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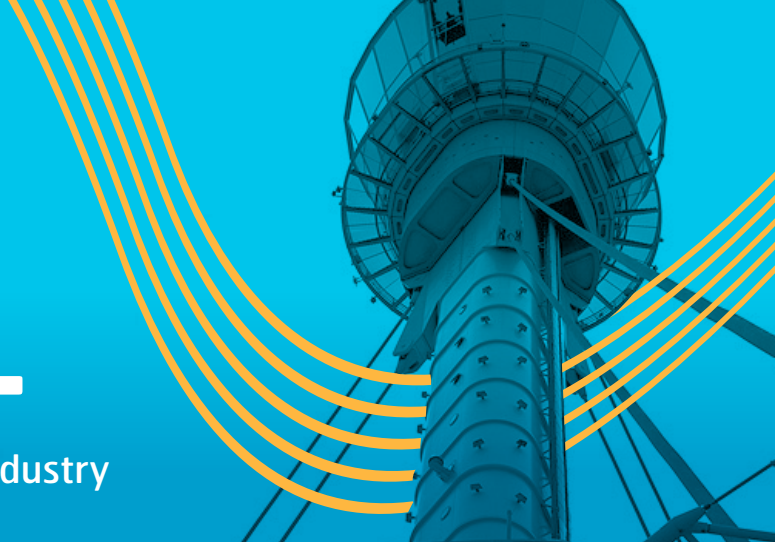
News, views and opinion for the aviation industry



NATS delivers medal winning performance

Over the past month, the eyes of the world have been firmly fixed on Great Britain. Guaranteeing the smooth arrival and departure of an additional five million visitors to the UK was of paramount importance under such an intense spotlight. In the spirit of the Games, the whole NATS operation came together to make sure that NATS played our part in what was an extraordinarily successful Olympics. This is our Olympic story.

A team effort

NATS' role in the Olympics started four years ago. During that time, there is virtually no-one in our business that hasn't been involved in the Olympics preparations in some way or another. From our airspace and procedure designers to our engineers and projects, from our training team and network management to our operations and support staff - it has been a real team effort. Our people worked tirelessly to get us ready for the challenge and the operation was prepared perfectly for the starter's gun!

Getting fit for the Olympics required us to implement a new airspace design, changes to method of operations and deal with the increased capacity safely, at the same time as facilitating the biggest airborne security operation in the UK since World War II. The Olympics presented NATS with an unprecedented challenge and our people responded brilliantly.

The main demand was expected to be focussed around London and the Olympic park, but there were another 30 venues across the UK. And with 150 Heads of State flights, 14,000 athletes, 20,000 media personnel and 70,000 overseas 'Games family' due to descend, the smooth and expeditious flow of air traffic was vital.

A runway slot reservation system was established to ensure that all aircraft using controlled airspace obtained an airport slot. Use of the system was mandatory for all arrivals and departures into the 40 airfields which fell within the Olympics area. As well as the busy airports such as Gatwick and Heathrow, this also affected many of the smaller airfields such as Blackbushe and Biggin Hill. The allocation of the slots was carried out by Airports Co-ordinated Ltd (ACL). As of 14 August, ACL had received 9,659 slot bookings in addition to the normal scheduled services.

Welcome to the third issue of the NATS newsletter, Airmail. It's designed to keep you up to date with news and latest developments from the global leader in air traffic control and airport performance.

NATS provides answers to the critical issues faced by airports, ANSPs and the aviation industry around the world. And we don't simply address the issues in isolation: we always bear in mind the bigger picture.

If there are any topics that you would like further information on or general enquiries, please contact us at: Airmail@nats.co.uk

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Temporary controlled airspace was introduced to improve the flow of traffic. This included the introduction of a number of new holds and routes to accommodate additional traffic to regional airfields. The UK Government also introduced security restrictions which saw the arrival of prohibited and restricted zones of airspace over large areas of London and the South East throughout the Olympics. The purpose was to establish a 'known air traffic environment' within the airspace above and around the Olympic Games.

All this change required training 400 of our controllers in new procedures. This complex training programme was delivered with minimal impact to the operation.

Working with the Military

One of NATS' biggest responsibilities was to create a dedicated Olympics Airspace Management Cell (OAMC) at our Swanwick Centre. The OAMC (also referred to as ATLAS) was manned by military personnel and was responsible for supporting the airspace restrictions around the Olympic stadiums. The Cell was delivered on time and without disruption to our day to day operations.

Military controllers in the OAMC were responsible for providing air traffic services outside controlled airspace within the restricted zone. They also provided 24 hour a day security surveillance.

Three intercept launches took place during the Olympics. Thanks to the response of our operational staff and the Military, these were handled safely and with minimum delay. The Royal Air Force has since written a letter to thank NATS for the way in which we handled traffic during this period of increased security.

Cross industry collaboration

Our success handling the Olympic traffic was thanks to a cross industry collaboration including the UK Military, the Government, the Met Office, the airports, our regulator – the CAA, our airline customers, Directorate of Network Management (DNM), the Irish Aviation Authority and our neighbouring ANSPs, general and business aviation. In short, the industry as a whole.

In terms of managing the flow of traffic effectively, NATS worked with adjacent states to agree re-route scenarios. This enabled traffic to be more evenly spread across the busy sectors in the UK.

UK flow management actively monitored and managed the UK network to ensure minimum delay. In addition, a permanent representative of UK flow management was seconded into DNM, to ensure a direct link between the UK and Europe.

A focus on our customers

In the run up to the event, a big focus was educating our airline customers on the changes during the Olympics and what it would mean for their operations. NATS hosted a series of workshops looking at diversion scenarios, airspace, procedures and policy changes. NATS also developed an interactive computer based training package to bring the changes to life for them.

Throughout the whole Olympics, NATS communications centre was activated – conducting three telephone conferences a day when traffic was at its peak. An airfield status map was also made available on our customer website, providing up-to-date information on airfield diversion status across the UK and Western Europe.

One of the biggest concerns for the airlines was the potential disruption from adverse weather or military activity. Despite several heavy thunderstorms and a number of military aircraft launches during the Olympics, customers' concerns were not realised.

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NATS' efforts didn't go unrecognised. We received numerous compliments from our customers on the way we handled the event, and the information we provided them. "Given the huge amount of preparatory work undertaken by NATS over the recent years for the Olympics, it is a credit to those involved how well it has all gone," was just one of the comments we received.

From a safety perspective, we had no risk bearing losses of separation attributed to the Olympics. We also had very few airspace infringements during the period. This can in many ways be attributed to the engagement and education programme we ran with the General Aviation community, along with the success of the OAMC.

In association with the CAA and the Government, NATS ran a programme for General Aviation and business jet pilots. Activities included a suite of online resources, in-person briefings at airfields, flying clubs and airshows throughout 2011 and 2012, direct mail campaigns and multimedia outreach, all intended to raise awareness of the Olympic airspace restrictions and the tools and resources available to keep pilots flying safely over the summer.

Other challenges presented themselves throughout the course of the Olympics. As an example, NATS was asked to facilitate a TV broadcast relay aircraft to operate throughout a number of key events, right in the middle of the London Terminal Manoeuvring Area. This was achieved with no impact on commercial aviation.

A great performance

In terms of air traffic, some parts of the UK network saw a significant rise. Traffic in the London area was up by 3.5% for a number of days, peaking at 4.5%. At the airports, traffic at Farnborough and Biggin Hill rose by 16% and 19% respectively on peak days.

The years of planning and training certainly paid off. Incredibly, there were only 593 minutes of delay attributable to NATS throughout the whole Olympics. This compares to last year's figure for the same period of more than 13,000 minutes of delay - a 95% reduction.

As Team GB reflects on its success and considers the legacy of the Olympics, NATS will do the same.

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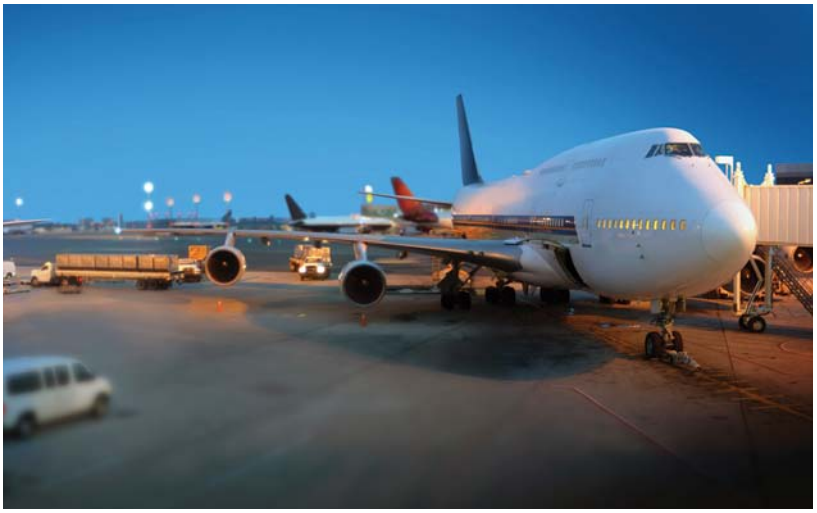
The secret to master planning success – future proofing airfields through effective ATM

Every airport manager knows the importance of the airport master plan – the blueprint for the airport's future development – and the value of input from the numerous airport service providers in shaping the master plan. It sounds obvious to say that air traffic management (ATM) should be a major factor in master planning, but is it?

When setting out an airport master plan, the top concerns for most airport operators are evident in their strategies - increase throughput of passengers while reaching for service excellence, without threatening the support of their investors or reaping havoc amongst their airline customers. The consideration given to air traffic management varies between airports and regions across the world, and in some cases is often an afterthought. However, when built into the master plan from the onset, ATM can help deliver significant capacity benefits alongside cost savings to both the airport and its airlines, creating an environment where the passenger experience has more freedom to flourish.



As one of the leading global air traffic management consultants, NATS is acutely aware of the advantages of considering ATM at every stage of airport development, and the serious pitfalls of neglecting it. Without expert advice on every aspect of its Air Traffic Control (ATC) operation, airports can end up investing in "enhancements" that deliver little or no capacity or efficiency benefits. In some cases, these well-intended changes can even result in a worse performance!

By embedding ATC experts in the master planning team, airports can be confident that the assets they put in place can definitely improve passenger throughput. Understanding the movement of aircraft around an airport is a specialised skill, and no amount of modelling can substitute for real-life experience at some of the worlds most congested and complex operations. We have worked with a number of teams at airports who strive each day to make difficult decisions based on information which may not be up to date, or using assumptions that are theoretically sound, but which do not have any practical application. This is sometimes due to the airfield infrastructure and design lagging behind today's high performance airframes and growing traffic levels. Take-off and stopping distances, pilot reaction times, taxying speeds, and safety improvements are all components of the operation that have significantly changed over the last few years and yet some of the master plans we review continue to design new taxiways and runways in positions that 'build in' operational inefficiencies. Of the airports intending to build new outer runways over the next 5 years, which of them have considered how many additional runway crossings (safety risks) will be created? And, whilst the length of the runway may have been calculated to address the optimal performance of the fleet mix of its users, how much consideration was given to the layout of holding areas and the position of the rapid exit taxiways? And more critically, how will it be used by the air traffic controllers themselves – segregated, mixed, independent and dependent – configurations that fundamentally change the runway service rates and overall capacity.

On the ground, the design and layout of an airfield and terminal buildings can have significant implications for the effectiveness of Ground Movement Controllers (GMC). When deciding the best place to locate the new 'iconic' control tower, what criteria are used to decide whether sightlines are within acceptable levels? Our experience has shown that there is no single answer, but worse than this is that the decision is often

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taken by the planners and architects rather than the controllers themselves. It follows that with visibility restrictions, the controllers have less confidence in making decisions quickly, meaning that aircraft will be delayed on the ground or off-stand for longer. A great example of this is where we observed an apron area that was difficult to see from the tower. Of the twenty stands available only one aircraft could push back and taxi at any one time. This was not necessarily due to its design, but more to do with the controllers not having a clear view. These unintended conflicts between form and function, and their subsequent cost implication, can be easily avoided by bringing ATC into the frame early in the planning process.

In the sky, airfields operate most effectively when the arrival and departure procedures align seamlessly with the en route ATM network. Runway orientation, neighbouring airspace restrictions and procedure design can all impact the speed and frequency with which aircraft can transition from tower control to en route. As a provider of both en route and tower services, NATS applies a holistic approach with its customers, working with master planning teams to ensure airfields are designed to stream traffic to and from the en route network without increasing pilot or controller workload. The reductions in workloads allow for faster decision making and can easily generate additional capacity without needing huge amounts of technology or infrastructure investment.

Involving and making use of those often forgotten experts in tower, will deliver a new dimension to your future airport design. They are the teams with the knowledge of what works and what doesn't and as changes are made to the infrastructure, they are the people that decide how best to use it, or not! Incredibly, we witnessed a situation whereby the airport operator was convinced that by putting in a link taxiway, the overall operation will improve. When asked, the incumbent controlling team, were adamant that in their opinion it will never be used. The situation is still not resolved, and one is left feeling that even if it is built, it is more likely to see more use from the airfield inspection vehicle than from any aircraft.

The poor communication we often observe between the Master Planning and ATM teams only serves to create an environment of uncertainty where each blames the other for the lack of capacity growth in the airport. One of our first tasks is to generate an open dialogue where the individual feels safe and confident to suggest ideas and challenge the decisions of those outside of their own organisation. This 'working together' partnership becomes the foundation for an airport model being fit for the future. It is also the precursor for establishing a sound concept of operation (CONOPS), which is something that is often overlooked, or is not regularly updated. An effective CONOPS is useful in a number of different ways including, base-lining the current operation, testing changes to infrastructure and procedures, generating safety and hazard assessments, helping to build the business case for change, and as a living document it is referenced by all to generate a common understanding.

A common understanding is what we all work towards, and air traffic management isn't the only consideration. In making our airports work well, we don't have a one-size-fits-all solution but, we do know that by working collaboratively with the ATM team, together with other stakeholders, from the earliest stages, master plans can and will endure the test of time.

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Familiarisation visit to NATS sites supports capacity growth in India

Mumbai's Chhatrapati Shivaji International Airport (CSIA) has set itself an ambitious target to increase their regular hourly throughput from 36 air traffic movements to 48. Over the last year, NATS has been working in Mumbai to identify options to enhance the two runway airfield's infrastructure and procedures to improve capacity. In order to demonstrate some ATC best practices in action, NATS worked with CSIA to design a programme specifically tailored for four separate week-long visits to the UK by controllers from Airports Authority of India and staff from Mumbai International Airports Limited.

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This engagement visit was designed to familiarise the Indian controllers and airport authority staff with the way NATS conducts high intensity runway operations in some of the world's busiest and most complex airspace. Altogether, 19 controllers from Airports Authority of India, including the CSIA ATC General Manager and some of his senior team, six staff from Mumbai International Airports Limited and one representative from the Indian regulatory body spent a number of days at four of NATS core sites.

As CSIA has cross runways, it operates in a single runway configuration most of the time. Gatwick, the world's busiest single runway airfield, was the obvious place to focus the visits. The visitors were given a bespoke tour of the Gatwick operation with a visit airside to get a feel for the airport infrastructure as well as a more detailed look at the operation from the Old Control Tower. The ATC staff also had the opportunity to use the Gatwick Tower and Approach simulators to try their hand at managing Gatwick's traffic load.

Visits to Heathrow Tower and Swanwick to see the approach side of the operation, along with a number of presentations on NATS safety and performance management completed a very busy schedule.

Heathrow, which operates one runway solely for arrivals and the other one for departures, is an ideal showcase for how airfields can cope with peaks of departure or arrival traffic. Following an overview of the airport layout, the visitors travelled up the Heathrow tower to observe NATS staff using the minimum wake vortex separations in a consistently safe environment, and how the runway and taxiway layout and controller techniques were used to minimise the departure delay. For a hands-on experience, some of the Indian controllers had the opportunity to visit the Heathrow 360 degree simulator which replicates the Heathrow operation and brings to life the benefits of an electronic flight progress strip system.

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At the Swanwick En Route control centre, the visiting group had in-depth tours of both Area Control and Terminal Control operations rooms, where London's heavy traffic load is managed. In Area Control the focus was on how NATS uses flow control measures and traffic prediction information to proactively regulate traffic through the available airspace. In Terminal Control the Indian controllers listened in to the Heathrow and Gatwick Approach positions alongside their UK counterparts to see how arrival spacing was consistently achieved through the use of speed control and precise vectoring.

The visits were rounded off at the Corporate and Technical Centre where, in addition to a number of presentations on safety, reporting and "Just Culture", the controllers were able to practise what they had seen in Terminal Control by using the simulators configured to represent the Gatwick Intermediate and Final Approach Director positions, with guidance and input from NATS Approach validated staff.

In visiting four of our key sites to observe the operation and experiencing Tower and En Route control on our simulators, over the course of a week the visitors gained a comprehensive understanding of how NATS approaches the challenge of capacity optimisation. And, through the mutual exchange of best practices, visits such as these will support them in reaching 48 movements per hour.

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New environmental metric delivering real results

On January 1st 2012 NATS delivered another world first by measuring the environmental performance of the airspace network above the UK in an entirely new way.

With the rising cost of fuel creating pressure on airlines to lower costs and NATS drive to improve their environmental performance, a target was set by NATS in 2008 to reduce UK CO_2 emissions by an average of 10% per flight by 2020 against a 2006 baseline. In 2009, the airline customers said this was a good first step but asked why NATS was not incentivised to improve their environmental performance. NATS agreed to explore the possibilities and put the question to NATS Operational Analysis (OA) department to provide a solution.

Multiple metrics and options were considered during several years of developmental work by NATS OA, in collaboration with the NATS Environment team, and the solution came in the form of the 3D Inefficiency Score (3Di).

The metric

The 3Di score highlights the ATM impact on flight inefficiency. Traditional emissions-based metrics are heavily influenced by the airframe in operation or the cost index of the operator and do not give a clear picture of the impact the ANSP is having on fuel efficiency. 3Di only considers an ANSPs impact on a flight – the horizontal track flown and the vertical profile given to a flight.

In the horizontal plane 3Di compares the actual radar groundtrack against the most direct great circle track – within the airspace network above the UK. The difference between these two distances, which describes the 'additional miles flown', defines the inefficiency in the horizontal plane.

In the vertical plane the metric compares the actual vertical profile against the airlines preferred trajectory. Vertical inefficiency that results from Air Traffic Control interactions has been simplified to periods of level flight that occur below the aircraft's requested cruise level.

The vertical inefficiency is defined by the amount of flight time spent in level flight and the deviation from its requested cruise level. Level portions of flight at low altitude are more fuel penalising than at higher levels. In addition, the more time spent in level flight below the requested cruise level the more penalising for 3Di.

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Lastly, because aircraft performance and in particular fuel flow rates vary across the different phases of flight the metric applies different weightings for level flight occurring in climb, cruise, and descent phases of flight. All of these factors are then combined to give a single 3Di score for each flight in NATS airspace above the UK.

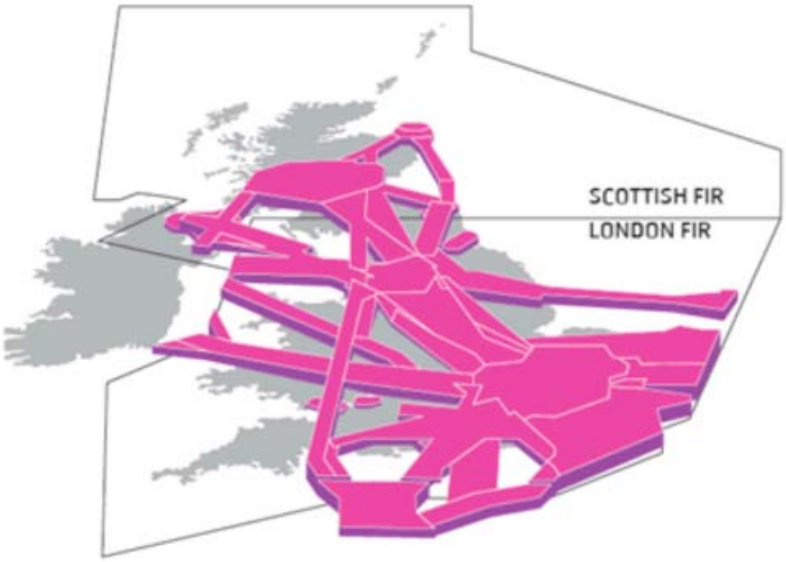
- Every commercial flight, every day of the year from 1st January 2012 will have a specific 3Di Score calculated. At the end of the year all the scores are combined to give a single annual average score for NATS.
- Scores run from 0, which represents zero inefficiency to over 100, with most flights typically having a score in the range between 15 and 35.
- Following consultation between NATS, airlines and our regulator, the UK CAA, a performance scheme that targets improvements to the UK 3Di score has been set.
- The advantage of the 3Di metric is that it can be applied to any region of airspace and therefore provide an estimate of the fuel efficiency of that region.

What has it done?

The 3Di metric has been designed so that it drives behaviours in NATS to deliver long-term improvements in flight profiles and related fuel burn and CO_2. A big factor behind the score is the underlying structure of NATS airspace. NATS operates some of the busiest airspace in the world and our primary consideration is to ensure the safe and expeditious flow of air traffic under our control.

The congested nature of UK airspace means that sometimes aircraft are not always able to obtain their most direct routes or most optimal climb and descent profiles. However, the metric has identified areas of inefficiency within the network and given our airspace designers additional information to consider when planning future airspace structure. It also incentivises designers to route flight paths as close to the environmental optimum as possible.

The metric has also provided controllers with a more representative measure of their impact on environmental performance. Through early engagement with our operational personnel and a series of education exercises in the metric, small day-to-day changes have started leading to an improved 3Di score – in turn reducing emissions and customer costs. The fact that the metric can help to drive reduced costs and is the first of its kind has been praised by NATS customers, as Paul Tate (Manager Flight Technical Services, British Airways) stated: "NATS should be congratulated for the work done on 3Di Flight Efficiency Metric through which it leads its European peers. This is an innovative, industry leading piece of work."



What does the future hold?

Initially, the future for NATS is to drive improvement to ensure it meets its regulated targets for the next 3 years. This target has been set by the regulator (UK CAA), in conjunction with input from airline customers and NATS. Every flight, every day of the year from 1st January 2012, with only a few exceptions (see graphic) will have a specific 3Di Score calculated and counts towards the overall average for NATS. Currently NATS 3Di score is close to 24; if we reduce this below 21 we enter bonus territory (max bonus £2.4m for a 3Di score of 9 Units), if 3Di goes above 27, we risk penalty (max penalty £4.8m for a 3Di of 51). The performance scheme tightens by one point in 2014 to provide extra incentive to improving fuel efficiency.

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The biggest improvements will be delivered by changes to the design and operation of airspace, improving access to shared airspace and providing controllers with tools that enable them to provide these desired profiles. Our challenge will be to do this in the face of factors that affect the score negatively, such as the volume of flights within our network, limited runway capacity which leads to aircraft holding and bad weather. Adapting our operation to become more resilient to these external factors will help drive the score down.

The 3Di score has helped identify areas to target for improvement for future designs and will also be used to monitor future performance and determine the success of future airspace changes from an environmental point-of-view. The metric also provides NATS with an effective method to understand their impact on their customers' fuel efficiency and ultimately incentivises us to reduce UK ATM CO_2 emissions and fuel costs seen to customers. Indeed, CAA analysis suggests that if NATS can meet it targets over the next 3 years, it could save its airline customers £120m and reduce CO_2 emissions in UK airspace by over 600,000 tonnes.

NATS is also beginning to work closely with European partners to produce 3Di scores for their regions that can help drive the same fuel burn and cost reductions that NATS is beginning to see with its own operation.

http://www.nats.co.uk/environment/reporting/3di/

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Third party risk around airports

Historical records show that around 70% of aircraft accidents occur in the landing and take-off phase of a flight. This means that areas close to airports have an above average risk of damage due to aircraft accidents. How do we protect against this risk?

Technical Advisor to HM Department for Transport

Public Safety Zone (PSZ) Policy was introduced by the Department for Transport (DfT) to mitigate the Third Party risk to people and property in the vicinity of airports. It applies planning restrictions to the affected areas to control the numbers of people and structures on the ground subject to unacceptable risk. On behalf of the DfT, NATS calculates the PSZs for more than 35 UK airports using NATS developed risk methodology for estimating the probability of fatality per year due to aircraft crashes.

This methodology is considered to be best practice, and NATS is a world leader in third party risk and public safety zone assessments which has led to international contracts in Europe, Middle East and Australia in addition to those in the UK.

Airport Master Planning

NATS also uses this methodology to support airport master plans and development, helping airports to understand how the changes in forecast traffic compare with the current PSZs to which local restrictions may apply. In some areas the PSZ provides one mechanism for monitoring the effects of airport growth and also limits some aircraft types. At London City Airport there is particular emphasis on the PSZ due to the density of the developments around the airport. Over the last couple of years NATS has worked with London City Airport to help them understand the effects of the change in movements forecast in the airports master plan on the PSZ. This has allowed them to optimise the traffic forecast within the constraints of the PSZ.

Support for Planning Applications to Developments around Airports

In addition to the support provided to airports for planning NATS has also undertaken a number of projects for developers looking to develop the land around the airports in support of planning applications. This has included assessments of the third party risk to users of developments in the vicinity of London City Airport, such as the Thames Gateway Bridge, and more recently the Emirates Air Line Cable Car.

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