



Directorate of Airspace Policy

30 June 2008

WEST END AIRSPACE CHANGE REVIEW

Introduction

The West End Airspace Change was introduced on 16 March 2006. This report details the outcome of a review of the effectiveness of the implementation, 12 months after its introduction.

Background

Under the terms of its operating licence for En-route operations, NATS is required by the Civil Aviation Authority (CAA) to provide a safe and expeditious air traffic service under strict economic regulation. The titled proposal was put forward by the Joint Future Airspace Development Team (JFADT), made up of representatives from both NATS and Ministry of Defence (MoD), and represented an extension to the pre-existing route structure, designed predominantly to reduce the number of choke points and areas of high controller workload which, in turn, would help to increase sector capacity.

Key Objectives

The redesign and revised arrangements to the airspace, both above and below flight level FL245 (24,500ft), were based on a need to reduce delays to commercial aircraft and deliver a substantial increase in Air Traffic Services (ATS) route capacity of 30%. From a MoD perspective, suitable airspace sharing arrangements were established to ensure existing and future operational capability, by the introduction of the South West Managed Danger Area (SWMDA) and the reorganisation of the North Wales Military Training Area (NWMTA). The new Lower Airspace structure, from base level to 24,500ft, is shown in Annex A, whilst Annex B illustrates the Upper Airspace structure, above 24,500ft. Annex C illustrates the major traffic flows within West End airspace before and after implementation.

Civil Air Traffic Management (ATM) Requirements

The West End region of the UK Flight Information Region (FIR) incorporates airspace over Wales and South West England and handles the following major traffic flows:

North Atlantic Track (NAT) Structure:

- When the NAT structure is anchored on Oceanic Exit and Entry Points (OEPs) west and south of Ireland, the Local Area Group West (LAG W) at Swanwick is heavily affected by the easterly and westerly NAT flows. Such traffic is made up of UK origin/destination, predominantly London Terminal Manoeuvring Area (LTMA), and overflights to/from continental Europe.

European/Domestic traffic:

- Traffic operating on a north-south axis to/from Manchester TMA (MTMA), Scottish TMA and northern UK airfields to/from southern Europe via the Brest FIR/UIR in France;
- Traffic on an east-west axis operating between Ireland and the UK (predominantly LTMA) and overflying to/from Europe;
- Traffic on a north-south axis operating between Brest FIR/UIR and the Shannon FIR/UIR. Such traffic (includes charter and scheduled airlines) comprises Shannon FIR airfields/Belfast TMA/Scottish TMA inbounds/outbounds from/to southern Europe;
- Traffic inbound to/outbound from Bristol and Cardiff Airports. Scheduled traffic operating to/from the north and east is supplemented by traffic to/from the south in the summer; and,
- Traffic inbound to and outbound from Exeter Airport.

Prior to the airspace change being implemented, this region routinely attracted significant Air Traffic Control (ATC) attributable delays - for the first six months of 2004, the West End group of sectors was responsible for 233601 minutes of delay (22% of the total NATS-attributable), the highest delay-producing en-route sector group in the UK. This was largely due to airspace and ATC sector constraints.

Although additional route distance will be incurred by those flights having to route around the active areas of the SWMDA, a NATS study concluded that the increased capacity and reduction of flight delay would produce aggregated net benefits of £115m in Present Value Terms to 2016. Such benefit would be obtained through improving the efficiency of the available airspace by:

- Using airspace sharing arrangements and enhanced Flexible Use of Airspace (FUA) procedures;
- Using 12 nautical mile spacing between routes which, when flights are radar monitored, permit them to be separated whilst on their own navigation without the need for radar vectors. This results in systemisation of traffic on ATS routes (referred to as Autonomous Operation), thereby reducing controller workload and potentially creating extra capacity; and,
- The introduction of 2 new ATC Sectors; Swanwick ACC sectors 35 and 36.

Military ATM Requirements

It is not possible to list the precise detail of all military flying, however, military flying is carried out in all areas of Class G uncontrolled airspace, as well as within the controlled airspace of the ATS network. When en-route to/from military bases, appropriate airways crossing services from Swanwick (Mil) and other approved units

are provided. The following is a sample of the types of activities conducted over the entire region where the airspace changes were implemented:

- Aircraft transiting to and from all the military airfields to carry out segregated autonomous operational sorties within Danger Areas (DA);
- Aircraft descending into the Low Level areas and climbing out from Low Level sorties;
- Aircraft operating in the NWMTA;
- Aircraft from RAF Boscombe Down conducting Test and Evaluation tasks and Empire Test Pilot School sorties;
- Air-to-Air Refuelling tasks;
- Airborne Early Warning (AEW) aircraft carrying out sorties in AEW orbit areas;
- Air Tests from RAF St. Athan;
- Royal Navy (RN) 'D' school training sorties;
- RN AEW sorties; flying training at respective RAF and RNAS units;
- Exercises in the South West Approaches;
- Operational Air Traffic (OAT) transit flights throughout the region which may also join the ATS route structure and fly as General Air Traffic (GAT)¹ (and vice-versa);
- Aircraft involved with parachuting in notified DAs or parachuting sites; and,
- Short notice Military tasks.

From the MoD's perspective, the establishment of the SWMDA and expansion of the NWMTA will accommodate the operational training needs of Typhoon and other future weapons platforms until at least 2012. The SWMDA is needed by the new generation of weapons platforms that require segregated airspace to carry out training; this will include supersonic flight in accordance with existing regulations.

With the introduction of the Typhoon to RAF service in 2005, it is expected that Typhoon operations will primarily be conducted in the North Sea Managed Danger Areas (MDA). However, the SWMDA can be utilised by the Typhoon when weather in the North Sea is unsuitable, or when these areas are booked or segregated for other users. When the Joint Combat Aircraft (JCA) is introduced (circa 2012) it is anticipated that usage of the SWMDA may increase significantly. The introduction of complimentary new FUA arrangements is intended to enhance the efficient use of the airspace for both civil and military operations such that when not in use for military activity, the area is available for Commercial Air Transport (CAT) traffic.

Key Elements

There were a number of key elements to this proposal. Analysis had shown that despite the forecast reduction in overall delay, some airlines operating between Ireland and southern European destinations would, at times, be required to fly longer distances to avoid the military activity within the SWMDA. The introduction of new

¹ In general, OAT are flights controlled by Military ATC; GAT are flights controlled by Civil ATC.

Conditional Routes (CDR) UN18², UN34, UN169 and UN12 and an FUA protocol designed to meet, as closely as possible, the needs of all airspace users provides alternative routings when SWMDA is active.

The introduction of new routes UN20, UN22, UN34, (U)N90 and the realignment of (U)N862 enables autonomous operations on portions of these routes thus improving ATC capacity. A further capacity enhancement is the systemisation of traffic flows which reduces complexity and enhances safety. Such systemisation occurs at the Dublin/UK interface, Brest/Jersey interface and for traffic arriving and departing from the London region.

Traffic studies had shown that only a small number of aircraft utilised the lower levels of airways N864 over mid-Wales and L9 over west Wales; the lower limit of the en-route portion of the airways has therefore been raised to FL145. However, in order to make full use of autonomous operations on N864 and N862 between the Bristol/Cardiff CTA and Manchester TMA, it was necessary to lower a section of N862 to FL145 so that it is contiguous with the base level of N864. Airway N862 is extended southward via LAMAT and BHD with a lower limit of FL105. NATS developed the detail of airspace sharing arrangements in conjunction with the British Gliding Association (Riles Boxes) and British Parachuting Association (Dunkeswell), which provides segregated access for these activities within defined areas of N862.

Areas of Contention

Environmental

Although much of the new airspace was introduced above 10,000ft agl, many of the airspace changes were in the vicinity of the Exmoor and Brecon Beacons National Parks (NP) and the following Areas of Outstanding Natural Beauty (AONB): Shropshire Hills; Lleyn Peninsula; Cotswolds; Wye Valley; Mendips; Quantock Hills; Blackdown Hills and East Devon. Maps showing the airspace changes and associated parks and AONBs can be found in Annexes A and B and figure 1.

NATS undertook an environmental assessment and consultation; this was supplemented by an independent assessment of the NATS/MoD proposal by CAA specialists in the Environmental Research and Consultancy Department (ERCD). Whilst in general terms sponsor consultation showed there was a broad acceptance that these proposals were tolerable, it was noted that forecast information was limited to 2006; DAP required the sponsor to provide additional forecast information beyond this, which was subsequently provided. Environmental consultees were provided with detailed explanations of these changes by the sponsor, which included background information on where aircraft could be expected to operate, within the ATS route structure, in relation to AONBs and NPs.

Regulatory Consultation was undertaken by the Directorate of Airspace Policy, which included a detailed environmental assessment of the proposals. This was sent to all recipients of the sponsor environmental consultation and all respondents to that consultation. This regulatory consultation was conducted in accordance with Cabinet

² UK airspace is split into the Upper Air (24,500ft and above) and Lower Air (below 24,500ft). When a route is established in the Upper Air only, it has a 'U' prefix; when established in both, it has a '(U)' prefix.

Office Code of Practice on Consultation³ and the, then extant, Airspace Change Process that required a second user consultation to be conducted by the CAA (DAP).

Figure 1 shows the location of the airspace changes with respect to the NP and AONBs in the area. The areas where new airspace was introduced over a NP or AONB are highlighted in purple. The corresponding areas that were already covered by existing airspace are coloured blue.

The airspace changes over Brecon Beacons NP and the AONBs were above 10,000ft agl. Whilst the thrust of the Government Environmental Guidance to the CAA on the exercise of its air navigation functions for overflight of an AONB deals with “visual intrusion”, in considering this change DAP also took into account potential aircraft noise. It was determined that noise produced by aircraft flying above the NP and AONBs would fall well below the level marking the onset of significant community annoyance, although it was deemed likely that some relatively low levels of aircraft noise will be experienced. It was thought probable that aircraft would be the subject of visual sighting from the NP and AONBs, but the higher the aircraft the less the degree of visual intrusion and noise.

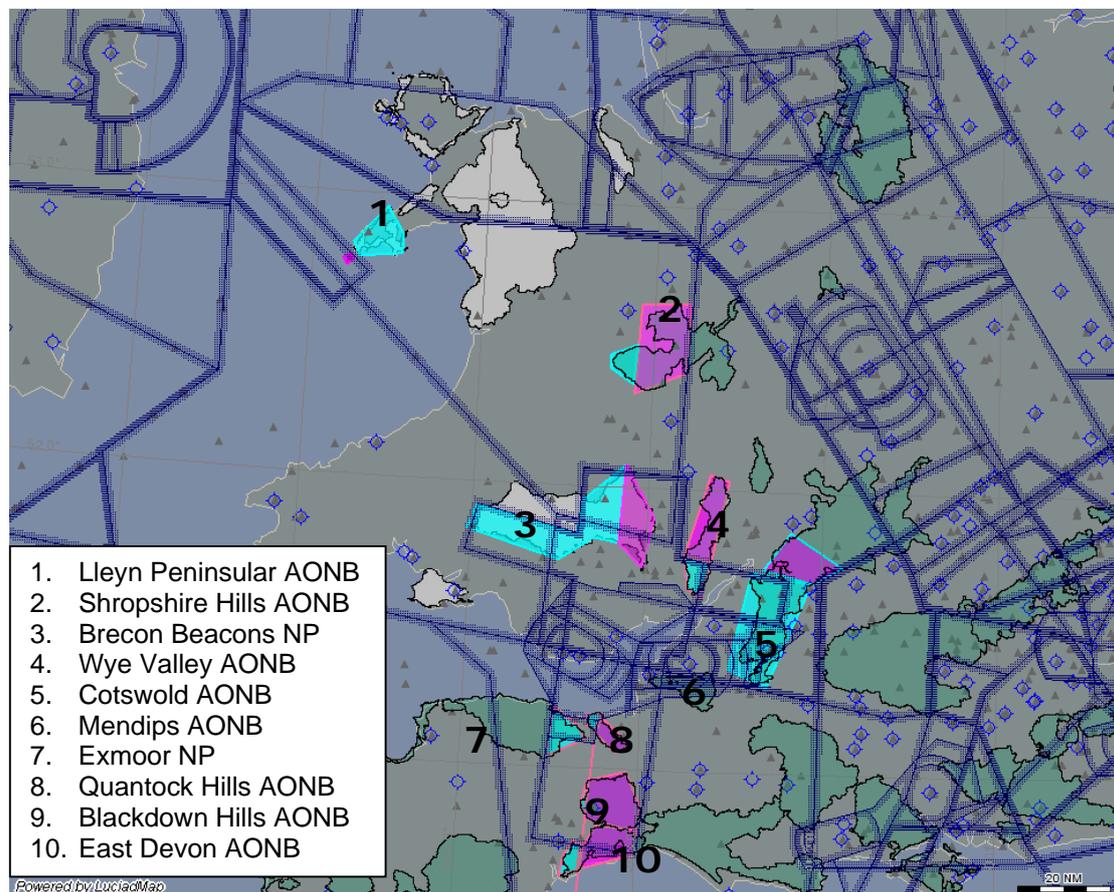


Figure 1 New West End Airspace and associated AONBs/National Parks

³ <http://bre.berr.gov.uk/regulation/documents/consultation/pdf/code.pdf>

From an airspace design perspective, DAP considered it impracticable to avoid overflight of either the Brecon Beacons NP or affected AONBs; it can be seen from the chart at Annex A that the ATS routes are integrated with other airspace structures. Alternative routes to avoid overflight of such areas would introduce significant complications to both ATC and aircraft operators and would not make the most efficient use of airspace. Moreover, such a design would result in aircraft flying considerably longer track distances, which would result in additional environmental penalties associated with extra fuel burn and associated increased emissions. Complexity would also increase and thereby lead to a potential reduction in capacity and efficiency.

Nevertheless, a number of bodies either associated with, or representing, AONBs objected to the changes, in particular the Shropshire County Council in respect of the Shropshire Hills AONB. Moreover, Stanford in the Vale in south Oxfordshire is not within a NP or AONB, but there was a significant campaign initiated by CPRE against the introduction of N14 and extension of the Cotswold CTA; the lowest level of the new airspace that overlies this area is FL105 (approximately 10,500 ft).

Generally, objections raised were in respect of the overflight of AONBs, the loss of tranquillity and environmental pollution. Following implementation, a number of individuals continued to object to the change directly to the CAA or via their MPs. The last registered complaint was a letter to DAP dated May 2007. The level of complaint received has been roughly similar to that encountered following the much less extensive Midlands Phase 2 project.

Analysis

Twelve months after implementation, NATS began analysing recorded radar data on flights using the West End airspace. Table 1 gives a summary of the flights over AONBs and NPs before and after the changes; the 'before' and 'after' data is averaged from the 18th-24th July 2005 and the 17th-23rd July 2006, respectively, to give a 'daily' figure.

		Total	No. Flights Increase	Change %	Below FL195	Above FL195
Lleyn Peninsula	Before	62			0	62
	After	12	-50	-80.6%	1	11
Shropshire Hills	Before	224			14	210
	After	271	47	21.0%	26	245
Brecon Beacons	Before	559			68	491
	After	568	9	1.6%	30	538
Wye Valley	Before	283			17	266
	After	305	22	7.8%	21	284
Cotswolds	Before	580			139	441
	After	611	31	5.3%	153	458
Mendip Hills	Before	17			12	5
	After	27	10	58.8%	22	5
Exmoor	Before	174			42	132
	After	162	-12	-6.9%	52	110
Quantock Hills	Before	125			36	89
	After	128	3	2.4%	38	90
Blackdown Hills	Before	98			16	82
	After	148	50	51.0%	18	130
East Devon	Before	191			33	158
	After	245	54	28.3%	44	201
Total Before		2313			377	1936
Total After		2477		7.1%	405	2072

Table 1 Summary of flights using Controlled Airspace over AONBs and National Parks

Lleyn Peninsula:

The area of the AONB over-flown following the changes is considerably less than was previously, as the new route was realigned further south over the sea. The number of flights over-flying the AONB has reduced by 81% (50 flights per day) with on average less than one over-flight per hour.

Shropshire Hills:

Post implementation, a slightly larger area of the Shropshire Hills AONB is over-flown than before and the base of controlled airspace overlying the eastern side is lower. The overall increase in flights is 21% (an additional 47 flights per day), where the number of flights over-flying the AONB below FL195 is relatively small; the majority of the additional traffic is above FL195.

Brecon Beacons:

The total number of flights over the Brecon Beacons has increased by 1.6% (an additional 9 flights). This is less than the annual traffic growth⁴. Whilst the area of

⁴ The UK average growth in traffic over the period in question was 5.9%

the NP experiencing over-flights has increased, it can be seen that the airspace change has resulted in over-flights passing over the NP at higher altitude; this is indicated by the reduction in the number of over-flights below FL195.

Wye Valley:

The number of commercial aircraft over-flying the Wye Valley AONB has increased by 7.8% (an additional 22 flights per day). While there has been a small increase in the number below FL195 (4 flights), the vast majority of flights passing over the Wye Valley are above FL195.

Cotswolds:

Cotswolds AONB has seen an increase in the total number of overflights of 5.3% (an additional 31 flights per day), which is slightly less than the national average traffic growth for the period. The flights that are routed over the new area would have over-flown the existing area of the AONB previously. Hence it can be concluded that the airspace change has resulted in some dispersal of flights over the AONB.

Mendip Hills:

Post implementation, the area of the Mendip Hills AONB that is over-flown has increased, although the total number of flights remains relatively low at 27 per day (an increase of 10 flights per day). Analysis of radar data has shown that all of the increase has occurred below FL130; this is entirely due to the growth in flights from Bristol and Cardiff airports and the subsequent changes made to the Bristol CTA, which were implemented on 31st August 2006.

Exmoor:

The area of the Exmoor NP that is over-flown has not increased as a result of the airspace change. The total number of over-flights over Exmoor NP has decreased by 6.9% (12 fewer flights per day). Although the volume of traffic below FL195 has increased, this can be directly attributed to the growth in flights from Bristol and Cardiff airports and the changes mentioned above.

Quantock Hills:

The Quantock Hills AONB has seen an overall increase in traffic of 2.4% (3 additional flights per day), which is less than the national average growth in traffic for the same period. The majority of flights passing over the Quantock Hills, as before the change, are above FL320.

Blackdown Hills:

The area of the Blackdown Hills AONB that is over-flown has increased as a result of the airspace change. This has resulted in an overall increase in the number of flights of 51% (an additional 50 flights per day). The vast majority of the flights over the Blackdown Hills are above FL300.

East Devon:

The area of the East Devon AONB that is over-flown has increased as a result of the airspace change. This has resulted in a 28.3% increase in the number of flights over the AONB (an additional 54 flights per day); the increase has been almost uniform above and below FL195. The vast majority of the flights over the East Devon AONB are above FL300, although the expansion in services from Exeter has seen growth in the number of flights arriving/departing the airport.

Overall, the AONBs and NPs associated with the West End Airspace Change show an overall traffic increase of 7.1%. The Lley Peninsula AONB, Brecon Beacons NP, Cotswolds AONB, Exmoor NP and Quantock Hills AONB experienced a change in over-flights that is below the UK average growth in traffic for the same period (5.9%). The Shropshire Hills, Wye Valley, Mendip Hills, and Blackdown Hills AONBs all experienced an increase in over-flights above the UK average growth. This can be directly attributed to the changes introduced to the West End airspace and to the associated changes to Bristol and Cardiff airspace, although in the case of the Shropshire Hills AONB, this increase is largely above FL195.

Aviation Stakeholders

The airspace change was undertaken by the JFADT and the proposers carried out in depth consultations with aviation stakeholders throughout the design stage of the process to ensure all airspace user needs were accommodated as far as was practicable.

Commercial Air Transport

During air traffic controller training prior to implementation, it was identified that the extant procedure for aircraft arriving/departing Birmingham Airport via West End airspace, would be complex and had potential safety issues during peak traffic times. Accordingly, timing restrictions on the use of this procedure were introduced, restricting availability between 0900 and 1700. This amendment to operations was not consulted on and negative feedback was received from 1 operator on the additional time and fuel used flying a longer route from the southwest, as schedules had been developed on the assumption that the previous arrangement would still be in place.

General Aviation

The bulk of the airspace changes to the West End were above 10,000ft. In addition, due to the large over-water area, as well as the number and type of Danger Areas – which add to complexity in this area of the UK – it was perceived that there would be no adverse impact on General Aviation. The Light Aviation Association confirmed that the West End changes were largely transparent to the GA community and no other comments have been received post implementation.

Gliding

In order to accommodate extant gliding operations in the West End, new areas and procedures were developed. The British Gliding Association reports that these measures have been effective in accommodating gliding operations.

Effectiveness of Change

Safety

An analysis of all incidents – observation reports⁵ and MORs (Mandatory Occurrence Reports) – involving the West End sectors was conducted using data extracted from

⁵ Observation reports are those that are optionally completed by ATC in order to highlight a potential safety related issue. Numbers of Observations reported can be influenced by

NATS' STAR database⁶; the before and after data sets used were 1st March 2005 – 28th February 2006 and 1st May 2006 – 30th April 2007 respectively, covering the Brecon (BCN) and Berry Head (BHD) sectors. This data was compared to two other LACC sectors with similar structure to the West End sectors, in order to determine whether changes in incident rates were due to sector design, or as a result of reporting changes across the organisation. The comparison sectors chosen were S1 (central southern England) and S11 (North Sea).

When all reports are taken into account, BCN and BHD have seen a decrease in the number of reported incidents of 30% (from 240 to 167 incidents) and 16% (from 104 to 87 incidents) respectively. Correspondingly, there is a decrease of 20% in S11 (from 40 to 32 incidents) with no change on S1 (remaining at 32 incidents). When observation reports are removed, these reductions fall to 14% (from 161 to 138 incidents) and 12% (from 82 to 72 incidents) on BCN and BHD respectively. No change is seen on S11 (28 incidents), and an increase of 28% on S1 (21 to 27 incidents).

By comparing the number of MORs recorded against the traffic handled throughout the data sets, the rate of MORs per 100,000 movements can be determined. BCN saw a 19% reduction and BHD 30%; the comparative sectors, S11 saw a 7% reduction⁷ whilst S1 saw an increase of 20%. Thus, the number of incidents at the London Area Control Centre has not increased as a result of the changes; in fact, West End has seen an improved safety record when compared to similar LACC sectors.

Additionally, NATS performed an analysis of the 'structural risk' of the airspace design by analysing radar data to assess the likelihood of aircraft being on converging trajectories whilst in the airspace. Comparing the new airspace structure with the old using this methodology, it was shown that aircraft are now 12% less likely to be on converging tracks and when they are, the new design gives more time for controller intervention.

Capacity/Delay

NATS used two methods to determine the capacity increase that the airspace change realised; these were:

- 1) Investigating capacity change based on Monitor Values and throughput; and,
- 2) Investigating capacity change based on relative throughput and delay.

By comparing Monitor Values⁸ before and after the changes for the West End sectors, a basic assessment of the capacity change can be made. If all sectors were open, the overall MV for the West End post implementation is 237 compared with the previous value of 175 – this is an increase of 35.4%. However, as this is a very

changes in reporting culture, hence are separated out in the analysis in order to give a more balanced picture.

⁶ STAR – Safety Tracking and Reporting is NATS' internal system for reporting all incidents/observations.

⁷ Due to a change in reporting methods, figures for S11 show a 'worst case' change for that sector. It is likely that the percentage change for S11 is around the 25% mark.

⁸ Monitor Values (MV) are used by Air Traffic Flow Managers, as a guideline, to regulate the numbers of aircraft a controller can expect to work in a given time period, above which regulations are often imposed.

simplistic method and considering two new high-level sectors were introduced, it is difficult to determine capacity solely by comparing MVs. Method 1 in Table 2 incorporates an additional capacity measure of throughput. Method 2 estimates the regional capacity increase by analysis of throughput and delay.

	Method 1	Method 2
All West End	+3.75%	+3.75%
All Brecon Sectors	No Change	No Change
All Berry Head Sectors	+4.87%	+12.82%
Sector 6 vs. Sector 6+36(combined)	+13.33%	+27.5%
Sector 9	+4.35%	+13.5%

Table 2 Capacity Change

From the table above, it can be seen that the BHD sectors combined show an increase in capacity from July 2005 to July 2006, mainly due to the S6+36 combination. In comparison a lack of capacity gain is shown in the Brecon sectors. The West End sectors as a whole display an increase in capacity for each of the methods used.

It should be noted that when band-boxed (combined together), the Brecon sectors did not accrue any delay in either July 2005 or July 2006, which suggests that in that configuration the capacity is not being reached. Due to staffing limitations, it is very rare that all 7 sectors in the West End can be opened at the same time, which will limit the potential maximum throughput of the sectors; NATS continues to train more controllers in an attempt to overcome this shortfall.

Additionally, S9 is populated with several Conditional Routes (CDRs)⁹; due to flight planning requirements/limitations, some operators (namely Ryanair and Aer Lingus) will not fly these routes, instead requesting to fly through the other busier West End sectors, such as S5/8 and S6/36. Thus, there is a latent capacity within West End that is not utilized and that cannot be determined using the methods above¹⁰. Therefore none of the methods used would be 100% accurate in determining actual capacity change.

Prior to the change, in the period June – September 2005, 112,385 minutes of delay attributable to ATC were generated in the West End sectors. For the same period following the change, this figure was 39,108 – this equates to a reduction in delay of 65.2%. Figure 2 illustrates the changes in the total delay incurred by airlines and fare-paying passengers.

⁹ A Conditional Route is a flexible airspace structure that can be opened and/or closed subject to civil/military requirements.

¹⁰ Prior to publication of this report, a temporary change to the CDR status in the southwest approaches was agreed to help increase their use; this will be implemented for summer period 2008. This followed the data capture period of this report.

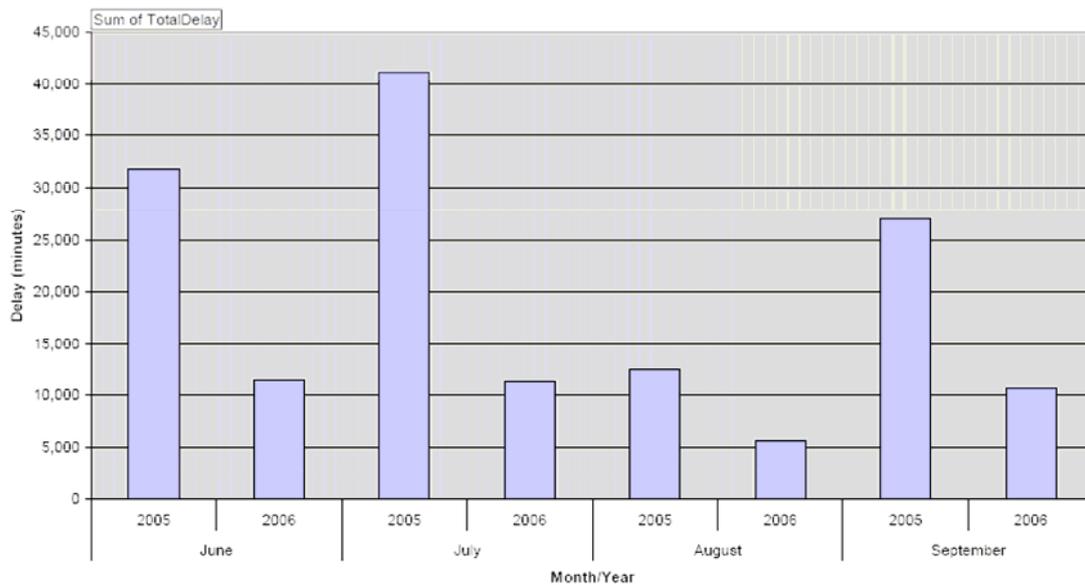


Figure 2 Total delay generated by West End sectors before and after development

Flexible Use of Airspace

The Airspace Management Cell (AMC) and Military Airspace Booking Coordination Cell (MABCC), a joint Civil-Military operation, provided the following information:

- In 2006, SWMDA complex was:
 - Booked for 135.5 hours in total, with 46 activations over 21 different days
 - Used for only 13 hrs 36 minutes – 10% of booked time
 - 84 hours have been released back to Civil – 62% of booked time;
- The SWMDA has not been utilised extensively; this was forecast in the ACP and it is anticipated that the usage will increase as the North Sea MDAs reach capacity as Typhoon increases its operation and the Joint Combat Aircraft is introduced to UK service. This was identified in the ACP document;
- The use of CDR 1 and 2 in these areas (and in the Hurn Sectors) lead to considerably increased complexity for the AMC – as a result, the AMC now considers itself to be at capacity and is pushing for automation as a high priority to help relieve their workload. AMC note that a change to the category of the CDRs in this area would help to alleviate some of the associated complexity;
- On the few occasions that the SWMDA was activated in the first 12 months, the protocols – although complex – worked without incident; and,
- It has been reported that the FUA operating agreement for the NWMTA (including the re-alignment and category change to L18 and UL18) has worked without incident.

ATC Operational Impact

Ministry of Defence (MoD)

MoD has been broadly content with the airspace arrangements following West End implementation. Use of the SWMDA has been minimal but effective, but MoD had

made clear at the outset that usage would only increase significantly over a period of years. There has been little adverse impact on MoD operations with regard to the Aberporth Reduced Coordination Area and the divided NWMTA, but the extra airspace in the northwest of the NWMTA has been of benefit for RAF Valley operations.

Overall the MoD considers that the West End Airspace Change was another successful example of NATS/MoD collaboration through the JFADT process.

London Area Control Centre

The new route (U)N14 (Annex A and B), specifically used for LTMA departures, has given considerable flexibility to controllers, thereby reducing their workload, leading to increased capacity. As a result, controllers are able to give aircraft more continuous climbs and descents, allowing optimum cruise levels to be achieved quicker; this in turn helps with sector planning/management, thus further reducing sector complexity.

The addition of radar monitored routes and flexible airspace structures have resulted in less workload for the controllers, thus increasing capacity and decreasing delays to aircraft. New Standard Instrument Departures and Standard Arrival Routes to/from Cardiff and Bristol airports associated with these routes were introduced; these have been hugely successful, allowing for better and more predictable presentation of aircraft between the airfields and the En-Route system. This predictability can increase the capacity of the airspace by reducing controller workload.

Introducing two new upper sectors has also improved the flexibility of the West End sector group, making it possible to remove high-level overflights from otherwise busy sectors, thereby reducing workload. This is also of benefit to aircraft with less frequency changes being issued, hence reducing the potential to “lose” an aircraft from the frequency.

In summary, the new route structure allows the introduction of specific traffic flows, resulting in less controller intervention, therefore less controller workload – with associated capacity increases – and less potential for human error.

The London Terminal Control Centre and Manchester Area Control Centre report that the changes have been almost entirely transparent to their operations.

Bristol Airport

The West End airspace development was complemented by the separate Cardiff/Bristol airspace changes, introduced on 31st August 2006. Bristol has since seen a noticeable reduction in the need for controller-to-controller co-ordination between Bristol radar controllers and LACC Sector 23. This has been achieved by a number of factors, notably:

- Establishing connectivity between Bristol CTA and the en-route system, thereby removing much of the requirement for Bristol initiated co-ordination designed to resolve conflicts in Class G airspace;
- The introduction of SIDs and STARs¹¹ standardises both the routes and processes for transfer of control of flights;

¹¹ SID – Standard Instrument Departure and STAR – Standard Arrival Route; these procedures automate the routes that aircraft follow when departing or arriving at airports

- Laterally segregating the inbound traffic streams to Bristol, Filton and Cardiff; and,
- Establishing a protocol permitting the silent release of traffic on radar headings subject to flights complying to agreed procedures.

The decreased coordination burden, when combined with additional benefits of the revised Bristol/Cardiff airspace, has led to the radar unit at Bristol experiencing an increase in ATC capacity.

The West End airspace development and the associated procedures necessary for the management of flights between LACC sectors and Bristol radar have proved fit for purpose. Safety levels have been enhanced at Bristol with a reduction in controller workload and all commercial flights now benefiting from contiguous controlled airspace without the need to cross Class G uncontrolled airspace.

Cardiff Airport

The West End resectorisation has resulted in an increase in capacity at weekends through the introduction of the N90 extension providing an increased volume of airspace. Also, when this airspace change is taken together with the Cardiff/Bristol airspace change of 31st August 2006, a known traffic environment now exists for Cardiff and Bristol operations. This has led to a reduction in workload when compared with provision of ATSOCAS (Air Traffic Services Outside Controlled Airspace), as was the case previously. This is expected to bring additional capacity to the sector. However, the potential capacity increase has not been tested within the Cardiff delegated area because the demand, although seen occasionally, has not been consistent.

Changes to the airspace have provided additional protection for all flights operating within controlled airspace inside the Cardiff area of responsibility, especially when considered together with the Cardiff/Bristol change previously referred to.

The 12-month rolling total of SSEs¹² at Cardiff has fallen from 6 in April 2006 to 4 in September 2007, which indicates an improvement in safety terms. Initially, there was a sharp rise in the number of infringements – this can be ascribed to pilots being unaware of the new arrangements. Since this period, there has been a significant downward trend. Level busts had increased following the introduction of the West End ACP, but this was in the main due to an issue with a particular SID out of Bristol and the issue has now been resolved.

International Impact

Shannon ACC (Ireland)

Shannon reports that it is satisfied that the level of safety has been maintained, or arguably improved, in the airspace concerned since the introduction of the re-designed West End. This enhancement to safety has occurred through the introduction of uni-directional routes, agreed transfer procedures and flight level allocation (capping) on specific routes, which has reduced the need for inter-centre coordination. This allows more time for controllers to monitor traffic, thus contributing to an increase in sector traffic throughput.

¹² Safety Significant Event – NATS' internal safety reporting system

It is difficult to quantify the precise increase in traffic that has occurred in this airspace since the introduction of West End design; this is partially due to the variation of aircraft positioning to and from the relevant North Atlantic Tracks, which have a significant bearing on the volume of traffic that is presented to Shannon from this airspace on a daily basis. What can be said is that there has been a significant increase in North/South traffic, especially when the SWMDA is inactive. In addition Shannon introduced a vertical split at FL335 to coincide with the resectorisation in the UK and this has assisted both ACCs in increasing traffic throughput while at the same time maintaining controller workload at acceptable levels.

Dublin ATCC

Since the introduction of the new West-End airspace there has been no reported degradation in safety due to the airspace changes. The changes introduced with the West End development has resulted in a capacity increase of 23% in Dublin's South Sector. The overwhelming feedback from controllers on the new airspace arrangements is positive.

Jersey ATC

The systemisation of routes inbound/outbound Jersey Islands has increased operational flexibility, providing more efficient traffic handling procedures; Jersey ATC considers the changes to be successful.

Brest ACC (France)

In conjunction with the West End changes, Brest ACC implemented the first phase of changes to their J, O and Q control sectors. As such, it has been difficult for Brest to quantify the individual impact West End has had on its operations, although the introduction of new routes UN26 and UN90 and silent radar handover procedures between LACC and Brest ACC has simplified the exchange of traffic.

The introduction of the SWMDA has had little impact on Brest's operations, although it is recognised that most operators continue to flight plan permanently available routes, rather than using the CDRs in this area (Ryanair and Aer Lingus continue to flight plan as they did before the changes). This is a pan-European issue for operators and ANSPs alike, due to the complexities surrounding different CDR types. To maximise network capacity benefits, both LACC and Brest would like more operators to utilise the CDRs throughout this area.

Conclusion

The AONBs and NPs listed in Table 1 were all subject to overflights to some degree prior to the West End changes being introduced. Following the change, considering aircraft at all levels, the Lleyn Peninsula AONB and Exmoor NP have both seen a decrease in the amount of traffic. The Brecon Beacons, Cotswolds and Quantock Hills AONBs have experienced an increase in traffic less than the UK national average (5.9%) for the 12 months following the change. The 5 remaining AONBs have all experienced an increase in overflying traffic in excess of the UK national average. Overall, the AONBs and NPs affected have seen a total average increase in traffic of 7.1%.

The avoidance of overflight of these areas would have been impracticable due to the structure of the ATS network in the West End area, the excessive ATC complications that would have arisen and the longer track distances that aircraft would have had to fly; DAP considered that this would not have resulted in an efficient use of airspace.

Feedback from General Aviation and gliding organisations has been positive. However, problems identified during simulation training by air traffic controllers highlighted potential safety issues associated with established procedures for the handling of commercial traffic arriving/departing Birmingham Airport. Changes to this procedure were introduced prior to implementation but the affected airlines were not consulted; this had a negative impact on the schedule of one operator.

When compared to other similar sectors at LACC, an analysis of safety records for similar traffic periods before and after implementation show that the West End sectors have seen a reduction in the number of reports submitted. In addition, a structural risk assessment was made of the new airspace design compared with the previous layout. This identified that aircraft in the West End sectors are now 12% less likely to be on converging tracks and when they are, controllers have more time to intervene.

For the 12 months following implementation, the West End saw a reduction in delay (attributable to NATS) to airlines of 65.2%. When the sectors are considered as a whole, the realised capacity increase of 3.75% is short of the predicted increase of 8.15% for the 12 months after implementation. However, the long-term target increase of 30% by 2012 is predicted to be achieved through recruitment and training of new controllers to address their lack of resources, and the re-categorisation of CDRs to make them more routinely useable for a greater number of operators. NATS believe that once the staffing levels are increased, the capacity increase of 30% will be achieved and they anticipate that by 2010-2011, resources in place will enable six sectors to open consistently and seven when required.

As the West End development was a JFADT led proposal, the MoD was a major partner in its development. As a result, the airspace sharing arrangements developed for the various flexible structures and Danger Areas has been a success from both a civil and military viewpoint. Although the SWMDA was under-utilised in the 12 months following introduction, this had been identified in the ACP documentation; as Typhoon operations expand, the use of this area will become more frequent. The introduction of the Joint Combat Aircraft circa 2012 will also benefit from the availability of the SWMDA.

The reduction in delay to airlines and the limited capacity increase, combined with the success attributed to the introduction of FUA arrangements, when balanced

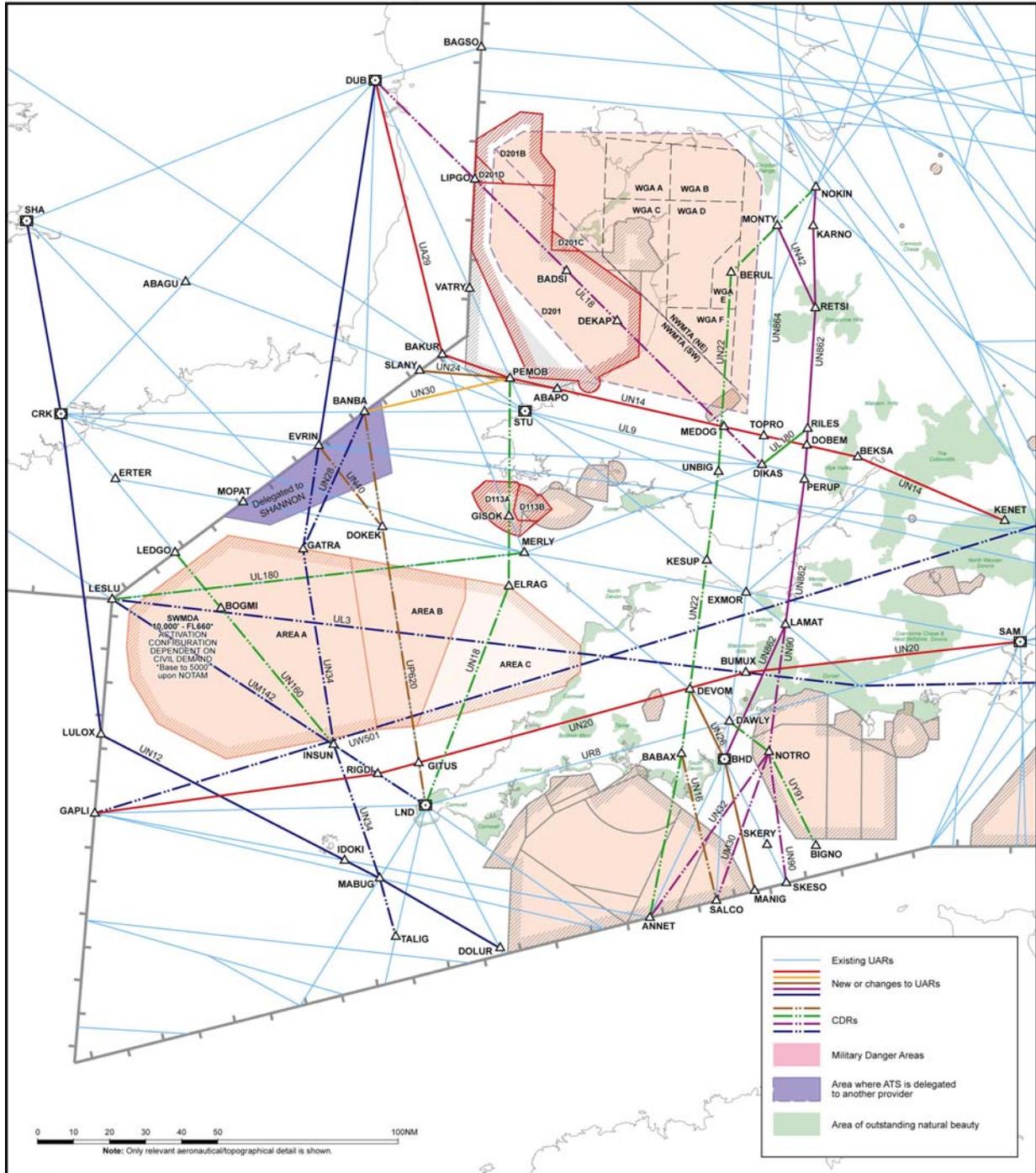
against some routes incurring additional track miles, indicates that airspace efficiencies have been achieved overall.

The changes to West End have had no impact on Manchester Area Control and London Terminal Control operations. Cardiff and Bristol report that the re-organisation has benefited their operations, particularly when considered alongside their own airspace development implemented on 31st August 2006. The international ATC agencies affected have also reported a positive impact on operations. Controllers who manage the West End airspace report that the new procedures, routes and more systemised traffic flows have resulted in less workload, thereby increasing individual controller capacity.

P Marks
Head of Controlled Airspace Section
Directorate of Airspace Policy

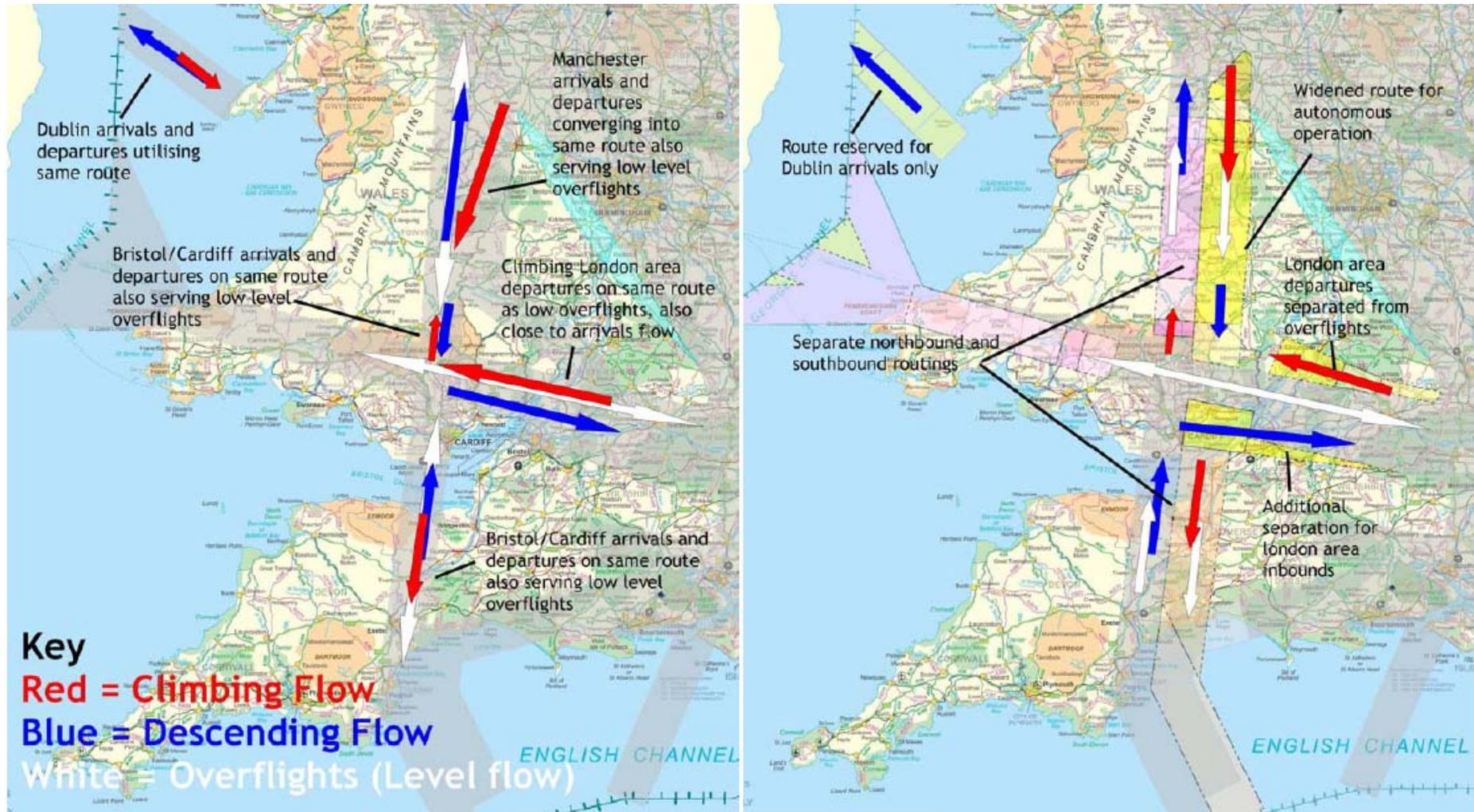
Annex B – Airspace Above FL245 and Associated AONBs/National Parks

Airspace Structure above FL245



ACD M2005/01 4.3.08

Annex C – West End Airspace Traffic flows before and after 16 March 2006



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Annex D – West End Upper ATS Routes (Above FL245)

Route	
UA29	No change
UL3	No change
UL9	No change
UL18	Conditional Route, realigned DIKAS - DUBLIN
UL22	No change
UL175	No change
UL180	Replaces UB40. CDR between LESLU - MERLY
UL607	No change. Min cruise affected by NOTAMd activity in D113 & D115
UL739	No change
UM17	No change. Airspace sharing arrangement with Aberporth to allow civil use of a Radar Coordination Area to the NE of PEMOB
UM30	CDR Weekend only
UM142	No change to alignment but becomes CDR between LESLU - LND
UN12	Primarily to be used as an alternative route when SWMDA Area A is active
UN14	New route KENET - BAKUR
UN16	CDR Weekend/Northbound only
UN18	CDR to be used as an alternative route when SWMDA Areas A & B are active
UN20	New route SAM - GAPLI
UN22	CDR Weekend/Northbound only
UN24	New route PEMOB - SLANY
UN26	New route MANIG – BHD - DEVOM
UN28	New route BANBA – GATRA for use when SWMDA area B is active
UN230	New route PEMOB - BANBA
UN32	CDR Weekend/Southbound only
UN34	New route, CDR MABUG - EVRIN
UN40	New route DOREK – EVRIN for use when SWMDA area A is active
UN42	New route MONTY - RETSI
UN09	CDR Weekend/Southbound only
UN160	Realigned CRK - LEDGO - INSUN - LND. CDR between LEDGO - LND
UN862	Realigned KARNO - BHD
UN864	No change
UP2	No change
UP4	No change
UP620	CDR BANBA - LND
UT7	No change
UW501	No change
UY91	Realigned DAWLY - NOTRO - BIGNO

Annex E – West End Lower ATS Routes (Below FL245)

Route	Brief description of change. Full detail/availability will be given in the UK AIP and Standard Route Document
G4D	To be disestablished or realigned to that of UN160, possibly as weekend only (interaction with SWMDA)
L9	Stepped raising of lower limit up to FL145
L18	Conditional Route, realigned DIKAS - DUBLIN. Delegated ATS to Dublin ACC west of BADSI
L175	Raised lower limit FL145
L180	New route RILES - DIKAS
M17	Raised lower limit FL145. Includes additional fillets to the east (subject to airspace sharing arrangement with MoD Aberporth) and west of M17
M140	Disestablished
N14	New route KENET - TORPO
N42	New route MONTY - RETSI
N90	New route LAMUT - NOTRO - SKESO
N160	New route LEDGO - BOGMI
N546	New route STU - BAKUR
N862	Realigned KARN0 - BHD. Lower limits lowered
N864	Lower limits raised in areas between TALGA and MONTY
R37	Disestablished
Y3	Lower limit of FL105 east of NUMPO. Additional fillet to the south of Y3 above the Cotswold CTA will be part of Y3.
Y91	Realigned DAWLY - NOTRO - BIGNO

Annex F - Military Airspaces Structures

Danger Areas

EGD201 Aberporth Range

The north-eastern boundary of D201 was straightened above FL145 so that (U)L18 can be contained within the danger area. This greatly simplifies FUA notification arrangements when cessation of DA activity make (U)L18 available for use. The additional areas required to achieve this are defined as D201 C and D, which continue to be used by aircraft within the Aberporth Range for positioning purposes and 4FTS aircraft in accordance with existing procedures agreed between RAF Valley and MoD Aberporth.

EGD203 Sennybridge

The geographical area remains unchanged, however times of activation became: Mon-Fri 0800 – 1800 (Local), SFC – 23000 ft; Mon-Fri 1800 – 0800 (Local), SFC – 18,000 ft; and at Weekends Fri 1800 -Mon 0800 (Local), SFC – 18000ft; By NOTAM to 50000ft.

EGD216 Credenhill

When the upper limit is raised by NOTAM the limit will become 12,500ft. This will enable the activity within the DA to remain below Airway N862 except when the atmospheric pressure is exceptionally low.

EGD147 Pontrillas

No change to lateral or vertical limits. FUA arrangements will ensure access to Airway N862 when operations within the DA are notified up to 10,000ft.

EGD113 Castlemartin

A separate proposal for D113/D113B has been submitted to DAP. However, for completeness, an outline of the proposal is provided.

The increase in lateral size is small as it overlaps adjacent D115B. The entire extension is over the sea and will have minimum impact on GA as few aircraft operate in this Class G airspace. To permit missile firing, it will have an upper limit of 45,000ft, which will be activated by NOTAM. A sub-division of the enlarged D113 will also be required which will permit the increased activity to remain east of the centrelines of ATS routes UN18 and UA29. Traffic on or west of the centrelines of these routes will be separated from activity within D115B. Further mitigation will be provided through a direct communications link between Swanwick and Castlemartin to enhance clear range procedures.

EGD115A Manorbier

The upper limit was lowered to 23,000ft to allow a minimum cruising level of FL250 on UL607. The facility to raise the upper limit by NOTAM action will remain.

EGD117 Pendine

The upper limit was lowered to 23,000ft to allow a minimum cruising level of FL250 on UL607 and UM17. When required NOTAM action will be taken to raise the upper limit to 27,000ft.

EGD118 Pembrey

The upper limit is raised to 23,000ft to meet MoD training requirements for weapons delivery from medium level. There is no encroachment into adjacent ATS routes; however, range orders will provide MoD crews with warning of the proximity of controlled airspace. The impact on GA will be minimal as few aircraft operate in this area of Class G airspace.

Plymouth Danger Area Complex

There was no change to the lateral and vertical limits of these danger areas. However, FUA arrangements were developed to improve efficient use of the airspace and availability of UN22, UN16, UN32, UM30 and UN90.

Portland Danger Area Complex

There will be no change to the lateral and vertical limits of these danger areas. However, FUA arrangements are being developed to improve efficient use of D012, D013 and D017 and availability of (U)N862, (U)M30, (U)N90 and (U)Y91.

South West Managed Danger Area

The SWMDA is sub-divided into 3 segments: A, B and C; all segments have an upper limit of FL660 and a normal lower limit of 10,000ft. On isolated occasions when large-scale exercises or specific military activity will require segregation the lower limit may be lowered by NOTAM to 5000ft by prior co-ordination with AUS. The volume of airspace to be booked must match the requirement for a particular sortie, and where possible, will be booked in blocks of 5000ft (defined in FLs). However, when Area C is requested with Area A&B, Area C will normally be requested from 10,000ft up to FL 260.

North Wales Military Training Area (NWMTA)

To accommodate military training for Typhoon or similar type aircraft, the following changes to the NWMTA were made:

- Upper limit raised from FL450 to FL660;
- Extended westward to a line 5nm east of the London/Shannon FIR/UIR Boundary;
- Reduction in Southwest corner to allow U(M)17 to be extended North East of STU; and,
- Southern boundary adjusted to be parallel to and 5nm north of the new UN14 route centreline.

The NWMTA was sub divided into North and South areas, the division being 5nm north of the northern boundary of UL18 and parallel to UL18. This allows the northern area to be used for military operations should short notice requests be made when UL18 is available for civil use. Aircraft would operate in Area North, either autonomously or under an ATS from ASACS or Swanwick (Mil). When RAF Valley re-commence flying, or when another military user requires to use the full areas North and South, at least 30 minutes notice to the Military Airspace Manager (MAM) at Swanwick would be required to enable GAT to vacate (U)L18 and notification to all relevant agencies.

Operating hours remain the same; however, enhanced Airspace Management (ASM) procedures enables (U)L18 to be activated when RAF Valley are not flying, no other

military operators have booked the NWMTA, and D201, D201B, D201C & D201C are inactive.

Air-to-Air Refuelling Areas (AARA)

- AARA10 FL80-260 extended west and split into two; and,
- AARA 11 FL80-260 repositioned south of the SWMDA.

Airborne Early Warning Areas¹³ (AEW)

- UK AEW 1 Lobes 1 to 6 not available when the SWMDA is active; and,
- UK AEW 2 The area of UK AEW 2 is reduced to avoid the SWMDA.

¹³ Not shown on charts.