Digital Switchover (DSO) Programme

Radio DSO Block 11C Cambridge

Document Reference: Radio DSO Cambridge–4.0

Release Date: 07 June 2011

Company Confidential

Document Details

General Detail				
Abstract	DSO Cambridge			
Author	Mary Smith			
Verifier	Brian Tait			
Owner	Glenn Doel			
Optional Information				
Author Defined Reference No	Not used	Project No	951223	
Cross Reference				

Document History		
Ver	Date	Amendment
000A	19.04/11	Draft version for review.
001	19/04/11	Initial release
004	07/06/11	Updated boundary plus population recounts

Table of Contents

1 Cambridge DSO Narrative

The current allocation for Cambridge is 11C and this has not been changed. The nearest co-block multiplexes are for South Yorkshire to the north-west, Birmingham to the west, Swindon to the south-west and Kent to the south-east. These areas are shown below in Figure 1.1.

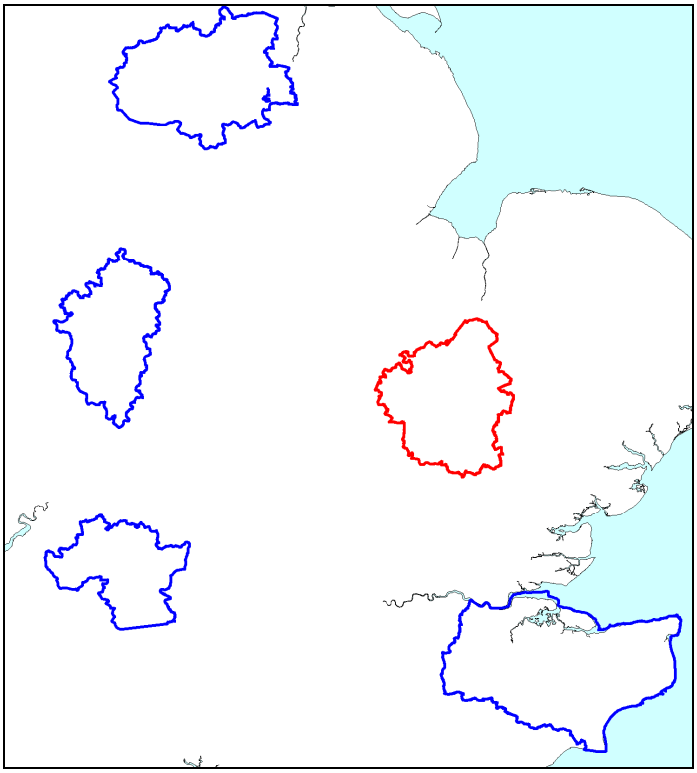


Figure 1.1: Cambridge – Adjacent Multiplexes

Madingley was the only transmitter on air for the original transmission. The detail is shown in Table 1.1.

Site Name	ERP	Site height m a.o.d.	Antenna height m a.g.l.	Antenna Type
Madingley	2 kW	120	50	Cardioids

Table 1.1: Cambridge – Current Transmission Characteristics

The editorial area however has been changed. It has been extended in some places and shrunk in other areas, see figure 1.2.

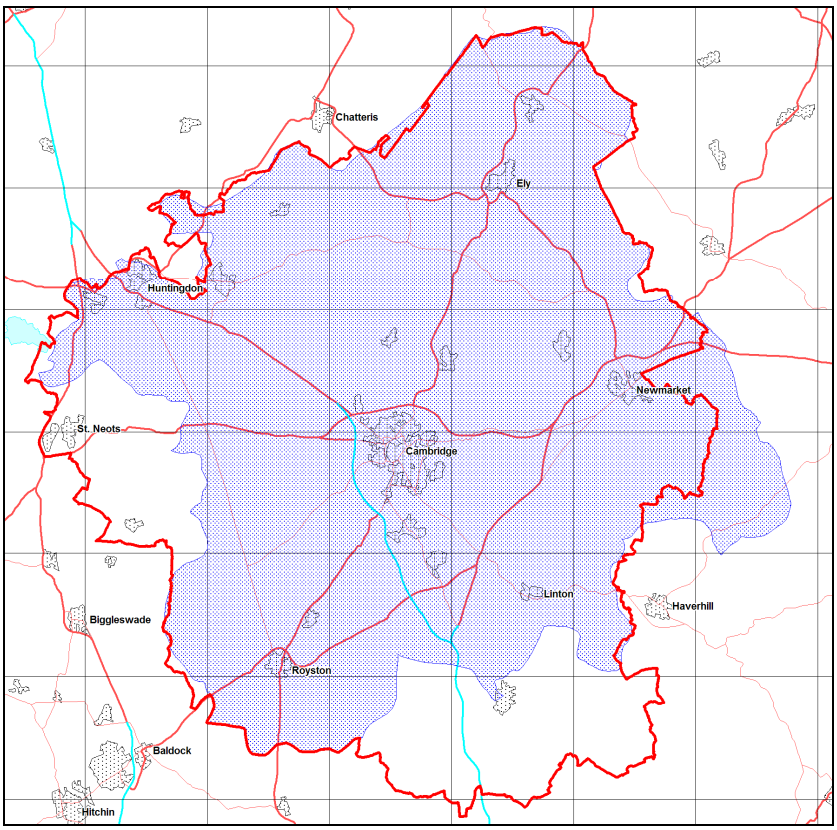


Figure 1.2 - Changes in Cambridge editorial area, the existing boundary is shown in blue, and the revised DSO Cambridge boundary is shown in red.

The Cambridge multiplex is surrounded by five other multiplexes, as shown in Figure 1.3. There is some overlap with Peterborough, and Hertfordshire, Bedfordshire & Buckinghamshire and Suffolk multiplexes.

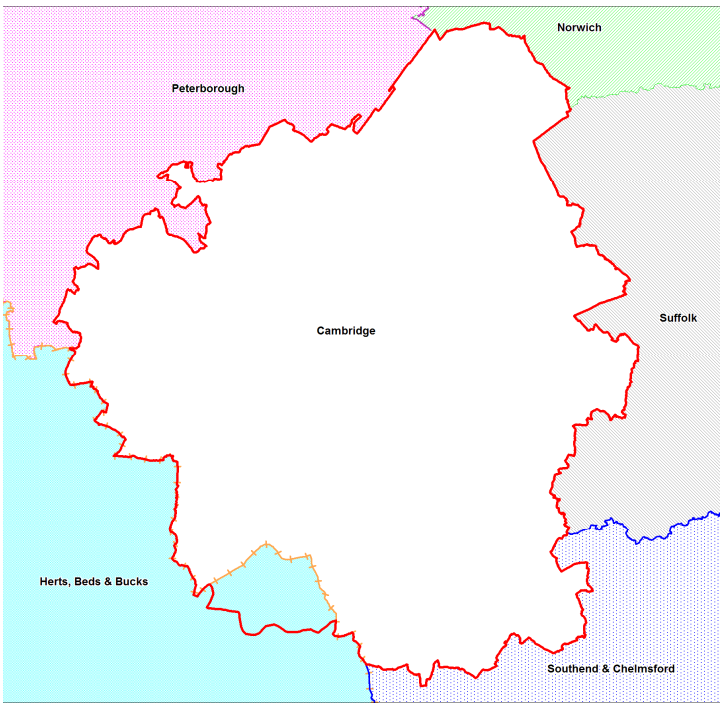


Figure 1.3: Cambridge Multiplex – Adjacent Multiplexes

In planning for each multiplex Ofcom have required coverage assessments:

- For each area four maps should be produced as follows:
    1. **Current Situation** - Map showing current actual coverage (or launch plans where a mux hasn't yet launched), including any transmitters which are required as part of the current licence, but which are not yet operational.
    2. **Modified Network 1** - Map showing the above, plus any improvements to existing infrastructure.
    3. **Modified Network 2** - Map of the above, plus additional smaller infill transmitters focused on areas where FM coverage is robust.
    4. **Modified Network 3** - Map of the above, plus additional transmitters to provide near universal coverage.

1.1 Outgoing interference and sensitivity to other co-block multiplexes

1.1.1 Existing Coverage (Case 1)

The existing Cambridge multiplex is quite vulnerable to co-channel interference; however the environs of the city of Cambridge are reasonably well protected. The existing coverage is restricted by co-channel interference from the Kent, South Yorkshire, Birmingham and Swindon multiplexes. No particular multiplex dominates the incoming interference.

The **noise** limited coverage for the existing coverage is shown in Figure 2.1; Figure 2.2 shows the coverage for existing 1% time interference limited. Figure 2.3 shows the mobile outdoor coverage, for case 1. This coverage is more restricted than the indoor coverage.

1.1.2 Existing Coverage (Case 2)

There is no proposal to modify the existing transmission characteristic for Cambridge, so the only change for case 2, modified network 1 is the additional incoming interference anticipated for the post DSO, Cambridge transmissions.

1.1.3 Proposed DSO Coverage (Case 3, Modified Network 2)

In order to improve the coverage for the Cambridge multiplex, the following transmitters have been considered:-

Sandy Heath (a new directional antenna), Ely Cathedral, Newmarket, Gog Magog, Newmarket and Cheveley.

It should be noted that initially the coverage falls significantly for the mobile service this is due to the impact of fully planned co-block multiplexes and high levels of interference that are referred to in the text of this document.

Cheveley and Newmarket were both considered in order to provide coverage around Newmarket. Both transmitters have been left in as neither, on its own, provides solid coverage for the town and its surroundings.

The proposed transmitter for Sandy Heath could contribute hugely to the western part of the Cambridge multiplex, however, in order to minimise the potential outgoing interference to the co-block multiplexes at Swindon and Kent, the ERP has been reduced from the optimum for population coverage in the Cambridge editorial area, in order to reduce outgoing interference.

The area to the north–west around Huntingdon also falls within the Peterborough editorial area (see figure 1.3) and is already adequately served by the Hinchinbrook transmitter for the Peterborough multiplex. This has not been added to the Cambridge multiplex at this time.

The transmitter proposed for Ely Cathedral provides good coverage for the city of Ely.

The Seawards End transmitter in the south provides coverage for the town of Saffron Walden.

The extent of the incoming co-block interference at 1% time is significant (for indoor and mobile outdoor coverage, see Figures 2.4 and 2.5), although not catastrophic.

Tables 2.2 indicates the road length coverage detail.

1.1.4 Expanded DSO Coverage (Case 4, Modified Network 3)

Figure 2.7 shows the Case 4, Modified Network 3 and the Gog Magog transmitter has been added. The Gog Magog transmitter reinforces the coverage to the south of Cambridge and significantly improves the coverage for the roads network; for the areas around Great Shefford and Sawston.

For the mobile outdoor coverage, there is significant incoming co-block interference, see Figure 2.8.

The extent of the incoming co-block interference at 1% time is significant, although not catastrophic.

Neither of the adjacent multiplexes of Suffolk on 5A or Southend and Chelmsford on 12D is able to serve the area around Saffron Walden and Haverhill well.

2 Coverage of Multiplex

2.1 Coverage Maps

Coverage maps for DAB are presented with three colours.

Blue = Mobile coverage (99% locations at 99% time)

Dark Green = Indoor coverage (80-95% locations at 99% time)

Light Green = Robust Indoor coverage (>95% locations at 99% time)

These maps included with this report

Figure 2.1

Case 1 -Current NOISE limited coverage for Cambridge *(1 transmitter)*

Figure 2.2

Case1 - Current interference limited coverage for Cambridge, 1% time - *(1 transmitter)*

Figure 2.3

Case 1 - Mobile outdoor Coverage for Current interference limited for Cambridge, 1% time - *(1 transmitter)*

Figure 2.4

Case 2, Interference limited coverage for Cambridge, Existing transmitter – DSO interference limited 1% time

Figure 2.5

Case 3, Interference limited coverage for Cambridge, Modified network 2 1% times - *(5 transmitters)*

Figure 2.6

Case 3, Interference limited mobile outdoor coverage for Cambridge,

Modified network 2 1% time - *(5 transmitters)*

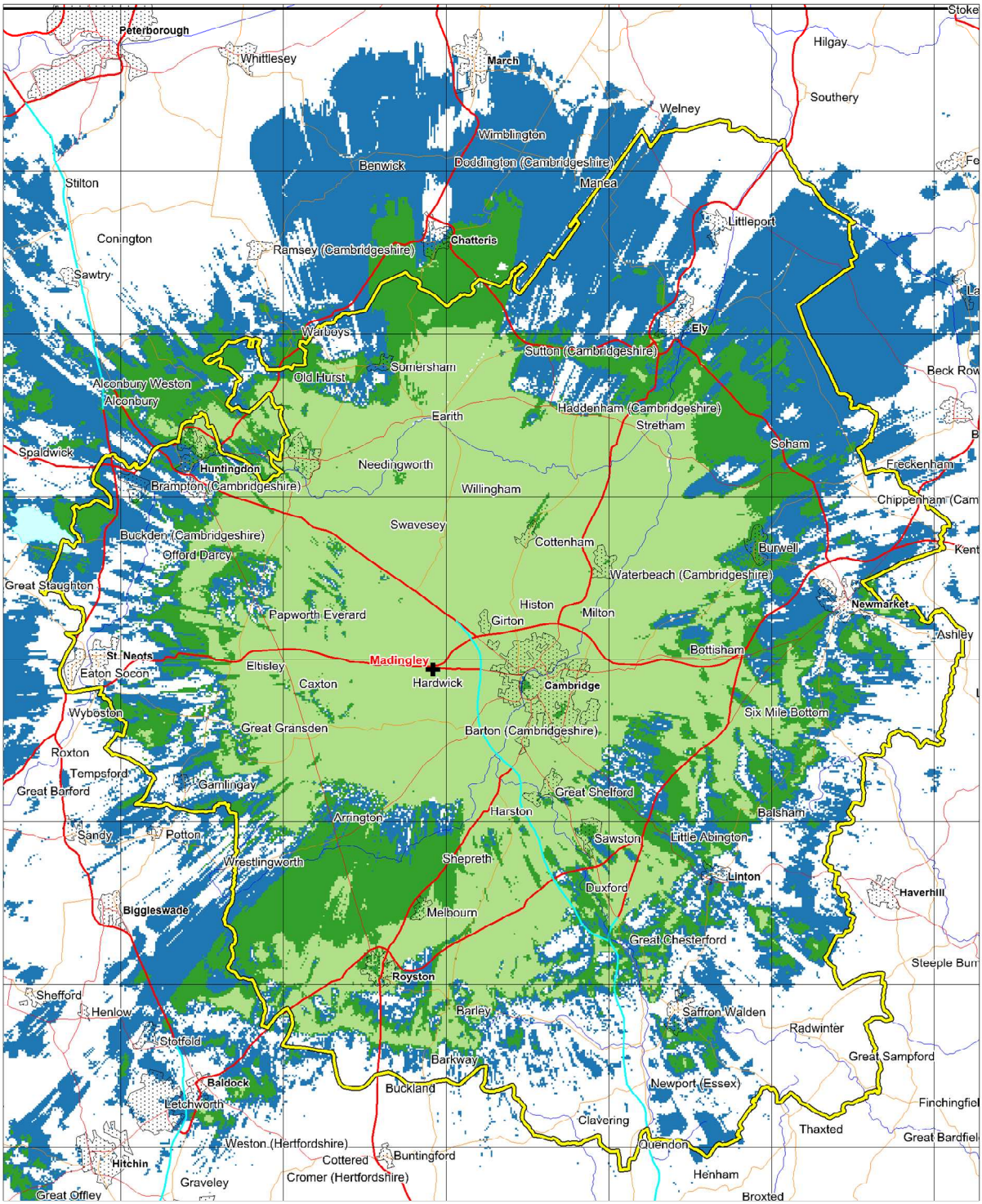
Figure 2.7

Case 4, Interference limited coverage for Cambridge, Modified network 3 1% time - *(7 transmitters)*

Figure 2.8

Case 4, Interference limited mobile outdoor coverage for Cambridge,

Modified network 3 1% time - *(7 transmitters)*



Percentage Locations %

- Robust Indoor
- Indoor
- Mobile Outdoor

NOW Cambridge_v0 (NOISE LIMITED)

Interference Limited Coverage, indoor portable reception
SFN percent locs S&Y sum with timing, version 2

arqiva

Figure 2.1 - Cambridge - EXISTING Coverage - Noise Limited Coverage

This plot shows predicted values; it does not guarantee that the indicated values will be achieved in practice.
Maps Copyright The Automobile Association

Date Plotted : 07 Jan 2011
© 2011

Filename : NOW Cambridge_v0.Indoor.per.fs

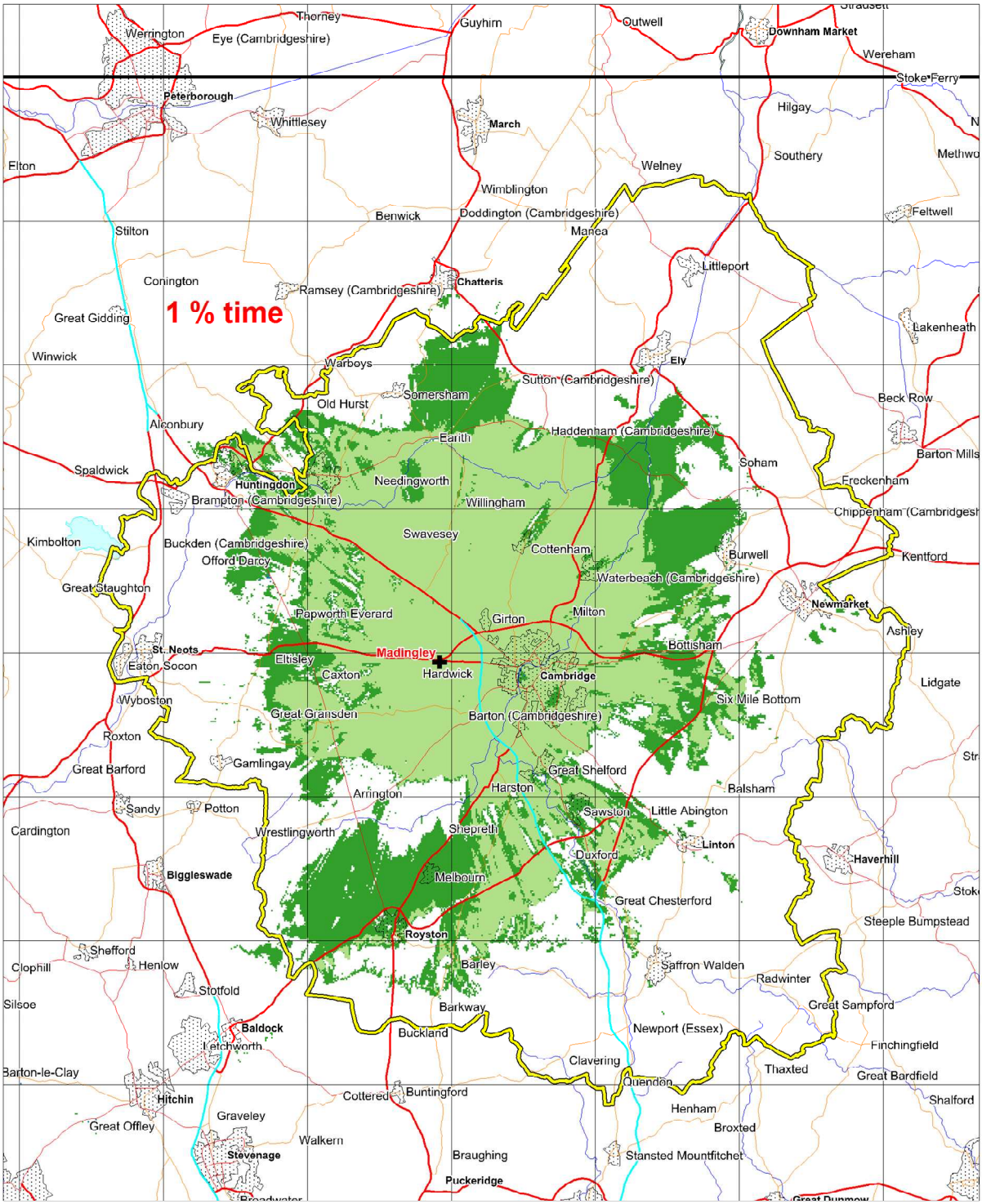
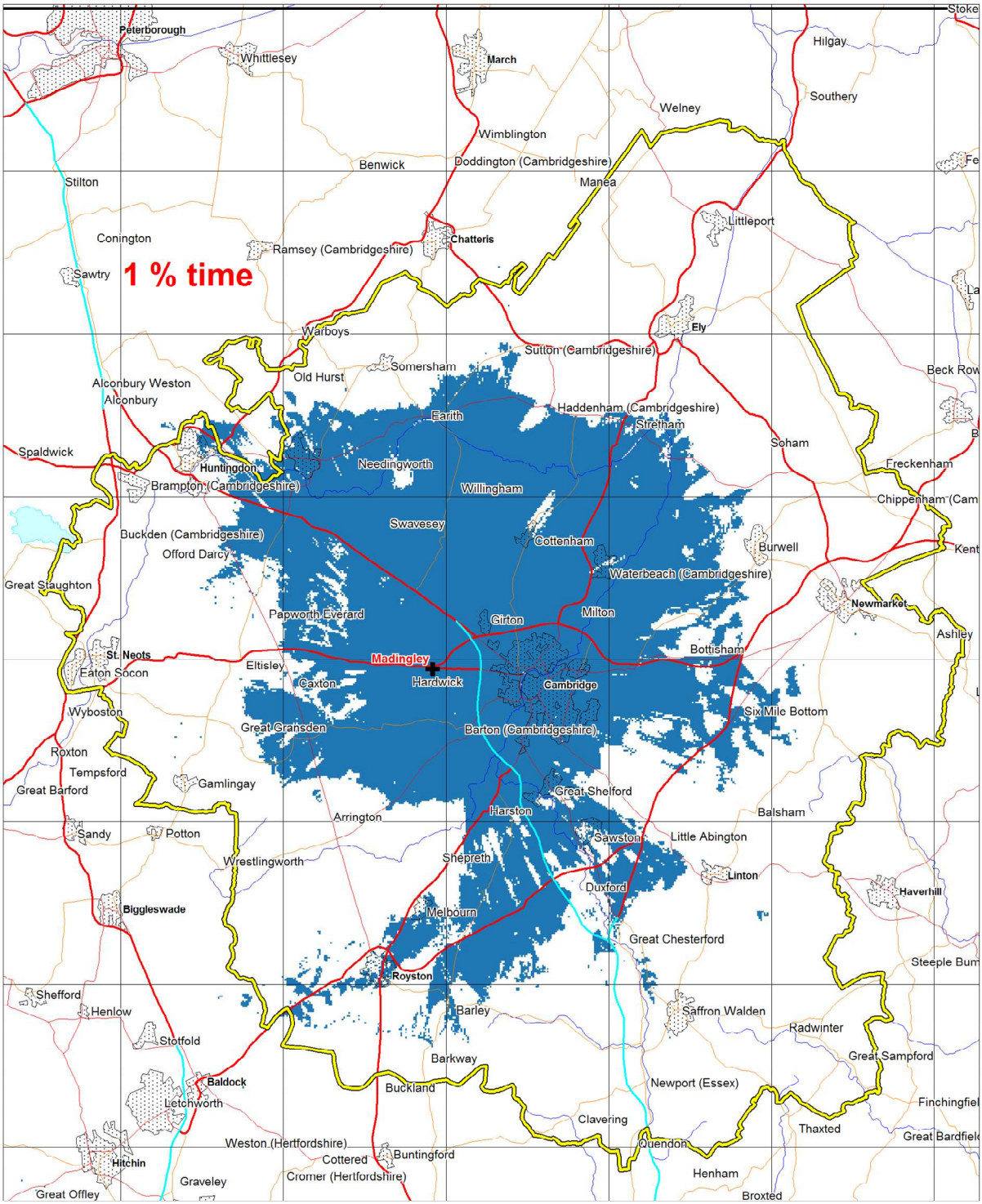


Figure 2.2 - Cambridge - Existing Coverage
Case 1- 1% time interference Limited Coverage



Percentage Locations %

Mobile Outdoor

NOW Cambridge_v0_CCI

Interference Limited Coverage, mobile outdoor reception
SFN percent locs S&Y sum with timing, version 2

Figure 2.3 - Cambridge (Mobile Outdoor only)
Case 1- Existing Coverage - 1% time - interference Limited Coverage

arqiva

This plot shows predicted values; it does not guarantee that the indicated values will be achieved in practice.
Maps Copyright The Automobile Association

Date Plotted . 07 Jun 2011
© 2011

Filename . NOW Cambridge_v0_CCI.outdoor.per.fs

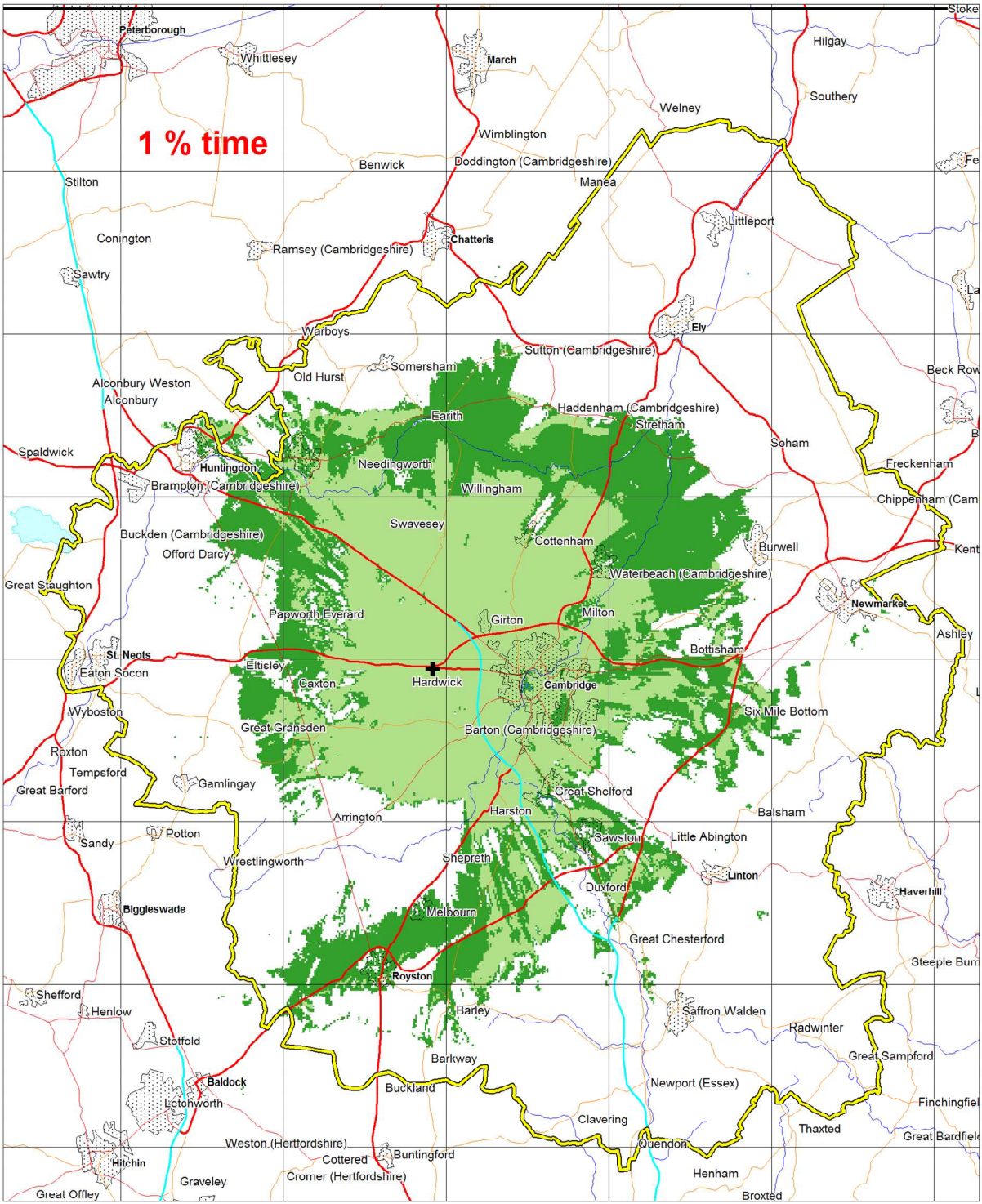
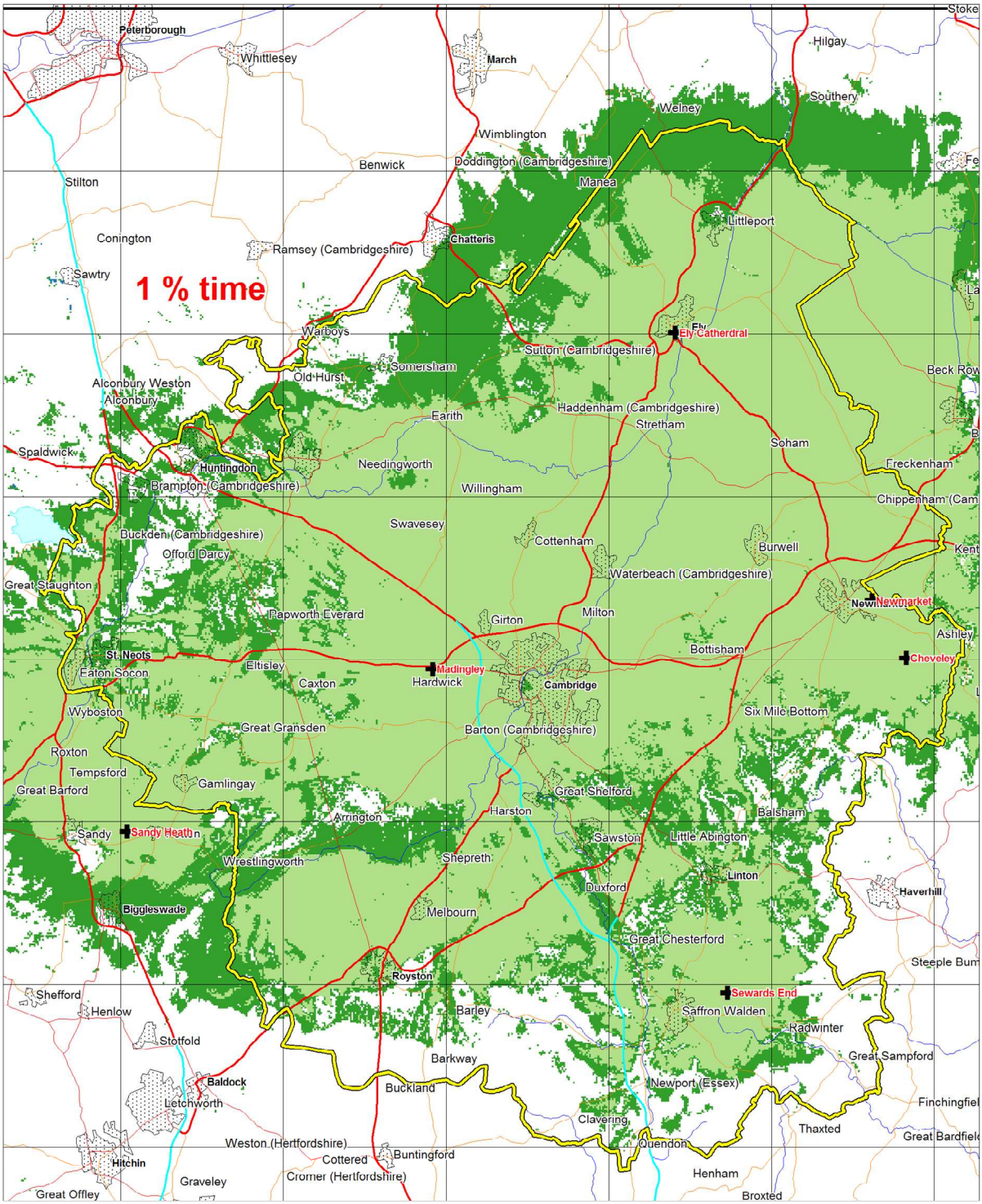


Figure 2.4 Cambridge DSO -Case 2 - 1% time interference limited



Percentage Locations %

- Robust Indoor
- Indoor
- Mobile Outdoor

NOW Cambridge_v10_Case3_GD_max

Interference Limited Coverage, indoor portable reception
SFN percent locs S&Y sum with timing, version 2

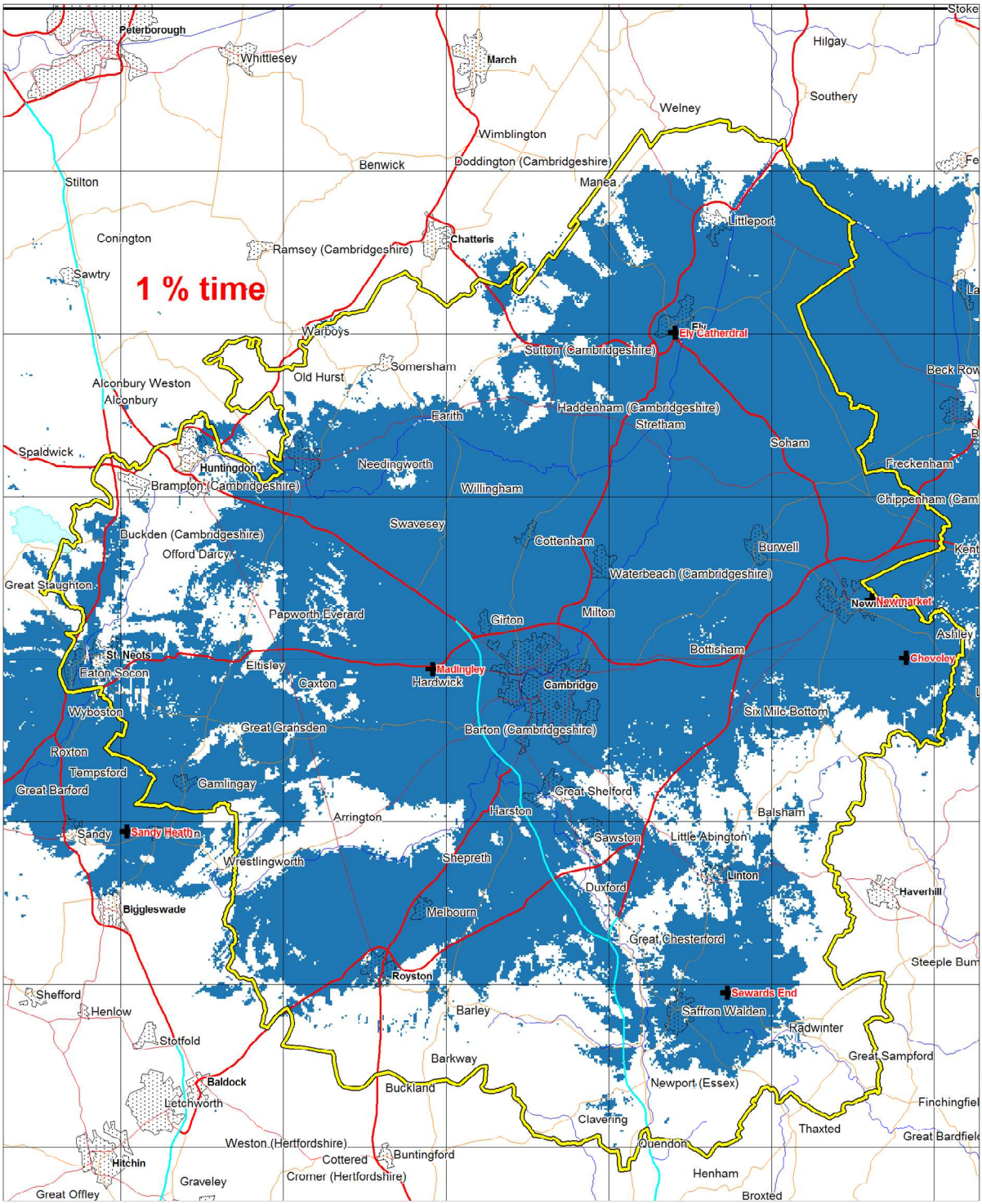
Figure 2.5 Cambridge DSO -Case 3, Modified network 2
1% time interference limited

arqiva

This plot shows predicted values; it does not guarantee that the indicated values will be achieved in practice.
Maps Copyright The Automobile Association

Date Plotted . 7 Jun 2011
© 2011

Filename . NOW Cambridge_v10_Case3_GD_rmax.indoor.per.fs



Percentage Locations %

Mobile Outdoor

NOW Cambridge_v10_Case3_GD_max

Interference Limited Coverage, mobile outdoor reception
SFN percent locs S&Y sum with timing, version 2

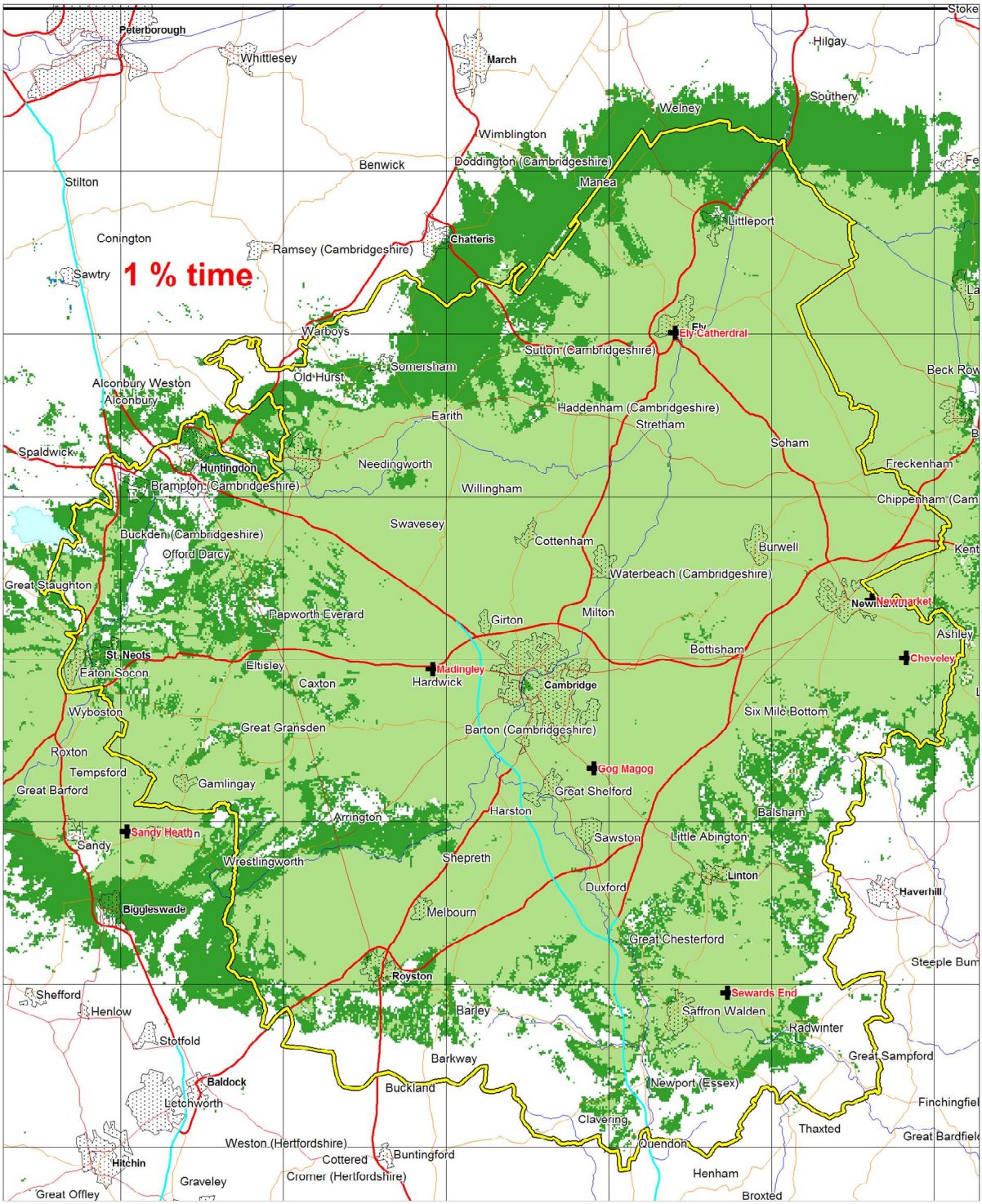
Figure 2.6 Cambridge DSO -Case 3, Modified network 2 - Mobile Outdoor 1% time interference limited

arqiva

This plot shows predicted values; it does not guarantee that the indicated values will be achieved in practice.
Maps Copyright The Automobile Association

Date Plotted . 7 Jun 2011
© 2011

Filename . NOW Cambridge_v10_Case3_GD_rmax.outdoor.per.fi



Percentage Locations %

- Robust Indoor
- Indoor
- Mobile Outdoor

Cambridge_v10 GD_cci_ auto order

Interference Limited Coverage, indoor portable reception
SFN percent locs S&Y sum with timing, version 2

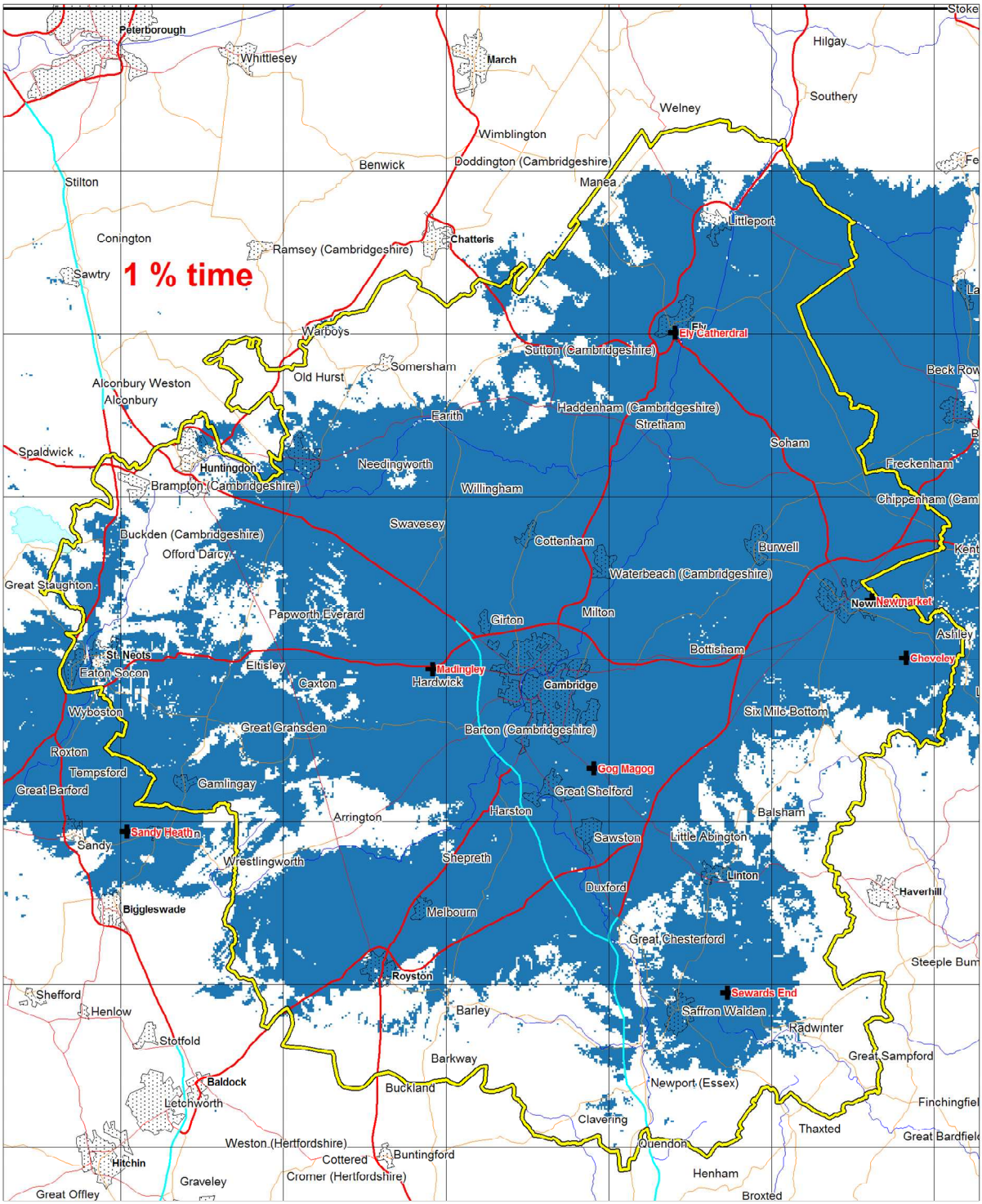
Figure 2.7 Cambridge - Case 4, Modified network 3
1% time interference limited

arqiva

This plot shows predicted values; it does not guarantee that the indicated values will be achieved in practice.
Maps Copyright The Automobile Association

Date Plotted . 7 Jun 2011
© 2011

Filename . Cambridge_v10 GDi_CCI.html.step006.indoor.per.fs



Percentage Locations %

Mobile Outdoor

Cambridge_v10 GD_cci_ auto order

Interference Limited Coverage, mobile outdoor reception
SFN percent locs S&Y sum with timing, version 2

Figure 2.8 Cambridge - Case 4, Mobile Outdoor, Modified network 3
1% time interference limited

arqiva

This plot shows predicted values; it does not guarantee that the indicated values will be achieved in practice.
Maps Copyright The Automobile Association

Date Plotted . 7 Jun 2011
© 2011

Filename . Cambridge_v10 GDi_CCI.html.step006.roads.per.fs

2.2 Population Coverage Tables

The following population tables 2.1, 2.2 and the road length coverage tables 2.3 and 2.4 are colour coded thus:-

Existing Cambridge Case 1*(1 transmitters)*

- Light Yellow = Existing sites unchanged

Case 2 (1 transmitter)

- Existing Cambridge transmitter – interference limited

Case 3 *(6 transmitters)*

- Light yellow + light blue = modified network 2

Case 4 *(7 transmitters)*

- Light yellow + light blue + light green = modified network 3

Table 2-1. Population coverage proportional indoor 99%T Total 227,750

Site scenario and incremental additional sites	Site Type	Individual Gross Interference Limited coverage within Editorial Area	Number of households within Editorial Area	Increase in number of households	Incremental percentage increase of population	Percentage of Editorial Area
Madingley Case 1	Existing site		123,245			55.58
Madingley Case 2	Existing site		110,381	-12,864	-5.8%	49.78
Cheveley	New Site	15,734 (7.10%)	140,379	17,134[1] 29,998[2]	7.73%	63.31
Sandy Heath	DAB site-new antenna	15,768 (7.11%)	166,321	25,942	11.70%	75.00
Sewards End	Existing DAB	10,702 (4.83%)	183,675	17,354	7.83%	82.83
Ely Cathedral	New Site	16,219 (7.31%)	196,589	12,914	5.82%	88.65
Newmarket	New site	15,887 (7.16%)	200,099	3,510	1.58%	90.24
Gog Magog	New Site	9,332 (4.21%)	201,489	1,390	0.63%	90.86

[1] Increase when compared to case 1

[2] Increase when compared to case 2

Table 2-2. Road coverage 99% locations, 99%T: Total 495.8 km

Site scenario and incremental additional sites	Site Type	Total road length in km	Increase in number of road length in km	Incremental percentage increase of road length	Percentage of roads within the editorial area
Madingley	Existing site	225.9			45.56
Madingley Case 2	Existing site	161.9	-24	-12.9%	32.66
Cheveley	New Site	248.7	22.8[3] 86.8[4]	4.61%	50.17
Sandy Heath	DAB site. New antenna	302.0	53.3	10.75%	60.91
Sewards End	Existing DAB	338.0	36.0	7.26%	68.17
Ely Cathedral	New Site	383.2	45.2	9.11%	77.29
Newmarket	New Site	401.1	17.9	3.61%	80.90
Gog Magog	New Site	422.3	21.2	4.27%	85.17

[3] Increase when compared to case 1

[4] Increase when compared to case 2

Table 2-3. Summary of Coverage within Editorial Area for Each Case

Case	Indoor Household (& percentage coverage)	Mobile Road Coverage (& percentage coverage) 99% locations
1	123,245 (55.6%)	225.9 (45.6%)
2	110,381 (49.8%)	161.9 (32.7%)
3	200,099 (90.2%)	401.1 (80.9%)
4	201,489 (90.9%)	422.3 (85.2%)

Case 1 - Light Yellow = existing sites unchanged

Case 2 - White Modified Network 1

Case 3 - White + blue = modified network 2

Case 3 - White +blue + green = modified network 3