

# AIRSPACE

Modernising our flightpaths



## NAVIGATION FACTSHEET

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### AIRCRAFT NAVIGATION: WHY IT IS CHANGING?

This factsheet outlines how the introduction of modern navigation techniques and requirements coupled with government policy, in the form of the Future Airspace Strategy (FAS), have influenced a need to change the routes to and from Glasgow Airport.

### HOW HAS AIRCRAFT NAVIGATION CHANGED?

Commercial aircraft used to navigate by receiving signals from a network of ground-based navigational beacons around the country and the routes they followed were defined, in the main, as tracks towards or away from these ground-based installations.

The principal type of navigation facility was known as a VOR (Very High Frequency Omni-Directional Radio Range) which enabled a pilot to determine his bearing in relation to magnetic north from the beacon. There were also a few NDBs (Non-Directional Beacons) which simply radiated a signal much the same as an old Medium-Wave radio station. These were supported by DME (Distance Measuring Equipment), which gave the pilot an indication of the distance he was from the beacon.

The entire Airways System was based upon this ground-based navigation infrastructure.

Over the last 30 years or so navigation systems on board modern aircraft have changed and become much more sophisticated and are known as Flight Management Systems (FMS). They no longer rely on the tracks being aligned towards or away from the ground-based facilities but can compute a track between any two specified points-in-space using a variety of external signal sources as well as sophisticated on-board Inertial Reference Systems (IRS).

But, most importantly, an aircraft FMS takes precise navigational information from a network of space-based navigational satellites. These are known as the Global Navigation Satellite System (GNSS), of which the best-known element is the Global Positioning System (GPS).

As not all aircraft were necessarily equipped to the latest navigational standard, the basic network of airways and other flight routes has, until now, remained largely aligned to the ground-based navigational facilities. This is now changing as we have reached a stage where very few commercial aircraft are still using the old "legacy" navigational systems and the vast majority are equipped and approved to use very accurate GNSS navigation.

### WHY IS "THE SYSTEM" CHANGING?

The demand for air travel is ever increasing and so it is necessary to find a way of enabling more aircraft to fly in the same finite volume of airspace with increasing levels of safety and with increasing levels of flight efficiency resulting in a positive impact on the environment.

Under a number of international programmes, of which FAS is the UK response, the worldwide network of air routes is being progressively updated and will be based primarily on more efficient and direct point-to-point routes rather than between ground-based beacons.

The UK's Future Airspace Strategy requires all participants in the aviation industry to upgrade their systems and the way aircraft are operated to meet the challenging safety, capacity and environmental demands of the future. The necessary changes apply to aircraft operators, airport operators, air traffic service providers as well as to military aircraft operations. Much of the air navigation technology that supports air transport needs upgrading. Doing nothing is not an option. The introduction of new technology, like Performance Based Navigation (PBN), will strengthen the resilience of our major airports to react effectively to disruption, improve the environmental performance of aircraft arrival and departure routes and further enhance air safety.

As part of the reorganisation of the route structure, many of the ground-based navigation aids will be removed as they are no longer necessary and would be very expensive to replace and/or maintain. This is the principal reason why we, at Glasgow Airport, must make some changes to the routes to and from Glasgow Airport in the short term. Our ground-based navigation facility, located on Glasgow Airport, which has historically defined the main routes in the Scottish Terminal Control Area (ScTMA) is scheduled to be withdrawn by NATS in 2019. The withdrawal of the Glasgow VOR (known as "GOW") is part of a national rationalisation programme which has been agreed between NATS and the CAA.

As we look to re-define those routes, which come under the Airport's responsibility, we aim to make changes that will make them more efficient for aircraft to fly, resulting in increased Airport capacity and reduce delays whilst seeking to minimise the impact on local communities. This is further explained in our factsheet about departing and arrival flight paths.

<sup>1</sup> NATS, formerly known as National Air Traffic Services, is an Air Navigation Service Provider (ANSP) Company which was previously part of the CAA but was privatised by Government in 2001. It provides the whole of the UK en-route network and terminal Air Traffic Services, including the ground-based navigation infrastructure, under licence from Government and is Regulated by the CAA.



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The development of area navigation (RNAV) in aircraft Flight Management Systems (FMS) removed the dependency on ground based aids. RNAV has since been further enhanced by the development of Global Navigation Satellite Systems (GNSS) that enable much more accurate aircraft positioning. To replace the departure procedures based upon the GOW VOR we are proposing to introduce RNAV procedures that will use GNSS.

## A BRIEF EXPLANATION OF THE AIRSPACE

The airspace surrounding the 3 Scottish lowland airports, of Glasgow, Edinburgh and Prestwick, is controlled airspace known as the Scottish Terminal Control Area (ScTMA). This airspace contains the departure and arrival routes and the terminal holding patterns. The routes cross and interact with each other and so vertical separation must be built-in to the procedures to ensure that they are safe. Closer to the airports the airspace is sub-divided into Control Zones (CTRs) and Control Areas (CTAs) which are managed by the Air Traffic Service Units located at the airports themselves.

Once airborne and clear of the immediate vicinity of the airports, it is the task of the Air Traffic Controllers at the Scottish Area Control Centre (ScACC) at Prestwick to get the aircraft climbing to their en-route cruising level. Responsibility for those aircraft descending from their en-route level towards their destination airport are handed over to controllers at the respective airports.

Air Traffic Services in the UK route network and the ScTMA are provided by NATS En-Route Ltd (NERL) under licence from Government. Departing aircraft follow Standard Instrument Departure (SID) procedures and arriving aircraft follow Standard Arrival Routes (STARs). Closer to the Airport, the SIDs must take account of the Airport's Noise Abatement Procedures (NAPs). The Airport also provides Instrument Approach facilities and procedures to enable aircraft to land in poor visibility conditions. These terms and procedures are explained in detail in other factsheets and in our consultation document.

## CHANGING THE PROCEDURES

If we, as an Airport Operator, wish to change any of our departure or approach procedures the CAA requires us to undertake an Airspace Change Process (ACP), which, amongst other things, requires us to consult extensively with both the airspace users and the local communities and with anyone who thinks they might be affected by any changes proposed. The Government (Department for Transport (DfT)) lays down strict environmental conditions that Change Sponsors must adhere to when considering any ACP with the entire process being overseen by the CAA.

<sup>1</sup> <http://www.glasgowairport.com/media/119680/gla-nap-web.pdf>. <sup>2</sup> Lmax is the simplest measure of a noise event, such as an aircraft overflight, is Lmax which is the maximum sound level recorded (in dB(A))