

Local TV Network Feasibility Study

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Restricted (Local TV Programme)

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Document Details

| General Detail | | | | | | | |
|----------------------|--|--|--|--|--|--|--|
| Abstract | This is a technical feasibility study to determine the technical specification and general parameters for a local TV network to meet Ofcom requirements. | | | | | | |
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Table of Contents

| 1 | Intro | duction | 5 |
|-----|-------|---|---|
| | 1.1 | Disclaimer | 5 |
| | 1.2 | Associated Documentation | 5 |
| 2 | Exec | utive Summary | 5 |
| 3 | Scop |)e | 6 |
| 4 | Netw | ork Assumptions | 6 |
| | 4.1 | Frequency Plan | 6 |
| | 4.2 | Potential Coverage | 6 |
| | | 4.2.1 Single Frequency Network Requirements | 7 |
| 5 | Ante | nna System | 7 |
| | 5.1 | Introduction | 7 |
| | 5.2 | Antenna Assessment | 7 |
| | | 5.2.1 Overview | 7 |
| | | 5.2.2 Power or Voltage Rating | 7 |
| | | 5.2.3 Interpretation of HRP Plots | 7 |
| | 5.3 | Compliance with Ofcom Requirements | 7 |
| | 5.4 | Antenna Gain Calculation Tolerance | 7 |
| | 5.5 | Antenna Configuration | 8 |
| | | 5.5.1 Half Antenna Operation | 8 |
| | | 5.5.2 Splitter & Feeders | 8 |
| | 5.6 | Channel Filtering | 9 |
| | | 5.6.1 Filter Specification | 9 |
| | 5.7 | Maintenance Coupler | 9 |
| | 5.8 | NA Interface | 9 |
| | 5.9 | Service Continuity | 9 |
| 6 | Struc | ctural Assessment | 9 |
| Ū | 6.1 | Mast Strengthening | 0 |
| 7 | Acco | ommodation | 1 |
| | Dow | | |
| 0 | FOW | | I |
| 9 | Teler | netry and Monitoring1 [,] | 1 |
| 10 | Serv | ice Availability1 | 1 |
| 11 | Rollo | out1 [,] | 1 |
| 12 | Exclu | usions1 [,] | 1 |
| App | endix | A Location/Site List1 | 3 |
| r r | | | - |

| A.1 | Phase 1 Sites | |
|--------------------|---|----|
| A.2 | Phase 2 Sites | 13 |
| Appendix | B Antenna Details | 15 |
| Appendix (HRPs | C Proposed Antenna HRPs Overlaid with Ofcom /Templates | 16 |
| Appendix | D Filter Specification | 43 |

1 Introduction

The Government proposes to create a number of local television service licences and as a result Ofcom intend to release spectrum for this purpose. Ofcom have asked Arqiva to provide a preliminary local TV (LTV) network design based on a list of candidate sites as specified in Appendix A. Arqiva understands that for the purpose of this study, this list of sites has been chosen by Ofcom based on population coverage and channel availability and is not to be taken as the final network configuration.

1.1 Disclaimer

The information contained in this document has been compiled by Arqiva for Ofcom to investigate options for the provision of Local TV at the sites proposed by Ofcom. This document does not constitute a recommendation, commitment or agreement. While the information contained in this document is based on the best available information, site surveys and detailed site by site analysis has not been possible in the time available and, as a result, technical solutions may be subject to modification as more detailed information comes to light.

| Item | Title | Version | Owner |
|------|---|---|-------|
| 1. | Site/Antenna list – GI_42_Sites.xlsx | E-mail dated 29 November | Ofcom |
| 2. | Antenna radiation patterns and plt files | E-mail dated 29th November 2011 | Ofcom |
| 3. | Additional locations for Local TV GI_54_Sites.xlsx | E-mail dated 24 th January 2012 | Ofcom |
| 4. | Antenna radiation patterns and plt files for additional sites | E-mail dated 24 th January 2012 | Ofcom |

1.2 Associated Documentation

2 Executive Summary

Following a request by Ofcom, Arqiva have undertaken a preliminary desktop technical review of Ofcom's 54 sites for Local TV. This study is based upon the Ofcom requirement of a minimum coverage of 20 (Phase 1) locations and further 24 (Phase 2) locations where local TV may be supported.

Refer to Appendix A for details of the Phase 1 and Phase 2 sites which serve these locations

This feasibility study is based upon the Ofcom site list and PLT files as detailed in Appendix B.

Note: Although Ofcom requested that Bilsdale Teesside Petal (to serve Middlesbrough) has been included in this Feasibility Study this location coverage is not required for the Reference Offer.

Whilst this feasibility has been limited to a desktop review, Arqiva has confidence that

- The antennas required by Ofcom can be provided at all sites
- Five sites require relatively minor structural strengthening
- Accommodation is available at all sites
- Sufficient power capacity exists at all sites

There are two sites (Emley Moor and Londonderry) where the apertures proposed by Ofcom are not available at this time but alternates are suggested for Ofcom's consideration.

3 Scope

The purpose of this document is to provide Ofcom with an assessment of the feasibility or otherwise, from a technical perspective, to provide Network Access infrastructure for Local TV from the 54 sites, as identified by Ofcom in document GI_54_Sites.xlsx. These sites have been allocated to the Phase 1 (20 locations) and Phase 2 (24 locations) as defined by Ofcom.

(Please note that costing of the solution is beyond the scope of this document.

This feasibility study related to the provision of Network Access infrastructure relating to the following sub systems:

- Antenna system
- Telemetry
- Network Access Accommodation
- Power
- Operations

For the avoidance of doubt the following facilities, although available from Arqiva, are <u>not</u> within the scope of this report:

- Transmitter system
- Signal processing equipment
- Remultiplexing equipment
- Fault management
- Playout facilities
- Compression/encoding systems
- Content distribution to terrestrial transmitter sites, including any cross carriage of system information.

4 Network Assumptions

Based on the information provided by Ofcom, Arqiva has conducted a study on the technical feasibility of providing Local TV services from the 54 sites stated by Ofcom. Arqiva has used the information, including channel numbers, frequencies and preferred antenna heights as the basis of this feasibility study.

In order to identify the types of equipment required Arqiva has made certain assumptions related to the overall architecture of the network as follows:.

It has been assumed that Arqiva will provide Network Access services to a single national multiplex provider (referred to herein as LTV MuxCo). It is understood that the LTV MuxCo will be appointed in 2012 and will be licensed to operate the services from up to 54 sites identified as potential local TV locations. Local Digital TV Programme Service (L-DTPS) Providers will contract with LTV MuxCo for broadcast capacity and a technical solution.

The Local TV Multiplex will contain up to three services from each transmitter site. Two services are likely to be generated centrally by LTV MuxCo (National TV services) and distributed to the transmitter sites. The third service, Local TV is likely be produced and encoded locally and inserted into the LTV multiplex at the transmitter site.

4.1 Frequency Plan

This report is based upon the provisional frequency plan provided by Ofcom and included in file GI_54_Sites.xlsx and changes to this plan will incur a re-assessment of the sites affected.

4.2 **Potential Coverage**

Ofcom has published estimates of households which should be able to receive Local TV services based upon assumptions related to the height and performance of antenna systems. It should be noted that, in some cases, Arqiva has been unable to provide aperture at the heights assumed by Ofcom and, as a result, coverage predictions may need to be reviewed.

It should also be noted that successful reception depends upon local conditions and the limitations of domestic equipment. Any channels outside the traditional UHF TV band, or transmitted from alternative sites, may not be able to receive service. Reception issues will be beyond the scope of Arqiva's responsibilities.

4.2.1 Single Frequency Network Requirements

Two sites which serve the Bristol area - Bristol Ilchester Crescent and Bristol Kings Weston combine to form an SFN on channel 30.

Two sites which serve the Leeds area – Emley Moor and Beecroft Hill combine to form an SFN on channel 56.

5 Antenna System

5.1 Introduction

Arqiva has used the information provided by Ofcom, (e.g. frequencies, ERPs, preferred heights and PLT files) as the basis of for antenna analysis

5.2 Antenna Assessment

5.2.1 Overview

The direction given to Arqiva by Ofcom requires new dedicated antennas to support the Local TV services due to the required directivity.

Please note that (due to aperture availability) many of the antennas are not at the same height as requested/proposed by Ofcom and these height modifications will require review to assess coverage impact by Ofcom. Two sites in particular are highlighted; Londonderry and Emley Moor.

This assessment was performed via a Desk Top study and a site survey will be required prior to finalising the designs/apertures.

5.2.2 Power or Voltage Rating

The antennas have been designed such that the voltage or power safety factors do not fall below the minimum permissible value of 1.5. For each mux, a 10dB peak to mean power ratio has been assumed.

5.2.3 Interpretation of HRP Plots

The antennas have been designed to match as closely as possible the PLT provided by Ofcom. Refer to Appendix C for proposed Indicative HRPs overlaid with Ofcom HRPs/templates.

Indicative PLT (3D) files have also been prepared and will be provided in a separate zip file.

5.3 Compliance with Ofcom Requirements

In summary, with the exception of necessary height modifications due to aperture availability, Arqiva have been able to replicate to a close approximation the Ofcom provided antenna patterns (as shown in Appendix C). Ofcom will need to confirm that these meet necessary template restrictions which have not been supplied to Arqiva by Ofcom.

The output of the Antenna Analysis process is summarised in Appendix B .

5.4 Antenna Gain Calculation Tolerance

Antenna Gain Calculations as quoted are not precise and tolerances as below are proposed.

The antennas that have been proposed have been based on what is considered to be a practically realisable design, whilst meeting the requirements of the Ofcom pattern (PLT file). System losses have been calculated/estimated.

Note: Specific antenna suppliers have not been identified at this stage and the HRP gain may be slightly different from that proposed.

For these reasons it is proposed that:

- for the simple Log Periodic antenna sites a typical tolerance of +/-1dB should be assumed.
- for the more complicated Panel antennas a typical tolerance of +/-1.5dB should be assumed.

5.5 Antenna Configuration

The antennas have specified in two halves – normal operating condition will be to have both halves powered.

5.5.1 Half Antenna Operation

The reserve condition will generally be to use one half of the antenna. When operating with the whole of the normal transmitter power fed into one half of the antenna the ERP will be reduced by approximately 3 dB.

Note the following:

- The Horizontal Radiation pattern of one half of the antenna will generally be a close match to that of the whole antenna. There will be a change to the Vertical radiation pattern which may result in change to the signal received at some locations.
- Repair or maintenance of the antenna may require the whole antenna to be taken out of service.



5.5.2 Splitter & Feeders

A splitter will be installed that will split the output from the channel filter to each half of the antenna system. A splitter bypass link will also be provided to allow the antenna system to operate in half antenna mode.

The main feeders have been specified as foam filled as this will obviate the need for a dehydrator to pressurise the feeders.

Single Antenna Systems (one main feeder) are not recommended as if an antenna fault occurs (or if antenna maintenance is required) the service would be unavailable until the fault was repaired.

5.6 Channel Filtering

RF filters will be required for each antenna system.

5.6.1 Filter Specification

The current DSO Combiner Specification (Arqiva Specification BOS014, based on Ofcom specification IR2022) would be adopted for the Local TV multiplex. A copy of this specification is included in Appendix D.

Additional filtering has not been considered at this time although may be required to protect high/low power adjacent channels. Arqiva seeks guidance from Ofcom relating to filtering requirements.

5.7 Maintenance Coupler

A directional coupler (1 forward and 1 reverse) will be installed at the input to the splitter and after the filter. This is specifically provided for maintenance activities, e.g. not program monitoring.

5.8 NA Interface

The main feeder connector type provided will be dependent on the nominal transmitter power for the multiplex (Please see table) but will typically be one of the following:

| Transmitter Power | Connector Type |
|-------------------|----------------|
| <700W | 7-16 |
| 700- 2kW | 7/8" |
| 2kW-5kW | 1 5/8" |
| 5kW-14kW | 3 1/8" |

The type of connector employed at each site will be as stated in the table above.

The standard position for the terminations of the feeder input will be inside or above the transmitter equipment.

5.9 Service Continuity

During any antenna construction period, existing customer broadcast services will be disrupted whilst a new antenna is being installed and it may be may be necessary for these existing services to operate in reduced power.

Arqiva will need to obtain the agreement of its customers for planned work to take place at these sites. This disruption is estimated to last no longer than one week.

It assumed that Arqiva safe working methods will be adopted at each phase of this project.

6 Structural Assessment

All structures were assessed by Arqiva's structural engineering department based upon the present configuration of antennas on the structures combined with the additional antennas for Local TV. This assessment was for strength. All structures were found to be are capable of supporting the Local TV antenna but some have been identified which require strengthening as listed below.

The aperture available was also assessed. Most of these structures are very congested with other antennas. A desk top assessment was carried out to determine a suitable aperture and where redundant antennas would have to be moved and existing antennas relocated, in order to meet the Ofcom requirements. This will be verified by detail survey when and if contracts are entered into with a Local TV customer.

In addition, two sites are highlighted as below where there are significant variances to the Ofcom proposed apertures:

| Site | Aperture requested | Aperture offered | Comment |
|-------------|-----------------------|---------------------|---|
| Londonderry | 59m | 88-91m | Congestion at aperture requested |
| Emley Moor | 161m | 247m | Emley Moor is a concrete structure – there are no openings at the height requested. |

6.1 Mast Strengthening

Following assessment by SED, (reference BS8100), the following structures will require strengthening, due the additional loading of the new antenna:

- Belmont
- Brierley Hill
- Craigkelly
- Hannington
- Kilvey Hill
- Plympton Hill

7 Accommodation

The LTV equipment at the hill top site will be accommodated in existing buildings and minor modification may be required to ensure suitable ventilation.

Planning permission and landlord consents will be required at a number of the sites and at this time no significant issues are expected.

The location of the LTV transmitter equipment is detailed on a site by site basis in Appendix B .

8 Power

A metered supply will be required for the service. A new LV board will be located near the transmitter to provide the requisite supplies.

Generator support will be available where there is currently a fixed generator on-site.

9 Telemetry and Monitoring

Arqiva would provide simple alarm telemetry system to the customer at each of the sites.

10 Service Availability

Arqiva seeks advice from Ofcom related to the levels of service availability that it would consider appropriate for Local TV.

As the antenna system has built in redundancy service (i.e. split antenna/dual feeders) the likelihood of a service outage will be minimised but the time to restoration would depend on the nature of the fault:

- In the event of an antenna system fault, service restoration to -3dB would take place up to 5 hours following loss of service (assuming access to site is not prevented by adverse weather conditions). It would then take up typically 3 to 5 further working days to restore service to full power (subject to weather conditions allowing access to site and to the structure).

11 Rollout

The Reference Offers will be based on the following timescales:

Design Start Date – Q4 2012

Phase 1 28 Sites (Ofcom Minimum Obligation) serving 20 locations - Q4 2013 and Q4 2014

Phase 2 26 Sites serving 24 further locations- Q4 2013 and Q42014

It is proposed that the minimum obligation 20 locations are delivered across 2013 and 2014. The additional 24 locations would be added to the rollout programme evenly across 2013 and 2014.

12 Exclusions

Arqiva has prepared this document to address the technical issues associated with the provision of Network Access services only at the 54 sites specified by Ofcom. Arqiva has based its technical solutions on the certain overall network architecture assumptions which need to be discussed and verified with Ofcom, namely;

 Arqiva are responsible for the provision of antenna equipment at hilltop sites in relation to Local TV Transmission Services

The provision of transmitter system, signal processing equipment, remultiplexing equipment fault management, encoding equipment and links/circuits to the transmitter site from the local TV station is

beyond the scope of the Local TV Transmission Service Reference Offer; Arqiva could provide an offer for such services under a separate agreement

Appendix A Location/Site List

A.1 Phase 1 Sites

| Site Number | Site Name | City/Town Served | Phase |
|-------------|--------------------------------|------------------|----------------------|
| 11601 | Bilsdale (Teesside petal) | Teesside | No longer applicable |
| 10415 | Beecroft Hill | Leeds | 1 |
| 12000 | Belmont | Grimsby | 1 |
| 10500 | Black Hill (Glasgow petal) | Glasgow | 1 |
| 10203 | Brierley Hill | Birmingham | 1 |
| 11008 | Bristol IIchester Crescent | Bristol | 1 |
| 11007 | Bristol King's Weston Hill | Bristol | 1 |
| 13100 | Caradon Hill (Plymouth petal) | Plymouth | 1 |
| 14700 | Craigkelly | Edinburgh | 1 |
| 10100 | Crystal Palace | London | 1 |
| 10700 | Divis | Belfast | 1 |
| 10400 | Emley Moor | Leeds | 1 |
| 10601 | Kilvey Hill | Swansea | 1 |
| 11000 | Mendip | Bristol | 1 |
| 11101 | Nottingham | Nottingham | 1 |
| 11700 | Oxford | Oxford | 1 |
| 13105 | Plympton | Plymouth | 1 |
| 10900 | Pontop Pike | Newcastle | 1 |
| 10800 | Rowridge | Southampton | 1 |
| 10307 | Storeton | Liverpool | 1 |
| 10200 | Sutton Coldfield | Birmingham | 1 |
| 11400 | Tacolneston | Norwich | 1 |
| 11100 | Waltham | Nottingham | 1 |
| 10600 | Wenvoe | Cardiff | 1 |
| 10805 | Whitehawk Hill | Brighton +Hove | 1 |
| 10300 | Winter Hill (Blackpool petal) | Preston | 1 |
| 10301 | Winter Hill (Liverpool petal) | Liverpool | 1 |
| 10302 | Winter Hill (Manchester petal) | Manchester | 1 |

A.2 Phase 2 Sites

| Site Number | Site Name | City/Town Served | Phase |
|-------------|-------------------------|---------------------|-------|
| 12300 | Angus | Dundee | 2 |
| 13815 | Barnstaple | Barnstaple | 2 |
| 11600 | Bilsdale (York petal) | York | 2 |
| 15800 | Bluebell Hill | Maidstone | 2 |
| 13700 | Caldbeck | Carlisle | 2 |
| 15200 | Darvel | Ayr | 2 |
| 11200 | Durris | Aberdeen | 2 |
| 10211 | Fenton | Stoke on Trent | 2 |
| 10101 | Guildford | Guildford | 2 |
| 12600 | Hannington (Basingstoke | Basingstoke | 2 |
| | petal) | - | |
| 13800 | Huntshaw Cross | Barnstable | 2 |
| 10202 | Kidderminster | Kidderminster | 2 |
| 10208 | Larkstoke | Stratford Upon Avon | 2 |
| 13000 | Limavady | Limavady | 2 |
| 11800 | Llanddona | Bangor | 2 |
| 13001 | Londonderry | Derry/Londonderry | 2 |
| 12402 | Luton | | 2 |

| Site Number | Site Name | City/Town Served | Phase |
|-------------|-----------------------------|------------------|-------|
| | Madingley | Cambridge | 2 |
| 10207 | Malvern | Malvern | 2 |
| 14500 | Moel y Parc | Mold | 2 |
| 14900 | Ridge Hill (Hereford petal) | Hereford | 2 |
| 15600 | Rosemarkie | Inverness | 2 |
| 10801 | Salisbury | Salisbury | 2 |
| 12400 | Sandy Heath | Bedford | 2 |
| 10403 | Sheffield | Sheffield | 2 |
| 12308 | Tay Bridge | Dundee | 2 |

Appendix B Antenna Details

| | | | | | | | Antonna System Details | | | | | | |
|--------------------------------|----------|--------|------------|---------------|-----|------------------------|------------------------|-----------|--------------------------------------|---------------------|-------------------|------------------------------|--|
| | | UFC | LUIVI Requ | lirement | | Antenna System Details | | | | | | | |
| | | | | | | | Ty Dowor | IX Power | | | | | |
| | | EDD | Ant Lit | | | Approx Ty | with 0 EdB | for Danal | | | | Aperture | |
| Station | Ch | | (m) | Beering | Del | Approx 1X | contingonov | | Antonno Description | Towart Awar | DI T filonomo | based on initial asseemnt of | |
| | Cn 40 | (KVV) | (11) | Bearing | POI | | contingency | Antennas | Antenna Description | Target Area | PLI filename | | |
| Angus | 48 | 1 | 117 | 150 | HP | 180 | 202 | 226 | Two panels @ 90 degrees - 2 tiers | Dundee | 12300_48P20110627 | 115.5m-18.5m | |
| Barnstaple | 49 | 0.001 | 25 | 260 | VP | 0.24 | 0.27 | | Crossed Logs @ 90 degrees - 2 tiers | Barnstaple | 13815_49020110627 | 27.2m | |
| Beecroft Hill | 50 | 0.02 | 43 | 30 | | 6.30 | 7.07 | | Crossed Logs @ 90 degrees - 2 tiers | Leeds Crimelau | 10415_56P20110622 | 221m 222m | |
| Beimont | 27 | 10 | 222 | 0 | HP | 865 | 971 | | Single Log - 6 tiers | Grimsby | 12000_27P20110720 | 221111-223111 100m 201m | |
| Bilsdale (Verk petal) | 24 | 2 | 200 | 20 | | 232 | 201 | | Single Log - 4 tiers | Widdlesbrough | 11600_24P20110621 | 19911-201111 147m 140m | |
| Blisdale (Fork petal) | Z4 | | 148 | 180 | | 487 | 240 | | Single Log - 4 tiers | Classow | 21600_24P20110708 | 147/11-149/11 152m 155m | |
| | 27 | 5 1 | 154 | 20 8 100 | | 1311 | 1095 | | Two Logs @ 80° & 200° - 4 tiers | Maidstone | 10300_31P20110310 | 29 5m | |
| Briarlov Hill | 27 | 0.2 | 44 | 30 & 190 | | 60 | 77 | | Crossed Logs @ 120 degrees 2 tions | Rirmingham | 10202 20020110624 | 44m | |
| Bristol Ilchostor Croscont | 20 | 0.2 | 44 | 140 | | 5.09 | 6.71 | | Crossed Logs @ 120 degrees - 2 tiers | Prictol | 10203_29F20110024 | 28m_3/m | |
| Bristol Kings Weston | 30 | 0.02 | 43 | 140 | | 6.23 | 6.99 | | Crossed Logs @ 90 degrees - 2 tiers | Bristol | 11008_30F20110024 | 28m_/1m | |
| Caldback | 56 | 5 | 45 | 145 | | 1674 | 1979 | 2107 | Two papels @ 90 degrees - 2 tiers | Carlislo | 12700 56020110024 | 162 2 166 9m | |
| Caradon Hill (Plymouth netal) | 30 | 1 | 182 | 120 | HP | 1074 | 125 | 2107 | Single Log - 4 tiers | Plymouth | 23100_30P20110020 | 180 7m-182 7 | |
| | 52 | 5 | 65 | 120 | нр | 675 | 757 | 850 | Two papels @ 90 degrees - 2 tiers | Edinburgh | 14700 52P20110310 | 64m-66 5m | |
| | 20 | 2 | 107 | 350 | нр | 415 | 166 | 523 | Two panels @ 90 degrees - 2 tiers | London | 10100_32P20110310 | 125m-129m | |
| Darvel | 30 | 1 | 80 | 90 215 & 320 | НР | 203 | 228 | 256 | 3 nanels - 2 tiers | Δvr | 15200_20120110510 | 82m-85m | |
| | 50 | - | 00 | 50, 215 Q 520 | | 203 | 220 | 230 | Single Panel @ 15 degrees - 2 tiers | | 15200_50120110022 | 02111 05111 | |
| Divis | 30 | 5 | 03 | 15 & 155 | нр | 1068 | 1108 | 1344 | Single Log $@$ 155 degrees - 4 tiers | Belfast | 10700 30020110305 | 92m-94m | |
| Durris | 30 | 10 | 157 | 50 | НР | 781 | 876 | 1344 | Single Log = 6 tiers | Aberdeen | 10700_30P20110505 | 155 5m-158 5m | |
| Emley Moor | 56 | 5 | 161 | 340 | НР | 1454 | 1631 | 1830 | Two nanels @ 90 degrees - 4 tiers | Leeds | 10400_56P20110310 | 247m | |
| Fenton | 29 | 0.05 | 45 | 270 | VP | 22 | 25 | 1050 | Crossed Logs @ 100 degrees - 2 tiers | Stoke on Trent | 10211_29P20110615 | 40m mean | |
| Guildford | 51 | 0.05 | 45 | 45 | VP | 37 | 41 | | Crossed Logs @ 90 degrees - 2 tiers | Guildford | 10101 51P20110701 | 32m-34m | |
| Hannington (Basingstoke netal) | 51 | 2 | 71 | 120 | HP | 178 | 200 | | Single Log - 4 tiers | Basingstoke | 22600_29P20110621 | 64m-68m | |
| Huntshaw Cross | 51 | 2 | 80 | 15 | нр | 178 | 199 | 223 | Single papel - 2 tiers | Barnstanle | 13800 51020010628 | 78.3-81.8m | |
| Kidderminster | 51 | 0.04 | 45 | 65 | VP | 7.12 | 7.99 | 223 | Single Log - 2 tiers | Kidderminster | 10202 51C20110616 | 45m | |
| Kilvey Hill | 30 | 0.1 | 45 | 270 | VP | 21 | 23 | | Crossed Logs @ 60 degrees - 2 tiers | Swansea | 10601_30P20110624 | 36.5m | |
| Lark Stoke | 48 | 0.1 | 10 | 20 | VP | 14 | 16 | | Single Log - 2 tiers | Stratford Upon Avon | 10208 48P20110704 | 10m | |
| Limavady | 48 | 2 | 35 | 90 & 235 | HP | 265 | 297 | | Two Logs @ 90° & 235° - 4 tiers | Limavady | 13000 48C20120117 | sub 22.4m | |
| Llanddona | 51 | 1 | 56 | 180 | HP | 87 | 98 | | Single Log - 4 tiers | Bangor | 11800 51C20110629 | 56m | |
| Londonderry | 51 | 1 | 59 | 115 | VP | 90 | 101 | | Single Log - 4 tiers | Derry/Londonderry | 13001 51P20110630 | 88m-91m | |
| Luton | 45 | 0.05 | 42 | 65 | VP | 15 | 16 | | Crossed Logs @ 90 degrees - 2 tiers | Luton | 12402 45C20110704 | 41-42m | |
| Madingley | 40 | 1 | 45 | 95 | НР | 60 | 67 | | Single Log - 4 tiers | Cambridge | 18241 40P20110613 | 45m-47m | |
| Malvern | 51 | 0.04 | 38 | 90 | VP | 16 | 18 | | Crossed Logs @ 120 degrees - 2 tiers | Malvern | | 38m | |
| Mendip | 51 | 10 | 144 | 10 | HP | 778 | 873 | | Single Log - 6 tiers | Bristol | | 146m-148m | |
| Moel y Parc | 56 | 2 | 118 | 180 | HP | 660 | 741 | | Crossed Logs - 4 tiers | Mold | | 111m-112.5m | |
| Nottingham | 50 | 0.1 | 41 | 100 | VP | 45 | 51 | | Crossed Logs @ 120 degrees - 2 tiers | Nottingham | | 39m-40m | |
| Oxford | 51 | 10 | 80 | 230 | HP | 581 | 652 | | Single Log - 6 tiers | Oxford | 11700_51P20110616 | 99m-102m | |
| Plympton | 39 | 0.1 | 45 | 305 | VP | 39 | 44 | | Crossed Logs @ 90 degrees - 2 tiers | Plymouth | 13105_39P20110620 | 41m -42m | |
| Pontop Pike | 56 | 5 | 73 | 90 | HP | 714 | 801 | 899 | Two panels @ 90 degrees - 2 tiers | Newcastle | 10900_56P20110310 | 77m-78m | |
| Ridge Hill (Hereford petal) | 51 | 1 | 79 | 310 | HP | 97 | 109 | | Single Log - 4 tiers | Hereford | 24900_51C20110613 | 81.5m-84m | |
| Rosemarkie | 52 | 1 | 61 | 170 | HP | 125 | 140 | 157 | Two panels @ 90 degrees - 2 tiers | Inverness | 15600_52C20110629 | 61m | |
| Rowridge | 29 | 10 | 89 | 25 | VP | 532 | 597 | | Two Logs (side by side) - 6 tiers | Southampton | 10860_29P20110616 | 72m-75m | |
| Salisbury | 51 | 0.2 | 45 | 40 | VP | 66 | 75 | | Crossed Logs @ 90 degrees - 2 tiers | Salisbury | 10801_51C20110705 | 38m-39m | |
| Sandy Heath | 42 | 2 | 119 | 270 | HP | 197 | 221 | | Single Log - 4 tiers | Bedford | 12400_42C20110603 | 121m-123.5 | |
| Sheffield | 55 | 0.1 | 43 | 110 | VP | 25 | 28 | | Single Log - 2 tiers | Sheffield | 10403_55P20110621 | 43m | |
| Storeton | 30 | 0.06 | 43 | 30 | VP | 8.83 | 9.91 | | Single Log - 2 tiers | Liverpool | 10307_30P20110622 | 41m-44m | |
| Sutton Coldfield | 51 | 10 | 132 | 230 | HP | 1246 | 1398 | 1568 | Single Panel - 4 tiers | Birmingham | 10200_51P20110305 | 129m-131m | |
| Tacolneston | 57 | 10 | 100 | 30 | HP | 1710 | 1919 | | Single Log - 4 tiers | Norwich | 11400_57P20110621 | 97m-98.5m | |
| Tay Bridge | 51 | 0.01 | 43 | 0 | VP | 2.68 | 3.01 | | Crossed Logs @ 90 degrees - 2 tiers | Dundee | 12308_51P20110630 | 40m-41m | |
| Waltham | 26 | 5 | 151 | 40 | HP | 1728 | 1939 | | Crossed Logs @ 100 degrees - 4 tiers | Nottingham | 11100_26P20110310 | 157m | |
| Wenvoe | 51 | 10 | 129 | 5 | HP | 1149 | 1289 | | Crossed Logs @ 70 degrees - 8 tiers | Cardiff | 10600_51P20110613 | 115m-118m | |
| Whitehawk Hill | 54 | 0.4 | 39 | 290 | VP | 40 | 45 | | Two Logs (side by side) - 2 tiers | Brighton & Hove | 10805_54P20110624 | 42.5m | |
| Winter Hill (Blackpool petal) | 56 | 1 | 144 | 300 | HP | 116 | 130 | | Single Log - 4 tiers | Preston | 20301_56P20110722 | 144m-145.5 | |
| Winter Hill (Liverpool petal) | 56 | 2 | 144 | 230 | HP | 232 | 261 | | Single Log - 4 tiers | Liverpool | 20300_56P20110722 | 144m-145.6 | |
| Winter Hill (Manchester petal) | 56 | 2 | 144 | 120 | HP | 232 | 261 | | Single Log - 4 tiers | Manchester | 10300_56P20110726 | 144m-145.7 | |

Version 3.8, 22 Feb 2012

Appendix C Proposed Antenna HRPs Overlaid with Ofcom HRPs/Templates

Angus



12300_48P20110627.plt

Barnstaple (Template does not show on scale 1W ERP)



Barnstaple_13815_LocalTV.plt

Beecroft Hill



¹⁰⁴¹⁵_56P20110622.ptt 452404012 ken.vickers BeecroftHillL.ant

Belmont



486511012 ken.vickers Belmont.ant

Bilsdale (Teesside petal)



⁴⁰²⁰¹¹⁰¹² ken.vickers BilsdaleTees.ant

Bilsdale (York petal)



Black Hill (Glasgow petal)



⁵⁵²⁰¹¹⁰¹² ken.vickers BlackHill.ant

Bluebell Hill



Brierley Hill



Bristol Ilchester Crescent



Bristol Kings Weston



= 587404012 ken.vickers Bristol_KWH_L.ant

Caldbeck (Template reference 5kW ERP)



Caldbeck13700_56_Ref37DBVV.plt

Caradon Hill (Plymouth petal)



408011012 ken.vickers Caradon.ant

Craigkelly



Crystal Palace



Crystal Palace_2T90_Local TV.ant

Darvel



Divis



542511012 ken.vickers Divis.ant

Durris



488711012 ken.vickers Durris.ant

Emley Moor



Emley Moor_2T_Local TV.ant

Fenton



408304012 ken.vickers FentonL.ant

Guildford



⁵⁹⁶⁷⁰⁴⁰¹² ken.vickers Guildford_L.ant

Hannington (Basingstoke petal)



417811012 ken.vickers Hannington.ant



Huntshaw Cross (Template reference 2kW ERP)

HuntshawLocal.ant Huntshaw13800_Ref33DBW.ptt

Kidderminster (Template does not show on scale 40W ERP)



Kilvey Hill



447404012 ken.vickers KilveyHillL.ant

Lark Stoke



Limavady (Template reference 2kW ERP)



Llanddona (Template reference 1kW ERP)



Llanddona_4T_Local TV.ant Llanddona11800_Ref30DBW.ptt

Londonderry



671904012 ken.vickers londonderry_L.ant

Luton (Template reference 50W ERP)



Luton12402_Ref17DBW.plt

Madingley



415111012 ken.vickers Madingley.ant

Malvern (Template reference 40W ERP)



Malvern_Local_TV.ant

Mendip



491711012 ken.vickers Mendip.ant

Moel y Parc



574511012 ken.vickers MoelYParc.ant

Nottingham



439804012 ken.vickers NottinghamL.ant

Oxford



494811012 ken.vickers Oxford.ant

Plympton



611904012 ken.vickers Plympton_L.ant





Ridge Hill (Template reference 1kW ERP)



Rosemarkie (Template does not show on scale 1kW ERP)





Rowridge



Salisbury (Template does not show on scale 200W ERP)



Salisbury_10801_LocalTV.plt

Sandy Heath (Template reference 2kW ERP)



Sandy_Heath_12400_LocalTV1.ptt SandyHeath12400_Ref 33DBW.ptt

Sheffield



643004012 ken.vickers Sheffield_L.ant

Storeton



649104012 ken.vickers Storeton_L.ant





Sutton Coldfield_4T_Local TV.ant

Tacolneston



443711012 ken.vickers Tacolneston.ant

Tay Bridge



632804012 ken.vickers Tay_Bridge_L.ant

Waltham



11100_26P20110310.ptt 570311012 ken.vickers Wattham.ant

Wenvoe



584011012 ken.vickers Wenvoe.ant

Whitehawk Hill



659404012 ken.vickers Whitehawk_Hill_L.ant

Winter Hill (Blackpool petal)



Winter Hill (Liverpool petal)



644016012 ken.vickers WinterHill_Liv.ant

Winter Hill (Manchester petal)



646916012 ken.vickers WinterHill_Man.ant

Appendix D Filter Specification

RF Filter Stop band Attenuation

The required minimum attenuation is in accordance with a mask indicated by the ERP. This is based on OFCOM specification IR2022 and the agreed transmitter characteristics.

Stop band Code 2A

Applies to stations having ERP 1000W or more

| Frequency relative to channel centre frequency (MHz) | Attenuation (dB) |
|--|------------------|
| -12 | -42.2 |
| -6 | -17.2 |
| -4.2 | 0 |
| -3.81 | 0 |
| +3.81 | 0 |
| +4.2 | 0 |
| +6 | -17.2 |
| +12 | -42.2 |

The mask is formed by drawing a straight line between the points in the table above.

Stop band Code B

Applies to stations having an ERP of less than 1000W but equal to or more than 100W.

Also applies to band edge channels with an ERP of less than 100W.

| Frequency relative to channel centre frequency (MHz) | Lower Band Edge Channels @ 100W (dB) | Lower Band Edge Channels @ 1,000W (dB) | Upper Band Edge Channels @ 100W (dB) | Upper Band Edge Channels @ 1,000W (dB) | Non Band Edge Channels @ 100W (dB) | Non band Edge Channels @ 1,000W (dB) |
|---|--|--|--|--|--|--|
| -12 | -42.2 | -42.2 | -32.2* | -42.2* | -32.2* | -42.2* |
| -6 | -17.2 | -17.2 | -7.2* | -17.2* | -7.2* | -17.2* |
| -4.2 | 0 | 0 | 0 | 0 | 0 | 0 |
| -3.81 | 0 | 0 | 0 | 0 | 0 | 0 |
| +3.81 | 0 | 0 | 0 | 0 | 0 | 0 |
| +4.2 | 0 | 0 | 0 | 0 | 0 | 0 |
| +6 | -7.2* | -17.2* | -17.2 | -17.2 | -7.2* | -17.2* |
| +12 | -32.2* | -42.2* | -42.2 | -42.2 | -32.2* | -42.2* |

* These figures are scaled proportionately to obtain attenuation figures for ERP between 1000W and 100W

The mask is formed by drawing a straight line between the points in the table above.