TV RECEPTION SURVEY REPORT

THIS POST CONSTRUCTION TV RECEPTION SURVEY WAS CONDUCTED BY:

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DATE OF SURVEY: 27th February 2026

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EXECUTIVE SUMMARY

The New development at 325 Deansgate, Manchester is now complete.

This Post Construction TV Reception Survey has been conducted to ascertain whether the introduction of the development has caused an impact to existing viewers' television reception in the surrounding area.

Since the Pre- Construction TV Reception Survey, which was undertaken in August 2018, the Winter Hill television transmitter has undergone certain changes (please refer to the Transmitter Technical Background section of this report). Although these changes have taken place, we are still able to conduct the comparison of the Pre and Post Construction Survey results, as the Winter Hill broadcast powers have remained constant.

There has been noted a slight reduction in aerial signal to the southeast of the proposed development covering test points 2 and 3. This is as largely as predicted in the initial pre-construction report, however we only expected a minor impact.

If there are any properties that have been affected by the introduction of the new development, we would have expected these issues would have already been reported and highlighted during the build.

A comparison of the pre and post construction test results shows that there has not been any wide scale impact to television reception caused by the new development and that the pre-existing signal levels have been generally maintained.

In addition, since the initial Survey in 2018 several other properties have been constructed and if signals have deteriorated at other test locations not already mentioned it is most likely this building may not be the sole cause.

There will be a shadow zone/blocking affect to satellite reception in the immediate vicinity to the northwest, however no satellite dishes were highlighted on the Pre-construction survey that would be affected.

Please refer to the Mitigation section of this report for possible remedies to rectifying terrestrial television reception issues.

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INTRODUCTION

Theory predicts, and practical evaluation has confirmed, that the introduction of new structures into an area can cause interference to television reception.

This Post-Construction TV Reception Survey has been undertaken to record the new television reception baseline conditions and assess if the introduction of the development has impacted upon existing viewers' television reception in the surrounding area.

To enable us to make an assessment, an initial desktop study is conducted, followed by a comprehensive field survey.

The desktop study is conducted using plans of the development for example the buildings' location and elevations, along with maps of the surrounding area and details of local television transmitter broadcast information.

The field survey is then conducted at several test point locations surrounding the development. Television signal test results and relevant information are recorded at each of the test point locations.

This report includes the information collated during the desk top study and field survey along with an assessment of where, or if, the introduction of the development has the caused interference to existing viewers' television reception and determine if mitigation is required.

SCOPE

To conduct a desktop study and comprehensive field survey to record existing baseline television reception conditions in the surrounding area to the development. To provide details of any impact zone and methods of mitigation if required, to conform to Local Planning Authority requirements. The results and information recorded during this field survey assist in assessing if, or where, the introduction of the proposed development has the potential to impact upon existing viewers' television reception.

DISCUSSIONS

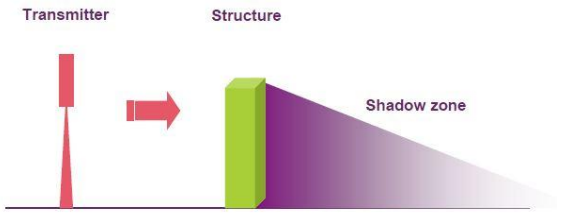
The introduction of a new building or structure into an area has the potential to cause interference to existing viewers' television reception.

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SIGNAL BLOCKING

Wireless signals, especially those using relatively high frequencies such as television, behave much like light. Therefore, it is desirable to have a clear line of sight path between the transmitter and a receiving aerial to achieve the most reliable reception. The presence of a tall structure between the transmitter and receiver will cause a 'shadow' to be cast behind the structure on the side opposite the transmitter. This effect is like the way that an obstruction between a lamp and an observer's eye blocks out the light.

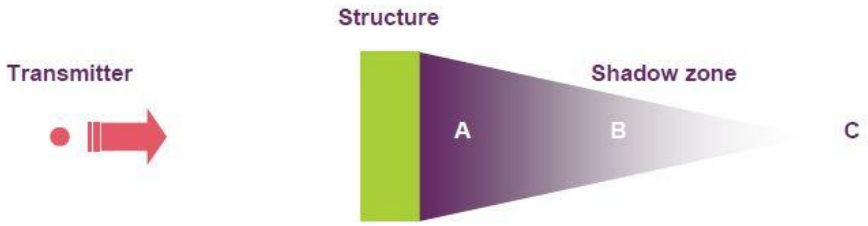


The shadow cast by a structure does not have hard edges though and does not usually extend indefinitely. While there would be a large reduction in signal levels immediately behind the structure, the blocking effect of the structure diminishes with distance because of diffraction. Diffraction is a process where signals appear to bend behind the structure and partially fill in the shadow.

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 resulting shadow is therefore a triangular shape as shown in Figure 2.



It should be noted that the severity of the reduction and the actual size of the shadow will depend upon many factors including the construction of the structure and its height – the distances given above are for guidance only.

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FIELD SURVEY METHOD

Tests are conducted at a selection of locations in the area surrounding the proposed development.

Test results are recorded regarding television signal strength and quality: -
Strength is recorded in: dBµv.
Quality is recorded in: VBER (Standard definition SD)
LBER (High-definition HD)

Due to the rollout of the 4G Networks all results are recorded with a CAI approved benchmarked aerial with a balun and LTE filter.

An alternative transmitter is assessed for and where receivable, results are recorded.

All tests are conducted at a 10m height above ground level.

The direction and type of existing viewers' television aerials is noted.

A bearing and distance to the proposed development is recorded at each test point location, for comparison with the bearing and distance to the television transmitter serving the area.

Existing obstructions to television reception are noted.

FIELD SURVEY EQUIPMENT

The field survey is conducted using the following equipment: -

- Specialist vehicle complete with telescopic mast
- 360º Antenna rotator
- 14 Element CAI approved wideband UHF antenna with balun and LTE filter, one vertical and one horizontal polarisation.
- 20m x WF100 twin screened CAI approved coaxial cable.
- Televes spectrum analyser/field strength meter
- Ordnance survey maps
- Garmin GPS receiver
- Compass
- Digital camera
- Digital terrestrial television decoder

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SERVICES LIKELY TO BE AFFECTED

TERRESTRIAL TELEVISION RECEPTION

There are two potential ways that the introduction of a new building can cause interference to terrestrial television reception; these are obstruction and reflection.

Obstruction occurs when existing viewers are in an area where their television aerial beam path (direction) to the television transmitter is either through, or within proximity to, the new building or structure. This can result in a reduction of television signal strength and quality and in some cases (if existing viewers are located within proximity to the new building or structure); receiving terrestrial television signals can become problematic and may not be achievable.

Reflection occurs when the new building reflects terrestrial television signals. These unwanted reflected signals are received on the existing viewer's television aerial along with the direct signals from the television transmitter, resulting in irregularities of television signal strength and quality. However, digital terrestrial television broadcasts are less prone to reflections than the previous analogue television broadcasts, but this must still be taken into account when assessing any potential impact.

SATELLITE TELEVISION RECEPTION

Satellite television reception requires a clear line of sight between the satellite antenna and the satellite it is aligned to. In most cases the angle of the satellite antenna to the satellite orbiting the earth is between 20- and 30-degrees elevation.

This elevation must be taken into account when assessing if the introduction of the new building or structure has the potential to obstruct existing viewers' satellite antenna beam path to the satellite.

Satellite reception is very rarely affected on a large scale and is mostly only relevant to existing viewers within proximity to the new building or structure.

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THE DEVELOPMENT:
Deansgate Hotel

CONDUCTED ON BEHALF OF:
ASK Deansgate Limited
Fulford House,
Newbold Terrace
Leamington Spa,
CV32 4EA

OVERVIEW OF THE DEVELOPMENT
The development is a new build of a 22-storey building development, located at 325 Deansgate in central Manchester, UK.

COORDINATES

Prior to commencement of the survey, coordinates at the development's location are entered into a GPS receiver, along with the coordinates for the television transmitter serving the area. This enables us to record a bearing and distance from each test point location to the development, for comparison with the bearing and distance to the television transmitter. The coordinates used throughout the survey are listed below and shown on Plan A.

LOCATION	NATIONAL GRID REFERENCE
Winter Hill Transmitter	SD 66000 14400
The Development	SJ 83431 97613

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TECHNICAL BACKGROUND – WINTER HILL

TRANSMITTER No: 103.00

NGR: SD 6600 14400

APPROXIMATE BEARING FROM THE DEVELOPMENT: 314°

APPROXIMATE DISTANCE FROM THE DEVELOPMENT: 24.2 km

Television Broadcasts from the Winter Hill Transmitter at the time of the Pre Construction Television Reception Survey (August 2018):

UHF Channel	Frequency	Multiplexer	Format	Broadcast Power
31	554.0	COM7	HD	25,700W
37	602.0	COM8	HD	14,000W
49	698.0	ARQA	SD	100,000W
50	706.0	BBCA	SD	100,000W
54	737.8	BBCB	HD	100,000W
55	746.0	ARQB	SD	100,000W
56	754.0	LM	SD	1,000W
58	770.0	SDN	SD	100,000W
59	778.0	D3+4	SD	100,000W

Television Broadcasts from the Winter Hill Transmitter at the present time (February 2026):

UHF Channel	Frequency	Multiplexer	Format	Broadcast Power
37	602.0	ARQB	SD	14,000W
31	554.0	ARQA	SD	100,000W
32	562.0	BBCA	SD	100,000W
35	585.8	BBCB	HD	100,000W
29	538.0	SDN	SD	100,000W
34	578.0	D3+4	SD	100,000W

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PLAN 1: THE DEVELOPMENT'S LOCATION



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PHOTO A:



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PHOTO B:



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TERRESTRIAL TELEVISION SERVICES

Viewers in the surrounding area to the development are receiving their terrestrial television services from the Winter Hill transmitter, located to the northwest.

The Winter Hill transmitter broadcasts 6 digital multiplexers providing the full range of standard definition and high-definition digital terrestrial television services available on Freeview, with regional programming for the northwest. Please refer to the transmitter details for further information about the Winter Hill Transmitter.

The test results recorded during the survey show that terrestrial television reception from the Winter Hill transmitter has good signal strengths and at the majority of test points the quality is good. Please note that the results are recorded at a 10m aerial height, in accordance with TV reception survey specifications and that for existing television aerials sited at multi-storey height reception could be much improved.

During the survey, tests were conducted to receive an alternative transmitter to the Winter Hill transmitter. The result of these tests was that no alternative transmitter could be received at an acceptable quality or strength.

SATELLITE TELEVISION SERVICES

Both Sky TV and Freesat are broadcast from the same fleet of satellites located at an orbital position of 28.2º east of south, with a required satellite dish elevation of approximately 23º.

Sky TV is primarily a subscription-based service offering several packages of various television services at monthly subscription costs.

Freesat is a non-subscription-based service and offers a similar television service line up to Freeview and selectable regional programming.

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FIELD SURVEY TEST RESULTS AND INFORMATION

TEST POINT 1

Location Little Peter Street
NGR: SJ 83508 97466
Alt: 33 m
Mast Height: 10 m

LOCATION	BEARING	DISTANCE
Winter Hill Transmitter	314°	24.3 km
Development	334°	0.18 m

Visible Existing Aerial Arrays: none

Visible Existing Obstructions: Various multi-storey buildings/Trees in the general direction of the Winter Hill Transmitter

Pre Construction signal levels

Channel	Service	Signal Strength (dBµV)	BER	Picture	Audio
31	COM7	49±0.4	0%	Fine	Fine
37	COM8	51±0.2	1x10-7	Fine	Fine
49	Arqiva A	44±.03	1x10-7	Fine	Fine
50	BBC A	46±0.4	1x10-7	Fine	Fine
54	BBC B	43±0.2	0%	Fine	Fine
55	Arqiva B	39±0.2	0%	Fine	Fine
56	LM/LL/LPR	32±0.6	1x10-6	Fine	Fine
57	GIM	29±0.2	-	-	-
58	SDN	41±0.5	1x10-6	Fine	Fine
59	Digital 3&4	39±0.4	1x10-6	Fine	Fine

Post Construction signal levels.

Channel	Frequency	MUX	Format	Level (dBµv)	CN dB	MER	VBER	LBER	Quality
37	602.0	ARQB	SD	38	20	20	-7		Marginal
31	554.0	ARQA	SD	43	24	20	-7		Marginal
32	562.0	BBCA	SD	42	22	22	-8		Marginal
35	585.0	BBCB	HD	42	22	15		-6	Marginal
29	538.0	SDN	SD	40	22	22	-6		Marginal
34	578.0	D3+4	SD	38	18	15	-4		Fail

Television strengths are low, and corruption is being received.

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TEST POINT 2

Location Loxford Street
NGR: SJ 83997 97022
Alt: 37 m
Mast Height: 10 m

LOCATION	BEARING	DISTANCE
Winter Hill Transmitter	314°	25 km
Development	317°	0.8 km

Visible Existing Aerial Arrays: none

Visible Existing Obstructions: Various multi-storey buildings/Trees in the general direction of the Winter Hill Transmitter

Pre Construction signal levels

Channel	Service	Signal Strength (dBµV)	BER	Picture	Audio
31	COM7	42±0.2	0%	Fine	Fine
37	COM8	50±0.4	5x10-8	Fine	Fine
49	Arqiva A	47±0.3	2x10-8	Fine	Fine
50	BBC A	46±0.2	4x10-8	Fine	Fine
54	BBC B	42±1	0%	Fine	Fine
55	Arqiva B	39±0.5	0%	Fine	Fine
56	LM/LL/LPR	33±0.3	9x10-7	Fine	Fine
57	GIM	29±0.2	-	-	-
58	SDN	41±0.4	3x10-4	Fine	Fine
59	Digital 3&4	38±0.5	1x10-5	Fine	Fine

Post Construction signal levels.

Channel	Frequency	MUX	Format	Level (dBµv)	CN dB	MER	VBER	LBER	Quality
37	602.0	ARQB	SD	38	18	15	-6		Marginal
31	554.0	ARQA	SD	46	24	22	-7		Pass
32	562.0	BBCA	SD	42	20	18	-7		Marginal
35	585.0	BBCB	HD	40	20	15		-4	Marginal
29	538.0	SDN	SD	38	20	18	-6		Marginal
34	578.0	D3+4	SD	36	-	-	-		Fail

Television strengths are low, and corruption is being received.

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TEST POINT 3

Location Booth Street West.
NGR: SJ 84306 96778)
Alt: 43 m
Mast Height: 10 m

LOCATION	BEARING	DISTANCE
Winter Hill Transmitter	313°	25.4 km
Development	312°	1.2 km

Visible Existing Aerial Arrays: High gain aerials on small mast, mounted at rooftop height on 2 storey properties, directed towards the Winter Hill Transmitter

Visible Existing Obstructions: Various multi-storey buildings/Trees in the general direction of the Winter Hill Transmitter

Pre Construction signal levels

Channel	Service	Signal Strength (dBµV)	BER	Picture	Audio
31	COM7	42±0.4	-	-	-
37	COM8	51±0.5	1x10-7	Fine	Fine
49	Arqiva A	45±0.2	1x10-4	Fine	Fine
50	BBC A	48±0.2	3x10-7	Fine	Fine
54	BBC B	45±1	0%	Fine	Fine
55	Arqiva B	38±0.3	-	-	-
56	LM/LL/LPR	34±0.4	2x10-3	Fine	Fine
57	GIM	32±0.2	-	-	-
58	SDN	43±0.3	7x10-4	Fine	Fine
59	Digital 3&4	51±0.3	3x10-3	Fine	Fine

Post Construction signal levels.

Channel	Frequency	MUX	Format	Level (dBµv)	CN dB	MER	VBER	LBER	Quality
37	602.0	ARQB	SD	45	22	22	-7		Marginal
31	554.0	ARQA	SD	46	24	22	-8		Pass
32	562.0	BBCA	SD	45	23	22	-8		Marginal
35	585.0	BBCB	HD	45	21	15		-6	Marginal
29	538.0	SDN	SD	46	26	25	-6		Marginal
34	578.0	D3+4	SD	44	21	19	-6		Marginal

Television signal strengths are low, but quality is acceptable.

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TEST POINT 4

Location Denmark road
NGR: SJ 84697 95990
Alt: 42 m
Mast Height: 10 m

LOCATION	BEARING	DISTANCE
Winter Hill Transmitter	314°	26.2 km
Development	321°	2.05km

Visible Existing Aerial Arrays: High gain aerials on small mast, mounted at rooftop height directed towards the Winter Hill Transmitter

Visible Existing Obstructions: Various multi-storey buildings/Trees/Land in the general direction of the Winter Hill Transmitter

Pre Construction signal levels

Channel	Service	Signal Strength (dBµV)	BER	Picture	Audio
31	COM7	45±0.4	0%	Fine	Fine
37	COM8	51±0.3	1x10-7	Fine	Fine
49	Arqiva A	49±.04	1x10-7	Fine	Fine
50	BBC A	47±0.4	1x10-7	Fine	Fine
54	BBC B	43±0.5	0%	Fine	Fine
55	Arqiva B	40±0.5	0%	Fine	Fine
56	LM/LL/LPR	29±0.6	-	-	-
57	GIM	27±0.2	-	-	-
58	SDN	45±0.3	1x10-7	Fine	Fine
59	Digital 3&4	41±0.3	1x10-7	Fine	Fine

Post Construction signal levels.

Channel	Frequency	MUX	Format	Level (dBµv)	CN dB	MER	VBER	LBER	Quality
37	602.0	ARQB	SD	46	13	13	-		Fail
31	554.0	ARQA	SD	40	11	10	-		Fail
32	562.0	BBCA	SD	52	12	11	-		Fail
35	585.0	BBCB	HD	45	16	11		-	Fail
29	538.0	SDN	SD	50	14	12	-		Fail
34	578.0	D3+4	SD	46	11	10	-		Fail

Television strengths are low, and corruption is being received.

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TEST POINT 5

Location Hadfield Close
NGR: SJ 85784 95311
Alt: 47 m
Mast Height: 10 m

LOCATION	BEARING	DISTANCE
Winter Hill Transmitter	314°	27.4 km
Development	314°	3.3 km

Visible Existing Aerial Arrays: 10 element aerials on 1 and 2m masts, mounted at rooftop height on 2 storey properties, directed towards the Winter Hill Transmitter

Visible Existing Obstructions: Various multi-storey buildings/Trees in the general direction of the Winter Hill Transmitter

Pre Construction signal levels

Channel	Service	Signal Strength (dBµV)	BER	Picture	Audio
31	COM7	53±0.3	0%	Fine	Fine
37	COM8	61±0.3	1x10-7	Fine	Fine
49	Arqiva A	53±1	1x10-7	Fine	Fine
50	BBC A	54±0.5	1x10-7	Fine	Fine
54	BBC B	55±0.6	0%	Fine	Fine
55	Arqiva B	48±0.5	0%	Fine	Fine
56	LM/LL/LPR	38±0.4	1x10-7	Fine	Fine
57	GIM	33±0.3	1x10-8	Fine	Fine
58	SDN	51±0.3	1x10-7	Fine	Fine
59	Digital 3&4	51±0.3	1x10-7	Fine	Fine

Post Construction signal levels.

Channel	Frequency	MUX	Format	Level (dBµv)	CN dB	MER	VBER	LBER	Quality
37	602.0	ARQB	SD	54	38	32	-8		Pass
31	554.0	ARQA	SD	58	30	31	-8		Pass
32	562.0	BBCA	SD	57	35	32	-8		Pass
35	585.0	BBCB	HD	56	38	32		-8	Pass
29	538.0	SDN	SD	53	30	32	-8		Pass
34	578.0	D3+4	SD	52	41	34	-8		Pass

Television reception is of a good quality and strength.

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TEST POINT 6

Location Hadley Avenue
NGR: SJ 86418 94691)
Alt: 51 m
Mast Height: 10 m

LOCATION	BEARING	DISTANCE
Winter Hill Transmitter	314°	28.4 km
Development	314°	4.2 km

Visible Existing Aerial Arrays: High gain aerials on 1m masts, mounted at rooftop height on 2 storey properties, directed towards the Winter Hill Transmitter

Visible Existing Obstructions: Various multi-storey buildings/Trees/Land in the general direction of the Winter Hill Transmitter

Pre Construction signal levels

Channel	Service	Signal Strength (dBµV)	BER	Picture	Audio
31	COM7	66±0.2	0%	Fine	Fine
37	COM8	71±0.2	1x10-7	Fine	Fine
49	Arqiva A	68±0.3	1x10-7	Fine	Fine
50	BBC A	70±0.3	1x10-7	Fine	Fine
54	BBC B	67±0.3	0%	Fine	Fine
55	Arqiva B	60±0.2	0%	Fine	Fine
56	LM/LL/LPR	47±0.3	1x10-7	Fine	Fine
57	GIM	35±0.2	2x10-7	Fine	Fine
58	SDN	64±0.3	1x10-7	Fine	Fine
59	Digital 3&4	61±0.3	1x10-7	Fine	Fine

Post Construction signal levels.

Channel	Frequency	MUX	Format	Level (dBµv)	CN dB	MER	VBER	LBER	Quality
37	602.0	ARQB	SD	60	30	28	-8		Pass
31	554.0	ARQA	SD	67	32	30	-8		Pass
32	562.0	BBCA	SD	70	36	32	-8		Pass
35	585.0	BBCB	HD	66	34	30		-8	Pass
29	538.0	SDN	SD	62	36	32	-8		Pass
34	578.0	D3+4	SD	60	40	32	-8		Pass

Television reception is of a good quality and strength.

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TEST POINT 7

Location: Osbourne Road
NGR: SJ 86936 94186)
Alt: 52 m
Mast Height: 10 m

LOCATION	BEARING	DISTANCE
Winter Hill Transmitter	314°	29.6 km
Development	315°	4.9 m

Visible Existing Aerial Arrays: High gain aerials on small mast, mounted at rooftop height on 2 storey properties, directed towards the Winter Hill Transmitter

Visible Existing Obstructions: Various multi-storey buildings/Trees/Land in the general direction of the Winter Hill Transmitter

Pre Construction signal levels

Channel	Service	Signal Strength (dBµV)	BER	Picture	Audio
31	COM7	66±0.1	0%	Fine	Fine
37	COM8	71±0.2	1x10-7	Fine	Fine
49	Arqiva A	70±0.4	1x10-8	Fine	Fine
50	BBC A	70±0.4	1x10-8	Fine	Fine
54	BBC B	67±1.0	0%	Fine	Fine
55	Arqiva B	63±0.2	0%	Fine	Fine
56	LM/LL/LPR	53±0.2	1x10-7	Fine	Fine
57	GIM	38±0.4	1x10-7	Fine	Fine
58	SDN	65±0.4	1x10-7	Fine	Fine
59	Digital 3&4	61±0.3	1x10-7	Fine	Fine

Post Construction signal levels.

Channel	Frequency	MUX	Format	Level (dBµv)	CN dB	MER	VBER	LBER	Quality
37	602.0	ARQB	SD	62	34	30	-8		Pass
31	554.0	ARQA	SD	69	34	30	-8		Pass
32	562.0	BBCA	SD	70	36	32	-8		Pass
35	585.0	BBCB	HD	67	36	32		-8	Pass
29	538.0	SDN	SD	64	40	34	-8		Pass
34	578.0	D3+4	SD	60	42	32	-8		Pass

Television reception is of a good quality and strength.

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MITIGATION

Terrestrial Television Reception

Remedial Aerial Work

One or all the following may assist in rectifying interference being received to terrestrial television reception.

Change of aerial type to one most suited to the type of interference being received.
Redirecting existing television aerial to an alternative transmitter that is not affected, in some cases the existing television aerial may not be suitable for redirecting and the installation of a suitable television aerial may be required.
Re-siting of the television aerial to a position on the property where interference is reduced or not present.
Increase or decrease of aerial height.
Installation of masthead amplification to improve television signal strengths being received

Remote Television Aerial

When a remote television aerial is positioned at a location with good quality television reception, (which can be a considerable distance from the affected area), and the signals are brought back via a cable network to the affected properties.

Utilising Satellite Reception

Should rectifying terrestrial television reception prove problematic, the installation of satellite systems using the Freesat platform can assist in rectifying reception issues.

To provide satellite television reception for individual affected dwellings or commercial units requires the installation of a satellite dish and set top box.

Satellite Television Reception

Remedial Satellite Work

One or all the following may assist in rectifying satellite television reception issues.

Re-siting of the satellite antenna to a position on the property where a clear line of sight can be achieved.
Increase in height of the satellite antenna to achieve a clear line of sight to the satellite.

Remote Satellite Dish

When the receiving satellite dish is sited in a position where a clear line of sight can be achieved; this can sometimes be a considerable distance from the affected property. In some instances, the satellite dish may require siting on the offending property to achieve a clear line of sight, or on an adjoining property where permission will have to be sought. The signals are brought back to the affected property via a cable and amplifier network.

The need for such mitigation would need to be determined on a case-by-case basis.

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POTENTIAL IMPACT ZONE – MAP 1



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REFERENCE OF TERMS

c.	Circa
CH	The UHF Channel allocation from the transmitter.
MUX	The digital multiplexer allocation/operator.
TX	Transmitter.
dBµv	Carrier strength reading (decibel microvolt).
C/N	Carrier /Noise Ratio
VBER	Measurement for digital signal after error correction (BER after VITERBi)
LBER	BER after been applied the LDPC (low density parity check) error correction.
SD	SD Standard Definition
HD	HD High Definition
NGR	National Grid Reference
ALT	Altitude above sea level at the location.
BRG	Bearing from North.
GPS	Global Positioning System.

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