IRISH SEA
AIRSPACE CHANGE PROPOSAL

APPENDICES

Appendix A: Cabinet Office Code of Practice on Consultation

Text from Cabinet Office Code of Practice on Consultation

The seven consultation criteria are:

1. When to consult
Formal consultation should take place at a stage when there is scope to influence the policy outcome.

2. Duration of consultation exercises
Consultations should normally last for at least 12 weeks with consideration given to longer timescales where feasible and sensible.

3. Clarity of scope and impact
Consultation documents should be clear about the consultation process, what is being proposed, the scope to influence and the expected costs and benefits of the proposals.

4. Accessibility of consultation exercises
Consultation exercises should be designed to be accessible to, and clearly targeted at, those people the exercise is intended to reach.

5. The burden of consultation
Keeping the burden of consultation to a minimum is essential if consultations are to be effective and if consultees' buy-in to the process is to be obtained.

6. Responsiveness of consultation exercises
Consultation responses should be analysed carefully and clear feedback should be provided to participants following the consultation.

7. Capacity to consult
Officials running consultations should seek guidance in how to run an effective consultation exercise and share what they have learned from the experience.

Appendix B: Stakeholder List

<table>
<tr><th>Aviation Stakeholders</th><th colspan="2">Environmental Stakeholders</th></tr>
<tr>
<td>National Air Traffic Management Advisory Committee (NATMAC)

BATA
BPA
Heavy Airlines
European UAV Systems Centre Ltd
Light Airlines
UKAB
PPL/IR
BALPA
GATCO
GAPAN
BHPA
BAA
LAA
GASCo
HCGB
Aviation Environment Federation
UKFSC
BBGA
AOA
BGA
BMFA
British Helicopter Association
AOPA UK
BBAC
BMAA
BAE Systems
British Airways
easyJet

(Airlines that use the routes regularly will also be notified)</td>
<td>Lancashire
(Sub-proposal 4)

Unitary Authorities
Lancashire County Council
West Lancashire Borough Council
Chorley Borough Council
Sefton Council

Members of Parliament
Dr John Pugh (Southport)
Ms Lorraine Fullbrook (South Ribble)
Ms Rosie Cooper (West Lancashire)
Mr Bill Esterson (Sefton Central)</td>
<td rowspan="5">Other environmental groups

Natural England
Countryside Council for Wales
English Heritage
Campaign for the Protection of Rural England (CPRE)
Friends of the Earth
The Environment Agency
The National Trust
Environmental Protection UK</td>
</tr>
<tr>
<td>Military Aviation
MoD DAATM</td>
<td rowspan="4">North Wales

(Sub-proposals 3 & 5)

Unitary Authorities
Anglesey County Council
Conwy County Borough Council
Denbighshire County Council
Flintshire County Council
Gwynedd Council
Wrexham County Borough Council

Members of Parliament (Westminster)
Mr Albert Owen (Ynys Mon)
Mr Hywel Williams (Arfon)
Mr Guto Bebb (Aberconwy)
Mr David Jones (Clwyd West)
Mr Chris Ruane (Vale of Clwyd)
Mr David Hanson (Delyn)
Mr Mark Tami (Alyn & Deeside)
Mr Ian Lucas (Wrexham)

National Assembly for Wales
Dissolved in preparation for elections on 5th May. The Welsh Civil Service (Air Services Manager) will pass the consultation information on to the newly elected Assembly Members.

Areas of Outstanding Natural Beauty, National Park

National Association of AONBs
Anglesey AONB
Clwydian Range AONB
Snowdonia National Park</td>
</tr>
<tr><td>Air Navigation Service Provider
Irish Aviation Authority</td></tr>
<tr><td>Airports
Belfast Aldergrove
Belfast City
Doncaster Sheffield
Isle of Man Ronaldsway
Leeds Bradford
Liverpool
Manchester</td></tr>
<tr><td></td></tr>
</table>

Appendix C: Overview of Structure and Operation of UK Airspace[1]

The airspace over the UK is a national asset and finite resource. The safe and efficient utilisation of our airspace is vital to both the UK economy and national defence. Accordingly, it is essential that UK airspace be provided, as far as possible, for the benefit of all users.

In simple terms, UK airspace, from ground level to approximately 66,000ft, is categorised as being either 'Controlled Airspace' or 'Uncontrolled Airspace':

Controlled airspace is established for the protection of aircraft during the various phases of flight and to facilitate a safe and expeditious flow of air traffic. Any aircraft operating within controlled airspace require an Air Traffic Control (ATC) clearance and must comply with the instructions issued. Controlled airspace is therefore, in most cases, a 'known environment', i.e. all traffic is known to the ATC system.

Commercial, passenger-carrying aircraft operate almost exclusively inside controlled airspace. Controlled airspace can be divided into 5 main types:

- Control Zones, which extend from ground level and surround major airports
- Control Areas, which do not extend down to the ground but have base levels between approximately 2,000 and 5,000ft above the ground
- Airways, which are corridors of controlled airspace that form the main routes connecting major airports and are a form of Control Area
- Terminal Control Areas, which are larger Control Areas established around groups of airports where several airways converge
- Upper Airspace that comprises all UK airspace from FL245 (24,500ft) upwards.

Whilst within controlled airspace, standard routes are published as a template for planning purposes, Air Traffic Controllers may use the full lateral and vertical extent of this protective airspace. In fact, the ability for controllers to tactically position aircraft is essential in ensuring the most effective flow of traffic, placing the safe separation and sequencing of aircraft above all other considerations. Consequently, aircraft will not necessarily follow exactly the same flight paths. However, the closer aircraft are to the airport of arrival or departure the less flexibility exists to adapt their flight profiles. For example, an aircraft 5 miles from touchdown needs to be aligned with the runway and therefore is likely to be in exactly the same piece of sky that the aircraft ahead occupied. The further from touchdown, the more variation in positioning is likely to exist because of the requirement to achieve the safe separation in the sequencing of arriving aircraft.

Only the controlled airspace established in the immediate vicinity of major airports extends down to the ground. As indicated previously, most areas of controlled airspace have base levels of several thousand feet above the surface.

Detailed maps and charts depicting the UK's airspace structure can be purchased from several commercial outlets.

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[1] Text from Directorate of Airspace Policy Environmental Information Sheet – Number 3
web address - www.caa.co.uk/default.aspx?catid=7&pagetype=68&gid=295

Uncontrolled airspace: the airspace outside controlled airspace extends from ground level to 19,500ft or to the base of controlled airspace.

Although ‘uncontrolled’, pilots can request a range of Air Traffic Services (ATS) within such airspace from a variety of civil and military ATS providers. These services range from the mere provision of information to a radar service in which controllers provide sequencing and separation instructions.

Uncontrolled airspace is airspace within which receipt of an ATS, whilst often available, is not an absolute requirement. Pilots can operate without talking to ATC and without a specific air traffic clearance. They therefore fly on a ‘see and avoid’ basis such that they can determine their routes according to their own requirements. Such activity is subject to compliance with the basic Rules of the Air Regulations and any weather, airspace, pilot or aircraft licensing limitation. The majority of military, instructional and recreational flying takes place in uncontrolled airspace.

ATC Organisation: Responsibility for the provision of ATC services in the UK lies with both civil and military service providers, that will provide a service to both civil and military aircraft within their areas of responsibilities. For the most part and in very general terms, activity inside controlled airspace is managed by NATS (En Route) plc, whose operation is regulated by the Civil Aviation Authority. Much of NATS activity is conducted from 2 control centres:

- **NATS Swanwick (Area Control and Terminal Control):** from where the flow of traffic in UK airspace south of 55 degrees North (over England and Wales) in the Upper Airspace, along the Airways system and within the high levels of Control Areas is managed; also from where the flow of traffic inbound to and outbound from the major airports in the South East of England is managed.
- **NATS Prestwick (Scottish and Oceanic Area Control Centre):** from where the flow of traffic in UK airspace north of 55 degrees North (over Scotland) in the Upper Airspace, along the Airways system and within the high levels of Control Areas is managed. The control of traffic bound to/from the major airports in the Manchester region is also managed from Prestwick Centre.

Appendix D: A Brief Outline of Air Traffic Control Principles

Introduction

The UK contains many large airports each of which generates significant volumes of air traffic. As a result the UK is recognised as having some of the most complex airspace structures and procedures in order to ensure the safe passage of aircraft flying through its airspace.

Air Traffic Control (ATC) is a service provided to afford a safe, orderly and expeditious flow of air traffic. The vast majority of commercial airliners and other large aircraft plan their routes along Air Traffic Service (ATS) routes (these are sometimes referred to as 'airways' or 'air routes'). These routes are protected by volumes of controlled airspace in which the position, height and intentions of aircraft are both known and controlled by ATC.

The details of each flight's proposed route form an individual "Flight Plan" that is used by aircraft operators to advise ATC of the proposed route to be flown between departure and destination airports.

Controlled Airspace and ATS Routes

Further out from an airfield aircraft are generally at higher altitudes or levels whilst they climb to, or descend from, their cruising flight levels. This permits the controlled airspace to be arranged in steps thereby allowing other (typically non-commercial) aircraft that are not in receipt of an ATC service to operate freely in uncontrolled airspace below or laterally clear of the ATS route.

ATS routes are themselves surrounded by volumes of controlled airspace which must extend a minimum of 5 nautical miles either side of the route centreline. These are established to protect aircraft during the en-route phase of flight. Large Control Areas are established in certain areas that contain many ATS routes.

Aircraft wishing to operate within controlled airspace must submit a flight plan and gain a clearance to enter from an ATC unit. On entering controlled airspace aircraft must obey all ATC instructions and maintain radio contact.

An aircraft flying within controlled airspace will therefore be operating within a known environment in which the Air Traffic Controller can safely separate it from all other aircraft operating within the controlled airspace. So long as an aircraft is flying within controlled airspace, it will also remain safely separated from aircraft flying freely outside of the controlled airspace environment.

Uncontrolled Airspace

Controlled airspace is delineated by a specified boundary and outside of this boundary the airspace is known as uncontrolled airspace. Within uncontrolled airspace aircraft operate with relative freedom without being in receipt of any Air Traffic Control Service and therefore are operating in what is sometimes referred to as an "Unknown" environment, i.e. the intended flight profile of aircraft is unknown. Aircraft routinely operating within uncontrolled airspace include light general aviation aircraft, military aircraft, helicopters, hot air balloons and gliders. Wherever possible, commercial passenger aircraft operate within the confines of controlled airspace for the protection that this environment affords compared to operating within an uncontrolled and unknown environment. However, some airports, due to the small volumes of commercial air traffic operating from them, are not protected by controlled airspace.

Route Centrelines and 'Vectoring'

The centreline of an ATS route is generally defined by navigational beacons or known positions called fixes. Aircraft navigate between these beacons and fixes when following ATS routes (see Figure C1 depicting an example of a simplified airspace structure).

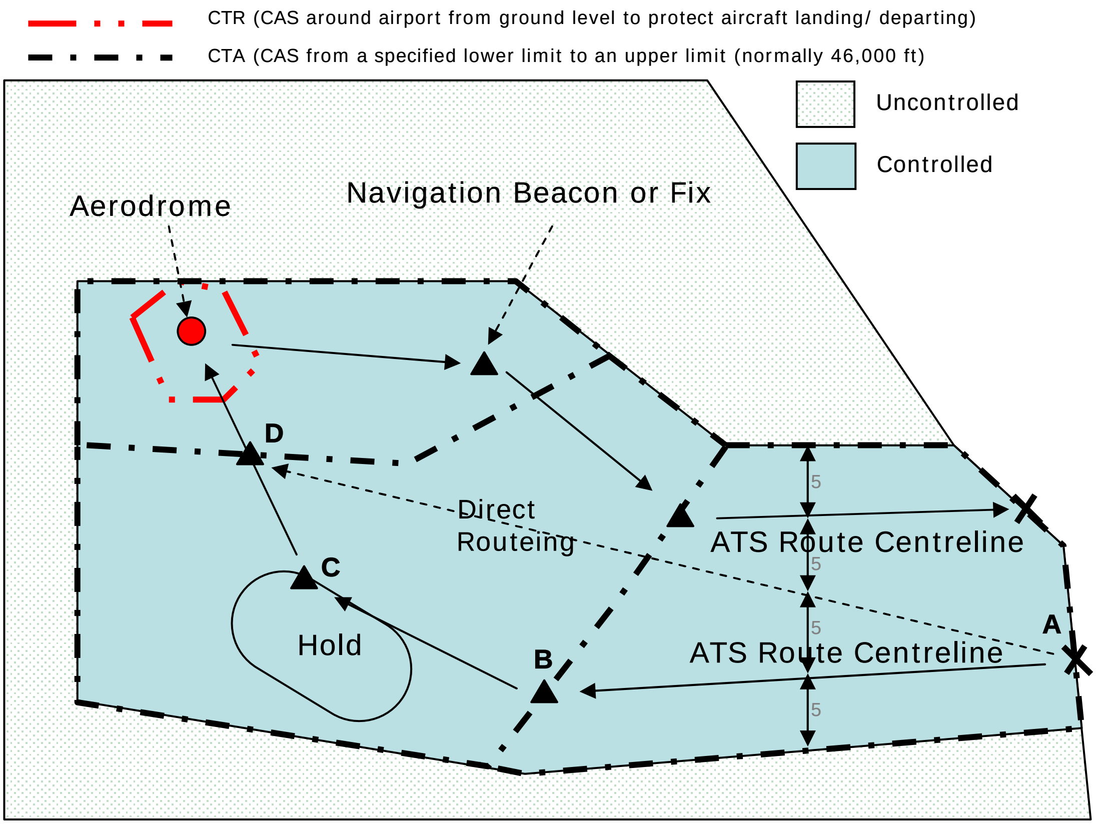


Figure D1 Simplified example airspace structure.

Although aircraft flight-plan their routes by reference to these ATS Route centrelines, aircraft are still deemed to be on the route as long as they remain within 5 nautical miles of its centreline. The controlled airspace associated with an ATS route extends a minimum 5 nautical miles either side of the promulgated route centreline. This is to allow for any navigation inaccuracies by the aeroplane and to provide space for ATC to separate any conflicting traffic using radar (i.e. by directing aircraft onto separated tracks within the boundaries of controlled airspace). Each aircraft files a flight plan setting out the route it plans to follow (such as shown in Figure D1 from point A to B to C to D). However, in order to provide a safe and efficient service, ATC may direct aircraft to take a more direct route anywhere within controlled airspace e.g. straight from A to D. This may reduce the distance that has to be flown to reach the destination. ATC may also direct aircraft off a route to ensure separation is maintained from other traffic, by instructing them to fly a magnetic heading (referred to as "vectoring").

ATC separate aircraft both vertically and horizontally. The vertical separation applied between aircraft in controlled airspace is a minimum of 1,000ft. The minimum horizontal separation between aircraft separated by less than 1,000ft vertically is 3 nautical miles. Within a large portion of UK airspace this 3nm minimum lateral radar separation is increased to 5 nautical miles due to the radar systems we employ.

Although Airspace Change Proposals define new and revised ATS routes by their centrelines it should be noted that these must be supported by a minimum of 5 nautical miles of controlled airspace either side of the centreline and between specific lower and upper limits. This is because aircraft can be directed anywhere within the full extent of established controlled airspace, and not just along the promulgated ATS route centreline.

Airspace Definitions (Altitudes and Flight Levels)

Volumes of controlled airspace are generally defined by specifying a lateral boundary and vertical extent.

Vertical boundaries may be defined in either altitude (in feet) or Flight Levels (FLs). Note that one FL relates to 100ft, i.e. FL70 equates to 7,000ft. Altitudes are generally used to define the height of an aircraft in the lower volumes of airspace (generally operating below 6,000ft in controlled airspace in the UK) as it is the most effective unit to use to determine aircraft position relative to the ground, therefore enabling an aircraft to avoid high ground etc. Flight Levels are generally used in higher volumes of airspace (generally operating above 6,000ft in controlled airspace in the UK) where the vertical separation of one aircraft relative to another aircraft is more important compared to their heights above ground.

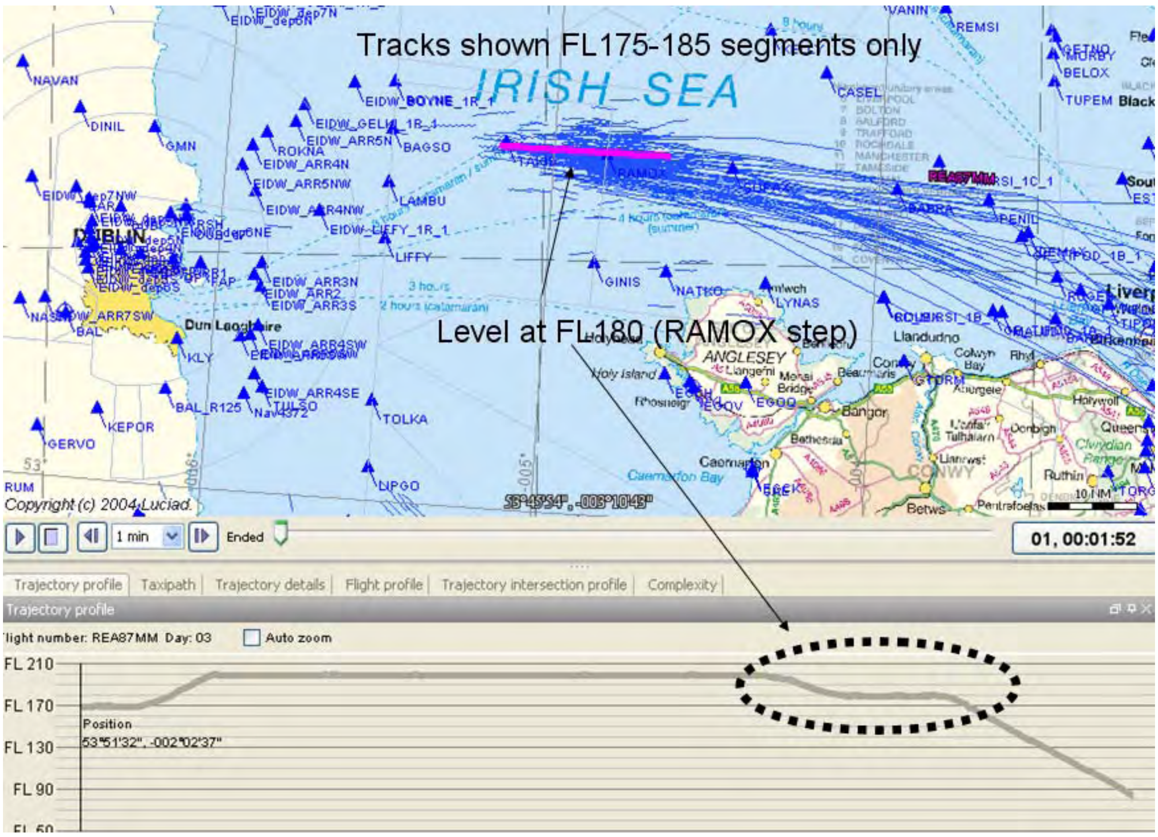
The difference in the units is because altitudes (in feet) are affected by variations in local atmospheric pressure, whereas FLs are based upon a universal unit of pressure (1013 Millibars) that is unrelated to local atmospheric conditions. This means that all aircraft equipment should agree on where FL100 is, as all aircraft flying at Flight Levels will set a common datum of 1013Mbs on their barometric altimeter. This common view of aircraft level enables more efficient and consistent vertical separation.

It should be noted that as Flight Levels do not take into account local atmospheric pressure, they do not represent a fixed reference point above the ground, therefore depending on the actual local pressure in any area an aircraft at a given Flight Level may seem to be slightly higher or lower in the sky (although such variation would not usually be noticeable to an observer viewing from the ground).

Appendix E: Track data illustrating RAMOX step

Density plot showing traffic concentration FL175-FL185 for Dublin arrivals along L70. The red area denotes where traffic is concentrated at FL180. All traffic reaching FL180 prior to RAMOX would require a level segment to remain within CAS. The red area dissipates after RAMOX as aircraft resume descent to FL100 at BAGSO.

Track plot showing traffic concentration of traffic FL175-FL185 for Dublin arrivals along L70. Pink track highlights an aircraft levelling at FL180 until past RAMOX as shown by the profile beneath. Note that the x axis of the profile is time rather than position along route, therefore profile should be viewed from left to right whereas traffic plot shows aircraft heading from east to west.



Appendix F: Traffic data

August 2010 traffic that would have routed via (U)Y124 if available (Sub proposal 3)

Annual traffic levels quoted in Part B are calculated by multiplying August totals by a factor of 10.3 (traffic levels for August 2010 being 1/10.3 of the annual 2010 total)

See Part C for histograms showing this data by time and grown to 2012 and 2017 forecast years.

Aircraft type		Dublin dep	over-flight
A124			
A306			
A30B		20	
A310			4
A318			
A319		81	2
A320		374	24
A321		56	2
A332		1	7
A333			10
A342			
A343			12
A345			
A346			14
A388			
AT43			
AT72			8
ATP		19	
B462			
B463			
B733		4	28
B735		3	
B736			
B737			
B738		131	14
B742			
B743			
B744		4	44
B752		1	55
B753			1
B762			
B763			90
B764			6
B772			60
B773			
B77L			

Aircraft type		Dublin dep	over-flight
B77W			5
BE20			
BE36			
BE40		1	
BE9T			
C10T			
C130			
C135			
C17			
C177			
C210			
C25A		1	
C25B		1	
C5			
C510		1	
C525		1	
C550			
C560			
C56X		1	
C680			
C750			
CL30			
CL60		3	1
CRJ2			
CRJ9			
DA42			
DC10			
DC93			
E135			
E145			
E3CF			
E50P		1	
EA50			
F2TH		1	
F50			
F70			

Aircraft type		Dublin dep	over-flight
F900		2	1
FA50			
FA7X		1	
GALX			
GL5T			
GLEX			1
GLF4			1
GLF5			1
H25B		1	1
HA4T			
HAWK			
HELI			
K35R			
L188			
LJ35			
LJ45			
LJ55			
MD11			
MD82			
MD83			
PA31		25	
PA34		2	
PA46			
PAY2			
PAY3			
PAY4			
PC12			
PC9			
PRM1			
RJ85		5	
SB20			
SR22			
TBM7			
TRIN			
Grand Total		741	392

August 2010 traffic that routed via (U)L10 and MIRSI (Sub proposal 4)

Annual traffic levels quoted in Part B are calculated by multiplying August totals by a factor 10.3 (traffic levels for August 2010 being 1/10.3 of the annual 2010 total)

See Part D for histograms showing this data by time and grown to 2012 and 2017 forecast years.

	Origin Airport (ICAO code)													
AC Type	BIKF	CYVR	CYYC	CYYZ	EGAA	EGAC	EGEC	KEWR	KJFK	KLAS	KORD	KPHL	KSFB	Grand Total
A320					1									1
A332		2	5							2				9
A333												1		1
B733					49									49
B735					2									2
B752	1			9				1	2		7			20
B763													1	1
DH8D						98								98
E190						63								63
F2TH							1							1
MD11									2					2
PA31					1									1
Total	1	2	5	9	53	161	1	1	4	2	7	1	1	248

August 2010 traffic that would have routed via extended (U)L6 if available (Sub proposal 5)

	Origin Airport (ICAO code)										
AC type	**EGHH**	**EGHI**	**EGKK**	**EGLF**	**LFBO**	**LFBT**	**LFMN**	**LFPB**	**LFPG**	**LFRN**	**Total**
A319			110				17		31		158
B733					2	1					3
BE40				1							1
BN2T		1									1
DH8D		78	9								87
E190			106								106
F2TH				1							1
GLF5							1				1
H25B				1							1
LJ45								1			1
SR22	1										1
TBM7										1	1
Total Aug 2010	1	79	225	3	2	1	18	1	31	1	362

Annual traffic levels are calculated by multiplying August totals by a factor 10.3 (traffic levels for August 2010 being 1/10.3 of the annual 2010 total)

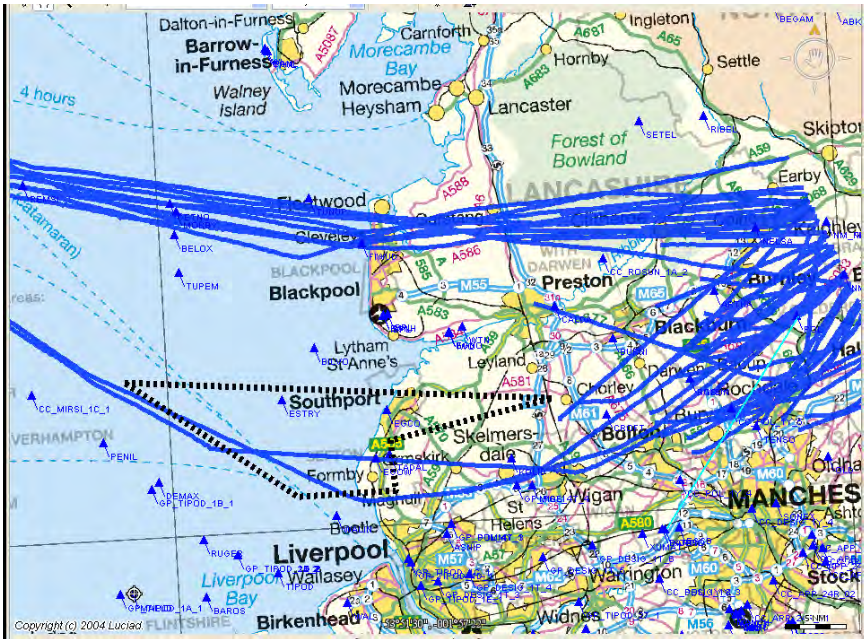
2012 and 2017 scenarios are grown from 2010 based on the NATS UK forecast generated in September 2010. This forecasts that 2010 traffic would have grown by 9% and 26% respectively by 2012 and 2017.

	Origin Airport (ICAO code)										
	EGHH	**EGHI**	**EGKK**	**EGLF**	**LFBO**	**LFBT**	**LFMN**	**LFPB**	**LFPG**	**LFRN**	**Total**
Annual total 2010	10	814	2318	31	21	10	185	10	319	10	3729
Annual total 2012	11	887	2526	34	22	11	202	11	348	11	4064
Annual total 2017	13	1025	2920	39	26	13	234	13	402	13	4698

Appendix G: Track data for Leeds departures

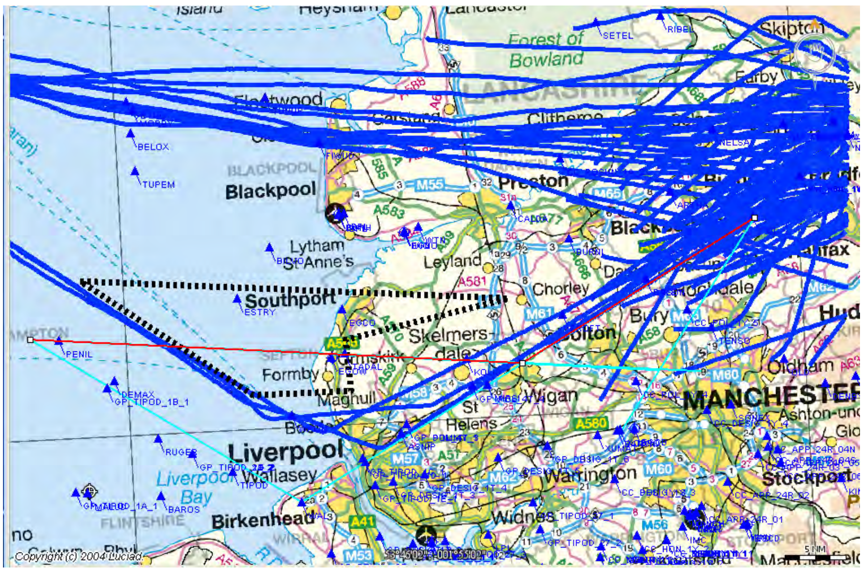
Plot showing one week of Leeds departures to Ronaldsway and Ireland (Northern, and Republic Of) at heights up to FL175. Sample date 01/08/2010-07/08/2010.

Two tracks (two tracks per week) shown RFL170 or below routing via L10. Both tracks already leave CAS



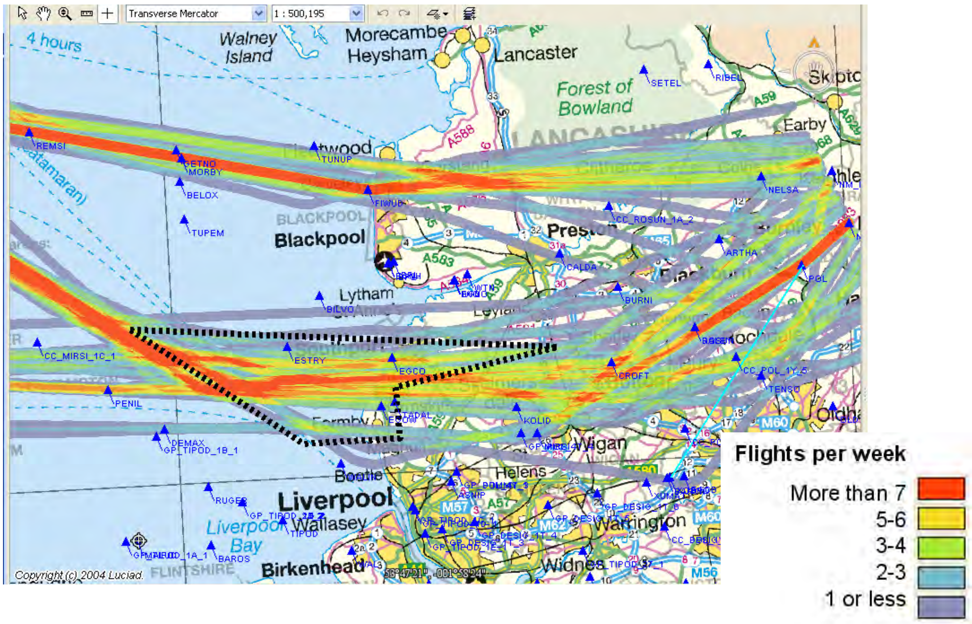
Plot showing one week of Leeds departures to Ronaldsway and Ireland (Northern, and Republic Of) at heights up to FL175. Sample date 01/02/2011-14/02/2011.

Three (less than 2 per week) tracks shown RFL170 or below routing via L10.



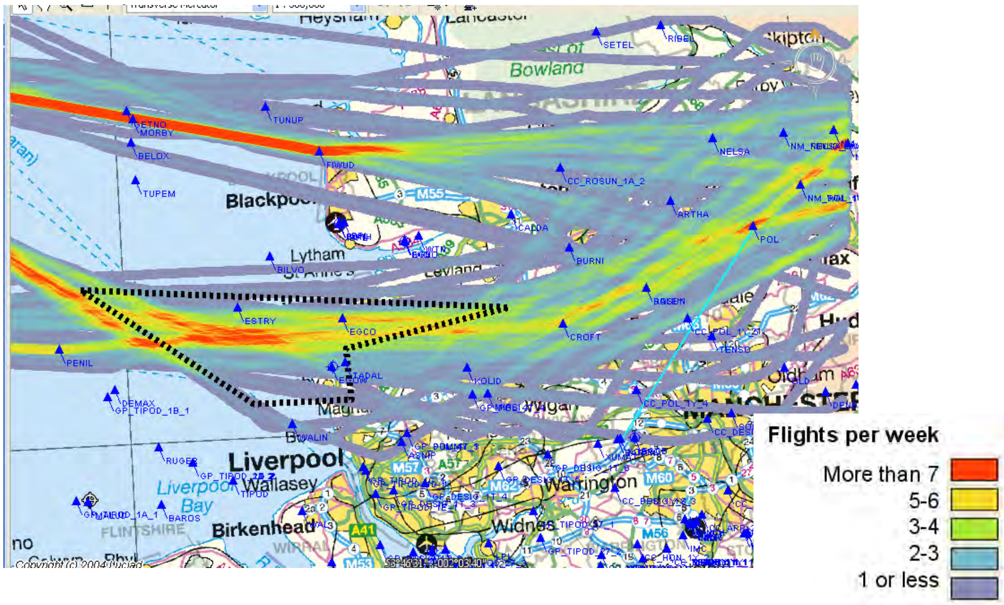
Density plot show one week of Leeds departures to Ronaldsway and Ireland (Northern, and Republic Of) at all heights. Sample date 01/08/2010-07/08/2010.

Track shown to be regularly vectored off WAL SID and along L70.

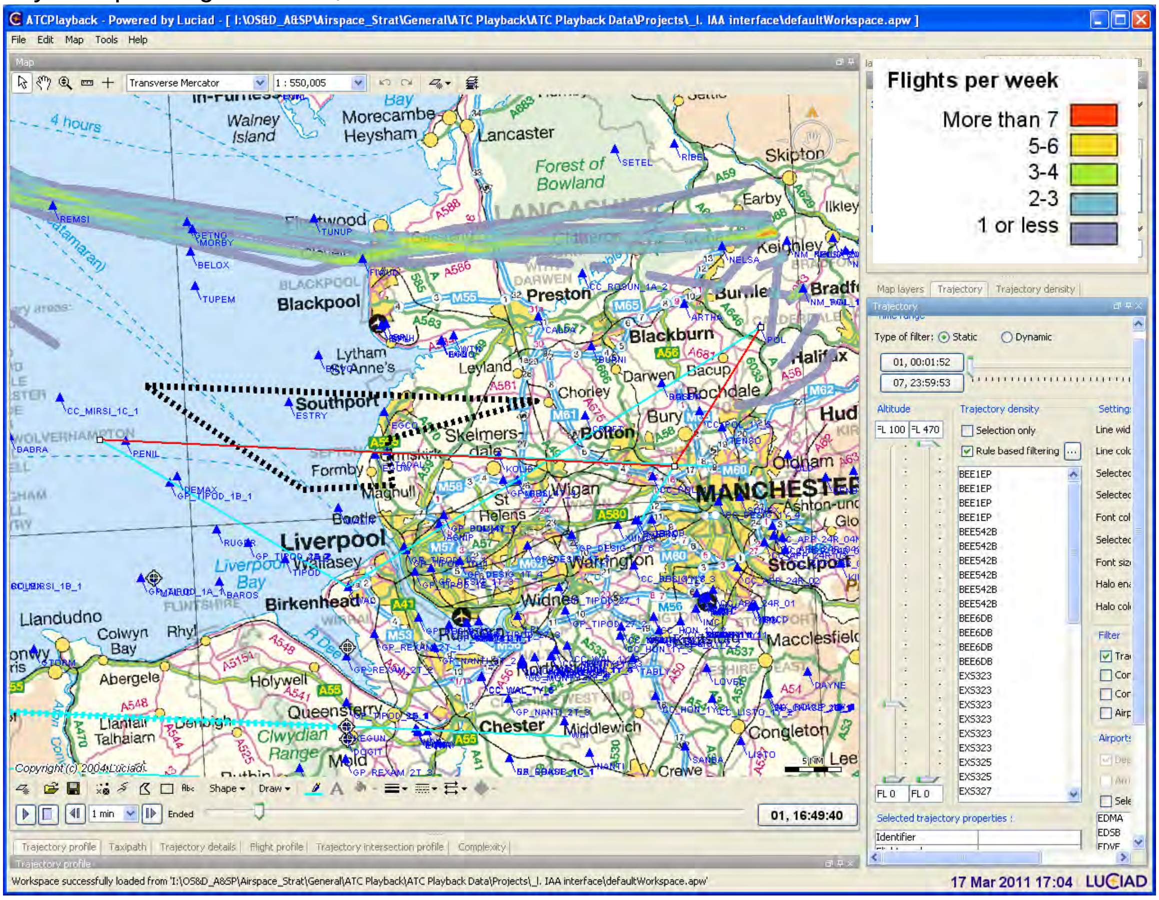


Density plot show two weeks of Leeds departures to Ronaldsway and Ireland (northern and republic of) at all heights. Sample date 01/02/2011-14/02/2011.

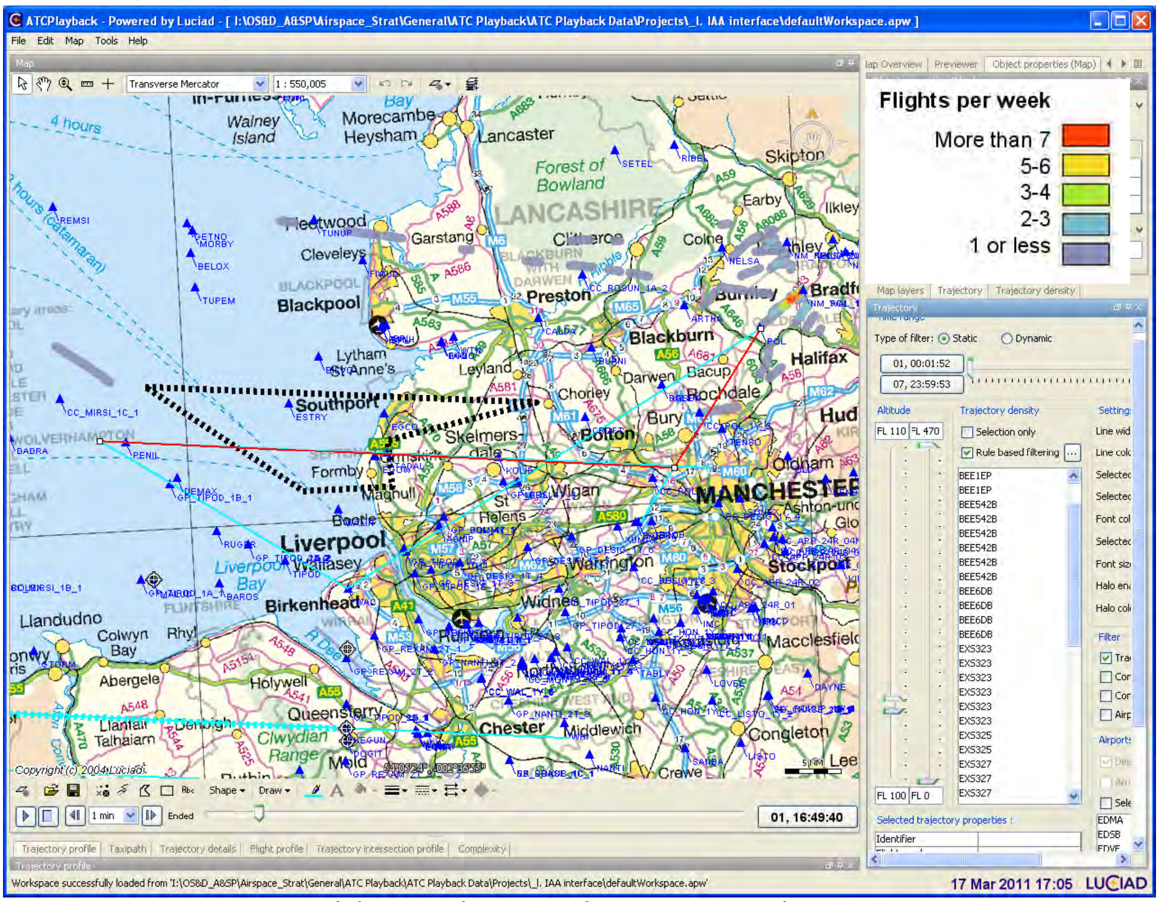
Track shown to be regularly vectored off WAL SID and along L70.



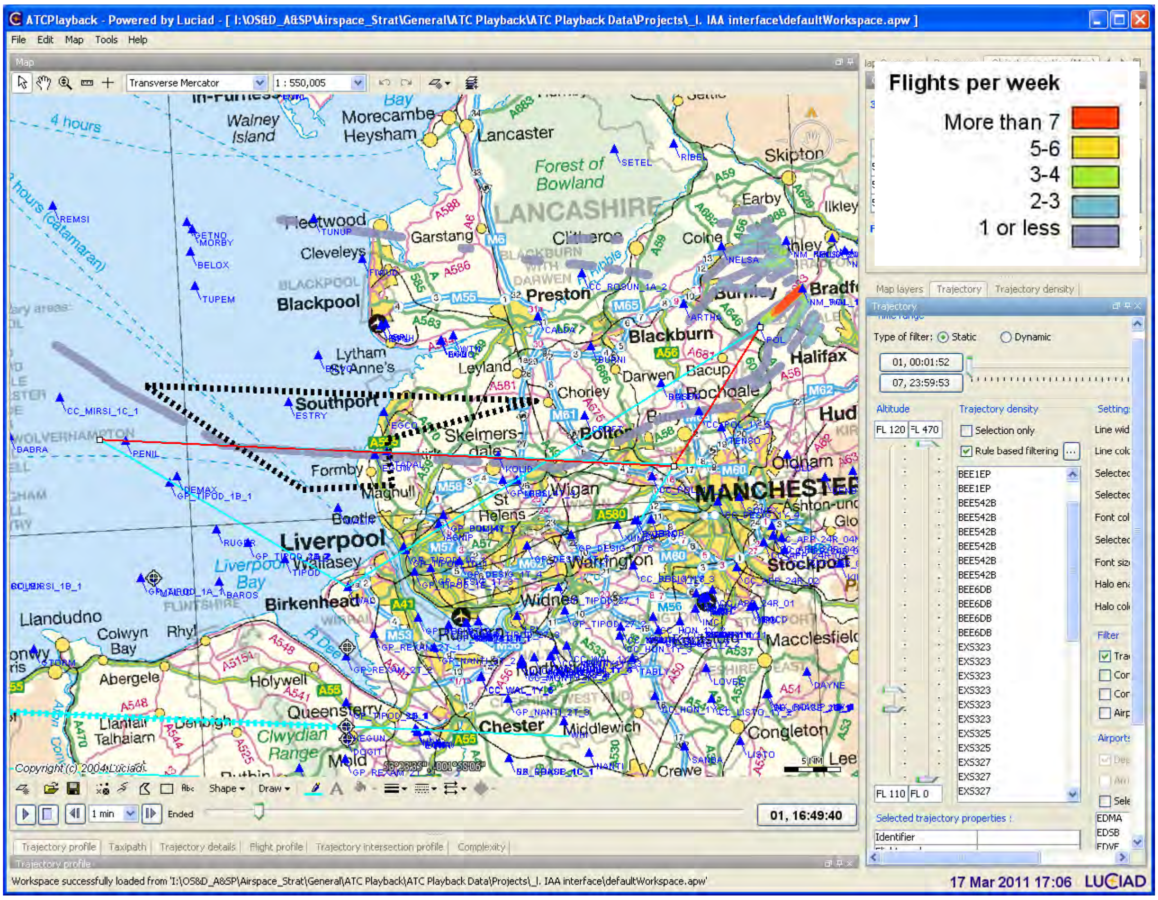
7 Day sample August 2010, 0-FL100



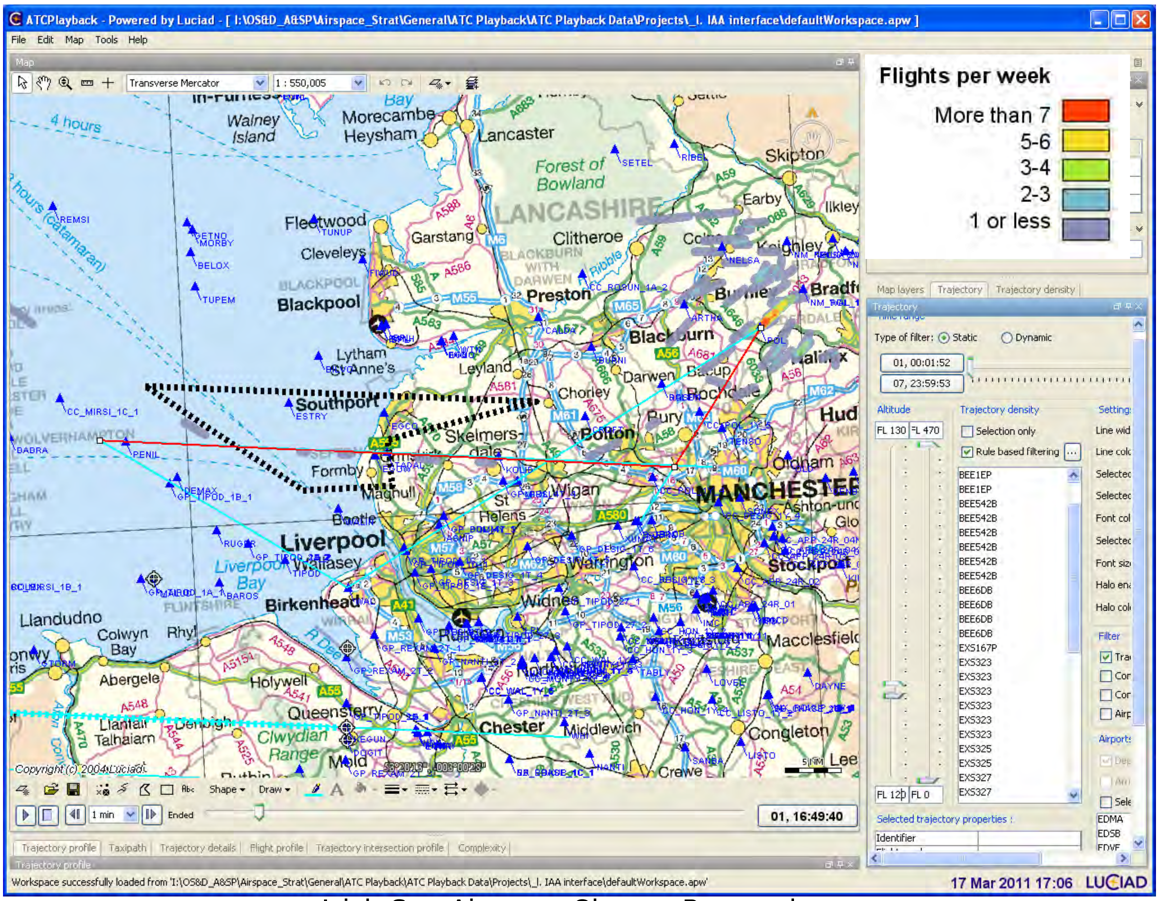
7 Day sample August 2010, FL100-FL110



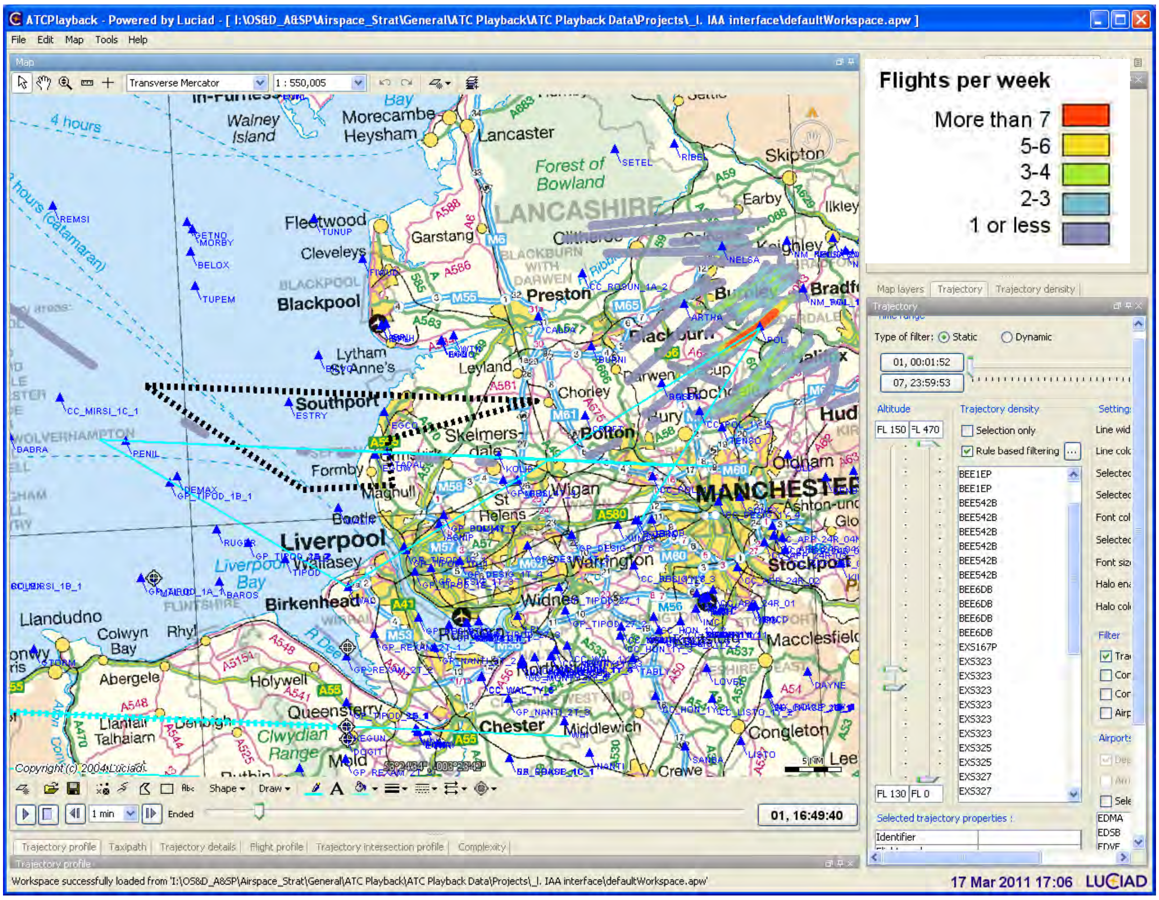
7 Day sample August 2010, FL110-FL120



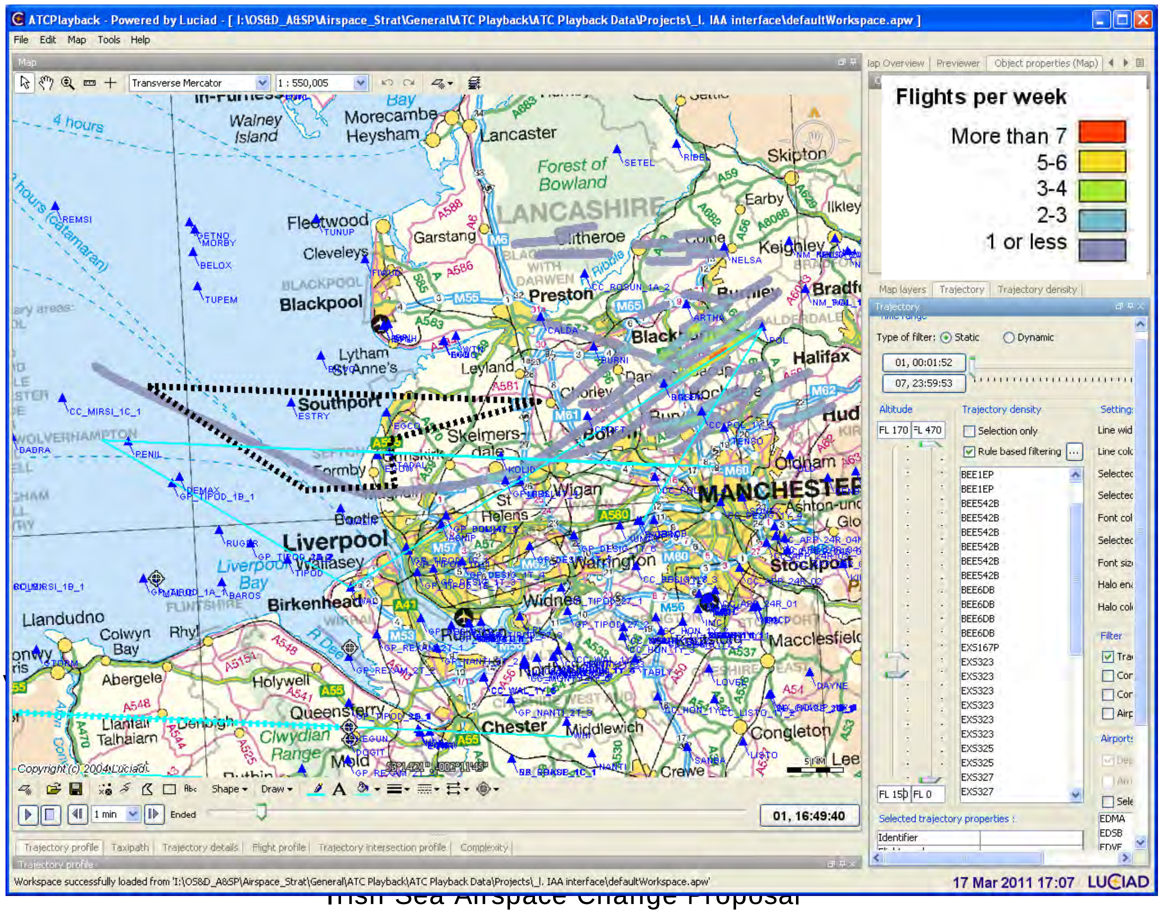
7 Day sample August 2010, FL120-FL130



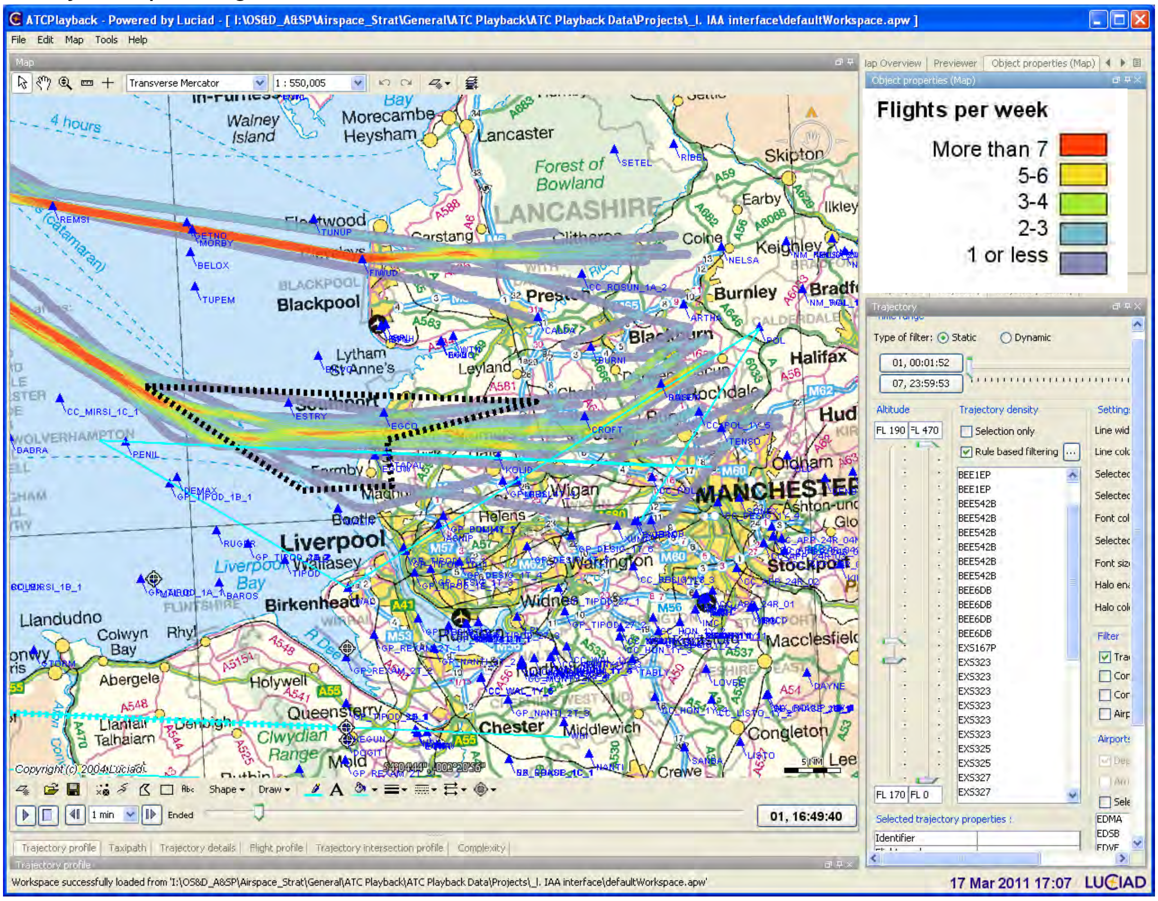
7 Day sample August 2010, FL130-FL150



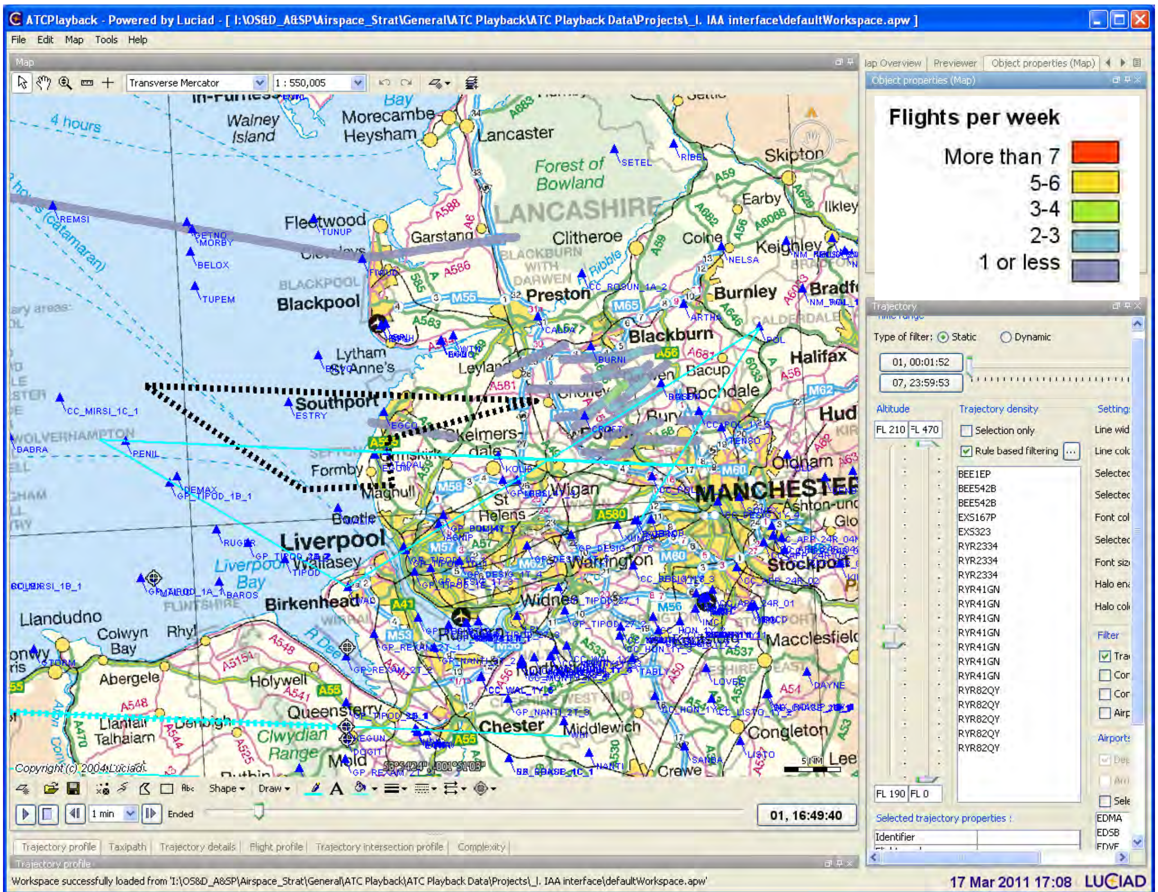
7 Day sample August 2010, FL150-FL170



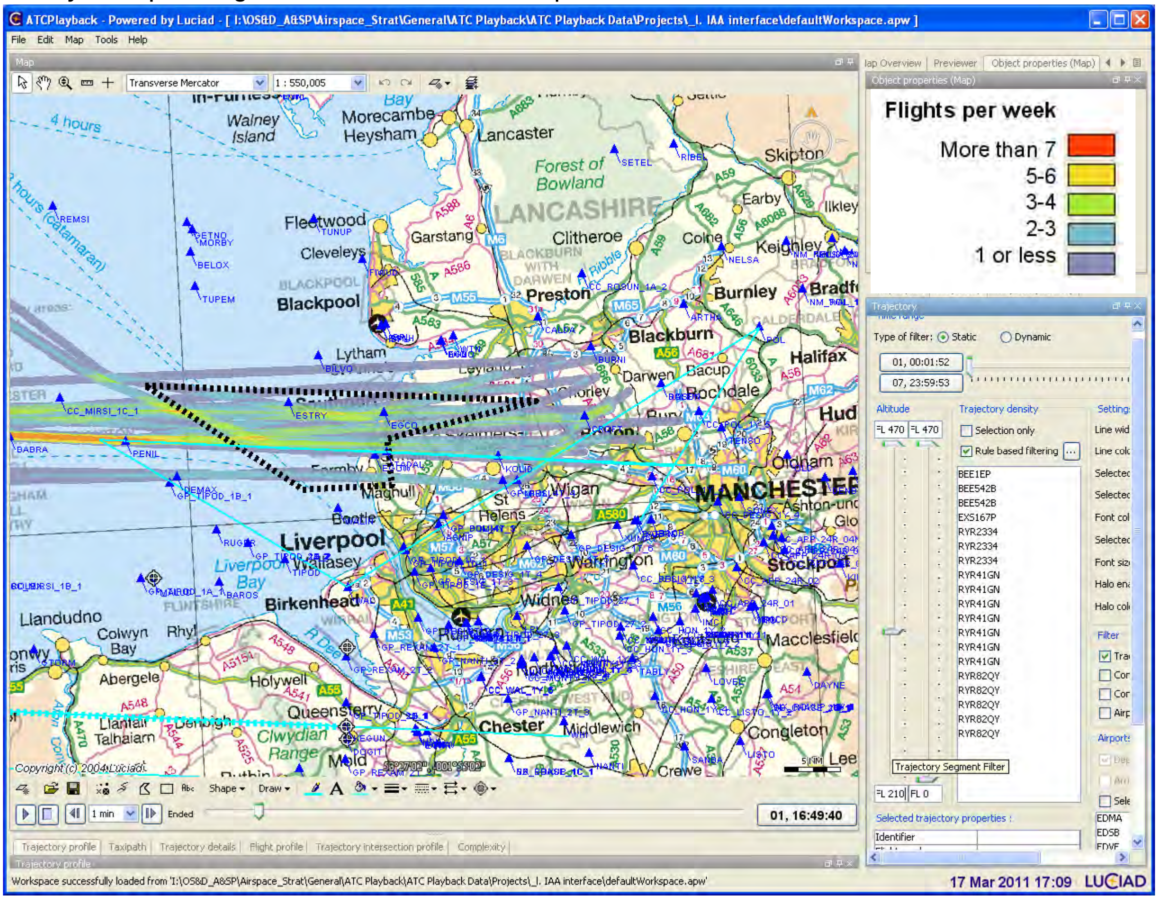
7 Day sample August 2010, FL170-FL190



7 Day sample August 2010, FL190-FL210



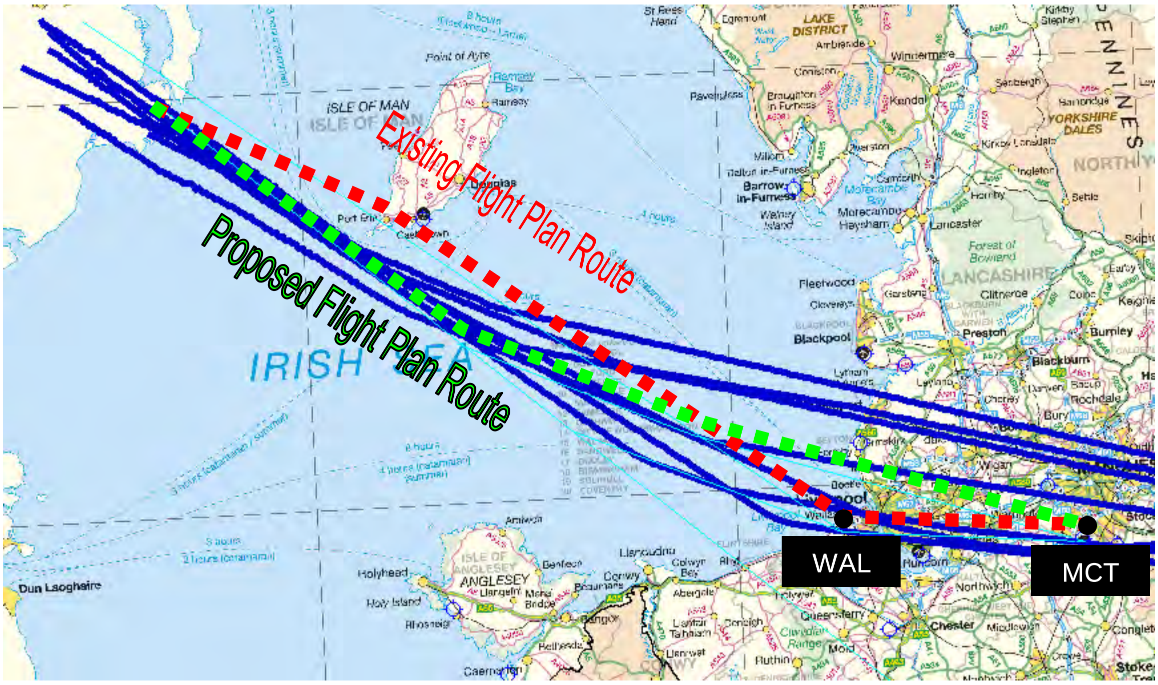
7 Day sample August 2010, FL210 and up



Appendix H: Track data for Belfast TMA Departures

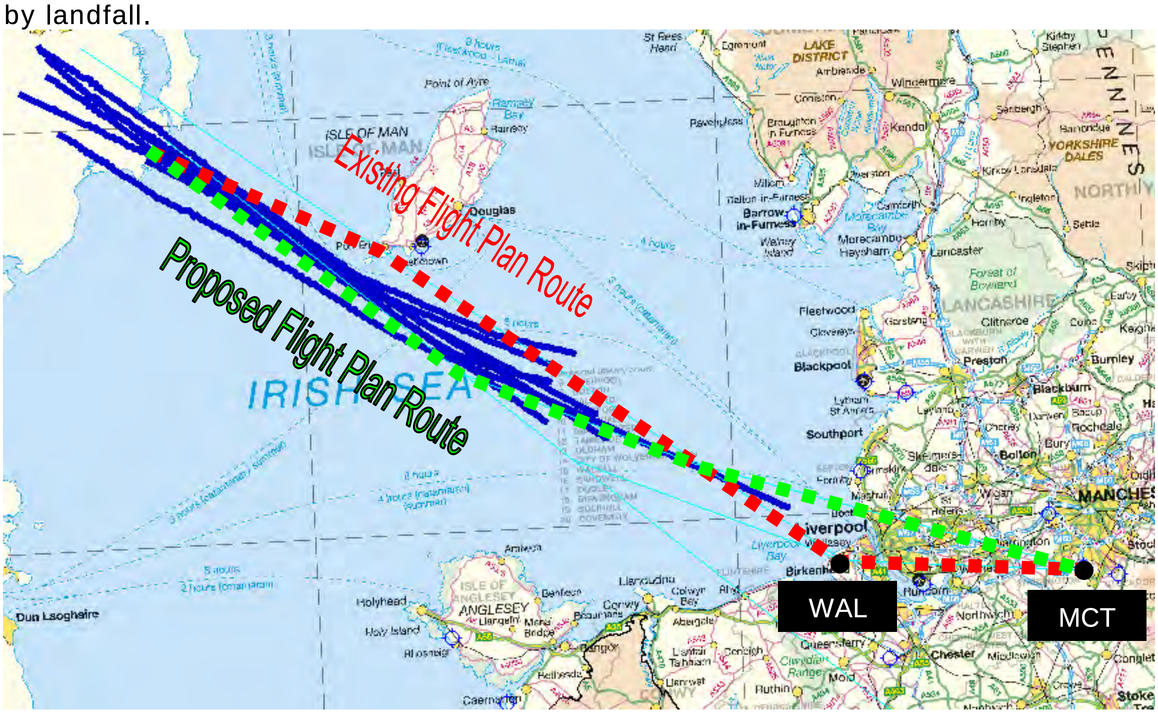
Plot showing one week of BTMA departures to the North Sea (flight plan routeing via MCT). Sample date 01/08/2010-07/08/2010.

This plot shows that there is only one regular flight to Amsterdam, and that this flight is vectored rather than following the flight planned route to WAL and then MCT.



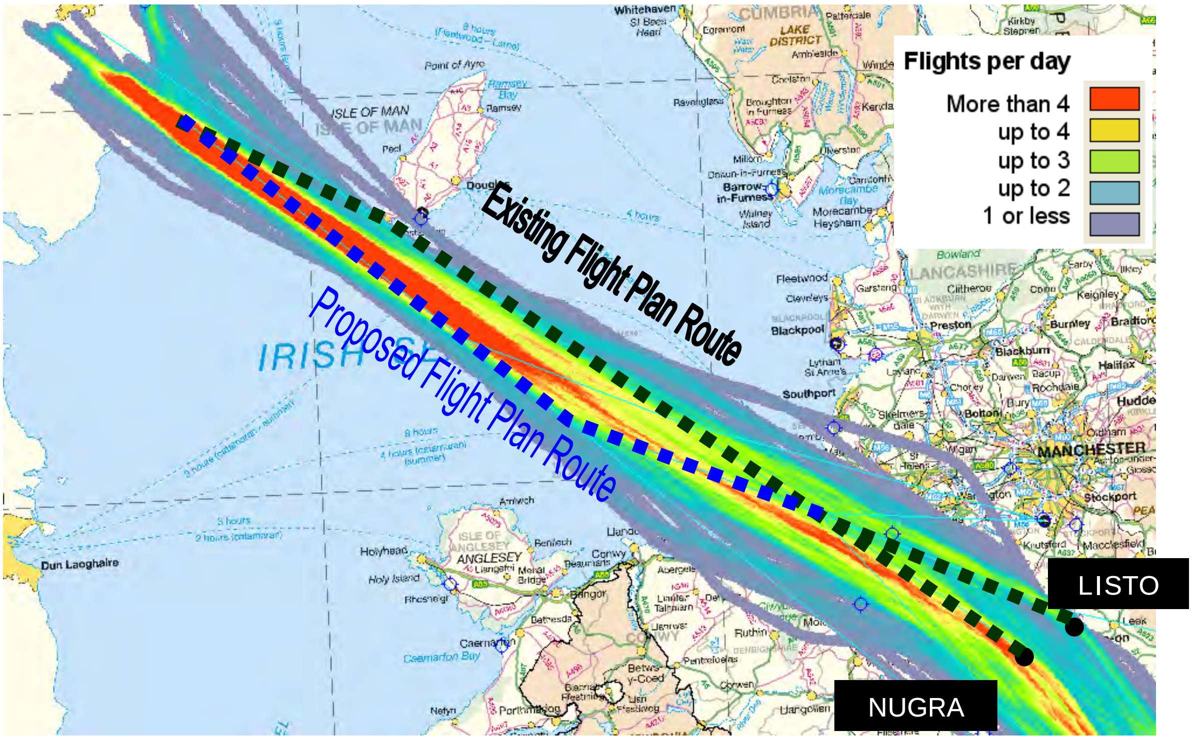
Plot showing one week of BTMA departures to the North Sea (flight plan routing via MCT) up to FL320. Sample date 01/08/2010-07/08/2010.

This plot shows that in addition to being vectored these aircraft are at High levels by landfall.



Plot showing one week of BTMA departures to the Heathrow, Stansted and Luton (flight plan routing via NUGRA or LISTO). Sample date 01/08/2010-07/08/2010.

This plot shows that these flights are vectored rather than following the flight planned route to NUGRA and LISTO via WAL. The proposal would not change the way in which these flights are vectored.



Plot showing one week of BTMA departures to the North Sea (flight plan routing via MCT) up to FL260. Sample date 01/08/2010-07/08/2010.

This plot shows that in addition to being vectored these aircraft are generally above FL260 by landfall.