Digital Switchover (DSO) Programme

Radio DSO Block 12D West & Mid Wales

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1.0	16/04/11	Draft version for review.
1.1	21/04/11	Initial release
2.0	25/05/11	Llandrindod ERP reduced to 1 kW; maps/Tables changed

Table of Contents

1 West & Mid Wales (12D) DSO Narrative

Block 12D, assigned to West & Mid Wales, is an existing allocation previously called Mid South Wales, the area of which is different to that proposed in this report. Four transmitters were planned, but never commissioned (It is noted that Kilvey Hill transmitter is greater than 20km outside the editorial area of the proposed West & Mid Wales (12D) multiplex) :-

Transmitter	ERP (kW)
Carmel	5.000
Fishguard	1.000
Presely	5.000
Kilvey Hill	2.950

There are nine proposed Block 12D allocations throughout UK :-

N. Ireland

Leeds

Stoke-on-Trent

Edinburgh

Coventry

Reading & Basingstoke

Southend & Chelmsford

Peterborough

West & Mid Wales

All these multiplexes, above, are currently radiating on block 12D with the exception of West & Mid Wales which has not been implemented. In addition, West Wilts(12D) is also currently radiating, but the area covered by this multiplex is to be re-allocated to another block. By virtue of the terrain and distances between multiplexes, the only 12D multiplexes having any affect upon West & Mid Wales (12D) are N Ireland (12D), Coventry (12D) and Stoke (12D); although even these have relatively small impact upon West & Mid Wales (12D). Similarly, West & Mid Wales (12D) has some affect, primarily to Coventry (12D), but also upon N Ireland (12D) & Stoke (12D) and no impact upon the other distant 12D multiplexes.

Figure 1.1 shows these proposed multiplexes in the area surrounding West & Mid Wales (12D). This also illustrates the terrain in the editorial area in relation to the other co-block allocations.

The proposed editorial area of the 12D allocation in West & Mid Wales has changed significantly to that of the original proposal; an area to the north has now been assigned to the proposed North Wales and West Cheshire (10D) multiplex; and an area to the south has been assigned to the proposed Swansea (12A) multiplex. The originally proposed Kilvey Hill transmitter provides coverage within the Swansea (12A) proposed editorial area.

The two editorial areas (existing & proposed) are show Figure 1.2

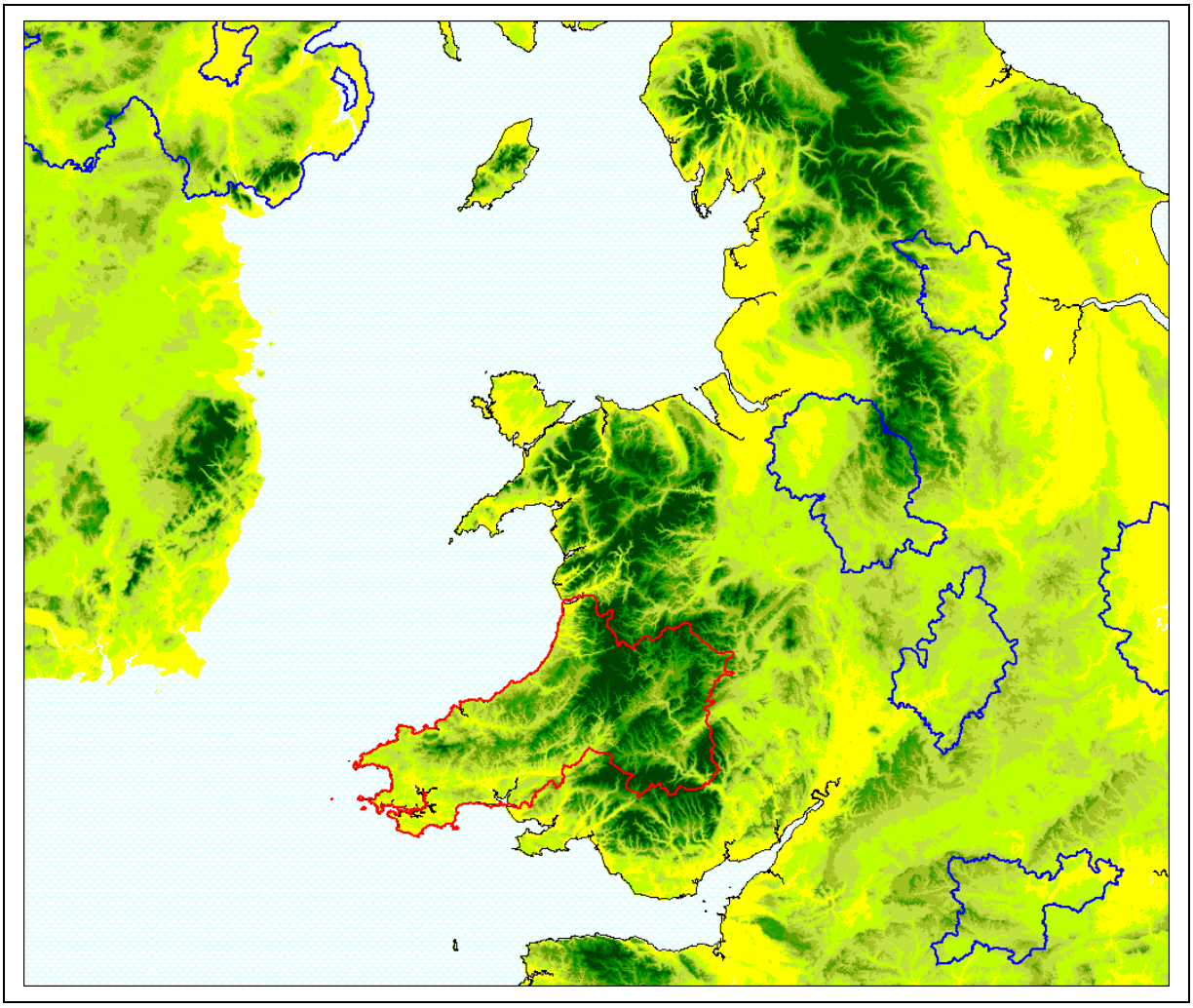


Figure 1.1: Proposed Block 12D Allocations

There are editorial area overlaps with :-

North Wales & West Cheshire (10D) in the north

Swansea (12A) in the south

The following three multiplexes abut West & Mid Wales (12D) :-

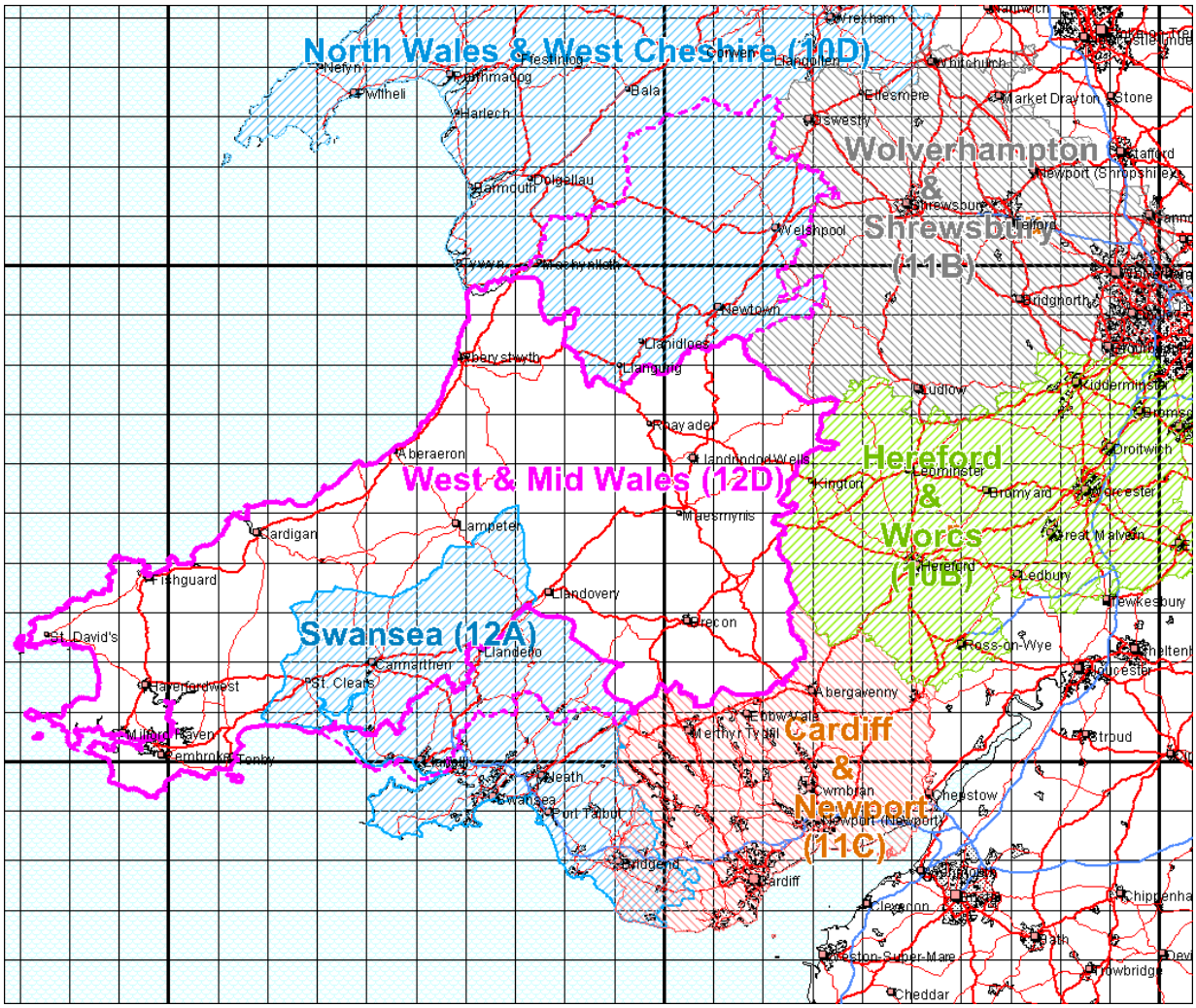
Wolverhampton & Shrewsbury (11B) in the north-east

Hereford & Worcester (10B) in the east

Cardiff & Newport (11C) in south-east

These adjacent areas are shown on map, *Figure 1.2* overleaf.

FM Radio coverage is currently provided by BBC Radio Cymru (from *Haverfordwest, Carmarthen, Carmel, Llandyfriog, Myndd Pencarreg, Brecon, Llyswen & Clyro* transmitters). Independent Radio is provided by two networks; Radio Pembrokeshire (from *Fishguard, Haverfordwest and Tenby transmitters*) ;and Real Radio (Fishguard, Presely, Carmarthen and Carmel transmitters) Considering the mountainous terrain, FM predictions show much the area as relatively well served by these combined FM services; some deep valleys remain poorly served.



Map Copyright: The Automobile Association

Figure 1-2: West & Mid Wales (12D) Editorial Area showing Surrounding Multiplexes

Solid Purple Contour	Proposed Editorial Area
Broken Purple Contour	Existing Editorial Area (service not implemented)

In planning for each multiplex, Ofcom have required coverage assessments:

- For each area four sets of maps should be produced as follows:

    1. **Current Situation** - Map showing current actual coverage (or launch plans where a multiplex 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.

For case 1: Current situation

Figures 2-1 and 2-2 show the current originally, proposed situation in West & Mid Wales (12D). There are four transmitters provisionally planned but not implemented and these are listed at beginning of *Section 1.* The antenna horizontal radiation patterns (HRP) are overlaid onto these maps. Interference limited coverage includes the nine co-block interferers including West Wilts (12D), although only N Ireland (12D) and Stoke (12D) impact West & Mid Wales (12D) – and the affect of these is relatively small because of their distance and interposing terrain.

In the proposed plan, the West Wilts (12D) allocation will move to another block.

The current West & Mid Wales (12D) coverage is essentially limited by terrain rather co-block interference; it's coverage is not that good for the original editorial area and will require many more transmitters to cover the newly proposed editorial area

For case 2: Modified network 1

Both Carmel and Kilvey Hill are outwith the new, proposed editorial area, although, in the case of Carmel, coverage into the editorial area is useful. Kilvey Hill is in excess of 20km outside the new editorial area boundary and has therefore been dropped from the plan (It is within the main hinterland for Swansea 12A).

It not proposed to increase the maximum effective radiated powers (ERP) of the Fishguard, Presely or Carmel – essentially coverage tends to be terrain limited.

Percentage Coverage is somewhat less than Case 1 because there are only 3 transmitters with slightly more co-block interference potential – mostly from N Ireland (12D)

Figures 2-3 & 2-4 show the predicted coverage's.

For case 3: Modified Network 2

In this it was required to serve areas where there is existing local FM coverage The area is predicted to be reasonably well served by combined FM services; exceptions being some of the deep valleys in the more remote central areas; the main A40 road roughly 10-15km either side of Brecon is poor; and the borders area east of Llandrindod Wells is poor too.

The proposed Llandrindod, Carmarthen & Greenhill transmitters are planned for BBC National although they are not currently radiating; they have been tagged in the population coverage tables (*Tables 2-1 & 2-2*) as 'new, existing infrastructure'.

Tenby UHF, Brechfa, Hafod y Gleddau, Troedrhrw and Talley have also been proposed by Swansea (12A). Clyro has been proposed by Hereford & Worcs (10B)

Fourteen further sites are required to emulate the FM coverage as far as reasonable, although it will still not match the predicted FM coverage. Many more small transmitters (mostly TV transmitter sites and Cellular 'phone sites) will be required to complete coverage in these deep valleys. *Figures 2-5 and 2-6* show this coverage.

For case 4: Modified Network 3

For this case it was required to 'fill' the multiplex to achieve near universal coverage (within practical planning limits).

The plan remains unchanged from that for Case 3 (previous case) Further transmitters may be added for small communities – as is the case with terrestrial TV relays - but in order to complete road coverage within some of the remote valleys, many more transmitters would be required; most likely be of the size and density of cellular phone masts.

With 17 planned transmitters, indoor proportional coverage was predicted to be 78.33% of the Editorial Area (1% Time interference). Outdoor (Road) coverage is 78.52% (1% Time interference) – not hugely different from the noise limited coverage. It should be noted that this multiplex has a very low population density with less than 155,000 households within the Editorial Area.

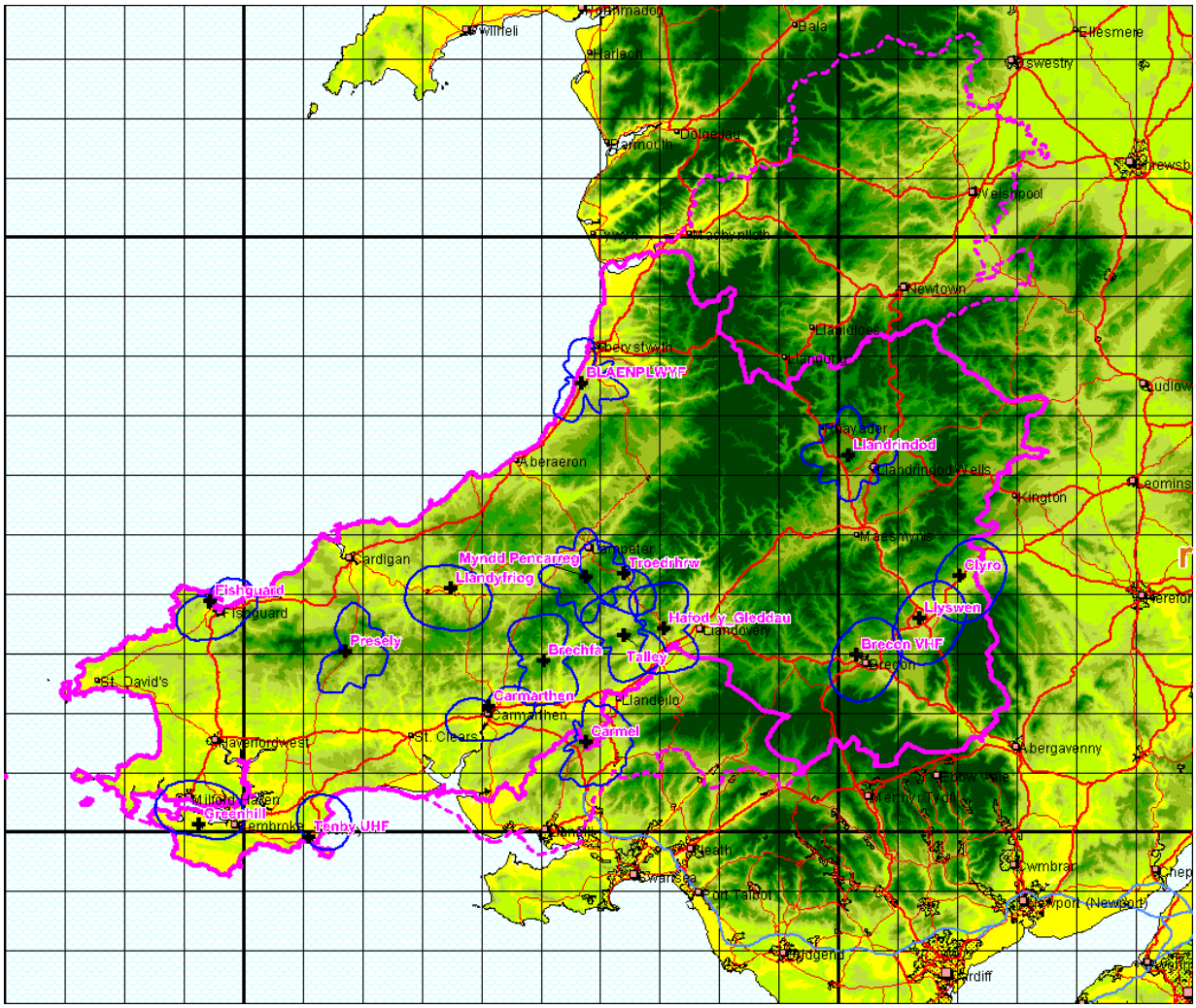
1.1 Incoming interference and sensitivity to other co-block multiplexes

The general 'Benchmark' for indoor and outdoor co-block interference protection is for 99% time and predicted coverage held up well to these levels so further predictions for 95% time interference were not necessary.

There is slight co-block interference from N Ireland (12D) on small areas of the coastal road. Stoke(12D) impacts some very remote locations

1.2 Outgoing interference to other co-block multiplexes

The terrain and remoteness of this multiplex precludes any significant outgoing interference, consequently, there is an impact to Coventry (12D) and a slight impact to Stoke (12D) from the proposed Llandrindod transmitter. Some small remote areas of N Ireland will be slightly impacted too if proposals contained in this report are implemented.



Map Copyright: Ordnance Survey 1: 625,000

Figure 1-3 West & Mid Wales (12D) Editorial Area – with Terrain

Solid Purple Contour Proposed 12D Editorial Area

Broken Purple Contour Existing 12D Editorial Area

Antenna Horizontal Radiation Patterns (HRP) are shown for the 17 transmitters proposed (Case 3/4)

2 Coverage of the Multiplex

2.1 Coverage Maps

Coverage maps for the DAB are generally presented with three colours unless otherwise stated:

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)

Figure 2-1 Existing Situation
Figure 2-2 Existing Situation – Outdoor Only: 1% Time Interference
Figure 2-3 Modified Network 1
Figure 2-4 Modified Network 1 – Outdoor Only: 1% Time Interference
Figure 2-5 Modified Network 2
Figure 2-6 Modified Network 2 – Outdoor Only: 1% Time Interference

Note *Modified Network 3 remains unchanged from Modified Network 2*

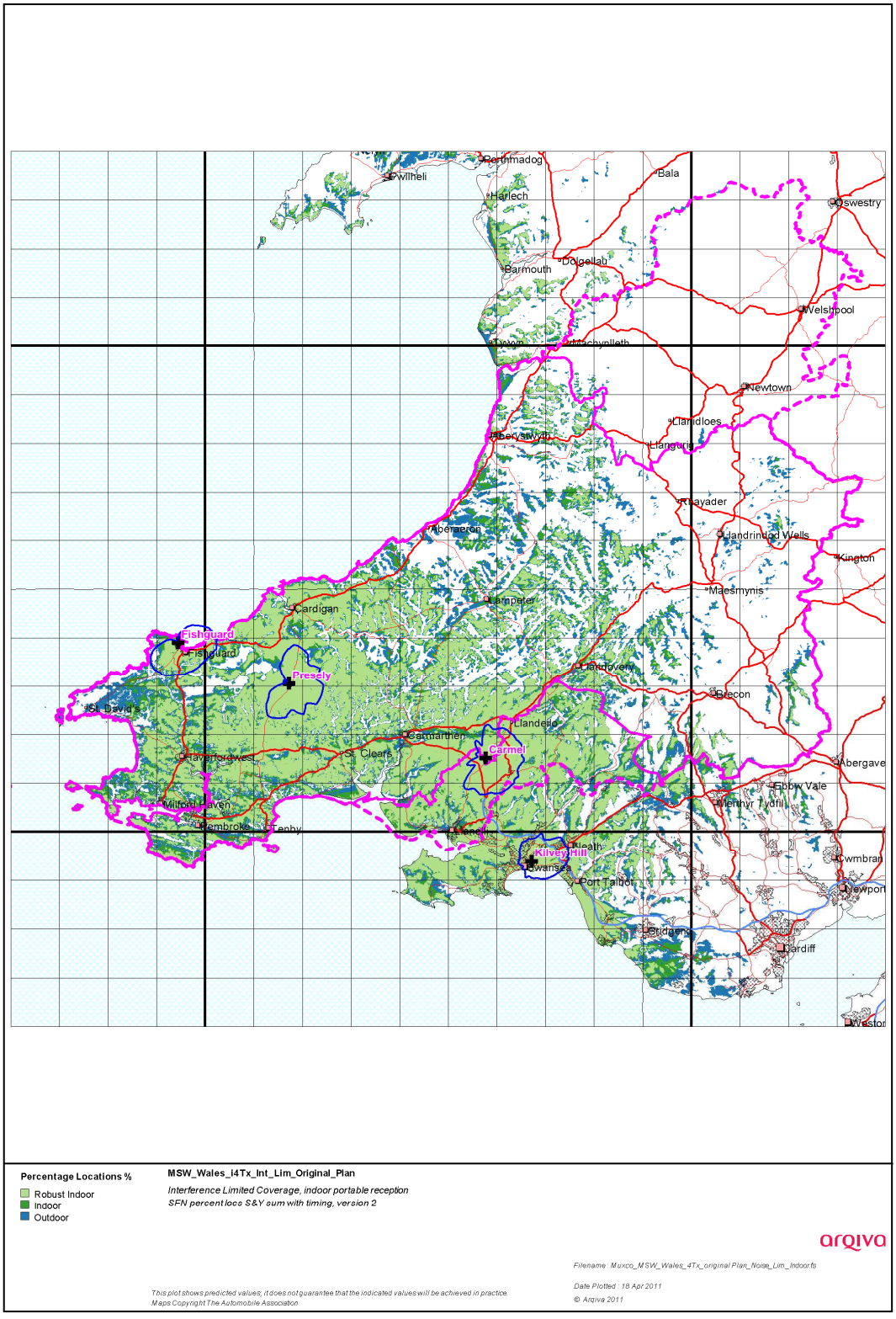


Figure 2-1. Current Situation

Broken Purple Contour shows the Existing Editorial Area

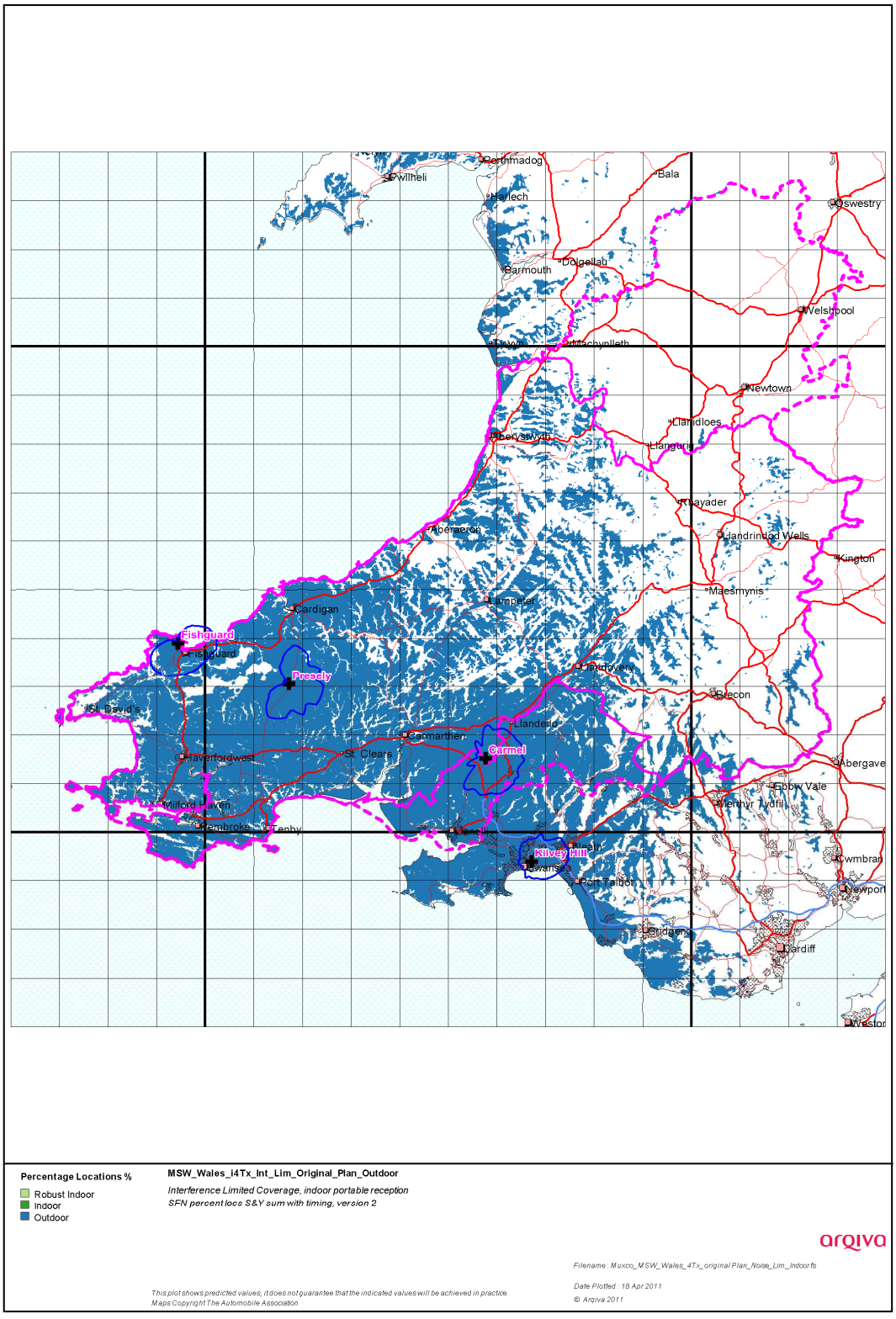


Figure 2-2. Current Situation – Outdoor Only, 1% Time Interference

Broken Purple Contour shows the Existing Editorial Area

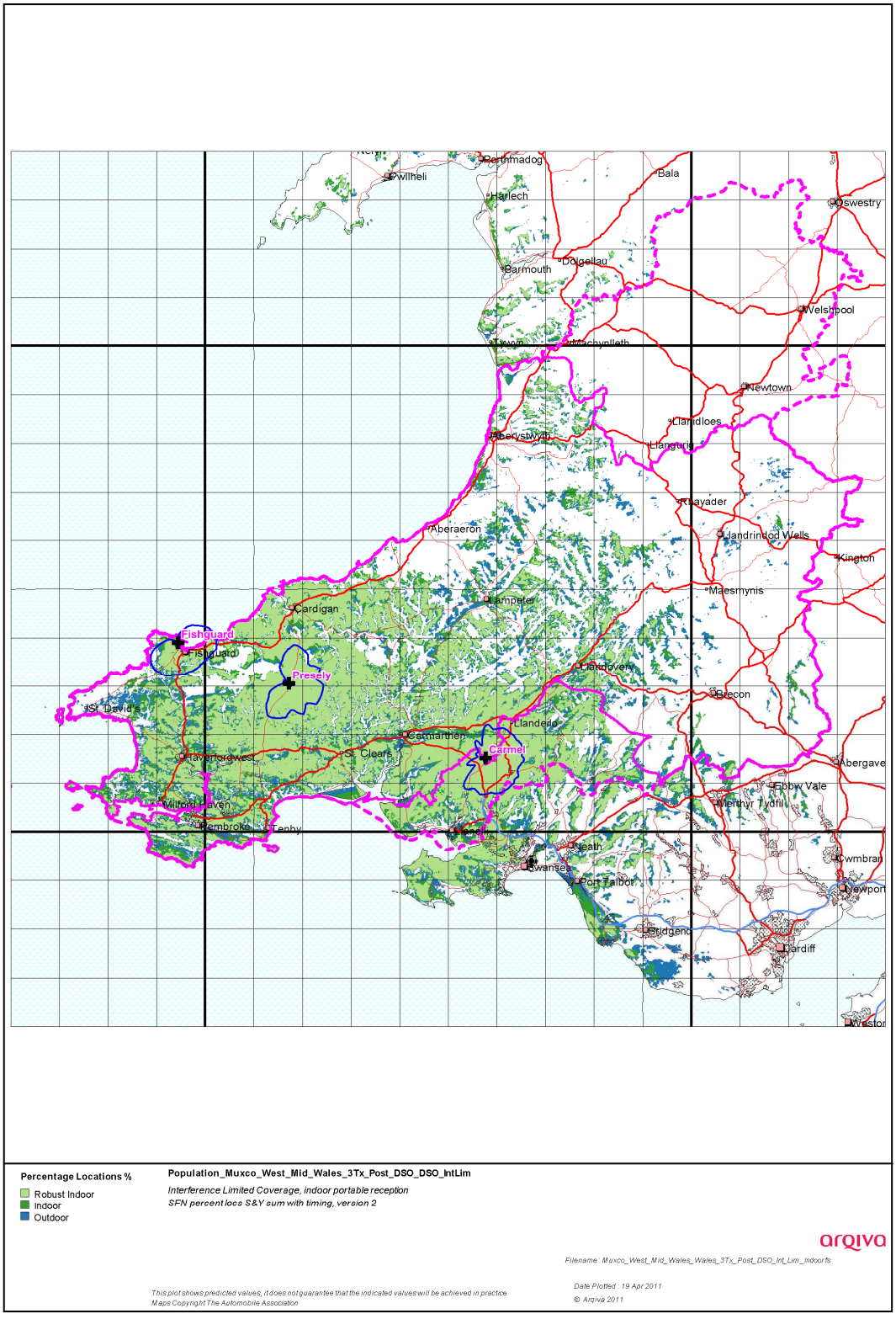


Figure 2-3. Modified Network 1

Broken Purple Contour shows the Existing Editorial Area

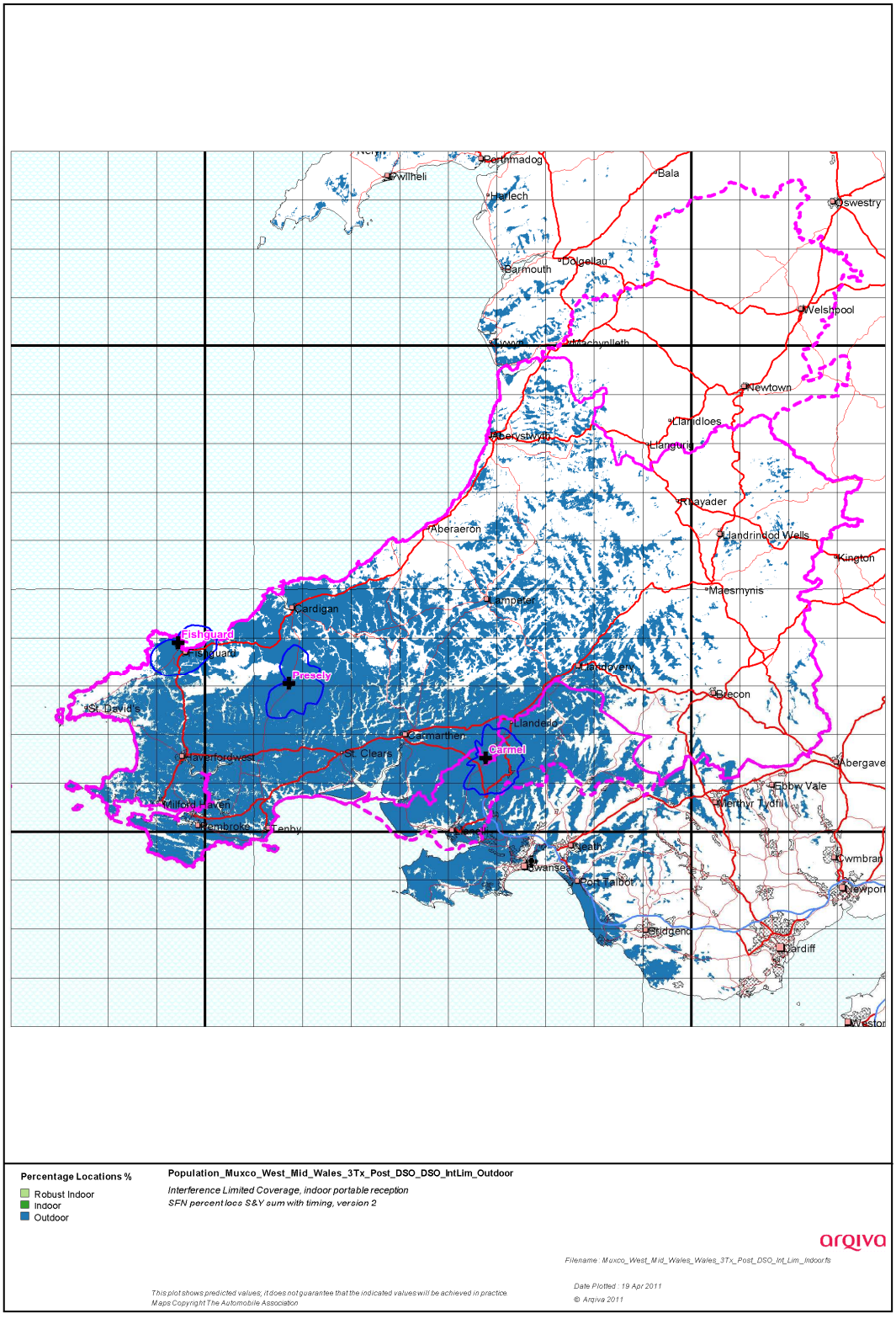


Figure 2-4. Modified Network 1 – Outdoor Only, 1% Time Interference

Broken Purple Contour shows the Existing Editorial Area

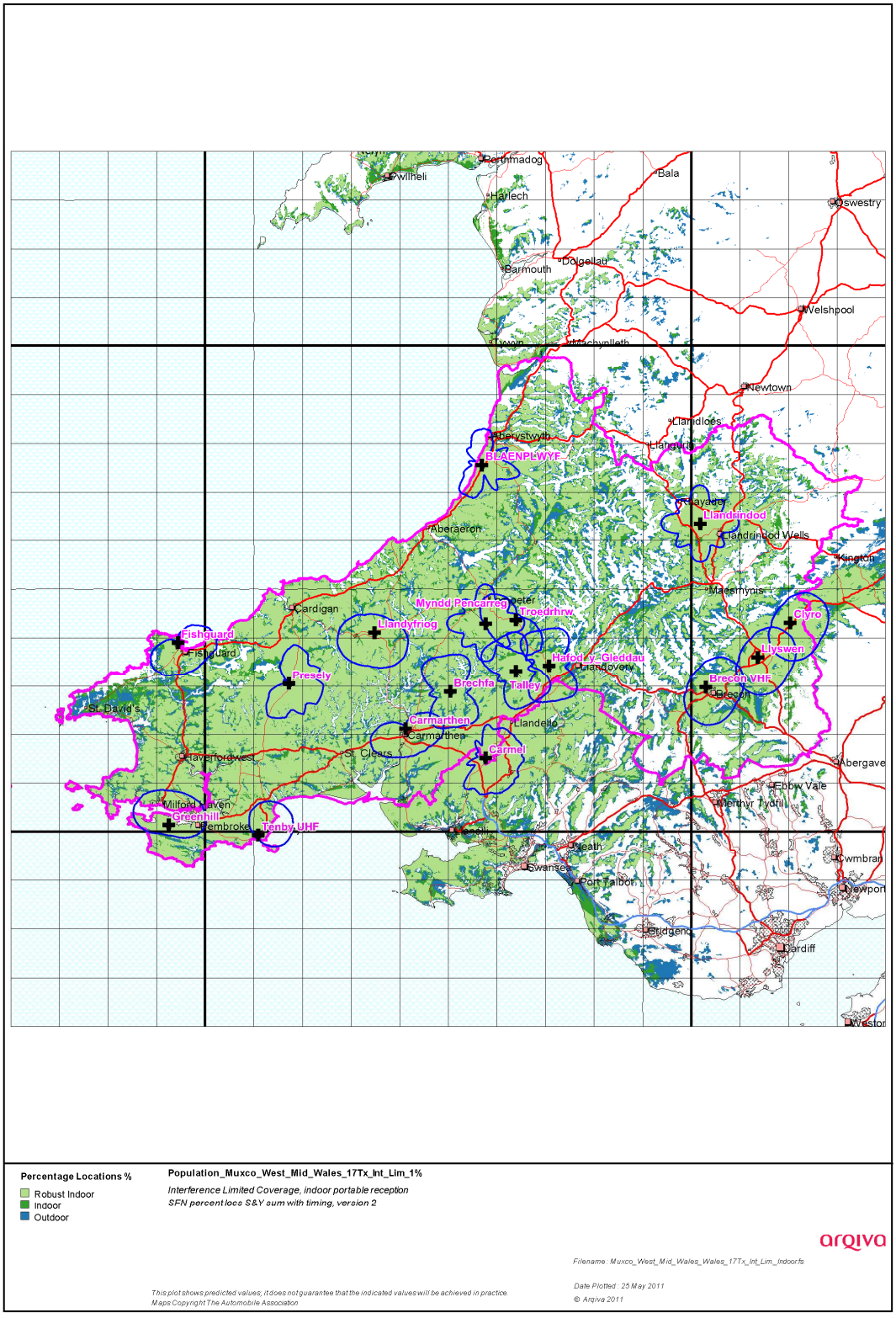


Figure 2-5. Modified Network 2

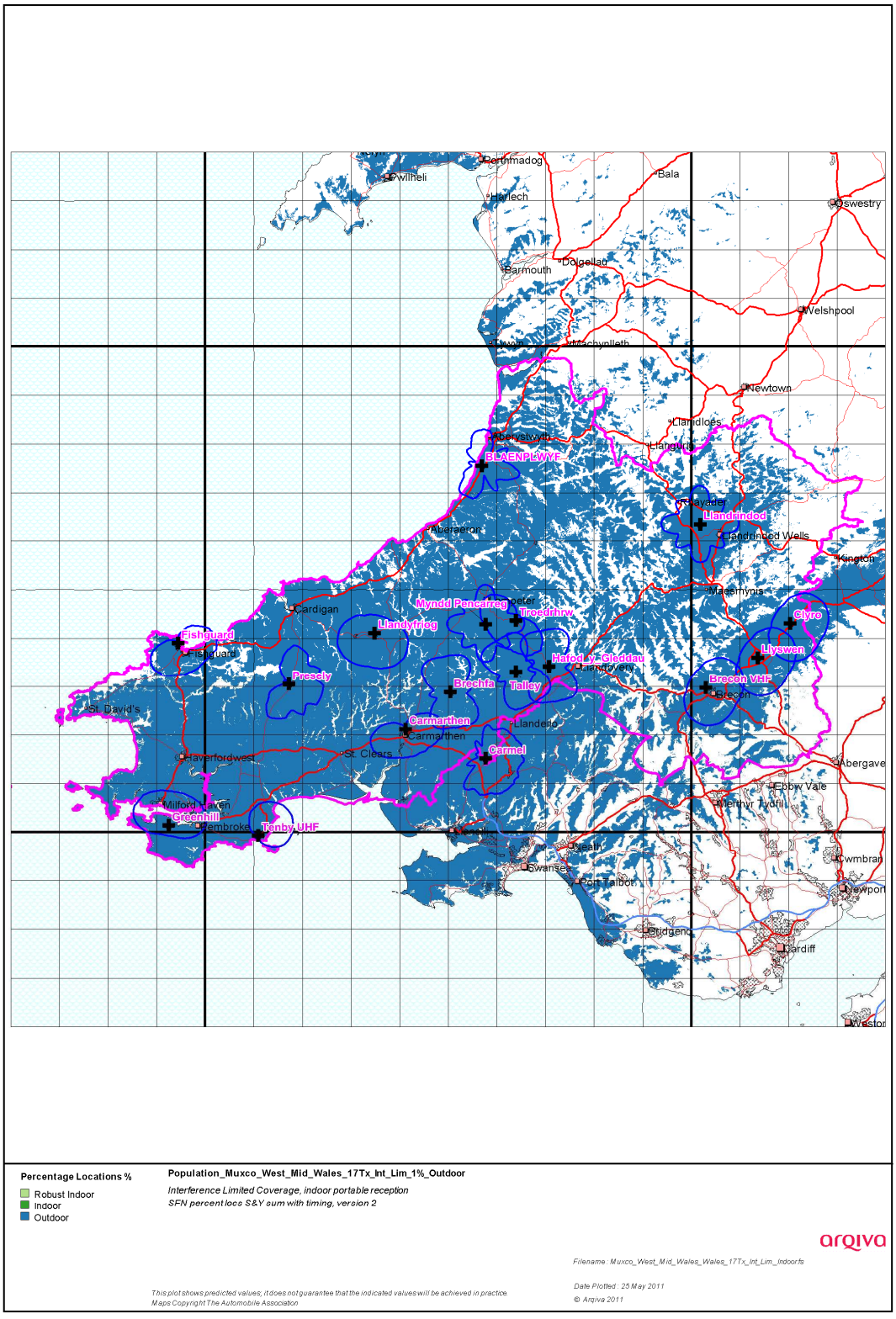


Figure 2-6. Modified Network 2 – Outdoor Only, 1% Time Interference

2.2 Population Coverage tables within Editorial Area

Table 2-1 Population - Proportional Indoor Coverage: Total households 154,400

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 (%)
Current (4Tx)	New, Existing Infrastructure	-	59,582	-	-	38.63
Current (3Tx)	New, Existing Infrastructure	-	57,392	-	-	37.21
Greenhill	New, Existing Infrastructure	24,000 (15.54%)	73,003	15,611	10.07	47.28
Blaen Plwyf	New, Existing Infrastructure	14,098 (9.13%)	87,609	14,606	9.46	56.74
Carmarthen	New, Existing Infrastructure	11,161 (7.23%)	95,259	7,650	3.66	60.40
Llandrindod	New, Existing Infrastructure	6,316 (4.09%)	99,644	4,385	4.14	64.54
Myndd Pencarreg	New	7,751 (5.02%)	105,553	5,909	3.82	68.36
Brecon VHF	New	4,391 (2.84%)	109,954	4,401	2.85	71.21
Lyswen	New	3,361 (2.18%)	113,405	3,451	2.24	73.45
Tenby UHF	New	6,601 (4.28%)	115,829	2,424	1.57	75.02
Llandyfriog	New	3,433 (2.22%)	117,989	2,160	3.40	76.42
Clyro	New	3,289 (2.13%)	118,619	630	0.41	76.83
Talley	New	383 (0.25%)	120,274	1,655	0.23	77.06
Brechfa	New	383 (0.25%)	120,523	249	0.15	77.21
Hafod y Gleddau	New	431 (0.28%)	120,675	152	0.11	77.32
Troedrhw	New	272 (0.18%)	120,804	129	0.09	77.41

Case 1		Light yellow	Existing Network
Case 2	-	Purple	Modified Network 1
Case 3	-	Blue	Modified Network 2
Case 4	-	*Blue + Green*	*Modified Network 3 n/a - same as Case 3*

Table 2-2. Road Coverage 99% Locations and 99% Time Interference Protection

Total Roads 1,169.9 km

Site Scenario and Incremental Additional Sites	Site Type	Total Road Length (km)	Increase in Road Length (km)	Incremental Percentage of Road Length (%)	Percentage of Roads within Editorial Area (%)
Current (4Tx)	New, Existing Infrastructure	532.1	-	-	45.4
Current (3Tx)	New, Existing Infrastructure	469.7	-	-	40.1
Greenhill	New, Existing Infrastructure	500.8	31.1	2.7	42.8
Blaen Plwyf	New, Existing Infrastructure	605.0	104.2	8.9	51.7
Carmarthen	New, Existing Infrastructure	616.0	11.0	1.0	52.7
Llandrindod	New, Existing Infrastructure	716.6	100.6	8.6	61.3
Myndd Pencarreg	New	784.1	67.5	5.7	67.0
Brecon VHF	New	813.7	29.6	2.6	69.6
Lyswen	New	863.4	49.7	4.2	73.8
Tenby UHF	New	869.9	6.5	0.6	74.4
Llandyfriog	New	878.4	8.5	0.7	75.1
Clyro	New	884.3	5.9	0.5	75.6
Talley	New	885.1	0.8	0.1	75.7
Brechfa	New	885.6	0.5	0	75.7
Hafod y Gleddau	New	892.3	7.2	0.6	76.3
Troedrhw	New	892.9	0.6	0	76.3

Case 1		Light yellow	Existing Network	
Case 2	-	Purple	Modified Network 1	
Case 3	-	Blue	Modified Network 2	
Case 4	-	Blue + Green	Modified Network 3	n/a – same as Case 3

Table 2-3. Summary of Coverage within Mid & West Wales (12D) Editorial Area for each case

Case	Indoor Households & (percentage coverage) *Proportional & 99% Time Interference Protection*	Mobile Coverage km & (percentage coverage) *99% Locations & 99% Time Interference Protection*
1	59,582 (38.63%)	532.1 (45.4%)
2	57,392 (37.21%)	469.7 (40.1%)
3	120,804 (77.41%)	892.9 (76.3%)
4	120,804 (77.41%)	892.9 (76.3%)

Case 1		Light yellow	Existing Network	
Case 2	-	Purple	Modified Network 1	
Case 3	-	Blue	Modified Network 2	
Case 4	-	Blue + Green	Modified Network 3	same as Case 3