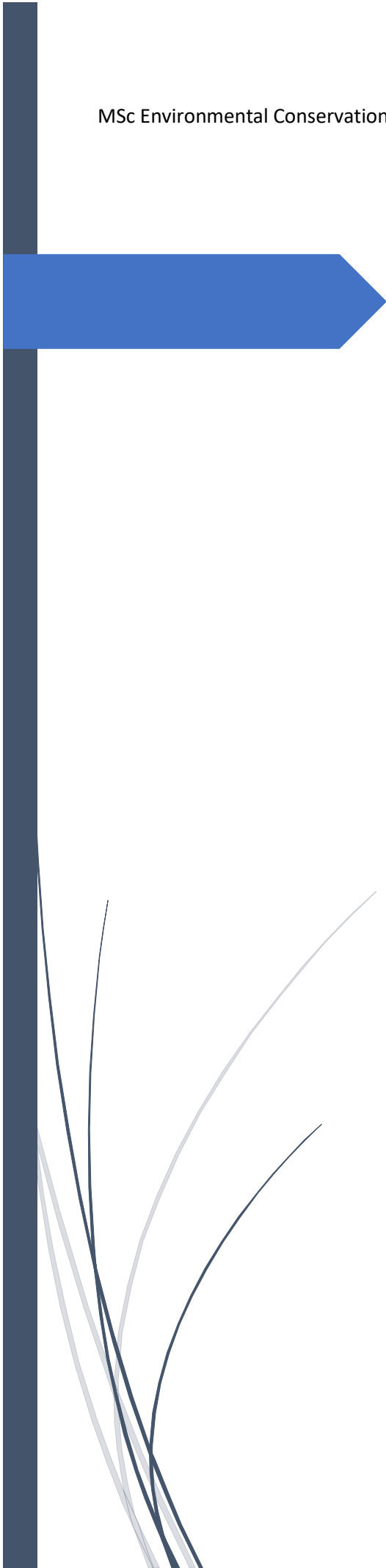


MSc Environmental Conservation and Management



Environment Planning and Policy

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REPORT: ENVIRONMENATAL IMPACT ASSESSMENT REVIEW

Content Table

1.0 Introduction	2
2.0 What is an EIA?	3
2.1 Principles and Origins	3
2.2 Legislation	3
2.3 EIA Process and Stages	4
2.4 Concerns	7
3.0 Case Study: Bristol International Airport Scooping Report	9
3.1 BIA Background	9
3.1.1 The Proposed Development	10
3.2 Scoping Report Structure and Content	11
3.3 Legislation	12
3.4 Ecological Assessment	14
3.4.1 Desktop Study and Designations	14
3.4.2 Site Walkthrough	14
3.4.3 Additional Mitigation and Environmental Enhancement	17
3.5 Visual Impact Assessment	18
3.6 Public Consultation	19
3.7 Noise	20
3.8 Air	21
4.0 Conclusion	23
5.0 References	
6.0 Appendices	

1.0 Introduction

Over the last few decades, there have been growing concerns about the consideration given to the environment concerning human activities (Das *et al.*, 2019; Glasson, 2019; Gov 2019). Development must be progressive to provide economic growth and development but without causing permanent harm to the environment. As such Environmental impact assessments (EIA) were formed as a way of identifying impacts pre-development and allowed for suitable mitigation to be proposed before a planning application can be granted by the governing authority (Gov, 2019). Associated with the growing use of EIAs, national and international guidelines and legislation have formed ensuring that developers comply with demands of environmental provision. The *European Union (EU) Directive 1985* is one of the oldest legislative pieces and has been amended several times since its introduction (European Commission, 2018). Following its introduction to UK legislation, developers argued that EIAs were just a time-consuming and costly undertaking that slowed down development and argued that environmental consideration in place was enough (Wang, Yang and Xu, 2006; Loomis and Dziedzic, 2018). EIAs have been criticised frequently for been subjective in their scoping and based on qualitative judgements by the surveyor. The scope of these assessments began quite basic but are continuously evolving in what they consider based on best practice and environmental knowledge that comes from research and experience (Wang, Yang and Xu, 2006; European Commission, 2018; Loomis and Dziedzic, 2018; Das *et al.*, 2019; Glasson, 2019; Gov, 2019). The following report will outline what specifically the EIA process is and how they are conducted in the UK. Bristol International Airport will be used as a case study example to identify the effectiveness of the EIA process and stages, and identify where improvements are needed. To get the best possible results this case study will be compared to other relatable EIA scoping reports or the modern theory and best practice guidelines set by industry experts.

2.0 What is an EIA?

2.1 Principles and Origins

Environmental impact assessment (EIA) is a process used to identify all the expected environmental impacts of a proposed development in advance so they can be mitigated (where possible) to promote good environmental practice (Bilgin, 2015; Das *et al.*, 2019; Glasson, 2019). Also referred to as environmental statements, the first EIA was used in the late 1960s, USA, before the concept of suitable pollution control. As a result, EIAs were introduced as an attempt to limit the financial cost of cleaning up any pollution incident (Wang, Yang and Xu, 2006; Bilgin, 2015; Glasson, Therivel and Chadwick, 2019). Since then many countries have seen significant growth in the application of EIAs and for development to be more sustainable and less impactful on the environment. Officially it was adopted as a directive by the European Commission in 1985 for all member states (*EU85/337/EEC*; Glasson, 2019).

Introduced into UK legislation in 1988, the number of EIAs carried out have grown from around twenty per year to several hundred as their scope continues to grow and widen with new research and lessons learnt from a continuously developing best practice (Das *et al.*, 2019; Glasson, 2019). Used as a decision-making tool, all potential impacts are to be considered in the EIA report before a decision is made to determine if a proposed development should be approved to continue to the next stage (Bilgin, 2015; Das *et al.*, 2019). Factors investigated include impacts on population, human health, biodiversity, flora, fauna, water, air, climate, soils, geology, landscape, cultural heritage and material assets and effects from inter-relations between any of these factors or others involved (Gonzalez and Enríquez-De-Salamanca, 2018). Citizen participation and consultation are becoming more recognised as a key role in the EIA process to ensure the decision-makers are considering all potential impacts beyond just the environmental scope in its decision-making process (Scott and Ngoran, 2003; United Nations, 2013; Bilgin, 2015; Berry *et al.*, 2019).

2.2 Legislation

UK legislation stems down from the EU directive (*85/337/EEC*) defined in two separate Annexes (Welsh Assembly Government, 2017; Awange, 2018; European Commission, 2018; European Commission, 2019). Annexe I is a mandatory EIA for developments expected to have significant impacts on the natural environment and Annexe II for EIAs to be carried out at the discretion member states and decided at a National level for projects that are not classified into Annex I. This directive has been amended several times in 1997, 2003, 2009, 2011 and

2014/52/EU as the scope of EIAs continue to develop and become more comprehensive. EIA assessments in the UK come under the *Town and Country Planning Regulations 2017*, predated by 2011 regulations, specifically relevant to England with each region having their regulations i.e. Wales, Scotland and Northern Ireland (Gov, 2019; Welsh Assembly Government, 2017; Awange, 2018). The 2017 regulation is applied to developments given planning permission as part III of the *Town and Country Planning Act 1990* (Gov, 2019). It is split into two Annexes referred to as Schedules 1 and 2, similar to the EU Directive (2014/52/EU; European Commission, 2018; European Commission, 2019; Gov, 2019). Developments listed under Schedule 1 will always require an EIA assessment and anything not listed in Schedule 1 is incorporated into schedule 2. The local planning authority decides if the development will likely have significant impacts and require an EIA assessment (Gov, 2019). In England, considerations are taken for developments in environmentally sensitive locations such as Special Protection Areas covered under the EU Birds Directive (74/404/EEC), Special Areas of Conservation (SAC) and Ramsar sites covered under the EU Habitat Directive (92/143/EEC; Office of the Deputy Prime Minister, 2006). Risks assigned to Sites of Special Scientific Interest (SSSI) English Nature should be consulted, or areas assigned Nature Conservation Orders such as National Parks, Areas of Outstanding Natural Beauty or World Heritage Sites are also to be considered when conducting an EIA (Office of the Deputy Prime Minister, 2006). Other legislation relevant maybe site or development specific for example, legislation may need to be considered such as light, noise and air pollution, disposal of waste, international commitments such as climate change commitments, which may not be enforceable but must be considered in the EIA dues to commitments made and targets set. In Wales considerations would be given to developments in relation to the *Well-being of Future Generations Act 2015* (Welsh government 2015;16).

2.3 EIA Process and Stages

Historically, planners have assessed environmental impacts before developments occur but not always taking a systematic and holistic approach compared to the EIAs that are conducted now (Das *et al.*, 2019). Modern EIAs require developers to (at their own expense) contract out the EIA assessment investigation to a competent third party. The UK government legislation states that there are five key stages to the process, although, each is quite broad in their scope and other sources such as Glasson (2019) would argue that these could be broken down further to create more detailed stages (Glasson, 2019; Gov, 2019). The five government stages are as follows:

Screening: this narrows the application of the EIA process to the developments that are likely to have significant environmental impacts (Cave *et al.*, 2017; Das *et al.*, 2019; Glasson, 2019; Gov, 2019). In the UK, this is determined by the regulations in place under the *Town and Country Planning 2017*. Projects may also be considered due to their large scale, or proximity to designated areas such as Special Conservation Areas (SACs), Sites of Special Scientific Interest (SSSI) or National Parks to name a few.

Scoping: to identify all the potential impacts and concerns of a pending development to include in the EIA report (Cave *et al.*, 2017; Das *et al.*, 2019; Glasson, 2019; Gov, 2019). Identifying all the possible impacts allows for the introduction of suitable mitigation to reduce the development impact on the environment. This is where the expert consultation is brought in to conduct the relevant investigations for the report. At this stage alternatives to development will be considered, for example, location, scale, processes, layouts and/or if the development has enough justification to proceed (Glasson, 2019).

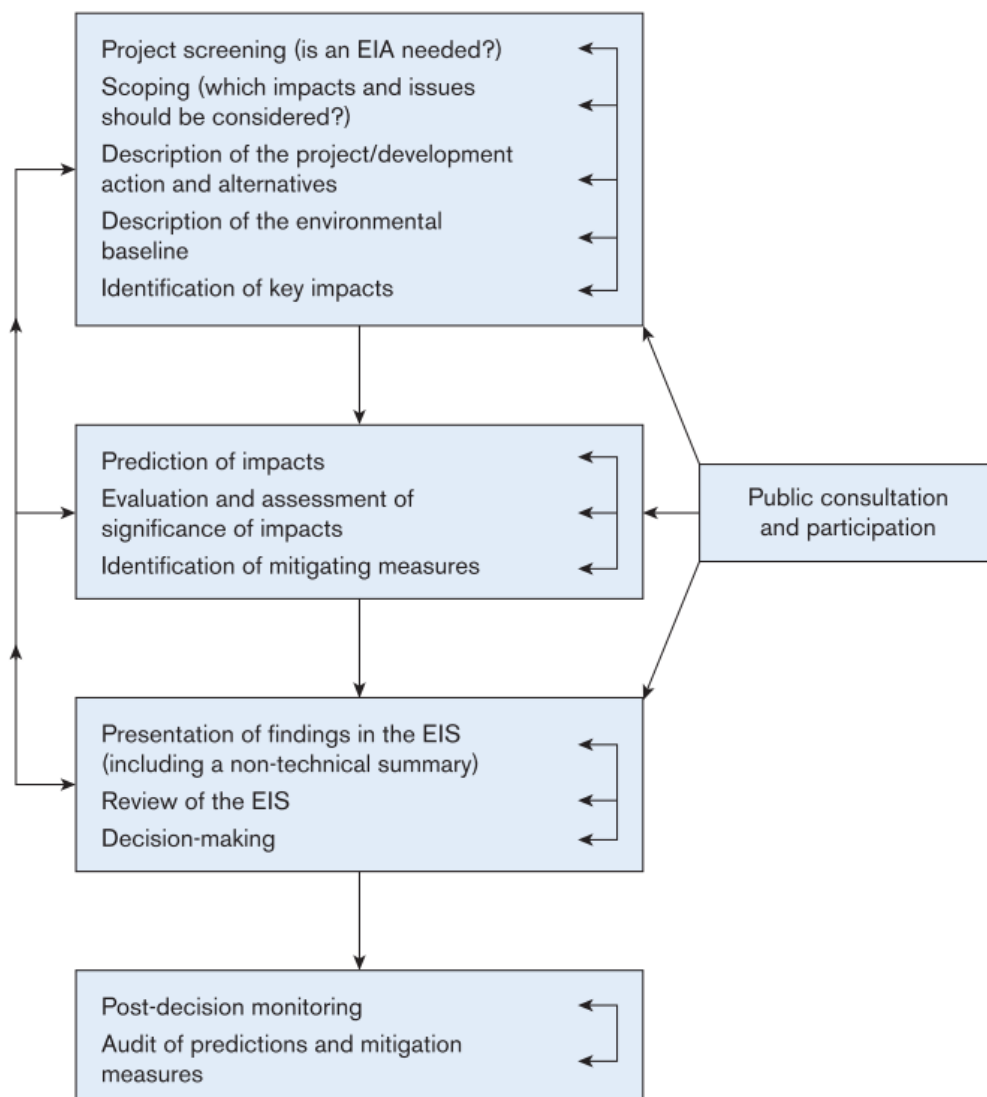
Preparing an Environmental Statement: any potential site for development must complete an EIA to for the developer to present to the local planning authority (Cave *et al.*, 2017; Das *et al.*, 2019; Glasson, 2019; Gov, 2019). This allows for an informed decision on whether the development can continue and if the mitigation is deemed suitable. If suitable mitigation is not considered in the report this must be reassessed before resubmitting the application to the local authority. To aid in the collection of data for the report, public authorities must make data sets in their possession accessible and available for the EIA report. If the EIA is poorly presented, it could be rejected and delay the application process (Glasson, 2019). Therefore, the report is outsourced to a competent third party to ensure its quality. The EIA is accompanied by a statement from the developer stating why the third party is deemed competent and will include any obtained qualifications or relevant experience to conduct an EIA.

Making a Planning Application and Consultation: EIA report is made electronically available and a post made by public notice to make the development known in the community area (Cave *et al.*, 2017; Das *et al.*, 2019; Glasson, 2019; Gov, 2019). The consultation bodies and the general public are to be given the chance to adequately discuss and have their opinions heard about the proposed development and the EIA report.

Decision Making: EIA report and any other information relevant to the final decision, comments and representations concerning the development are to be shared with the local planning authority who are responsible for making the final decision (Cave *et al.*, 2017; Das *et*

al., 2019; Glasson, 2019; Gov, 2019). The final decision and its justifications are to be made available electronically and by public notice.

Each stage is not necessarily a linear process and some of the early stages may not follow the above-structured order. To work efficiently the process must be circular to flow through the relevant stages, demonstrated in Fig 1 (Das *et al.*, 2019; Glasson, 2019).



(Glasson, 2019)

Fig 1. Environmental Impact Assessment Process. The first box incorporates the first 2 stages to include screening and scoping, the second box incorporates what needs to be considered in the EIA, the third box is the actual preparation of the EIA into a professional report format for submission and decision by the local authority. The final box incorporates the follow-up monitoring and auditing to ensure it is being upheld by the developer. Each stage has flow arrows back to the previous stage/stages if the EIA is not meeting the required standards (European Commission, 2018; Das *et al.*, 2019; Glasson, 2019).

2.4 Concerns

The amendments made to the UK EIA regulations over the years are a testament to how the field is continuously evolving what is required for consideration in the EIA assessment scope (Wang, Yang and Xu, 2006; Wright *et al.*, 2013; Cave *et al.*, 2017). It is impossible to fully understand the extent of all the impacts on the environment pre-development, particularly concerning human activities as they are not fully known or understood. Assessments are usually qualitative and based on human assumptions (Wang, Yang and Xu, 2006; Wright *et al.*, 2013; Cave *et al.*, 2017). Many stipulations within the UK's legislation are 'inexact' leaving it open to the interpretation of the reader (Wright *et al.*, 2013; Cave *et al.*, 2017; European Commission, 2018; Gov, 2019). For example, the legislation states:

'To ensure the completeness and quality of the Environmental Statement, the developer must ensure that it is prepared by competent experts' (Gov, 2019)

Some interpretation is required for what qualifies as a '*...competent expert*', some environmental consultancies hold themselves to high-quality standards than others (BSG Ecology, 2020; CIEEM, 2020). Many require their environmental consultants to hold Chartered Institute of Ecology and Environmental Management (CIEEM) certificates in the UK. This is a regulating body of Ecology consultancy as evidence of a certain level of competence and training achieved but not all consultancies are required to meet this standard and if relevant qualifications are not available the developer just still justify the use of their chosen consultancy in a statement to the local authority. Public notice for consultation window is arguably too small, a public notice may not be seen by the community, the legislation states:

'to ensure that the public are given early and effective opportunities to participate in the decision-making procedures'

(Statutory Instruments, 2015; Gov, 2019)

Glasson (2019) states how public consultation must be adequately discussed but again this is open to interpretation as who decides if the measure taken is adequate? For example, Water treatment works in Gylntawe came under some criticism from villagers as the community engagement opportunity was held in the wrong location resulting in poor attendance and failing to address many of the community's concerns (Jenkins. 2020). Additionally, a proposed wind farm above Port Talbot, Wales held their community engagement opportunity on a weekday, in the middle of the day when most people would be in work (Bradfield, 2020). Even Swansea Bay Tidal Lagoon came under criticism despite extensive public engagement opportunities (Sustainable Development Commission, 2007). More work is needed on behalf of all

developers to better meet the concerns of the community directly rather than working around them and stronger stipulations within the legislation are required to ensure the developers comply. Further concerns have been recognised from the public display notice (required by regulations) not being located appropriately and in a visible location for the public. The legislation states:

*‘...posting of the notice by firm fixture to some object, sited and displayed in such a way as to be **easily visible** and **legible** by members of the public’*

(Statutory Instruments, 2015; Gov, 2019)

For example, the Glyntawe Water treatment works posted their public notice on a public road but one that was disused and unlikely to be seen by the community suggesting that they did not want any objections to the development (Jenkins, 2020). The official government webpage does not discuss in the EIA stages the post-decision monitoring for outcomes after a development has been given the go-ahead (Gov, 2019; Wright *et al.*, 2013; Loomis and Dziedzic, 2018; Glasson, 2019). Little is mentioned about how long monitoring post development needs to continue for? and who is responsible for ensuring its conducted? Concerns are raised over how long mitigation proposed to offset environmental impacts with remain in place for following development completion.

3.0 Case Study: Bristol International Airport Scoping Report

3.1 BIA Background

Often referred to as the ‘Gateway to the West’ it is the ninth busiest UK airport with 5.2m passengers in 2005, located in Somerset (Fig 2; Bristol International Airport, 2005, 2006). The proposed case study is a full scoping report for BIA, which was conducted in 2005 before the full EIA report being provided by Entec UK Ltd on behalf of the developer. The airport originally opened in 1957 but was sold to Cintra and Maxquaire Bank who purchased it from Bristol City Council and First Group in 2001 (Airport Technology, 2020). Justification for the proposed development came from the increasing passenger usage (Appendix 1) and predictions made for air travel in the White Paper document ‘*The Future of Air Transport*’ published by the government in 2003 (Bristol International Airport, 2005). Estimating air travel passengers will grow to 10-12 million per year by 2030, whereas BIA on forecast estimates it will grow to approximately 8 million passengers per annual by 2015. Alternatives to the proposed development were considered at this stage including other potential locations, scale, layouts to determine the project is even justifiable.

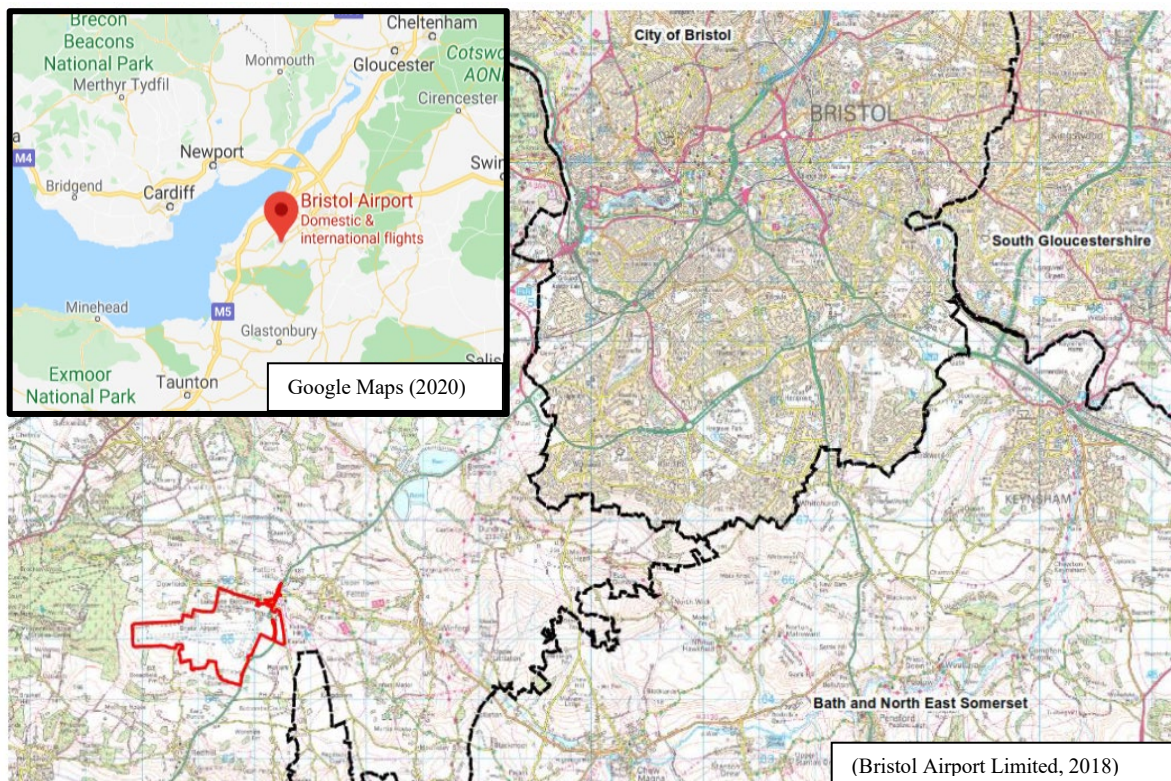
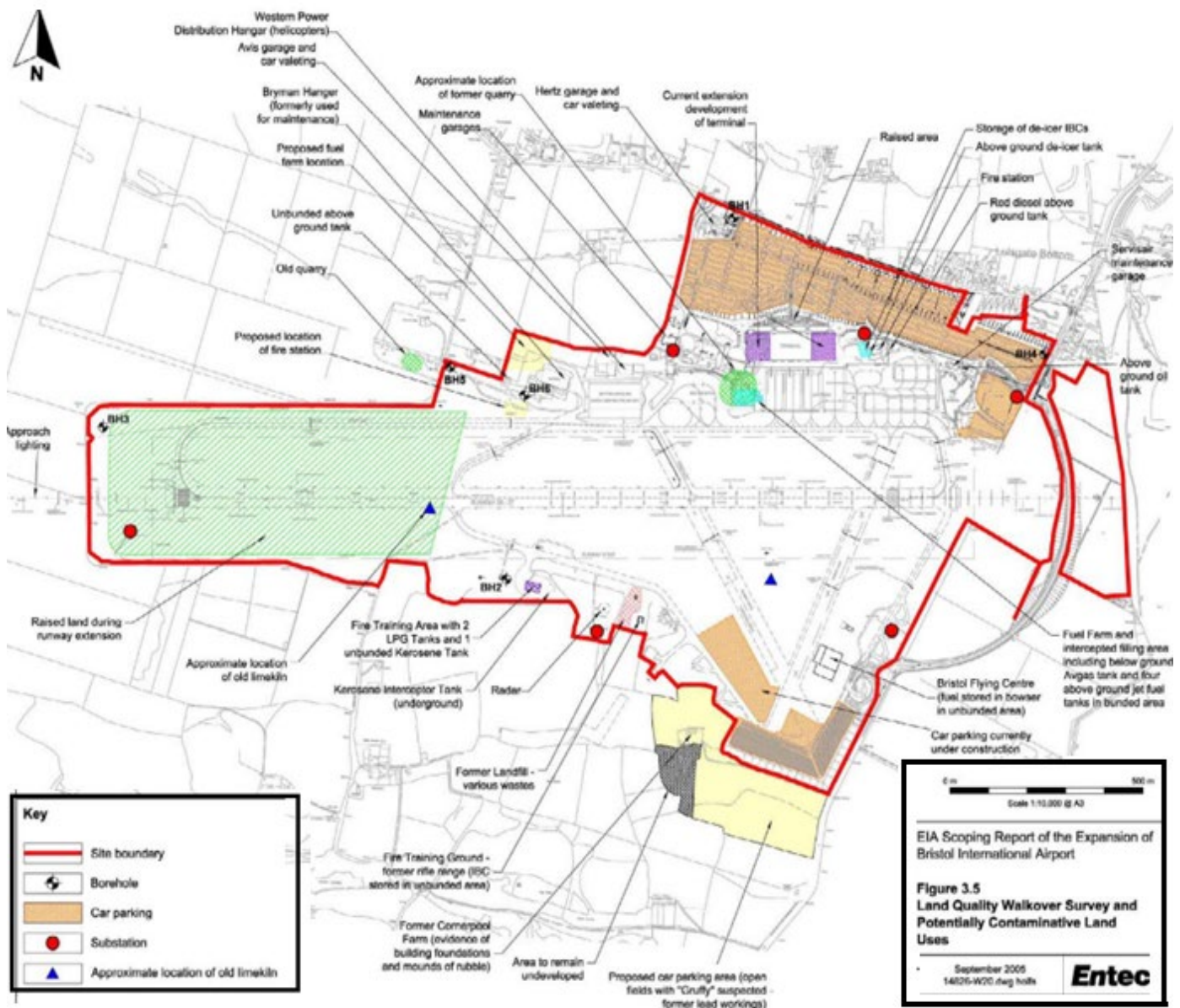


Fig 1. Bristol Airport Location. The top left image indicates BIA in the South West region. The larger image indicates BIA location just South West of Bristol City. Black Outline indicates regional Boundaries; BIA is in North Somerset bordering Bristol and Bath/North East Somerset to the East (Bristol Airport Limited, 2018).

3.1.1 The proposed Development

An £80m five year plan was announced by BIA to meet the demand through redevelopment and expansion of its North terminal along with an expansion of additional airport infrastructure and facilities including catering, a new fire station, fuel store, car park, hotel and more aircraft stands (Fig 3; Bristol International Airport, 2005, 2006; Airport Technology, 2020). All this information forms the justification provided by BIA to conduct redevelopments and new infrastructure plans to better meet the predictions for the increase in demand and usage of the airport by passengers.



(Bristol International Airport, 2005)

Fig 2. Land Quality Survey and Potentially Contaminative Land Use. Figure 1 shows the current land uses at BIA along with the proposed new developments and refurbishments (Bristol International Airport, 2005)

3.2 Scoping Report Structure and Content

BIA contracted out the EIA report to Entec UK Ltd, an ecological consultancy (Bristol International Airport, 2005). Entec is not easily available online and several of their EIAs reference an address and contact telephone numbers but no website is available to showcase their suitability as an environmental consultancy. There is no mention Entecs projects before the BIA EIA and their suitability for the task is not mentioned within the EIA report or commented on by the developer. However, given the size and scale of the project, it can only be concluded that Entec has a valued reputation, and have since gone on to work on other projects including *Planning at the Coast Project 2009*, *Mersea Homes 2009* and the *Movement Greenwich 2011* to name a few (Entec UK Limited, 2009a, 2009b, 2011).

Within the BIAs report each of the topical scoping sections follows a similar structure (Table 1; Bristol International Airport, 2005):

- Any relevant legislation, directives, commitments or policies are acknowledged
- Approach to identifying significant effects
- Collecting information to establish baseline data including acknowledging any gaps within the data sets
- Identifying the next steps in the assessment process
- Mitigation: split into two parts 1) impacts identified as significant requiring mitigation actions 2) impacts identified as non-significant that require no further action
- *Environmental enhancement measures proposed (Ecology)*

Some variations occur withing the different sections but the above provides the core structure the scoping report follows. Similarly, Gatwick Airports scoping report covers all the same topics but has some additional topics not discussed or considered in BIAs report (Table 1; Bristol International Airport, 2005; Gatwick Airport, 2019). The additional measures illustrate the progression EIA scoping reports have made since BIAs 2005 report. This may be down to improvements to best practice guidelines provided by the government and other institutions (Office of the Deputy Prime Minister, 2006; IEMA, 2016; Lantieri *et al.*, 2017; Gatwick Airport, 2019; Her Majesty's Government, 2019).

Table 1. Scoping Topics discussed in BIA (2005) and Gatwick Airports (2018) scoping reports. The left column is the topics discussed concerning the BIA scoping report, whereas the right column contains a list of scoping topics discussed in Gatwick Airports scoping report. The table is constructed in a way that links the comparable topics for both reports with Gatwick Airport having additional topics in BOLD. The community does not have a specific section in Gatwick Airports EIA but is discussed when relevant in the different sections (Bristol International Airport, 2005; Gatwick Airport, 2019).

BIA Scoping Topics	Gatwick Airport Scoping Topics
• Air	→ • Air Quality
• Archaeology, Culture and Heritage	→ • Historical Environment
• Biodiversity	→ • Ecology and Nature
• Community	→ <i>(broken down into specific sections below)</i>
• Geology and Land Quality	→ • Geology and Ground Conditions
• Landscape and Visual	→ • Landscape, Townscape and Visual Resources
• Noise	→ • Noise and Vibration
• Vortex and Vibration	→
• Transport	→ • Traffic and Transport
• Water Resource Quality	→ • Water Environment
• Cumulative Effects	→ • Cumulative Effects and inter-relationships
	• Climate Change and Carbon
	• Socio-economic effects
	• Health and Well-being
	• Agricultural Land Use and Recreation
	• Waste
	• Major Accidents and Disasters
	• Trans-boundary Effects

(Bristol International Airport, 2005; Gatwick Airport, 2019)

3.3 Legislation

Following the proposed plans for redevelopment and expansion, BIA was required under the *Town and Country Planning Act 1990; Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999-SI No 293* to provide an EIA before planning permission could be granted by the local authority (Gov, 2019; Bristol International Airport, 2005; Office of the Deputy Prime Minister, 2006). Amendments have since been made to this legislation in 2008, 2011, 2015 and 2017 when Schedule 2 was updated to ensure EIAs are provided for industrial estate development projects (Gov, 2019; Turley, 2018).

In-line with the legislation at the time, the *Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999, SI 1999 No 293*, environmentally sensitive locations were required to be considered in the EIA report for BIA include the Somerset and Mendip SAC and nearby SSSIs as a result of increased air traffic movements and

changes in vegetation composition due to the increased levels of nitrogen deposits (Bristol International Airport, 2005; Office of the Deputy Prime Minister, 2006). A list of all legislation and similar documents mentioned directly in the BIA report is provided in Table 2. Several new updates to legislation/directives/frameworks have been introduced post-BIA report (Appendix 3) and will be discussed when relevant throughout the following sections (Bristol International Airport, 2005).

Table 2. BIAs Directive, Legislation and Frameworks. The following table contains all the regulation/legislation, and guidelines mentioned in BIAs scoping report (Bristol International Airport, 2005).

BIA Scoping Report 2005	
European Directives	
European Directive 2002/49/EC Environmental Noise Directive	
Ground Water Directive (80/68/EEC)	
Dangerous Substances Directive 76/647/EC	
Legislation/regulations	
Wildlife and Countryside Act 1981 (amended)	
The Town and Country Planning Act 1990	
Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 - SI No. 293	
Conservation (Natural Habitats &c.) Regulations 1994	
Environment Act 1995	
Air Quality (England) Regulations 2000 (Amended 2002)	
The Future of Air Transport 2003	
Water Resource Act 1991	
Duty of Care Regulations 1991	
Waste Management Regulations 1994	
Groundwater Regulations 1998	
Standard/Guidelines	
British Standards: BS 5228: Noise and vibration control on construction and open sites	
The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS) January 2000. Pre-dated by: National Air Quality Strategy (NAQS) March 1997	
Institute of Environmental Management and Assessment (2002)	
Guidelines for the Environmental Assessment of Road Traffic, published in 1993	
The Future Development of Air Transport December 2003	
Legislation not mentioned in BIA report	
Habitats Directive 92/43/EEC	Likely due to referring directly to UK regulations
The Wild Mammals (Protection) Act 1996	Likely as it covered protected species under the Conservation (Natural Habitats &c.) Regulations 1994

(Bristol International Airport, 2005)

3.4 Ecological Assessment

3.4.1 Desktop Study and Designations

Following the structure outlined in Table 1, Entec completed a desk study to collect all the historical data and more recent data from local reliable sources (Table 3) to indicate species they may find on-site, paying particular attention to priority and protected species as required under legislation (Bristol International Airport, 2005; Lantieri *et al.*, 2017; Glasson, 2019). Desk studies are still used as a first step in researching a site before the next steps in the process can be identified. Several recent scooping reports used desk studies including Heathrow and Gatwick Airports and Mumbles Lifeboat Station (Statement, 2010; Heathrow Airport, 2018; Gatwick Airport, 2019; Glasson, 2019). However, as desk studies are conducted from remote office locations and potentially do not consider local knowledge or undocumented key species in a scooping report, for example, new species may have established into an area that may not be recorded in secondary data sets (Glasson; 2019). Several sites with designations were located by desk studies with 2km of BIA including two SACs, five SSSIs and 24 Wildlife Sites. Some Wildlife Sites do not hold specific designations but some adjacent woodlands are home to several nationally rare and scarce plant species (Bristol International Airport, 2005). It is important to consider these adjacent areas as many species operate trans-boundary and utilize different habitat areas (Bristol International Airport, 2005; Her Majesty's Government, 2019; Kienast, Wartmann and Hunziker, 2019).

BIA report EIAs are now more inclusive of a greater radius particularly given the scale of the project proposal, for example, Gatwick and Heathrow Airports included bat data and ecologically important sites within a 10-20km radius but in terms of scale they are much larger and busier airports with more passenger numbers and air traffic (Bristol International Airport, 2005; Gatwick Airport, 2019; Glasson, 2019). Different types of projects will consider the scooping radius according to the type of development, for example, Greenwich Industrial Estate London used a smaller 500m radius from the boundary area due to the project scale and type (Entec UK Limited, 2011). A list of the greatest concerns for biodiversity are acknowledged in the report and suitable next steps are advised (Appendix 4; Bristol International Airport, 2005).

Table 3. Ecological Datasets Consulted. A list of all datasets consulted/provided to establish baseline data for biodiversity (Bristol International Airport, 2005)

• Cresswell Associates (1999) Bristol International Airport Conservation Management Plans
• Bristol Regional Environmental Records Centre (BRERC) (2005). Data provided on statutory and non-statutory designated sites of nature conservation interest and records of legally protected species and other local notable and or BAP species within 2km of the airport
• Billington, G. (2002) Radio Tracking Study of Greater Horseshoe bats (<i>Rhinolophus ferrumequinum</i>) at Brockley Hall Stables SSSI, May-August 2001. English Nature Research Report No.442 2001. English Nature. Peterborough;
• Hall Stables SSSI, May-August 2001. English Nature Research Report No.442 2001. English Nature. Peterborough;
• an Extended Phase 1 survey carried out by Entec during January 2005, and updated during May 2005;
• Correspondence from North Somerset Council's biodiversity team (in a letter dated 5 th January 2005)
• Correspondence from English Nature (in a letter dated 13th January 2005)

(Bristol International Airport, 2005)

3.4.2 Site Walkthrough

A site 'walkthrough' was undertaken on two separate occasions one in January 2005 (winter) and one in May 2005 (Spring; Bristol International Airport, 2005). At this time (January) a Phase 1 Habitat Survey was conducted but several species could likely have been missed during this time and the number of ecologically important species undetermined. Award-winning ecology firm BSG, state that Phase 1 Habitat surveys are best conducted between April and September when the most variety of vegetation species are available for documenting (BSG, 2020a). Although these surveys can be conducted year-round, it does not necessarily give a suitable representation of the variety of species available outside of this window. BIA Phase 1 was updated on the return visit in May 2005, inside of the recommended window but it is unclear if any additional or key species of ecological importance were documented during this time (Bristol International Airport, 2005). Phase 1 Habitat surveys were carried out within the recommended guidelines stated by BSG Ecology for Gatwick and Heathrow Airports and Gatwick Airport specifically followed guidelines outlines by Joint Nature Conservation Committee (JNCC; Heathrow Airport, 2018; Gatwick Airport, 2019).

Several priority species were identified by the desktop study (Fig 3) within enough proximity of BIA to be considered in the scoping report (Bristol International Airport, 2005). The presence of badgers (*Mustelidae*) and bats (*Chiroptera*) was supported by the site walkthrough identifying potential bat roosting sites, bat foraging/commuting habitats and four active badger

setts but no surveys were carried out at the time. The report simply stated that additional surveys would be carried out at the appropriate time of year to provide more robust data, but it only directly mentions surveys for a few specific species (Fig 3; Bristol International Airport, 2005).

Receptor	Changes and potential effects
<i>Construction and permanent land use change</i>	
Vegetation in Felton Common County Wildlife Site	Increased dust deposition from construction activity affecting growth/survival of plants.
Bats (all species)	- Demolition or disturbance of structures that may support roosting bats (e.g. trees, World War 2 dispersal pens, hangers, and other buildings). - Disturbance/loss of foraging habitat and/or modification of commuting routes (including disturbance from lighting).
Great crested newt (if present)	Permanent land take causing death/injury/ disturbance/loss of resting places.
Badger	Damage and/or disturbance to setts, loss of some foraging habitat, and/or access to some foraging habitat.
Slow worm and other reptiles	Damage or disturbance to individual reptiles or resting places, and/or loss of foraging habitat.
Dormouse	Damage or disturbance to individual dormouse or resting places, and/or loss/disturbance of foraging habitat.
Nesting birds	Damage or disturbance to nesting birds, nests, or their young by construction activities.
Semi-improved calcareous grassland	Loss of areas of the grassland through construction activities.
Groundwater fed watercourses	Increase in pollution transmitted through groundwater to watercourses resulting in a change in biodiversity.
<i>New infrastructure and operation</i>	
North Somerset and Mendips SAC and constituent SSSI	Disturbance to roosting bats from an increase in air traffic movements and change to vegetation composition due to an increase in nitrogen deposition.
Bats	Disturbance to key commuting routes and foraging areas from proximity to car parks and lighting
Badger	Potential risk of injury of mortality through access to new roads and car park.
Dormouse	Disturbance to hedgerow habitats from proximity to car parks and lighting.
Flora and fungi sensitive to an increase in air pollution	Increase in aircraft emissions at a concentration that might cause dieback or mortality of notable flora or fungi.
Birds	Increase in risk of mortality through bird strike.
Groundwater fed watercourses	Increase in pollution transmitted through groundwater to watercourses resulting in a change in biodiversity

(Bristol International Airport, 2005)

Fig 3. List of Ecological Important Species. The list of species was compiled for various data sources on a desktop study which will then guide the ground surveys following the scoping report (Bristol International Airport, 2005).

3.4.3 Additional Mitigation and Environmental Enhancement

Following the identification of potential biodiversity impacts (Appendix 3) mitigation measures were proposed in two parts 1) significant effects needing mitigation and 2) non-significant effects needed no further action (Appendix 4). Providing suitable mitigation measure is required by legislation and mitigation measures were based at the time on Guidelines provided by *Institute of Ecology and Environmental Management (IEEM)* now referred to as CIEEM (Bristol International Airport, 2005; Office of the Deputy Prime Minister, 2006; Statutory Instruments, 2015; Loomis and Dziedzic, 2018; Gatwick Airport, 2019; Gov, 2019; CIEEM, 2020). Many ecology firms and councils still use this institute as a valuable institution that holds high standards and certificates including Gatwick and Heathrow Airport scoping reports (Heathrow Airport, 2018; Gatwick Airport, 2019).

At the time the mitigation measures focused its enhancements for biodiversity south of Silverstone car park, which looked to improve the area for foraging bats by providing a green roof on the northside car park (Bristol International Airport, 2005, 2006). Many of the older buildings were to be redeveloped so only a small parcel of land was to be lost. To comply with legislation under *schedule 4 of the EIA regulations*, consideration is given to species expected to be affected during the construction and operational stages of the development (Bristol International Airport, 2005; Legislation, 2017; Glasson, 2019; UK Essays, 2018).

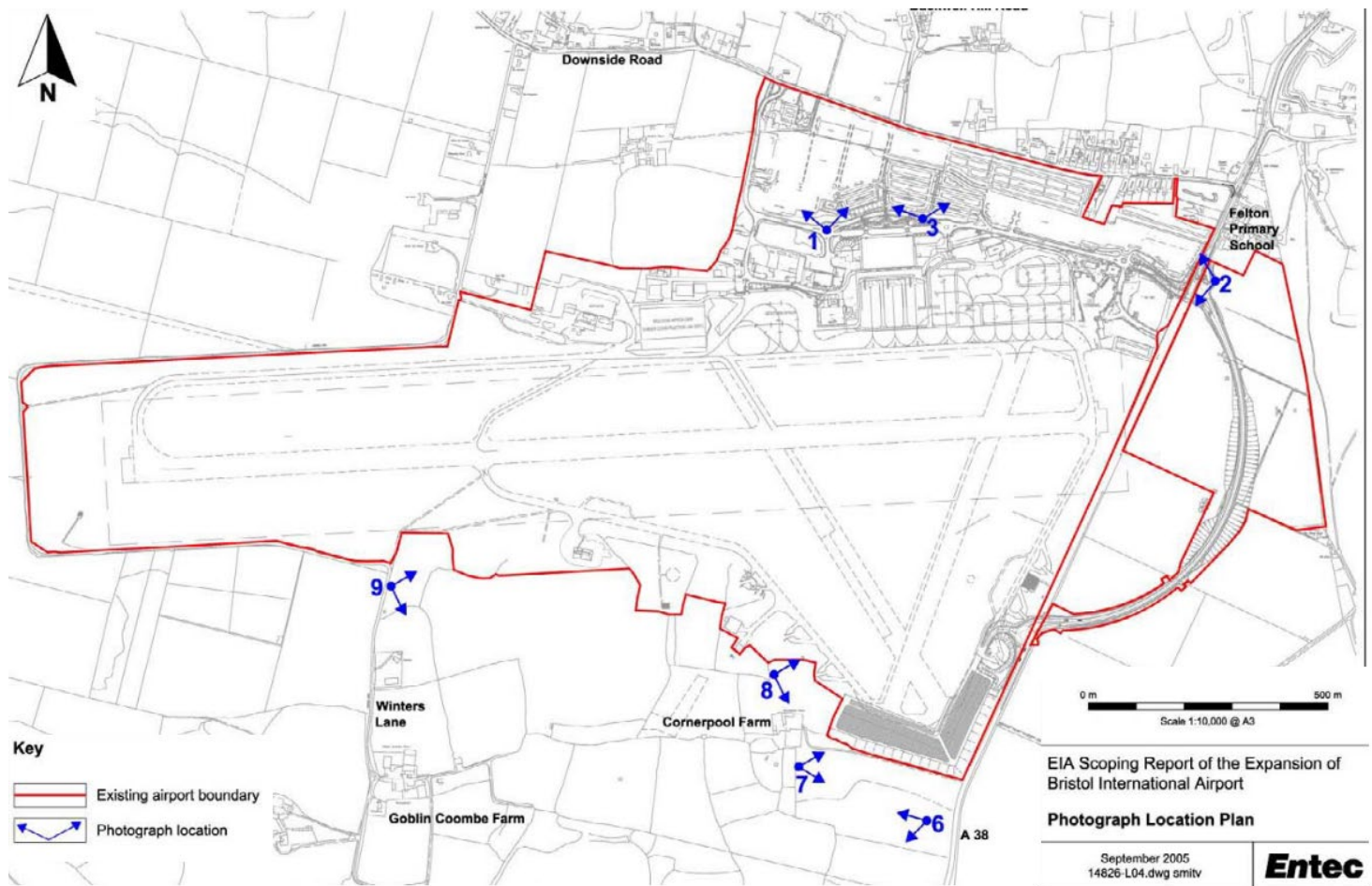
In 2018, the government launched a *25 Year Plan to Green the Environment* where more consideration is now given to protecting and enhancing biodiversity although new developments are not discussed directly urban design is now incorporating greener infrastructure (Her Majesty's Government, 2019). Concerns were raised by environmental groups at the time about The Transport Minister at the time Alistair Darlings attitude towards the environment (News Bank, 2005c). His belief that planning permission takes far too long due to environmental assessment and that they should not be held up by Newts and voles as there is plenty of places for them to live. Environmental Statements are designed to work alongside development and not hinder progress. Mitigation measures provided were suggested measures and at this stage of the development not confirmed for action (Bristol International Airport, 2005). No post-development monitoring was mentioned (for biodiversity) to determine if the mitigation was suitable. Post-development monitoring is a key stage in the EIA process and more consideration should have been given to this in BIAs report (Gov, 2019; Glasson, 2019). Other more recent EIAs are more detailed when discussing long-term

monitoring but with UK airports it is usually noise and pollution-based monitoring and not related to ecological mitigation (Statement, 2010; Heathrow Airport, 2018; Gatwick Airport, 2019).

3.5 Visual Impact Assessment

At this time under *Guideline for Landscape and Visual Impacts Assessment 2002 (VIA)*, a VIA was conducted during the site walkthrough in January 2005 by the Entec landscape and visual specialist (Bristol International Airport, 2005). Photographs were taken and discussions held with BIA representatives to assess potential impacts and create a baseline for monitoring records. This is a recognised method of assessing sight visuals but should be collected from several locations across the site to provide an accurate representation of any landscape changes over time (Fig 4; Appendix 5; Kienast, Wartmann and Hunziker, 2019). However, BIA's report does not mention plans for any long-term visual impact monitoring just those taken to assess the impacts of the new development. It was determined that as the development was to take place on previously developed land there were no significant issues in terms of aesthetics and most of the site is visually blocked by existing vegetation such as hedgerows and woodlands (Bristol International Airport, 2005).

The development was visible to some residential properties to the south, but no mitigation provided due to the land being formerly developed; this resulted in opposition from the residents. Development of the new car park meant that some vegetation and hedgerows would be removed but removal would have to take place outside of the bird nesting seasons (March-September) and the hedgerow surveyed for protected species (Bristol International Airport, 2005; Gov, 2015). Modern developments must replace lost habitat with new ones two to three times the ecological value or the original (Bristol International Airport, 2005; Gov, 2012; Thompson Environmental Consultants, 2020). To mitigate hedgerow loss, a new hedgerow would need to be planted or a new habitat created for other species of importance. However, no mitigation action was mentioned in BIA's report just that it was important for further consideration.



(Bristol International Airport, 2005)

Fig 4. Photograph Sites. Blue arrows indicate the direction visual photographs were taken of the development with the red line indicating the airport boundary (Bristol International Airport, 2005).

3.6 Public Consultation

Public consultation must be incorporated into the scoping process to comply with current regulations in place such as posting a public notice, posting letters to residents, providing a formal open forum to address concerns (Gov, 2019; Statutory Instruments, 2015). Public engagement in the planning process is critical to provide an opportunity for communities to air any concerns and address how the developer intends to provide suitable mitigation (Hughes, 1998; Sustainable Development Commission, 2007; United Nations, 2013; Berry *et al.*, 2019). It is essential to identify any possible concerns the development may encounter in the early stages so it can be incorporated into the project design early and avoid costly amendments later. Typical public concern includes increased levels of pollution including air and waste, increased traffic, unsightly landscape or visuals from public pathways or residence, noise, and/or light pollution. Even before the proposed development in 2004 as part of the *BIAs Master Plan*

(2006), a *Statement of Community Involvement (SCI)* was prepared to showcase the possible future developments and growth of BIA and aimed to address all the potential community and stakeholder concerns in advance (Bristol International Airport, 2005, 2006; Bristol Airport Limited, 2018). This publication was distributed to 58 key parties representing various organisations, stakeholders, government organisations, communities, and local authorities and invited opinions and ideas on how this feedback could improve the airport expansion in the future. A non-technical summary of the plans was posted door to door in local communities, a local forum was created for the above parties as a safe space to compile feedback and provide information to those interested in the development. Some of the most prominent concerns addressed included those linked to delays and congestion with public transport and pollution. No direct issues brought forward by the public was included in BIA's report just BIA's own predictions of what issues/concerns they expected to encounter. Public concerns were growing over the associated impacts that came with the increased air traffic and passenger numbers (News Bank, 2005d, 2005a, 2005b). Protests were held outside the airport as well as a campaign fuelled by Friends of The Earth to no avail. More recently BIA has proposed new redevelopment in 2019, which has caused many concerns with the public (discussed above). Even protests from extremist group 'Extinction Rebellion' climate change activists in 2019, indicating that concerns stem from further afield than just residents (Somerset Live, 2019).

3.7 Noise

BIA's noise pollution was considered at the following stages: construction, airborne, ground operations and road traffic particularly concerning disturbances to the local community (Bristol International Airport, 2005, 2006). Noise pollution was monitored with specialist devices and fell within the legislative requirements at the time (Appendix 3). Entec monitored day and night-time noise by air traffic but the noise generated from ground activities was not regularly monitored. However, as part of *BIA's Master Plan 2006*, BIA aims to reduce and illuminate as much noise as possible through careful planning and management (Bristol International Airport, 2006). Monitoring airport traffic noise is now more extensively monitored across the UK, Gatwick and Heathrow Airport manage noise pollution to comply with the newly updated regulations and guidelines and have more monitoring equipment in place long-term due to them being busier airports surrounded by dense residential areas (Heathrow Airport, 2018; Gatwick Airport, 2019; World Health Organisation, 2020). A *Site Environment Management Plan (SEMP)* was provided by BIA to reduce the impacts associated with a construction including

noise, dust, ground conditions, visual effects, traffic, biodiversity, and archaeological areas. Vibration and vortex impacts were also expected to cause some disruption particularly along the flight path of lower flying aircraft (Bristol International Airport, 2005, 2006). The impact on biodiversities such as bats from the noise and vortex was considered non-significant through data modelling but no ground surveys or investigations were carried out to support this. Community impact was considered about health impacts and mental well-being, but only briefly; only modelling methods were used to assess this based on previous data collected. Residents had formally been offered noise insulation grants by BIA in 1997 but were only available to homes that regularly experienced noise levels above 82 decibels. None of the potential impact relating to noise were concluded to require any further mitigation action as noise levels remained within the regulatory guidelines, despite several complaints made to the airport due to air traffic noise which are just collected for monitoring purposes.

3.8 Air

Air quality standards at the time were set by the *Air Quality Strategy (England) Regulations 2000* (AQS) and had objectives that England had committed to and provided a framework to guide all policies and developments (Legislation, 2000; Bristol International Airport, 2005). Legislation commitments to comply with air quality assessments were also outlined in Part VI of *The Environment Act 1995* giving the local authorities responsibilities for reviewing this type of pollution. Assessment of air quality for BIA used a three-stage approach 1) simple screening methods, 2) modelling 3) monitoring in areas of high risk for exceeding set targets. BIA's report highlighted that emissions (NO_x and PM₁₀) set for airports by the AQS had already been exceeded having some significant implications, especially as air travel was predicted to continue increasing (Bristol International Airport, 2005, 2006; Bristol Airport Limited, 2018). Resulting in BIA needing to carry out more detailed investigations and monitoring of pollution levels but does not specify what they will be in this scoping report. All mitigation measures proposed were about reducing road traffic and congestion, but this would only tackle a minor contributor to the overall pollution levels both noise and air. Air pollution poses a risk of altering vegetation types through the increased disposal of nitrogen. One mitigation measure for air pollution being utilised more is biophilic infrastructure such as green walls and roofs. Planting of certain trees and vegetation quickly absorbs and stores pollutants from the atmosphere as well as other aesthetic, water storage and drainage and biodiversity benefits (Almusaed *et al.*, 2006; Swansea Council, 2019). Although, the new car park was proposed to

have one green roof this could have been developed a lot further reduce more pollution. Many EIAs now are more detailed on their scoping of air pollution and are required to carry out Health Impact Assessment (HIA; Bristol International Airport, 2005; Soysal, 2009; Chadderton *et al.*, 2012; Den Broeder *et al.*, 2017). Although HIAs have evolved alongside EIAs, due to pressure from organisations such as the World Health Organisation (WHO) and the European Union (EU), they are not stipulated in any legislation directly but are required to meet industry standards, policy commitments and targets. Gatwick airport uses several more up to date sources to inform their mix method approach to monitoring and mitigating as many impacts as possible (Bristol International Airport, 2005; Soysal, 2009; Chadderton *et al.*, 2012; Den Broeder *et al.*, 2017).

4.0 Conclusion

EIAs have evolved dramatically in their scope from when they were first introduced to the UK (European Commission, 2018; Loomis and Dziedzic, 2018; Das *et al.*, 2019; Glasson, 2019; Gov, 2019). To address their continuously growing scope several amendments have been made to the international and UK legislation to reflect a continuously growing knowledge base and best practice guidelines. At their foundation, EIAs are implemented to protect the valuable aspects of the natural environment without hindering development. The depth at which the topical areas are discussed has grown and introduced new aspects of quantitative data to support qualitative assessments particularly about assessing and monitoring ongoing pollution types (Cave *et al.*, 2017; Heathrow Airport, 2018; Loomis and Dziedzic, 2018; Das *et al.*, 2019; Gatwick Airport, 2019). Plenty of opportunities are given for the public to have their concerns addressed by developers but arguably more needs to be done to make sure these meetings are held at separate times, days, and on several occasions over a longer period to allow for as many parties as possible to have their concerns discussed (Hughes, 1998; Wang, Yang and Xu, 2006; Sustainable Development Commission, 2007; United Nations, 2013; Berry *et al.*, 2019; Das *et al.*, 2019). Perhaps the UK regulations need to be more demanding of developers in this aspect to ensure the community needs are being addressed but this is difficult to achieve without causing costly delays to development and part of the EIA ethos is to protect the environment but not hinder development (Gov, 2012; Bilgin, 2015; Legislation 2017; Awange, 2018; Loomis and Dziedzic, 2018). To achieve these ethos mitigation measures are proposed to offset any impacts outlined by the proposed development. Historically, mitigation has not always been reflected of the project scale but due to growing concerns about climate change and biodiversity decline across the planet several international commitments compel development to be more sustainable and reflective of the impact left on the environment. As a result, mitigation measure proposed now must create new beneficial habitats or habitat features to a greater ecological value than the one lost (European Commission, 2019; Thompson CIEEM, 2020; Environmental Consultants 2020). Although, the downside to this is that the new habitat created may not be the same as the one lost and potentially benefits some species more than others, usually in favour of UK priority or protected species. In its early stage of the EIA process, little consideration is given to the monitoring stage post-development, particularly about biodiversity mitigation measures. Guidelines and regulations need to consider this in greater detail to ensure that the mitigation measures proposed by development have a long-lasting benefit to the environment and as identified in BIA scoping report, there is little

evidence to suggest that ecological monitoring was given much consideration beyond development completion (Lantieri *et al.*, 2017; Loomis and Dziedzic, 2018; Das *et al.*, 2019). Even more modern EIAs such as Gatwick and Heathrow Airports had very little post monitoring in place for ecological factors.

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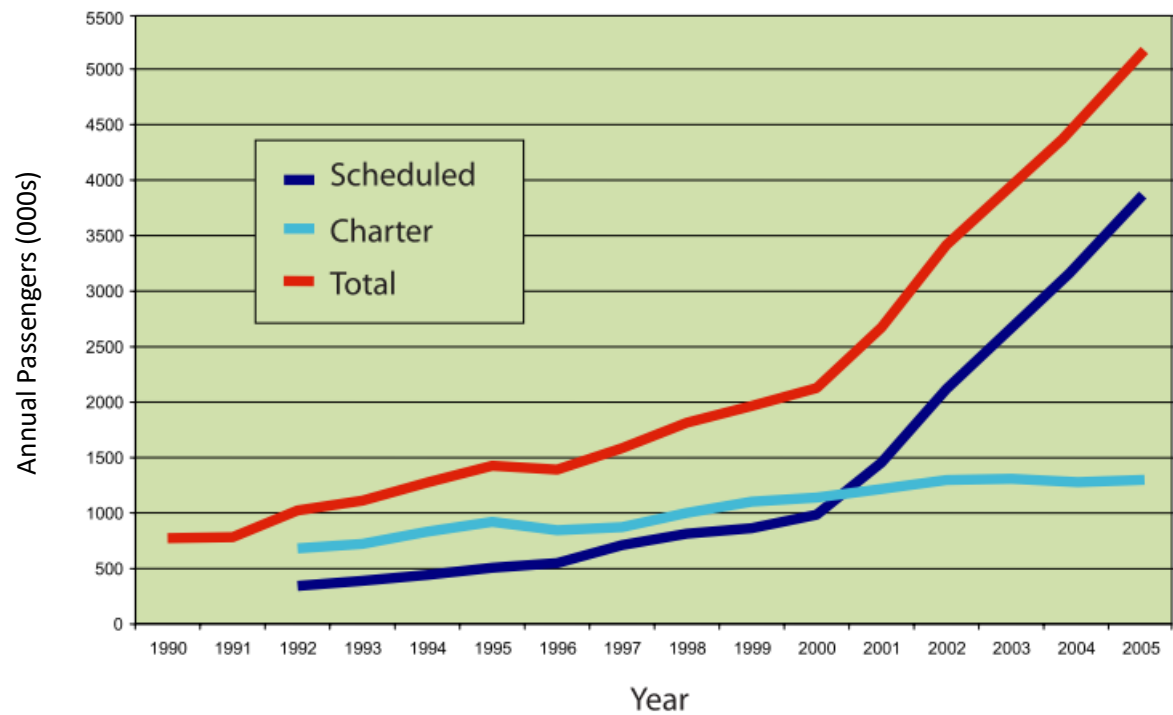
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6.0 Appendices

6.1 Appendix 1; Passenger Growth at BIA 1990-2005



(Bristol International Airport, 2006)

Fig 1. Passenger Growth at BIA 1990-2005. Significant increase in passenger usage can be seen from 2000 onwards which co-insides with the construction of the original North terminal and the deals with the airlines including EasyJet and GO Fly. Levels are not predicted to increase at such a rate but are expected to level off (Bristol International Airport, 2006).

6.2 Appendix 2; Directives, Legislation and Guidelines/policy for EIA Consideration

Table 1. Legislation for EIA Consideration. The following table identifies updates and new additions to legislation/regulations/directives/policy/frameworks relevant for consideration in modern EIA scoping reports. However, table 1 provides an overview of a few relevant examples and does not contain all possible updates (Heathrow Airport, 2018; Gatwick Airport, 2019).

Up to date legislation regulation directives guidelines and more
Directives and Commitments
European EIA Directive 2011/92/EU /amended: 2014/52/EU
Habitats Directive 92/43/EEC
Birds Directive 2009/147/EC
UN Sustainable Development Goals (17 Goals) including Climate change
Legislation/regulations
Wildlife and Countryside Act 1981 (amended)
Protection of Badgers Act 1992
The Wild Mammals (Protection) Act 1996
Countryside rights of way Act 2000
The Natural Environment and Rural Communities Act 2006 (amended)
Conservation of Habitats and Species Regulations 2017
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
The Sustainable Drainage (Approval and Adoption Procedure) (England) Regulations 2018
Policy
Airport National policy Statement for Transport 2014 (amended 2018)
The National Planning Policy Framework
Aviation Policy Framework 2013
The National Infrastructure Delivery Plan 2016-2021

(Heathrow Airport, 2018; Gatwick Airport, 2019).

6.3 Appendix 3; Biodiversity Scoping Assessment Summary

Topic	Potential effect	Next steps
Biodiversity	Demolition of structures that may support roosting bats (e.g. trees, World War 2 dispersal pens), disturbance/loss of foraging habitat and/or modification of commuting routes (including disturbance from security lighting), and severance of commuting routes.	Bat surveys (roost inspections, and activity surveys) will be undertaken based on guidance provided by English Nature and the Joint Nature Conservation Committee.
	Permanent land take causing death or injury, and disturbance, or loss of great crested newt resting or foraging-habitat and commuting routes.	Surveys will be undertaken in accordance with guidance from English Nature.
	Damage and/or disturbance to badger setts, and potential for sett destruction, loss of some foraging habitat, and/or access to some foraging habitat.	Surveys will be undertaken in accordance with guidance from English Nature.
	Damage or disturbance to individual reptiles and/or their resting places, and/or loss of foraging and resting habitat.	Surveys will be undertaken in accordance with guidance from English Nature and the Joint Nature Conservation Committee.
	Damage or disturbance to dormouse hedgerow habitat and potential for injury to dormouse.	Surveys will be undertaken in accordance with guidance from English Nature and the Mammal Society.
	An increase in aircraft emissions at a concentration that might cause dieback or mortality of notable flora or fungi within designated sites.	Review of the outputs from the air quality modelling and published information.
	Disturbance to roosting bats within the Somerset and Mendips SAC and constituent SSSIs as a result of an increase in air traffic movements and change to vegetation composition due to an increase in nitrogen deposition.	Review of the outputs from the air quality modelling and published information.
	Increase in risk of groundwater contamination, and consequential change in water quality within surface watercourses	Review of the risk of changes in surface water quality and effects on aquatic ecology.

(Bristol International Airport, 2005)

Fig 2. Biodiversity Scoping Assessment Summary. Taken from BIAs scoping report the figure above identifies all the potential effect for biodiversity and the next steps to be considered about these impacts (Bristol International Airport, 2005).

6.4 Appendix 4; Significant and Non-Significant Mitigation Measures

Significant issues requiring the next steps:
• Demolition of structures that could affect roosting bats, forging/commuting habitats from construction works, light and noise disturbance.
• Permanent loss of foraging/ commuting habitat resulting in death, injury and/or disturbance for Greater Crested Newts (<i>Triturus cristatus</i>)
• Damage, loss or disturbance to badger setts, foraging habitat, or access to foraging habitat
• Damage or disturbance to individual reptiles and/or their resting places, foraging/commuting habitat
• Damage or disturbance to Dormouse (<i>Muscardinus avellanarius</i>) hedgerow habitat and potential for injury to dormouse
• Increase in aircraft emissions at a concentration that may cause dieback of various vegetation/fungi within designated sites
• Disturbance to roosting bats within the Somerset Levels and Mendips SAC and SSSIs as a result of increased air traffic -risks to vegetation loss/changes due to increased nitrogen deposits
• Increase in contaminants transmitted through groundwater resulting in a change in biodiversity fed watercourses
Non-significant issues requiring no further consideration:
• Dust deposits on vegetation in Felton Common Country Wildlife Site
• Damage or disturbance to nesting birds, nests or they are young by construction activities (med February-August)
• Loss of semi-improves calcareous grassland through construction activities
• The potential risk of injury mortality to badger through access to new roads and car park
• Increased risk of bird mortality through increased air traffic activities

(Bristol International Airport, 2005)

6.5 Appendix 5; Photographs of Site Assessment



(Bristol International Airport, 2005)

Fig 3. Photographs of Site Assessment. These images were taken from designated fixed locations to assess the habitat type and structure during the site walkthrough in May 2005 (Bristol International Airport, 2005).