



Birmingham Airport Climate Change Adaptation Progress Report

November 2016



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1. Introduction

1.1. Background

In 2011 Birmingham Airport produced our first Climate Change Adaptation Report. This report was completed under the direction from the Department for Environment, Food and Rural Affairs ('Defra') under the Climate Change Act 2008.

The 2011 report identified the risks to Birmingham Airport by a changing climate. This report outlined how we are committed to ensuring that Birmingham Airport adapts to climate change such as; hotter and drier summers, warmer and wetter winters and increasingly frequent extreme weather events such as prolonged snow and ice, storms and crosswinds.

Birmingham Airport has assessed risks of climate change adaptation against information from the UK Climate Projections (UKCP09), produced by the Met Office Hadley Centre, and has chosen to assess its assets and processes against four UKCP09 scenarios.

As well as being committed to climate change adaptation, Birmingham Airport has reduced its Carbon emissions by 26% per passenger since 2012 and we review our Carbon Management Plan on a regular basis.

Analysis and experience has shown that airport infrastructure may be vulnerable to certain aspects of climate change; however, the infrastructure has a significant degree of resilience to change. These risk assessments indicated that in 2011, Birmingham Airport's assets and processes are resilient to the climate change that is predicted to occur. Within the initial assessment, there were some assets which will require further analysis, when more refined data is available. This is an ongoing process, which is incorporated in to Birmingham Airport's Corporate Risk Management Procedure.

This updated report has been requested by Defra and outlines progress made since 2011 at Birmingham Airport and reviews the risk assessment for climate change adaptation.

1.2. Birmingham Airport

Birmingham Airport is one of the UK's largest and most successful airports. It provides a wide range of services, domestic, short haul and long haul, to passengers from across the Midlands and beyond. It handled over 11 million passengers between August 2015 and August 2016, making it the third largest regional airport in the UK, and the second largest regional airport in England. Passenger numbers have grown by around 13% over the last five years as the Airport, along with the West Midlands region, has recovered strongly from the global recession.

This makes Birmingham Airport one of the most important economic drivers in the West Midlands region. Through the diverse range of activities at the Airport, the wide range of users of air services and through multiplier effects, the Airport supports economic activity across a wide range of sectors in the regional economy. The Airport handled over 9.7 million passengers in 2014 and its total economic impact in the West Midlands was around £1.1 billion in Gross Value Added (GVA). It also supported around 25,300 jobs (20,800 full time equivalents (ftes)). This puts the Airport in a similar bracket to developments such as HS2 in terms of driving the regional economy. Across the UK, where more of the Airport's economic impact is captured, its total impact is estimated at around £1.7 billion in GVA and around 39,850 jobs (33,050 ftes).

The Airport's economic impact in 2014 therefore equated to £113 of GVA per passenger and 2.6 jobs in the West Midlands for every 1,000 passengers passing through the Airport. This reflects:

- Birmingham Airport's role as a major piece of transport infrastructure;
- Its crucial role in providing international connectivity to the region's highly significant manufacturing sector and a range of financial and business services;
- Its role in supporting the visitor economy in the region.

Furthermore, the economic benefits have increased this year as the Airport experienced record growth with passenger numbers exceeding 11 million in 2016.

2. Climate Change Adaptation

2.1. Background

The planet's climate constantly changes over time and changes are part of a natural cycle, however human activities also contribute significantly to changes in the climate. Since the mid-twentieth century, there have been noticeable increases in global temperature. It is the rate of these increases that are causing concern for scientists and governments. Even if greenhouse gas emissions were to stop today, past emissions mean changes to the climate will continue for the next 30 - 40 years.

The Intergovernmental Panel on Climate Change (IPCC) attributes these changes largely to anthropogenic greenhouse gas emissions (man-made greenhouse gas emissions). The IPCC was set up by the United Nations Environment Programme (UNEP) and the World Meteorological Organisation. It is the leading authority on global climate change and delivers key global policies which many governments use in their own climate change policies.

The Climate Change Act 2008

The Climate Change Bill was introduced into Parliament on 14 November 2007 and became law on 26 November 2008.

The Act creates a new approach to managing and responding to climate change in the UK, by:

- Setting ambitious, legally binding targets.
- Taking powers to help meet those targets.
- Strengthening the institutional framework.
- Enhancing the UK's ability to adapt to the impact of climate change.
- Establishing clear and regular accountability to the UK Parliament and to the devolved legislatures.

The Act also introduced a new power for the Secretary of State for Environment, Food and Rural Affairs to direct "reporting authorities" (companies with functions of a public nature such as water and energy utilities) to prepare reports on how they are assessing and acting on the risks and opportunities from a changing climate. The reporting authorities also includes ten "strategic airport operators", defined as Birmingham, Cardiff, East Midlands, Edinburgh, Glasgow, London Gatwick, London Luton, London Heathrow, London Stansted and Manchester.

The earlier that adaptation actions are adopted, the less it will cost and the better equipped organisations will be to cope with these and other potential changes. Proactive planning – planning for the future – and not just reacting to emergency situations will save money and reduce the risk of effects of climate change. A wide range of advice is available to help organisations adapt to the changing climate, which the Airport Company has embraced.

2.2. Birmingham Airport Climate Change Adaptation

Our 2011 report assessed the potential climate change impacts that were identified during a series of workshops held with relevant stakeholders. Each timeline was considered in the context of the modelled evidence and how the scenario would affect the services and

infrastructure of the Airport. From the climate modelling, four scenarios were selected as being the key threats to the Airport and its functions:

- Hotter drier summers – drought, prolonged higher temperatures, hotter hottest days.
- Milder wetter winters – heavy prolonged rain/flooding, rise in communicable diseases.
- Extreme weather events – prolonged snow/ice, storms, gales, crosswinds.
- General – indirect impacts – sea level increases (as a threat to some low level destinations).

The Airport Company in 2011 chose only two of the key timelines to discuss - 2020 and 2050, with 2080 being considered too far beyond the scope of the current Airport Master Plan, with a Plan Period to 2030. When the Airport Company reviews its Master Plan beyond 2030, which is due to be published in 2017, climate change adaptation issues up to 2080 will need to be considered.

Short term climate change impacts were considered to be an increase in temperature due to current building's cooling and air conditioning being already near to capacity, with energy demand and energy security also being rated as important in the short term. While long term climate change impacts were considered in the assessment, it is expected that these will be mitigated through action taken to mitigate and address short term impacts and they will not pose such a significant threat.

The Airport Company has identified several areas where there is a potentially high risk to the business:

- Energy Security – reliance on fossil fuels and fossil fuel generated electricity. The level of impact is high as this could adversely affect Airport operations and have a financial impact on the Airport Company as a business.
- Water Security – water supply and consumption, which could impact on public health.
- Markets Stability – increases in UK 'stay-cations' and increases in foreign markets could potentially have an impact on the Airport Company as a business and future development.
- Infrastructure Stability – heating and cooling capacities for future expansion of the passenger terminal and offices may be affected if infrastructure is not 'future-proofed' when considering capital investments.
- Flood Risk – risk of reduced capacity and impact on airfield operations due to flooding on the runway and aircraft stands and manoeuvring areas. Considered low to medium likelihood, but it would have a high impact should floods actually occur.

3. Review of Climate Change Adaptation

3.1. Risk Assessment Review

In 2016 we reviewed our climate change risk assessment register to 2050 with all applicable stakeholders. These stakeholders were asked to review the previous risk assessment published in 2011 and to identify any new risks. Birmingham Airport has revaluated the risks of climate change adaptation against information from the UK Climate Projections (UKCP09), produced by the Met Office Hadley Centre, and has chosen to assess its assets and processes against the five UKCP09 scenarios detailed above: energy security; water security; market stability; infrastructure stability; and flood risk.

This risk assessment review determined that the assessment for 2020 and 2050 remained largely the same. Risk scores were reduced for the 2020 assessment as these risk have not been realised in the preceding 5 years at the airport and the closer we get to 2020 the lower the likelihood of this occurring. The updated climate change risk assessment is given below.

Risk Assessment to 2020

Climate Variable	Specific Event	Receptors	Impacts	2020		Action plan
				Risk	Likelihood	
Warmer drier summers	Prolonged hot weather / hotter hottest days	People, Premises, Finance, Process, Logistics	1. Increased energy demand - e.g. cooling and ventilation. 2. Hotter working conditions for employees and hotter terminals for passengers	2	2	1. Energy Security to ensure continuity of supply. 2. Continued Infrastructure Capability assessment of heating and cooling needs. 3. Infrastructure capability - capital investment appraisal process for building and infrastructure development where required 4. Employee risk assessments and wellbeing currently include provision for hot weather working. This is unlikely to change over this timescale.
Milder wetter winters	Flooding	People, Premises, Finance, Management, Process, Logistics	Airport capability compromised due to stand/taxiway and access roads flooded	2	3	1. Continued awareness of potential flood risks to runways and taxiways. Monitoring of Brook Levels to determine risk.
More extreme weather / storm events	Prolonged snow and ice	People, Premises, Finance, Management, Process, Logistics	Airport closure in heavy snow. Increased cost of snow clearing operations	2	2	1. Winter Operations Preparation. 2. De-icer supplier agreements during extreme weather to ensure continuation of supply.
General	General Climate Change	All	Risk of uncertainty of Climate Change forecasts	2	3	1. Extreme weather event forecasting assessment

Risk Assessment to 2050

Climate Variable	Specific Event	Receptors	Impacts	2050		Action Plan
				Risk	Likelihood	
Warmer drier summers	Prolonged hot weather / hotter hottest days	People, Premises, Finance, Process, Logistics	1. Increased energy demand - e.g. cooling and ventilation. 2. Hotter working conditions for employees and hotter terminals for passengers	3	4	1. Energy Security to ensure continuity of supply. 2. Infrastructure Capability assessment of heating and cooling needs. 3. Infrastructure capability - capital investment appraisal process for building and infrastructure development 4. Employee risk assessments and wellbeing includes provision for hot weather working
	Prolonged drought / water shortage	People, Premises, Finance, Management, Process, Logistics	Water shortages within airport infrastructure	3	4	Infrastructure capability - capital investment appraisal process for building and infrastructure development
Milder wetter winters	Flooding	People, Premises, Finance, Management, Process, Logistics	Airport capability compromised due to stand/taxiway and access roads flooded	3	4	Hatchford Brook Flood Risk Assessment
More extreme weather / storm events	Prolonged snow and ice	People, Premises, Finance, Management, Process, Logistics	Airport closure in heavy snow. Increased cost of snow clearing operations	3	4	Extreme weather event forecasting assessment
General	General Climate Change	All	Risk of uncertainty of Climate Change forecasts	3	3	Extreme weather event forecasting assessment

3.2. Uncertainties

Predicting climate change and the adaptation to this is extremely difficult due to the great amount of uncertainties surrounding predicting future climates and weather events.

There are also uncertainties on how a business such as Birmingham Airport will grow over the timescales that climate change risk assessments are undertaken. The airport masterplan to 2035 will be published in 2017 which will set out how it plans to grow and develop the growth of the airport in the future.

3.3. Actions Progress

The 2011 report identified a number of actions. Although there were no immediate actions to be taken, other than setting a programme with identified triggers that may initiate more tangible actions to ensure that climate change adaptation is considered as part of the Airport Company's capital appraisal and master planning processes.

The 2011 assessment identified that the current capacity will be able to cope with the majority of climate change effects in the short term. In this 2016 review, the position remains largely the same and thus our potential risk in 2020 has reduced. The risk and actions required for 2050 remain the same.

Risk priorities will be considered using the existing Airport Company risk matrix, to ensure continuity and any risk considered to be high will be reviewed, appropriate actions identified and an appraisal will be completed for consideration by the Airport Company's Executive Board. The Board will review the actions periodically to ensure they are still relevant to the business and progress is being made.

The actions and their progress are detailed below:

Climate Change Adaptation Action Plan Progress

Action Identified in 2011 Report	Progress to 2016 Review	Current Status
<p>Energy Security – Work with the Carbon Trust on the development of on-site Renewable Energy Biomass Combine Heat & Power (CHP) and/or Photovoltaic Solar Farm or a shared renewable energy generation facility will result in increased security of supply and a reduction of CO₂ emissions.</p>	<p>Progress made into installation of PV panels on terminal building. Continued investigations into renewables as part of the Carbon Management Plan.</p>	<p>Ongoing – as part of the Carbon Management Plan we are looking at alternative fuel sources as well as working with local partnerships on energy matters.</p>
<p>Infrastructure Capability - the Airport Company is working with De Montfort University to investigate how the existing Airport building stock can be made more resilient in terms of heating and cooling capacity. Also compliance with the Energy Performance in Buildings Directive, with Energy Performance Certificates obtained for all buildings, provides detailed energy efficiency improvement actions.</p>	<p>As part of the energy savings made across the airport the capacity requirement for the current infrastructure is yet to be reached and demand is reducing overall. Asset management protocols have been but in place for all airport infrastructure.</p>	<p>Ongoing and we will continue to evaluate our infrastructure capability especially through our asset management programme.</p>
<p>Infrastructure Capability – capital investment appraisals for future infrastructure and building development will incorporate an analysis that includes resilience to climate change.</p>	<p>Infrastructure projects have generally evaluated energy efficiency, sustainability and where appropriate, resilience to climate change.</p>	<p>Ongoing – developments that could be impacted by climate change will be assessed for their climate change resilience.</p>
<p>Flood Risk - the Airport Company has carried out a Flood Risk Assessment (FRA)¹ as part of the planning application for the runway extension. It was in accordance with Planning Policy Statement 25, Development and Flood Risk. Overall, the modelling has shown that the flood risk is less than that shown on the Environment Agency Flood Zone Maps. By means of engineering and drainage works, including the realignment of the A45 and diversion of upstream watercourses, the FRA has shown that the runway</p>	<p>Airfield operations monitor watercourse levels across site. No flood occurrences have happened on the airfield and the runway extension has delivered the expected flood risk benefits.</p>	<p>Ongoing – Further flood risk assessments will be undertaken when appropriate</p>

¹ Proposed Runway Extension - Flood Risk Assessment, Scott Wilson, December 2007

<p>extension scheme will be safe and reduce potential flood levels upstream of the Airport for a 1 in 100 year event, including a 30% climate change allowance as requested by the Environment Agency (to be completed by 2014).</p>		
<p>Flood Risk – a study to assess flood risk from the Hatchford Brook at the northern end of the airfield will be undertaken to assess the flood risk and whether mitigation works are required.</p>	<p>The North Airfield Drainage system has alleviated some of the flood risk from Hatchford Brook. This has increased the storage potential during heavy rainfall events and allows discharge to either foul sewer or to Hatchford Brook.</p> <p>Flood prevention measures have been put in place at one of the critical airport substations due to flooding issues that have been realised recently within the Hatchford Brook area.</p>	<p>Ongoing. Flood risk will be continually monitored and where required preventative measures will be put in place to protect critical infrastructure.</p>
<p>Extreme Weather Events such as electrical storms/increased wind – the Airport Company will investigate equipment and/or data that will provide improved real time information on wind, wind shear and for monitoring storms. Increased wind gusts and potential changes in direction are expected as a result of climate change, but details are uncertain.</p>	<p>Extreme weather events are continually monitored on the airfield. Details are still uncertain on future predicted extreme weather events as a result of climate change. The airport has responded adequately to extreme events that have occurred and are capable of accepting aircraft divers due to weather events at other airports.</p>	<p>Ongoing. The UKCP09 model continues to be used, though this has limited use for determining future extreme weather events and wind events which may impact flights to and from Birmingham Airport.</p>

3.4. Interdependencies

Birmingham Airport has a complex nature of interdependencies with other stakeholders. We work with all our stakeholders on a collaborative approach to climate change adaptation at the airport, particularly the key issues below.

Surface Access

Birmingham Airport relies on other modes of transport for surface access, to allow passengers and staff to get to the Airport, including the Highways Agency (for motorways), Solihull MBC, Birmingham CC and Warwickshire CC (for local roads), Centro (for public transport), Network Rail and Train Operating Companies (for rail services) and Bus and Coach operators (for bus and coach services). These functions are important to the success of the Airport's surface access and surface access policies and getting passengers, staff and supplier chains in and out of the Airport.

Energy Supply

Birmingham Airport's current dependence on fossil fuels is well catalogued, in the Airport's greenhouse gas emissions footprint, and the Airport Company currently relies on supply from external parties, and, in turn, many other parts of the Airport (including partner airlines and concessions) are equally dependent on the Airport for energy supply.

Communications

Both land and wireless communication feature heavily in the Airport's interdependencies, particularly in the operational field of Air Traffic Control. Birmingham Airport has brought in its Air Traffic Control as an internal function, thus giving greater control over the assets. Compromise or failure of these systems, through poor adaptation to climate change, would have severe ramifications.

Sustainable Aviation

Birmingham Airport also contributes to Sustainable Aviation allowing us to contribute to the aviation industry on issues including climate change and adaptation.

3.5. Monitoring and Review

The risk from climate change is continually reviewed and the risk registers are updated as new developments at the airport occur. The master planning process will address any significant risks on a longer term that may arise as a result of climate change.

The risk assessment detailed in the sections above will be reviewed when any significant changes have been identified to either areas that are potentially high risk to the business or infrastructure changes to the airport.

4. Conclusions

Birmingham Airport has reviewed the climate change adaptation strategies and risk assessment to 2020 and 2050. The risk to 2020 has reduced from the initial assessment undertaken in 2011 as the likelihood of these risks occurring has reduced by getting closer to 2020.

The 2050 risk assessment has remained unchanged as the scenarios in place for changes as a result from climate change remain the same on this timescale.

A number of actions have been taken as a result of adaptation to climate change issues. Flood prevention measures have been put in place at one of the critical airport substations due to flooding issues that have been realised recently within the Hatchford Brook area.

Flooding remains a prominent risk on site and monitoring of watercourse levels will be undertaken continually. Flood preventative measures will be put in place where necessary to protect key infrastructure and assets.

Birmingham Airport will continue to work with local and national stakeholders on climate change adaptation and report its progress and findings on climate change and adaptation.

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