected by the passing of adjacent trains and the development may have exacerbated this for the terrestrial television services received at Slate Wharf.

[15] Post-construction survey locations 1 to 6.
[16] Post-construction survey locations 4 and 6.
[17] Post-construction survey locations 7 to 10.

6 MITIGATION

6.1 Overview

The most effective form of mitigation is dependent on the specific impact. The most common mitigation options 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, internet television, or cable.

6.2 Implemented Mitigation

The impact at Slate Wharf has been discussed between the developer of the Trinity Islands development, and property managers/landowners of Slate Wharf. Mitigation by way of financial compensation has been agreed[18].

[18] Source: Emails between Renaker and Stevenson Whyte (Appendix E)

7 CONCLUSIONS

7.1 Conclusions

For six locations[19] adjacent to a terrestrial television aerial within Slate Wharf with reported interference, a reduction in the average main multiplex signal strength was not observed; however, interference was observed for two of these six locations[20]. For each of these two locations, up to two of the main multiplexes either displayed intermittent audio and picture quality or did not decode. In general, it was observed that when trains passed by the adjacent railway the signal was partially affected. The development may have contributed further to the interference at Slate Wharf.

Although four of the six locations adjacent to the aerial within Slate Wharf maintained fine audio and picture quality, this may have been due to the local environment at that time i.e. the presence or absence of trains. Effects are potentially partly influenced by the passing of trains, with two of the six locations adjacent to Slate Wharf demonstrating that interference is possible.

For four locations not within Slate Wharf[21], a reduction in the average main multiplex signal strength was not observed. Furthermore, the main multiplexes maintained fine picture and audio quality.

Overall, interference may have already been partially affected by the passing of adjacent trains and the development may have exacerbated this for the terrestrial television services received at Slate Wharf.

7.2 Mitigation

Mitigation for the terrestrial television reception at Slate Wharf has been agreed and will be implemented (see Section 6).

[19] Post-construction survey locations 1 to 6.
[20] Post-construction survey locations 4 and 6.
[21] Post-construction survey locations 7 to 10.

APPENDIX A – POST-CONSTRUCTION SURVEY RESULTS

Location 1

Coordinates: Lon: -2.25900, Lat: 53.47404					
Channel	**Service**	**Signal Strength (dBμV)**	**BER**	**Picture**	**Audio**
24	LTVmux	40.1 +/- 0.5	4x10^-7	Fine	Fine
27	Glmux	30.2 +/- 0.5	-	DND[22]	DND
29	SDN	51.2 +/- 2.0	4x10^-8 to 1x10^-5	Fine	Fine
31	Arqiva A	56.2 +/- 0.2	1x10^-7	Fine	Fine
32	BBC A	53.2 +/- 0.3	1x10^-7	Fine	Fine
34	Digital 3&4	53.0 +/- 0.3	1x10^-8	Fine	Fine
35-	BBC B	52.5 +/- 0.5	1x10^-8	Fine	Fine
37	Arqiva B	50.2 +/- 1.0	1x10^-7 to 2x10^-6	Fine	Fine

Notes: One HP UHF[23] aerial was observed at this location. Three satellite dishes were observed at this location.

[22] Did not decode.
[23] Ultra-High Frequency

Location 2

Coordinates: Lon: -2.25874, Lat: 53.47383					
Channel	**Service**	**Signal Strength (dBμV)**	**BER**	**Picture**	**Audio**
24	LTVmux	41.0 +/- 0.3	1x10^-7	Fine	Fine
27	Glmux	37.3 +/- 0.3	2x10^-5	Fine	Fine
29	SDN	53.2 +/- 0.3	1x10^-8	Fine	Fine
31	Arqiva A	49.4 +/- 0.3	1x10^-7	Fine	Fine
32	BBC A	50.5 +/- 0.3	1x10^-7	Fine	Fine
34	Digital 3&4	51.0 +/- 1.0	1x10^-8	Fine	Fine
35-	BBC B	49.9 +/- 1.0	1x10^-8	Fine	Fine
37	Arqiva B	49.7 +/- 1.0	1x10^-7 to 5x10^-6	Fine	Fine

Notes: One HP UHF aerial was observed at this location. No satellite dishes were observed at this location.

Location 3

Coordinates: Lon: -2.25840, Lat: 53.47401					
Channel	**Service**	**Signal Strength (dBμV)**	**BER**	**Picture**	**Audio**
24	LTVmux	37.5 +/- 0.5	3x10^-7	Fine	Fine
27	Glmux	34.0 +/- 0.1	-	DND	DND
29	SDN	48.5 +/- 1.0	2x10^-5	Fine	Fine
31	Arqiva A	49.7 +/- 0.3	1x10^-6	Fine	Fine
32	BBC A	53.0 +/- 0.4	1x10^-7	Fine	Fine
34	Digital 3&4	48.0 +/- 1.0	1x10^-7	Fine	Fine
35-	BBC B	47.0 +/- 0.5	1x10^-7	Fine	Fine
37	Arqiva B	52.1 +/- 0.5	5x10^-8	Fine	Fine

Notes: One HP UHF aerial was observed at this location. Three satellite dishes were observed at this location.

Location 4

Coordinates: Lon: -2.25754, Lat: 53.47422					
Channel	**Service**	**Signal Strength (dBμV)**	**BER**	**Picture**	**Audio**
24	LTVmux	35.0 +/- 2.0	1x10^-4 to 1x10^-7	Fine	Fine
27	Glmux	33.5 +/- 0.5	3x10^-2	Intermittent	Intermittent
29	SDN	49.0 +/- 3.0	1x10^-4 to 1x10^-8	Fine	Fine
31	Arqiva A	48.5 +/- 1.0	4x10^-4 to 1x10^-3	Fine	Fine
32	BBC A	47.0 +/- 0.5	1x10^-4	Fine	Fine
34	Digital 3&4	50.5 +/- 0.5	7x10^-8	Fine	Fine
35-	BBC B	47.5 +/- 1.0	1x10^-1	DND	DND
37	Arqiva B	50.3 +/- 2.0	1x10^-3 to DND	Intermittent	Intermittent

Notes: No HP UHF aerial was observed at this location. Multiple satellite dishes were observed at this location.

Location 5

Coordinates: Lon: -2.25721, Lat: 53.47392					
Channel	**Service**	**Signal Strength (dBμV)**	**BER**	**Picture**	**Audio**
24	LTVmux	34.9 +/- 1.0	1x10^-3 to 1x10^-8	Intermittent	Intermittent
27	Glmux	32.5 +/- 1.0	-	DND	DND
29	SDN	54.4 +/- 0.5	1x10^-7	Fine	Fine
31	Arqiva A	56.9 +/- 0.3	1x10^-8	Fine	Fine
32	BBC A	56.6 +/- 0.3	1x10^-7	Fine	Fine
34	Digital 3&4	52.0 +/- 5.0	1x10^-6 to 1x10^-8	Fine	Fine
35-	BBC B	52.0 +/- 1.0	1x10^-7	Fine	Fine
37	Arqiva B	48.5 +/- 1.0	1x10^-4	Fine	Fine

Notes: No HP UHF aerial was observed at this location. Multiple satellite dishes were observed at this location.

Location 6

Coordinates: Lon: -2.25789, Lat: 53.47375					
Channel	**Service**	**Signal Strength (dBμV)**	**BER**	**Picture**	**Audio**
24	LTVmux	35.5 +/- 1.0	2x10^-2	Intermittent	Intermittent
27	Glmux	34.7 +/- 0.3	-	DND	DND
29	SDN	48.7 +/- 0.3	1x10^-4	Fine	Fine
31	Arqiva A	52.0 +/- 0.4	5x10^-6	Fine	Fine
32	BBC A	51.0 +/- 0.3	1x10^-8	Fine	Fine
34	Digital 3&4	48.9 +/- 0.4	6x10^-6	Fine	Fine
35-	BBC B	45.7 +/- 0.5	-	DND	DND
37	Arqiva B	53.2 +/- 0.3	1x10^-8	Fine	Fine

Notes: One HP UHF aerial was observed at this location. Multiple satellite dishes were observed at this location.

Location 7

Coordinates: Lon: -2.25704, Lat: 53.47309					
Channel	**Service**	**Signal Strength (dBμV)**	**BER**	**Picture**	**Audio**
24	LTVmux	35.4 +/- 0.3	4x10^-6	Fine	Fine
27	Glmux	31.2 +/- 0.4	-	DND	DND
29	SDN	50.1 +/- 0.3	4x10^-7	Fine	Fine
31	Arqiva A	50.2 +/- 0.2	2x10^-7	Fine	Fine
32	BBC A	48.5 +/- 0.3	1x10^-7	Fine	Fine
34	Digital 3&4	49.1 +/-0.2	5x10^-8	Fine	Fine
35-	BBC B	48.8 +/- 0.3	1x10^-7	Fine	Fine
37	Arqiva B	48.3 +/- 0.3	8x10^-6	Fine	Fine

Notes: No HP UHF aerials or satellite dishes were observed at this location.

Location 8

Coordinates: Lon: -2.25409, Lat: 53.47265					
Channel	**Service**	**Signal Strength (dBμV)**	**BER**	**Picture**	**Audio**
24	LTVmux	39.3 +/- 0.3	1x10^-7	Fine	Fine
27	Glmux	35.3 +/- 0.3	1x10^-3	Fine	Fine
29	SDN	56.3 +/- 0.2	1x10^-7	Fine	Fine
31	Arqiva A	52.3 +/- 0.5	1x10^-7	Fine	Fine
32	BBC A	50.1 +/- 0.3	1x10^-7	Fine	Fine
34	Digital 3&4	57.9 +/- 0.4	1x10^-7	Fine	Fine
35-	BBC B	55.7 +/- 0.3	1x10^-7	Fine	Fine
37	Arqiva B	54.4 +/- 0.3	1x10^-7	Fine	Fine

Notes: No HP UHF aerials or satellite dishes were observed at this location.

Location 9

Coordinates: Lon: -2.25371, Lat: 53.47430					
Channel	**Service**	**Signal Strength (dBμV)**	**BER**	**Picture**	**Audio**
24	LTVmux	40.4 +/- 0.3	1x10^-8	Fine	Fine
27	Glmux	37.3 +/- 2.0	1x10^-4	Intermittent	Intermittent
29	SDN	55.9 +/- 0.3	1x10^-7	Fine	Fine
31	Arqiva A	51.5 +/- 0.3	4x10^-7	Fine	Fine
32	BBC A	51.8 +/- 0.3	1x10^-7	Fine	Fine
34	Digital 3&4	50.0 +/- 1.0	5x10^-8	Fine	Fine
35-	BBC B	53.3 +/- 0.5	1x10^-7	Fine	Fine
37	Arqiva B	49.8 +/- 0.3	1x10^-6	Fine	Fine

Notes: No HP UHF aerials or satellite dishes were observed at this location.

Location 10

Coordinates: Lon: -2.25565, Lat: 53.47410					
Channel	**Service**	**Signal Strength (dBμV)**	**BER**	**Picture**	**Audio**
24	LTVmux	40.0 +/- 0.2	1x10^-7	Fine	Fine
27	Glmux	37.7 +/- 0.2	1x10^-3	Fine	Fine
29	SDN	58.0 +/- 0.4	1x10^-7	Fine	Fine
31	Arqiva A	57.6 +/- 0.2	5x10^-8	Fine	Fine
32	BBC A	57.0 +/- 0.2	1x10^-7	Fine	Fine
34	Digital 3&4	58.4 +/- 0.3	1x10^-7	Fine	Fine
35-	BBC B	56.8 +/- 0.1	1x10^-7	Fine	Fine
37	Arqiva B	57.8 +/- 0.2	1x10^-7	Fine	Fine

Notes: No HP UHF aerials or satellite dishes were observed at this location.

APPENDIX B – POST-CONSTRUCTION SURVEY PHOTOGRAPHS

Location 1



Location 2



Location 3



Location 4



Location 5



Location 6



Location 7



Location 8



Location 9


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Urban & Renewables
T +44 (0)1787 319001
www.page
E015 OEY

Location 10



APPENDIX C – BASELINE SURVEY RESULTS

Location 1

Location 1 (GPS Coordinates: 53 28 34.09320 -2 15 34.34399)						
Channel	**Service**	**Signal Strength (dBμV)**	**Variance**	**BER**	**Picture**	**Audio**
24	Unknown	32.9	0.1	1.6*10^-7	Fine	Fine
27	Unknown	29	0.1	-	DND[24]	DND
29	SDN	46.8	0.1	4.5*10^-7	Fine	Fine
31	Arqiva A	46.9	0.1	6.3*10^-8	Fine	Fine
32	BBC A	47.9	0.1	4.2*10^-8	Fine	Fine
34	Digital 3&4	46	0.1	1*10^-8	Fine	Fine
35	BBC B	46	0.1	1*10^-8	Fine	Fine
37	Arqiva B	46.5	0.1	1*10^-8	Fine	Fine
55	COM7	37.6	0.1	-	DND	DND

Notes: No UHF aerials or satellite dishes were observed at this location.

[24] Did not decode.

Location 2

Location 2 (GPS Coordinates: 53 28 25.30559 -2 15 27.94680)						
Channel	Service	Signal Strength (dBμV)	Variance	BER	Picture	Audio
24	Unknown	29.5	0.1	7*10^-4	Fine	Fine
27	Unknown	28.5	0.1	-	DND	DND
29	SDN	47	0.1	2.7*10^-7	Fine	Fine
31	Arqiva A	44.6	0.1	1.2*10^-7	Fine	Fine
32	BBC A	45.5	0.2	1*10^-8	Fine	Fine
34	Digital 3&4	42.9	0.1	1*10^-8	Fine	Fine
35	BBC B	41.9	0.2	1*10^-8	Fine	Fine
37	Arqiva B	42.1	0.1	5*10^-6	Fine	Fine
55	COM7	33.5	0.1	-	DND	DND

Notes: One UHF aerial directed towards the Winter Hill transmitter was observed. Multiple satellite dishes observed.

Location 3

Location 3 (GPS Coordinates: 53 28 23.10599 -2 15 25.44840)						
Channel	Service	Signal Strength (dBμV)	Variance	BER	Picture	Audio
24	Unknown	33	0.1	3*10^-7	Fine	Fine
27	Unknown	29.8	0.1	-	DND	DND
29	SDN	45.8	0.1	4*10^-6	Fine	Fine
31	Arqiva A	47.7	0.1	8*10^-7	Fine	Fine
32	BBC A	47.6	0.1	1*10^-8	Fine	Fine
34	Digital 3&4	47.1	0.1	1*10^-8	Fine	Fine
35	BBC B	45.8	0.1	1*10^-7	Fine	Fine
37	Arqiva B	45.6	0.1	3.4*10^-7	Fine	Fine
55	COM7	30.7	0.1	-	DND	DND

Notes: No UHF aerials were observed at this location. One satellite dish was observed. Surve aerial looked east at this location because stronger signal in that direction were received.

Location 4

Location 4 (GPS Coordinates: 53 28 26.82120 -2 15 20.47320)						
Channel	Service	Signal Strength (dBμV)	Variance	BER	Picture	Audio
24	Unknown	36.2	0.1	1*10^-7	Fine	Fine
27	Unknown	34.1	0.1	8*10^-4	Fine	Fine
29	SDN	53.7	0.1	1*10^-8	Fine	Fine
31	Arqiva A	52.1	0.1	1*10^-8	Fine	Fine
32	BBC A	52.5	0.2	1*10^-8	Fine	Fine
34	Digital 3&4	50	0.1	1*10^-8	Fine	Fine
35	BBC B	50	0.1	1*10^-8	Fine	Fine
37	Arqiva B	50	0.1	1*10^-8	Fine	Fine
55	COM7	40.3	0.1	1*10^-8	Fine	Fine

Notes: No UHF aerials or satellite dishes were observed at this location.

Location 5

Location 5 (GPS Coordinates: 53 28 21.50039 -2 15 15.07319)						
Channel	Service	Signal Strength (dBμV)	Variance	BER	Picture	Audio
24	Unknown	35.3	0.1	1*10^-8	Fine	Fine
27	Unknown	29.7	0.1	-	DND	DND
29	SDN	50.4	0.1	1*10^-8	Fine	Fine
31	Arqiva A	48.6	0.1	1*10^-8	Fine	Fine
32	BBC A	47.8	0.1	1*10^-8	Fine	Fine
34	Digital 3&4	48.9	0.1	1*10^-8	Fine	Fine
35	BBC B	48.8	0.1	1*10^-8	Fine	Fine
37	Arqiva B	51.2	0.1	1*10^-8	Fine	Fine
55	COM7	38.9	0.1	1*10^-8	Fine	Fine

Notes: Two UHF aerials directed towards the Winter Hill transmitter were observed. No satellite dishes were observed.

Location 6

Location 7 (GPS Coordinates: 53 28 5.77199 -2 14 56.64840)						
Channel	Service	Signal Strength (dBμV)	Variance	BER	Picture	Audio
24	Unknown	31.2	0.1	2*10^-6	Fine	Fine
27	Unknown	29.1	0.1	-	DND	DND
29	SDN	44.2	0.2	7.5*10^-8	Fine	Fine
31	Arqiva A	45.7	0.1	1*10^-8	Fine	Fine
32	BBC A	44.8	0.2	1*10^-8	Fine	Fine
34	Digital 3&4	42.9	0.2	6.7*10^-8	Fine	Fine
35	BBC B	41.2	0.1	1*10^-8	Fine	Fine
37	Arqiva B	43.4	0.1	4.3*10^-7	Fine	Fine
55	COM7	36.5	0.1	1*10^-8	Fine	Fine

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

Location 7

Location 6 (GPS Coordinates: 53 28 12.08640 -2 15 57.38999)						
Channel	**Service**	**Signal Strength (dBμV)**	**Variance**	**BER**	**Picture**	**Audio**
24	Unknown	32	0.1	2.4*10^-7	Fine	Fine
27	Unknown	30.1	0.1	-	DND	DND
29	SDN	41.5	0.2	1*10^-4	Fine	Fine
31	Arqiva A	52.9	0.1	1*10^-8	Fine	Fine
32	BBC A	51.3	0.1	1*10^-8	Fine	Fine
34	Digital 3&4	50.9	0.1	1*10^-8	Fine	Fine
35	BBC B	49.9	0.1	1*10^-8	Fine	Fine
37	Arqiva B	49.2	0.1	1*10^-8	Fine	Fine
55	COM7	40	0.1	1*10^-8	Fine	Fine

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

Location 8

Location 8 (GPS Coordinates: 53 27 47.22839 -2 14 25.46879)						
Channel	Service	Signal Strength (dBμV)	Variance	BER	Picture	Audio
24	Unknown	30.9	0.1	4*10^-5	Fine	Fine
27	Unknown	27.6	0.1	-	DND	DND
29	SDN	45.3	0.1	4*10^-5	Fine	Fine
31	Arqiva A	47.1	0.1	7*10^-8	Fine	Fine
32	BBC A	49.4	0.1	1*10^-8	Fine	Fine
34	Digital 3&4	47	0.1	1*10^-8	Fine	Fine
35	BBC B	45.6	0.1	1*10^-7	Fine	Fine
37	Arqiva B	48.4	0.1	1*10^-7	Fine	Fine
55	COM7	34.1	0.1	-	DND	DND

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

APPENDIX D – BASELINE SURVEY PHOTOGRAPHS

Location 1



Location 2



Location 3


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SURVEYING

Location 4



Location 5


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and three bed
s and penthouses
PAGERPOWER
Urban & Renewables
SURVEYING
www.pagerpower.com
Compound
Gate 2

Location 6


PAGERPOWER
Urban & Renewables
www.pagerpower.com
PAGERPOWER
Urban & Renewables
E015 0EY

Location 7


PAGERPOWER
Urban & Renewables
SURVEYING
www.pagerpower.com
PAGERPOWER
Urban & Renewables
ED15 OEY
GFZ 9765

Location 8


PAGERPOWER
Urban & Renewables
E015 0EY
SURVEYING
PAGERPOWER
Urban & Renewables
SURVEYING

APPENDIX E – MITIGATION ACCEPTANCE

The email correspondence between Renaker and Stevenson Whyte is presented below.



From: [redacted] <[redacted]@stevensonwhyte.co.uk>
Sent: 05 September 2025 10:59
To: [redacted] <[redacted]@renaker.com>
Cc: [redacted] <[redacted]@stevensonwhyte.co.uk>
Subject: Re: Slate Wharf

Hi M[redacted],

Hope you're well.

We have finally had a response from the directors and they have happy to accept the offer of £[redacted] plus [redacted] as compensation from Renaker.

Slate Wharf comprises Medlock House, Bridgewater House, Irwell House, Rochdale House, Ashton House, and Ship Canal House.

Kind regards,

[redacted]
Property Manager

T: 0161 832 5060
E: [redacted]@stevensonwhyte.co.uk
W: www.stevensonwhyte.co.uk
A: Sales & lettings - 5-9 Duke Street, Manchester, M3 4NF
Block management - 384A Deansgate, Manchester, M3 4LA

Stevenson Whyte
Block Management
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Lettings
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