

A Critique of Environmental Impact Assessment -

BRISTOL AIRPORT EXPANSION PLAN



Natasha Rose Dodds

UWTSD

Table of Contents

INTRODUCTION 1.0	2
ECOLOGY AND SURROUNDINGS 1.1	3
ENVIRONMENTAL IMPACT ASSESSMENT 1.2	3
BIA EXPANSION PROPOSAL 1.3	5
METHODOLOGY 2.0	7
DISCUSSION 3.0	8
BIODIVERSITY 3.1	9
GEOLOGY AND LAND QUALITY 3.2	10
WATER 3.3	10
AIR QUALITY 3.4	11
CULTURAL HERITAGE 3.5	13
COMMUNITY 3.6	13
LANDSCAPE AND THE VISUAL ENVIRONMENT 3.7	14
NOISE 3.8	14
TRANSPORT 3.9	15
CONCLUSION 4.0	16
REFERENCES 5.0	17

Table of Figures

Figure 1 Map of Bristol Airport location - Entec, 2005	2
Figure 2 Image of Greater Horseshoe Bat - Uk Bat Trust, 2019	3
Figure 3 Map showing layout of plans - Entec 2005	5
Figure 4 Drawing showing plans and locations - Entec, 2005	5
Figure 6 Figure E Annual Mean NO2 concentrations (current) Bleadon 2018	12
Figure 7 Figure E Annual Mean NO2 concentrations (predicted) Bleadon 2018	12
Figure 8 Overview of traffic survey - Bleadon, 2018	15

Table of Tables

Table 1 SWOT of Key Impacts - Entec, 2005	8
Table 2 Information on pollutants to Air – North Somerset Progress Report	11

Introduction 1.0

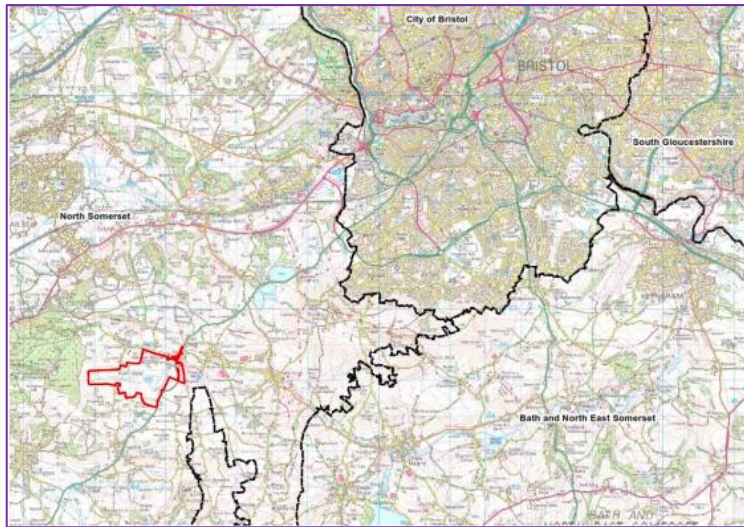


Figure 1 Map of Bristol Airport location - Entec, 2005

Bristol International Airport is located (fig 1) on the A38 in the South East of England, UK, roughly 11km from Bristol City Centre and within the boundary of North Somerset Council. The airport is the UK's ninth largest airport and in 2017 over 8.2 million passengers passed through the airport for one of the 120 destinations across 34 countries offered (Bristol Airport Limited, 2018).

The proposed development and expansion of the airport aims to increase the existing passenger capacity from 10 million to 12 million per annum making use of the original site and adding any necessary infrastructure for the remit. The airport currently handles 8 million per year but proposed footfall is due to rise by 1.5 million passengers per year by mid 2030's and 20 million per day in the 2040's (Chapman and Postle, 2019). A master plan was conceived and to support the planning application an EIA was undertaken in 2005 under the old regulations. Recent regulation changed in 2016 now make it mandatory, and an environmental statement must be issued, which presents the possible environmental effects to enable decision makers and public to fully grasp the potentially significant effects of the proposed expansion on the local surrounding ecosystem (Bristol International Airport, 2006). This research aims to quantify whether the environmental assessment was properly actioned and to critique and understand further where improvements could have been made along with suggestions for future development in line with the new EIA regulations.

Ecology and Surroundings 1.1

The development covering 196 hectares is surrounded on all sides by open countryside known as the Green Belt, close to the Mendip Hills, an AONB, There is extensive wooded areas located west of the development as well as arable farmland, medium sized villages and residential properties clustered. The Mendips are known for their carboniferous limestone and are important both for Biodiversity and Geodiversity. There are additionally expanses of grassland. There are known to be UK BAP protected species (fig 2) residing within the areas potentially affected by the expansion (Bristol Airport Limited, 2018)



Figure 2 Image of Greater Horseshoe Bat - Uk Bat Trust, 2019

Environmental Impact Assessment 1.2

An EIA is defined by the United Nations Environment Program (UNEP) as “ a tool used directly to identify the environmental impacts of a proposed project or development” whilst taking into consideration cultural and health impacts and socio economic issues both adverse and beneficial in order to mitigate, prevent and offset these potential shortfalls (Convention on Biological Diversity, 2010). It is a systematic process which predicts, identifies and evaluates the possible effects to environment from proposed projects. By using EIA there can be economic and environmental benefits achieved and saved time and costs for implementation of project and potential costs saved from the need to treat or clean up problems. The EIA can be considered effective if;

- Suggestions predicted were correct
- The information gathered during EIA helped make better decisions
- The compensatory and mitigatory measures approved objectives set out by management and stakeholders (Convention on Biological Diversity, 2010).

On 16/6/09 A planning application was first submitted to North Somerset Council with the goal of developing the airport and an additional scoping report was provided by Entec along with a public consultation to allow residents and opposition groups fair time to make objections known. The final goal of an EIA is to promote sustainable development by ensuring proposed developments don't over exert critical resources and negatively affect ecological functions and services or the communities and their wellbeing who depend on the said ecosystems, so it is essential that residents and stakeholders are equally benefitted from the plans alongside the local environment (Entec, 2005).

A strategic environment assessment (SEA) Risk assessment has been described by Sadler and Verheem (1996) as "the environmental consequences of proposed policies, plans or programmes to ensure that they are fully included and appropriately addressed at the earliest possible stage of decision-making on a par with economic and social consideration". SEA fits more under the description of being proactive and driven sustainability wise whilst EIA is sometimes explained as being largely reactive (Convention on Biological Diversity, 2010).

The proceeding at airports involves large scale construction and frequent usage afterwards, this is likely to impact flora and fauna but on the other hand can override essential transport strategies which bring extensive economic benefits to communities, such as job provision and footfall to local businesses etc. When managed correctly impacts can be significantly reduced So scoping is essential and consideration of alternatives a must (Environment Agency, 2001).

BIA Expansion Proposal 1.3

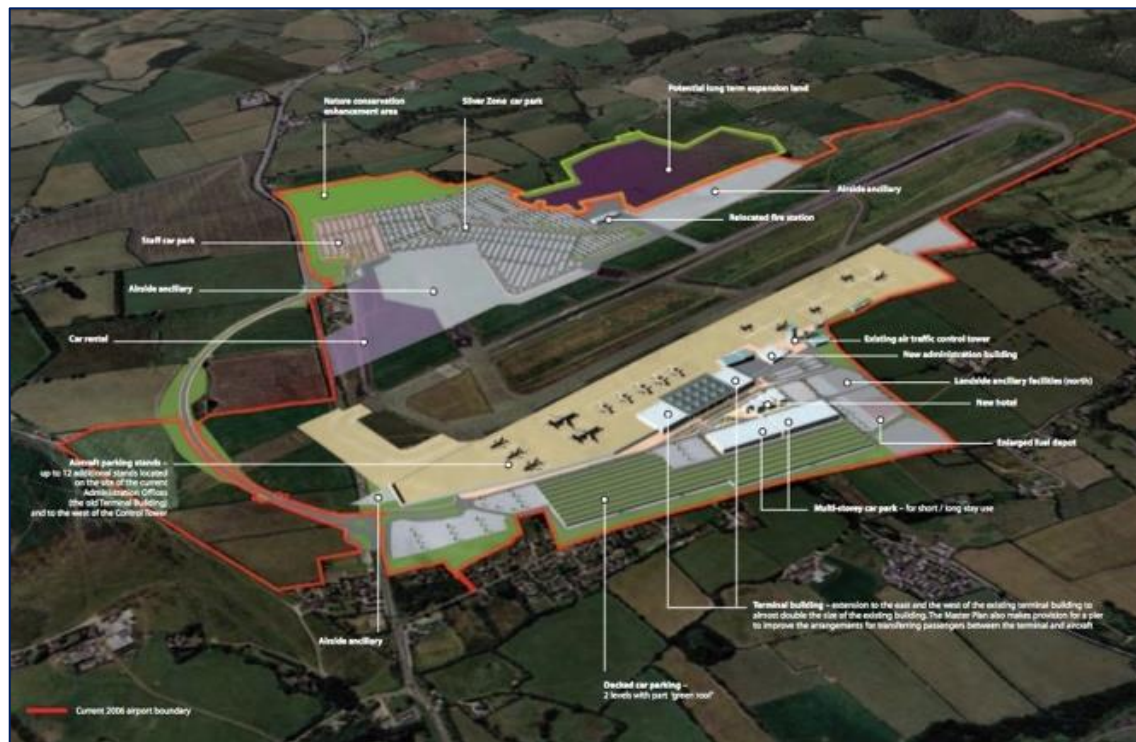


Figure 3 Map showing layout of plans - Entec 2005



Figure 4 Drawing showing plans and locations - Entec, 2005

The plan (fig 3) seeks permission for an initial growth phase beyond the 10 million to 12 million passengers per year. To accommodate this rise in footfall; The development will follow the new EIA regulation framework set out in the Air Transport White Paper, a document providing regulations and policy, published by Department of Transport, 2003 in anticipation of increased industry demand going forward (Griggs *et al.*, 2018)

- New infrastructure is proposed as well as improvements to existing facilities.
- 10420 flights per year increase = 2 million passengers
- Removal of night flight constraints – allow night flights but cap at 4000 per year
- 4 storey extension to western side of terminal building
- 2 storey extension to east
- East pier and walkway connecting to east pier
- Larger service yard
- Two lane one way road plus internal surface parking
- Taxiway delta and link
- Year round usage of silver zone car park plus extension for 2700 spaces
- Highway improvements for connectivity

Methodology 2.0

In order to assess the EIA set and Environmental statement research was undertaken into the planning documents, along with EIA documents and other literature surrounding best practices for EIA. Literature was gathered and analysed along with maps from the development and conclusions were formed.

Discussion 3.0

Airports are known to cause have numerous different anthropogenic effects upon the surrounding landscape. The table below show some of the key impacts globally and whether they have a negative or positive impact. The only positive clearly shown below found in this study by Aviation Environment Federation (Environment Agency, 2001).

Some of the negative impacts (table 1) include land take, noise, air pollution, climate change, water use, and effects on the social structures of local communities. Positive impacts include employment, and socio economic benefits to people who fly.

Table 1 SWOT of Key Impacts - Entec, 2005

Key impacts - negative impact + positive impact	terminal & ground operations		flights	airport access		associated projects	
	construction	operation	operation	construction	operation	construction	operation
air pollution			-		-		-
biodiversity impacts	-	-	-	-	-	-	-
climate change		-	-		-		
employment and economic benefits	+	+	+			+	+
heritage	-		-		-		
land take	-		-	-		-	
landscape	-	-		-		-	-
noise		-	-	-	-		
risk and public safety zones			-				
social costs to nearby communities	-	-			-		
traffic	-			-			-
water pollution		-			-		
water use		-					-

To summarize the impacts found by Entec during their EIA appraisal of BIA in 2005 are listed below and will be discussed individually for accurate analysis and compared with the new EIA regulations brought forward in 2016 (Entec, 2005).

- Biodiversity
- Geology and Land Quality
- Cultural Heritage
- Community
- Air Quality
- Landscape and the visual environment
- Noise
- Transport
- Water

Biodiversity 3.1

The location of the airport is on elevated flat ground with grassland, groups of trees and scrub, hedgerows and small patches of woodland. A number of ecological surveys were carried out since the 2005 investigations which were not fully undertaken initially and are now part of the new EIA framework. In 2018 phase 1 surveys for plants and habitats, amphibians, reptiles, bats, badgers, breeding birds, and hazel dormice (Bristol Airport Limited, 2018)

A SSSI is located nearby in Kingswood and in the town close to where the airport is situated and there are 19 non statutory sites lie within 2 kilometres with movements of Newt, Slow worm, Dormouse.

Wrighton parish is a known foraging and movement from place to place ground of the greater and lesser horseshoe bats, a nationally significant keystone species' a species found on the Endangered species list and protected under local Biodiversity Action Plans BAP's. Other bat species such as Common Pipistrelle, Daubentons, Long Eared, Noctule, Whiskered and Soprano Pipistrelles have also been recorded within the vicinity (Bristol Airport Limited, 2018).

The Common Dormouse is also found in Kings Wood and is far less abundant than in previous times and is limited to South and West England.

Breeding birds such as the Skylark have been found to potentially be at threat from this development from loss of habitat and increased mortality from air Collision. The vegetation has also been found to potentially be at risk of nitrogen deposits. A recent report by wood suggested and best practice management could ensure the habitats are kept at a high standard and a report by Wood suggested that there would be no negative effects on site for ecology or for those in the surrounding landscape but this comes from frequent monitoring over subsequent years since the initial EIA and has allowed a broader picture and in turn allows more socio-economic

To mitigate against these problems, fencing was put around specific areas to control movement of species and an unlit buffer zone was left between car parks for foraging bats. A case study at Indianapolis International Airport provided 9 types of artificial roost which were placed in woodlots in an effort to provide habitat for these endangered Indiana myotis bats (*Myotis sodalis*) which could prove beneficial (Whitaker, Sparks and Brack, 2006).

Geology and Land Quality 3.2

Airports often cause issues to land from land use change, soil deterioration, the need for tall tree removal for flight paths and associated infrastructure. A soil survey undertaken by Findlay et al found brown loam and clay on carboniferous limestone in 1984 but this was the last survey done at the time of the original EIA which is no sufficient and more up to date surveys should have been done (Environment Agency, 2001).

A technology hydrogeological survey found evidence of lead and zinc and limestone strata dipping 12 degrees NNW and mining and mine shafts were identified by waterman in 2003. Entec suggest that “No detrimental effect envisaged to landscape character’ and also that No sensitive landscape receptors within current development plan’ (Entec, 2005).

Water 3.3

Airports both during construction and operation can suffer surface water hydrology problems. The construction of infrastructure, car parks etc can lead to soil compaction. This can present problems such as flooding and soil erosion. Also once operational spillages can present risks from aircraft spillages to paint stripping and de icier spray etc during cold periods can seep in underground aquifers nearby and pollute waterways (Somerville *et al.*, 2015)

The EIA followed the water resources act of 1991 and ground water regulations 1998 and examined relevant pollutants such as chemicals, trade effluent, fuel etc and considered water quality overall i.e. biological, chemical and physical and the status of sub surface water. In mitigation ENTEC suggested;

- Better and more appropriate design and maintenance to avoid contamination
- Make use of SUDS and more efficient drainage
- Monitoring of all discharge .

A case study considering sustainable water management strategies at Copenhagen Airport mitigated against the risks by regular monitoring and the implementation of various water saving initiatives such as reducing water consumption and an aquifer thermal energy system (Baxter, Srisaeng and Wild, 2019)

Air Quality 3.4

A survey using dispersion modelling and emission inventories was constructed for 2005–20 under the AQR 2000. A report by RASCO suggested that air pollution would be minimal at this increase from the original master plan document considering air pollution.

Pollutants from auxiliary power units, engines and fuelling was studied such as oxides of nitrogen, carbon monoxide, sulphur dioxide, hydrocarbons and particulate matter. The annual mean concentration for particulate matter over the period 1999–2005 is shown below in table 2 . Sbac, 2006 suggest that NO_x is a bi-product of combustion which can be controlled by improved engine technology. A case study on Airports Air pollutants emissions in Italy found a method to evaluate aircraft's emissions and results were obtained using AIR AIR model. The paper suggested best practice using estimation of emissions models (Trozzi, Barbizi and Trobbiani, 1999)

Table 2 Information on pollutants to Air – North Somerset Progress Report

Substance	Statutory or Non-statutory	Averaging Period	Value ($\mu\text{g m}^{-3}$)	Date to be achieved
Benzene (C_6H_6)	S	Running annual mean (All UK)	16.25	31 Dec 2003
	S	Annual mean (England and Wales)	5	31 Dec 2010
1,3-Butadiene (C_4H_6)	S	Running annual mean	2.25	31 Dec 2003
Carbon Monoxide (CO)	S	Maximum daily running 8-hour mean (equivalent of 100 Percentile)	10 mg m^{-3}	31 Dec 2003
Nitrogen Dioxide (NO_2)	S	Annual mean	40	31 Dec 2005
	N	Annual mean For the protection of vegetation and ecosystems	30	31 Dec 2000
	S	1-hour mean, not more than 18 exceedences a year (equivalent of 99.79 Percentile)	200	31 Dec 2005

The recent analysis by Bleadon found proposed development is suggested to potentially cause small increases in NO₂ readings (fig 6) and (fig 7) downwind of the airfield. Moderate impacts are thought to affect 7 properties which lie in the downstream path of airfield. This being said, all readings would still remain within legal standards. The new EIA rules insist on this thorough testing and surveying to fully and accurately predict the CO₂ emissions over proposed timescale of the airport operating (Bristol Airport Limited, 2018).



Figure 5 Figure E Annual Mean NO₂ concentrations (current) Bleadon 2018



Figure 6 Figure E Annual Mean NO₂ concentrations (predicted) Bleadon 2018

The total CO₂ aviation emissions are roughly 2% of the Global Greenhouse Gas Emissions with the approximated predicted growth around 3–4% per year. A variety of standards and best practices have been formulated to address both aircraft noise and engine emissions through the embracing of airport and land-use planning technological improvements, proper organization of air traffic, operating procedures, appropriate airport and land-use planning and market-based options (Čokorilo, 2016).

Greenhouse gas GHG assessments were carried out considering the potential emissions from the proposed development with regards to global climate. The Draft West of England Joint Spatial Plan (in which the four West of England Councils set out their goals for sustainable growth and development) and the UK Green Construction Board decided after considering varying factors that the proposed development would not pose any significant threat to climate change (Bristol Airport Limited, 2018)

Cultural Heritage 3.5

When considering Cultural heritage the EIA must take human activity into account and the area's well known cultural heritage. The area has been known for remains and artefacts. The EIA of BIA found through aerial photography and cartographic sources some Mesolithic artefacts associated with surrounding areas from 8000 BC. To the south there was a Neolithic Long Barrow and Three Bronze age barrows were found at the west end. Lulsgate airfield was abandoned in 1946 but also needs consideration though there is however little of the WW11 infrastructure remaining. To the south east, corner pool farm has remains from post medieval lead mining. The appraisal concluded there were no surviving 'features of interest' that fall within the development area.

Community 3.6

The expansion could bring fantastic employment opportunities to the community . Bristol airport contributes £355 million and 3075 jobs to North Somerset alone. Over the South West of England the effect is even bigger at £1.7 billion and 23 thousand jobs. The proposed development will create lots more jobs and further support the economy. The difference between not expanding and expanding is thought to be some 12,600 jobs and just under £1.2 billion which means an increase of £210 million per year to the economy and 2000 jobs. A development of this scale can help local businesses and businesses across the region and so is highly positive for the community.

[Landscape and the visual environment 3.7](#)

Bristol Airport has been part of the surrounding landscape and people's views for nearly 90 years. When considering darkness and night skies, the appraisal found there would be little changes and views from the nearby by Mendip hills and Black down AONB should not be more affected than now.

Suggestions were for development to consider the natural vegetation and consider design strategy which would soften the visual impact. One way this was achieved is through green infrastructure in the form of green roofs on top of the new multi storey car park. Additionally, the North side will benefit from green planting for biodiversity and to help control temperature and UHI effect. There will also be usage of planting to create a southern boundary. Lighting will be reassessed to reduce glare for local residents from light spill (Bristol International Airport, 2006).

[Noise 3.8](#)

The assessment of noise and vibration considers the effects on residential properties within the vicinity of the airport and changes in the noise environment of local communities. Air noise is a big issue and can be based on aircraft type and 3 other areas were also considered Construction, ground ops, road traffic. Detailed computer modelling was utilised with noise contours showing increase at end of runway near the new stands and a decrease in North and South. Mitigation measures decreased night flights. And noise levels are continuously measured. Additionally acoustic barriers were added to perimeters. Significant vibrations are also expected from construction

A case study on Brussels airport obtaining data from public opinion found the impact of aviation on local air quality is often ignored and the impact of aviation on local air quality also ignored (Boussauw and Vanoutrive, 2019).

Transport 3.9

The current transport links connecting the airport with surrounding cities are very poor with no direct motorway access(fig). A study was undertaken on possibility of rail link which would be vital for the predicted footfall from proposed development, an extra 2 million people annually. Arup and OVE and Partners 2003 did a strategic transport study on A38, A368, A370 and B1310 (fig 8) and a A new link road between A38 to A370 implemented.

A number plate survey was also utilised to understand the user origins to predict future needs for road expansion etc. There was found to be an initial impact from HG vehicles during the construction phases and increased private vehicle usage. The data for North Somerset found that although overall co2 emissions had decreased, transport was one area which fluctuated greatly and nitrogen dioxide from car emissions a concern for the area (Amec, 2011)

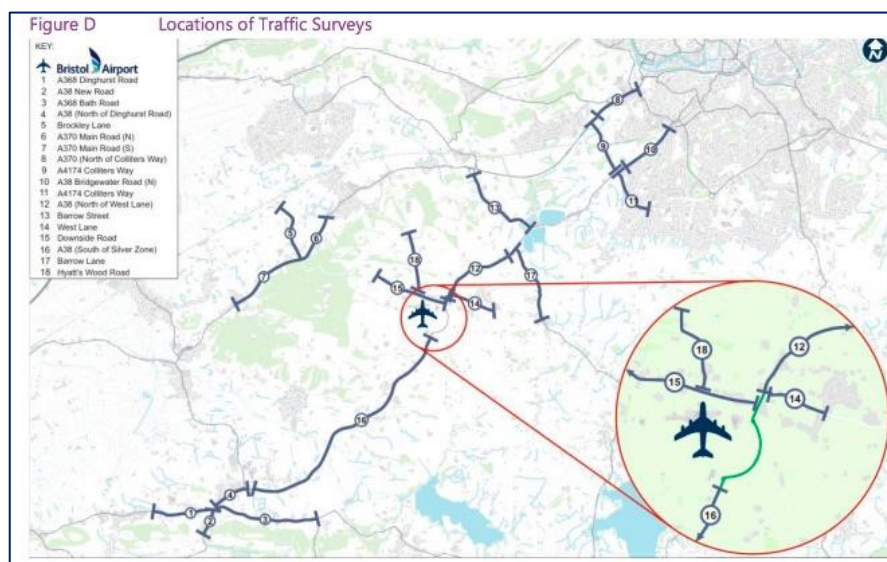


Figure 7 Overview of traffic survey - Bleadon, 2018

In Mitigation the provision of cycling routes and better public transport links could be beneficial and a routing strategy to keep peak times under control. and a case study on transport to and from airports. Also a shuttle bus was suggested for staff as well as car sharing schemes.

Conclusion 4.0

In conclusion the EIA originally was developed under old EIA regulations which did not have such strong regulations with regards to monitoring and management of issues. Since the original plan, many surveys have been completed over long periods of time and new decisions formulated in line with relevant legislation and UK Biodiversity action plans both nationally and locally. There is no doubt of the positive economic benefits a development like this could bring, particularly to regional and local businesses. Since the original plan the North Somerset Greenbelt/Mendips have been designated NPPF and so the expansion would have potentially led to further destruction of this classified and protected habitat. Potentially the further expansion could have destroyed a further 700 acres of the green belt (AEF, 2008) so a number of opposition groups eventually won the battle and the expansion was decided against, mainly due to the need for a carbon free future and the lack of conform to White paper along with the species potentially disturbed such as bat and dormice.

References 5.0

- AEF (2008) *Aviation Environment Federation » Green Belt threatened across UK*. Available at: <https://www.aef.org.uk/2008/04/14/green-belt-threatened-across-uk/> (Accessed: 15 May 2020).
- Amec (2011) 'Appendix A Bristol Airport Green Belt Inset ©', (November).
- Baxter, G., Srisaeng, P. and Wild, G. (2019) 'An Assessment of Airport Sustainability: Part 3—Water Management at Copenhagen Airport', *Resources*. MDPI AG, 8(3), p. 135. doi: 10.3390/resources8030135.
- Boussauw, K. and Vanoutrive, T. (2019) 'Flying Green from a Carbon Neutral Airport: The Case of Brussels', *Sustainability*. MDPI AG, 11(7), p. 2102. doi: 10.3390/su11072102.
- Bristol Airport Limited (2018) 'Development of Bristol Airport to Accommodate 12 million Passengers Per Annum', (December).
- Bristol International Airport (2006) 'Bristol International Airport Master Plan 2006–2030', (November).
- Chapman, A. and Postle, M. (2019) 'Evaluating the Benefit case Analysis of A Social Cost– the Lead Work Peer Ment or for expansion of Bristol Airport Programme'.
- Čokorilo, O. (2016) 'Environmental Issues for Aircraft Operations at Airports', *Transportation Research Procedia*, 14, pp. 3713–3720. doi: 10.1016/j.trpro.2016.05.491.
- Convention on Biological Diversity (2010) 'What is Impact Assessment?' Secretariat of the Convention on Biological Diversity.
- Entec (2005) 'Bristol International Airport Environmental Impact Assessment of the Expansion of Bristol International Airport', (September).
- Environment Agency, U. (2001) 'Scoping Handbook ', *I6: Scoping the Environmental Impacts of Tidal Power Developments*.
- Griggs, S. *et al.* (2018) 'The Future of Air Transport', *The politics of airport expansion in the United Kingdom*, (December). doi: 10.7765/9781526112132.00011.

Somerville, A. *et al.* (2015) 'Sustainable water management at major Australian regional airports: The case of Mildura Airport', *Aviation*. Taylor and Francis Ltd., 19(2), pp. 83–89. doi: 10.3846/16487788.2015.1057992.

Trozzi, c, Barbizi, S. and Trobbiani, R. (1999) *(PDF) Airports Air pollutants emissions: Italy air quality management plans case studies*. Available at: https://www.researchgate.net/publication/236857923_Airports_Air_pollutants_emissions_Italy_air_quality_management_plans_case_studies (Accessed: 15 May 2020).

Whitaker, J. O., Sparks, D. W. and Brack, V. (2006) 'Use of artificial roost structures by bats at the Indianapolis International Airport', *Environmental Management*, 38(1), pp. 28–36. doi: 10.1007/s00267-005-0117-2.

