

A Case Study of Bristol Airport Expansion, Environmental Impact Assessment

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List of Abbreviations

EIA	Environment Impact Assessment
BIA	Bristol International Airport
APUs	auxiliary power units
GPUs	ground power units
BRL	Carboniferous Black Rock Limestone
SuDS	Sustainable Drainage System
HGV	Heavy Goods Vehicles ³⁶
IEA	Environmental Assessment's

CHAPTER 1

INTRODUCTION

1.1 Environment Impact Assessment (EIA)

The technique of Environmental Impact Assessment in the context of town and country planning in England is governed through the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. The purpose of environmental impact assessment is to protect the environment by making sure that a local planning authority makes a decision about whether to grant planning permission for a project knowing full well that the decision will likely have significant effects on the environment and will take this into consideration (Orford and Henderson, 2017).

The EIA process is divided into five general phases:

I. Screening

In this stage it is deciding whether a proposed project is subject to the Regulations and whether an assessment is necessary because it is likely to have an impact on the environment.

II. Scoping

Scope of the issues will be figure out and that will be evaluated and stated in the environmental statement. The applicant may request a "scoping opinion" from the local planning authority, which expresses the authority's position on the information that must be disclosed.

III. Preparing an Environmental Statement

The applicant is expected to create and submit an environmental statement in cases where it is determined that an evaluation is necessary. The Environmental Statement must adhere to Regulation 18 and at the very least contain the information that is reasonably necessary to assess the potential substantial environmental consequences of the development described in Regulation 18(3). (4). Public agencies are required to provide any relevant environmental data they may have in order to assist the applicant.

The developer must make sure that the Environmental Statement is created by qualified specialists in order to guarantee its accuracy and quality. A declaration from the developer explaining the pertinent experience or qualifications of such specialists must be included with the Environmental Statement.

IV. Making a planning application and consultation

The Environmental Statement must be made available online and through public notice. It is necessary to give the public and the statutory "consultation bodies" the chance to express their opinions on the proposed development and the Environmental Statement.

V. Decision making

The local planning authority and/or the Secretary of State must consider the Environmental Statement, any additional material that is pertinent to the decision, and any comments and representations made on it when determining whether or not to approve the development. Both electronically and through a public notice, the public must be informed of the judgement and its key justifications.

1.2 A 'SWOT' Analysis for UK EIA system according to the Glasson's SWOT results (Glasson ,1999)

Strengthens

- Underpinned by EU legislation
- Has not become over technical
- Capacity building: guidance documents; training programmes
- General acceptance of utility of EIA from all 'actors' in the process
- Some widening (e.g. environmental appraisal of development plans)

Weaknesses

- multiple and fragmented legislation and links (e.g. to IPC)
- little consideration of alternatives
- little monitoring and auditing
- bio-physical perspective on environment
- little consideration of cumulative impacts
- 100s of competent authorities; weak quality control
- Perceived problem of
- developer/consultant management of the EIA process
- Lack of effective public participation; too little too late

Opportunities

- Environmental politics/pressures (e.g. Local Agenda 21)
- Pressures from environmental liability/insurers
- Amended EU Directive; new Directives
- More projects subject to EIA; more stages of project life cycle
- Widening scope-SIA, etc.

- Tiered assessment-SEA, etc.
- Use of IT (GIS, Experts Systems, etc.)

Threats

- Deregulation/privatisation (more one-offs; less continuity)
- Fast-tracking/routinisations/cost reduction (more with less)
- Continuing perceived bias; inequity of process
- Perceived threats to/from competitive procedures (e.g. IPPS)

CHAPTER 2

A Case Study of Bristol Airport Expansion, Environmental Impact Assessment

2.1 Introduction

A detailed direction for the growth of airport capacity in the United Kingdom is laid out in the government's aviation white paper, "The Future of Air Transport." The White Paper endorses, subject to restrictions, the expansion of Bristol International Airport to accommodate an anticipated increase in demand for air travel to between 10 and 12 million passengers annually by 2030. By 2015, the number of passengers using Bristol International Airport (BIA) is expected to increase to over 8 million per year (mppa). The development of the existing terminal building facilities on the airport's north side, along with an expansion of other airport infrastructure and amenities, in order to accommodate the anticipated increase in demand, is Bristol International Airport's proposed solution.

The following topics are specifically mentioned in the White Paper for the South West of England:

- South West airports have the potential for positive growth
- Many travellers from the South West (now 70%) fly into airports in neighbouring areas, primarily the South East. This is one of the most significant leakages in any English region, and stopping it is congruent with the fundamental idea of minimizing surface traffic by maximizing the usage of local airports, especially BIA
- based on government projections, BIA should continue to be the major airport in the area, and growth, including a new terminal and an extension of the runway, is encouraged
- There is no support for the idea of building a new airport to the north of Bristol

Since the BIA site is located within the Green Belt, any significant suggestions for airport development must take this into account while evaluating them.

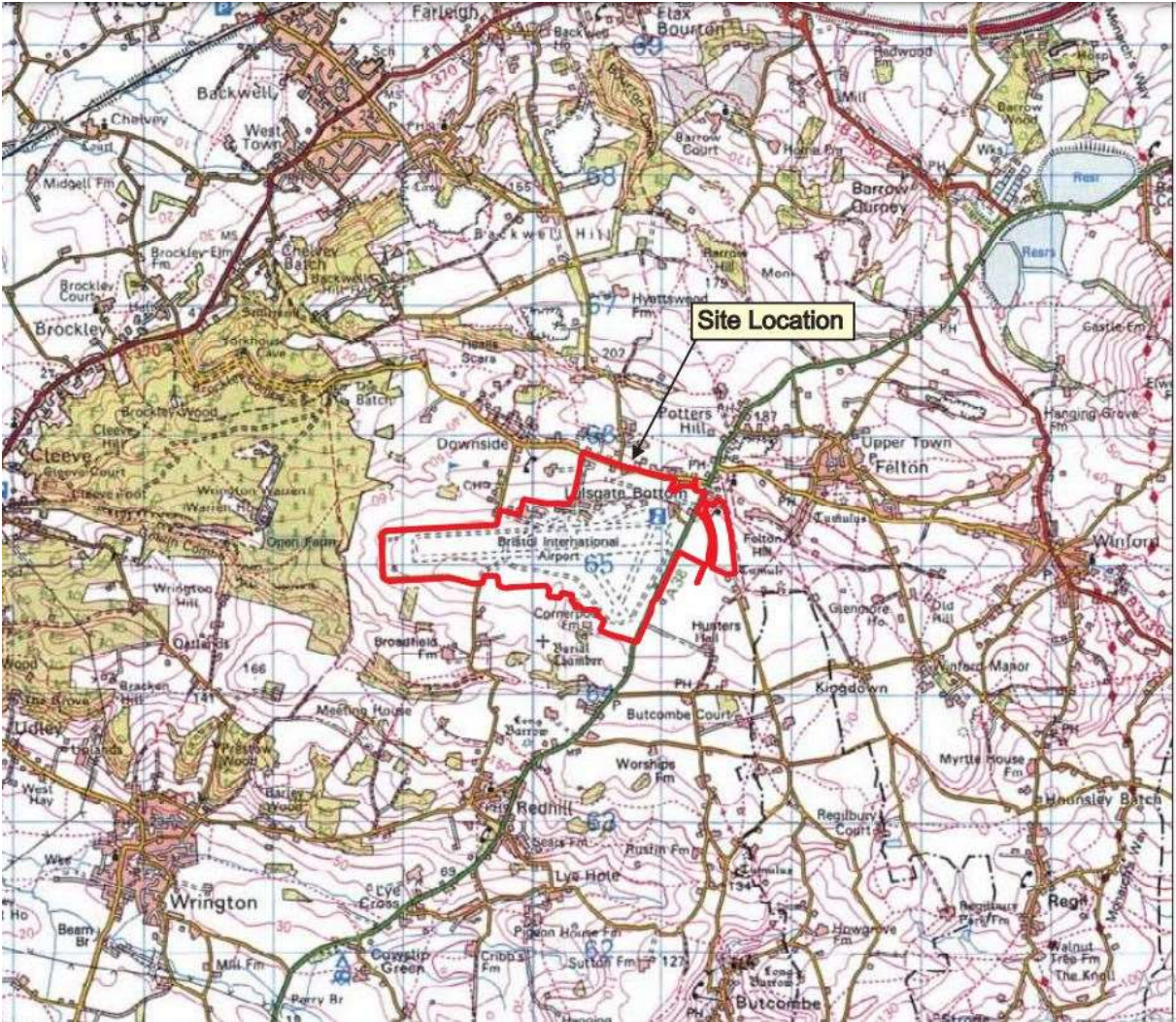


Figure 2.1 – Location of Bristol International Airport (Bristol International Airport, 2005)

2.1.1 Legislation

According to The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 - SI No. 293, this scoping report was created as part of an Environmental Impact Assessment (EIA). Prior to granting planning permission for some types of development covered by The Town and Country Planning Act 1990, an EIA is required by the EIA Regulations. According to the guidelines outlined in the Aviation White Paper, Bristol International Airport decided whether an EIA was necessary for this construction.

2.2 Scoping

The major goal of this scoping report is to determine the recommended scope of the assessment in regard to these effects as well as the expected important effects of the development that must be carefully evaluated as part of the EIA (BanhalmiZakar et al., 2018). The following significant stages of development have been taken into account when analysing potential environmental effects:

- Land use change brought about by building - many consequences are transient and short-lived
- New infrastructure and operation/occupation of the project- These activities often have long-lasting consequences on the environment

One of the main goals of the EIA process is to use the environmental data collected to help the development's design evolve with the aim of minimizing any negative environmental consequences that the development might have and maximizing its beneficial ones. The EIA team must collaborate closely with the project design team to accomplish this. Although some of this collaboration has already happened, the majority will happen after the scoping report is prepared

Bristol International Airport conduct an environmental assessment of a high level master plan for the proposed development (a "Statement of Intent") prior to the creation of this scoping report. In addition to some stakeholder interaction and site visits, this study includes the collection and assessment of all publicly available and pertinent environmental data, including earlier work commissioned by BIA. The identification of potentially sensitive and valuable environmental resources and receptors at an early stage of the design process was made possible by this knowledge. With the help of this data, the BIA and its consultants have been able to determine the expected effects of the development projects and potential mitigation strategies. The proposed airport master plan for Bristol International Airport has been updated in light of the information to take environmental concerns into account.

The following list comprises the development's main components;

- Expansion of the passenger terminal
- Insertion of new mezzanine floor and aircraft access piers in existing terminal building
- Apron extensions
- Provision of new multi storey car parking facilities
- Long stay car park to south of Airport
- Demolition of former terminal building and existing fire station
- Hotel accommodation
- New fuel farm
- Fire station relocation

- Provision of new office accommodation
- New road infrastructure
- Runway and taxiway
- General aviation
- Freight

The proposed scope of the EIA is summarised as below. For each of the environmental matters that want to be considered in the EIA described below.

2.2.1 Air

The Air Quality Strategy (England) Regulations 2000 (AQS) established air quality standards at the time, had goals that England had agreed to, and provided a framework for all future policies and improvements (Legislation, 2000; Bristol International Airport, 2005). Part VI of The Environment Act of 1995 also detailed legal obligations to follow air quality evaluations, giving local governments responsibility for monitoring this kind of pollution. A three-stage process was utilised to evaluate the air quality for BIA. Simple screening techniques, modelling, and monitoring in areas with a high risk of going over budget are the first three. The AQS emissions targets for airports (NO_x and PM₁₀) had already been exceeded, according to BIA's assessment, with potentially serious ramifications, especially given the rise in air travel. As a result, BIA will need to do more thorough investigations and monitor pollution levels, though it is unclear what those values will be in this scoping report. All of the proposed mitigation methods centred on reducing traffic and congestion on the roads, although this would only address a small portion of the overall noise and air pollution. Due to increased nitrogen discharge, air pollution puts vegetation kinds at danger of change. Increasing the use of biophilic infrastructure, such as green walls and roofs, is one way to reduce air pollution. Planting specific trees and flora has other advantages for aesthetics, water storage and drainage, biodiversity, and fast absorbing and storing toxins from the atmosphere. Even though it was suggested that the new parking lot feature 22 green roofs, this might have been expanded much farther to avoid additional pollution. Health Impact Assessments are now needed for many EIAs and they are more precise in how they scope out the problem of air pollution (Almusaed et al., 2006; Swansea Council, 2019).

A possible cause of air pollution is activities related to airport operations. Possible sources comprise (Bristol International Airport, 2005):

- airplane operations, which include engine testing, takeoff, landing, taxiing, and running auxiliary power units (APUs) and ground power units (GPUs) on aprons
- airside and landside vehicle emissions

- energy consumption (heating and power)
- aircraft fuel storage
- refuelling of aircraft and storage tanks (such as fugitive releases of hydrocarbons, volatile organic compounds); and
- maintenance and building operations

The following are the main air pollutants that airports emit:

- nitrogen oxides (including nitric oxide and nitrogen dioxide);
- volatile organic compounds;
- carbon monoxide;
- carbon dioxide;
- sulphur dioxide; and
- particulates

2.2.2 Community

The possible consequences on employment, tourism, commerce and investment, health, and leisure are all covered in this section. BIA is positioned between the residential communities of Lulsgate Bottom and Redhill on a plateau surrounded by farmland and is close to the A38.

The development could be lead potential effects as follow (Bristol International Airport, 2005);

- Labour force can be effect by direct and indirectly
- Local community affected by change of air quality , noise ,incensement of traffic

2.2.3 Geology and land quality

A qualitative risk assessment based on the "source-pathway-receptor" approach is used to identify the likely important consequences that relate to geology and land quality. This methodology can be defined as follows (Bristol International Airport, 2005).

- Source: a pollutant that might be harmful to environmental and human receptors. In a broader sense, this could refer to specific ground conditions, like the existence of abandoned footings, which could have an effect on redevelopment plans. People, other living things, physical systems, and manufactured objects may all be affected by the "source."
- Receptor

The "receptor" can only be affected if a functional pathway connects the "source" and the "receptor." It is possible to consider groundwater and surface water systems to be receptors in and of themselves due to the fact that their quality is regulated by statutory agencies and that they act as pathways for pollutant migration to other receptors.

- people's health, including that of site employees, site visitors, site users, future development workers engaged in below-ground excavations, and residents of nearby residential and commercial premises(Bristol International Airport, 2005);
- buildings and buried services – current and proposed;
- land quality – current and future;
- surface water;
- groundwater; and
- flora and fauna.

Possible impacts of the proposed development on biodiversity, surface water, groundwater, and/or the presence of toxins

- Pathway: the potential path by which the "source" and "receptor" might interact. This can involve the physical transfer of contamination, groundwater, wind-blown dust, vapour migration, excavation and deposition, among other methods.

The existence of "gruffy" patches, which have been linked to historical lead and calamine mining, could point to the possibility of elevated metal concentrations close to the proposed auto parking lot to the south. The site that Cornerpool Farm once inhabited, which could potentially be contaminated by waste or rubble and where there are signs of building foundations, is suggested to be used for the car parking space(Bristol International Airport, 2005).

Improvements to drainage, including an update to the site's interceptors, are among the environmental enhancement measures connected to the proposed construction. This will lessen the possibility that hazardous contaminants will affect the condition of the land.

It's possible that historical activities in the intended development zones have contaminated the land. During the development and rebuilding processes, such contaminants that may otherwise go undetected and continue to endanger sensitive receptors may be characterised(Bristol International Airport, 2005).

2.2.4 Noise

Noise pollution was taken into account at the following stages: construction, airborne, ground operations, and road traffic, particularly with regard to disturbances to the local population. BIA offered a plan to decrease the consequences connected with a construction (Bristol International Airport, 2005, 2006). At the time, noise pollution was being measured using specialised equipment and was compliant with the law. Monitored the noise produced by air traffic during the day and at night, but it did not routinely measure the noise produced by ground activities. But as part of its 2006 Master Plan, BIA intends to manage and plan for as much noise reduction and illumination as it can (Bristol International Airport, 2006). Gatwick and Heathrow Airports are now more thoroughly monitored for airport traffic noise across the UK. An Environmental Site Management 21 Environmental factors such as traffic, biodiversity, noise, dust, and ground conditions. Additionally, interruption from vibration and vortex impacts were anticipated, especially along the flight path of lower flying aircraft (Bristol International Airport, 2005, 2006). Data modelling determined that the noise and vortex's effects on biodiversity like bats were not significant, but there were no on-the-ground surveys or other research to back this up. Only briefly was the community influence on physical and mental health taken into consideration; modelling techniques were employed to evaluate this based on previously gathered data. Grants for noise insulation had been publicly made accessible to residents by BIA since 1997, but they were only extended to houses that consistently encountered noise levels above 82 dB. Despite several complaints about the airport's air traffic noise that are only recorded for monitoring purposes, it was determined that none of the possible noise impacts required any additional mitigating measures because noise levels were within the legal limits.

2.2.5 Water resources and quality

A strategy based on the "source-pathway-receptor" concept is used to identify impacts that are expected to have a major impact on surface and groundwater features. Anyone who causes or intentionally permits the entry into surface or groundwater polluting substances, particularly those on Lists 1 and 2 of the 1998 Regulations, is guilty of an offence under the Water Resources Act of 1991 and the Groundwater Regulations. The BIA is situated on Broadfield Down, a dome-shaped periclinal formation, the core of which is made up of Carboniferous Black Rock Limestone (BRL). The surrounding soil has a high potential for leaching, according to the Environment Agency's Groundwater Vulnerability Maps (sheets 36 and 37). As a result, the lack of a large physical barrier and the poor chemical attenuating qualities of the soil would imply that there may not be much standing in the way of potentially tainted recharge waters making their way to the water table beneath the ground. BIA will keep growing till it reaches its current capacity. An increase in the use of potentially polluting products (such as fuel and de-icers) is predicted, but any consequences should be mitigated by following the present environmental management and

pollution prevention/response methods. According to the Environment Agency, BIA is not at risk from severe river or sea flooding. Climate change is anticipated to cause changes to climatic factors. The main effects of this could be drier summers and more variable and intense rains during the winter. An increase in surface runoff and the possibility of localized flooding may be caused by the shift in rainfall pattern. It has been expected that there will be a general drop in groundwater recharge, which will lower groundwater levels and have corresponding consequences in groundwater supported watercourses (Bristol International Airport, 2005, 2006).

To accommodate the expected short-term increase in passenger volume, a new parking space is now being built. This location will use a Sustainable Drainage System (SuDS) that is connected to the current drainage system and consists of a permeable surface covered in a layer of sand and geotextile (Bristol International Airport, 2005, 2006).

Mitigation practices as follow;

- A detailed pollution prevention and management plan based on best practices must be created for the building period
- A review and modification of the current drainage system to reduce the transfer of pollutants to groundwater, as well as further monitoring to assess the system's effectiveness
- creation of a system to contain pollutants at the new fire station and fuel farm
- Use of SuDS to increase the amount of runoff that percolates through the soil to groundwater in areas of new and existing parking, in compliance with the discharge consent and EA guidance for the site

2.2.6 Transport

The EIA's methodology will follow the guidelines outlined in the Institute of Environmental Assessment's (IEA) "Guidelines for the Environmental Assessment of Road Traffic," which were issued in 1993. Therefore, the evaluation will concentrate on possible effects on:

- Local roads and the people who utilize them
- Along with the relevant occupants and users, the land uses and environmental resources fronting those highways are all important

The movements of commercial Heavy Goods Vehicles³⁶ (HGV) travelling to and from the site during the construction period of the development are expected to have an influence on transportation during construction. Once the plant is operating, private vehicle travel to and from the site will have the greatest impact on transportation (Bristol International Airport, 2005, 2006). The general operation of the highway network, including traffic speeds and capacity of highway linkages and junctions, may be impacted by changes in the baseline traffic as a result of construction activity, particularly HGVs.

Even if the development is abandoned, background traffic volumes are expected to increase and it is necessary to quantify these increases in order to conduct a thorough assessment of the effects. Therefore, in order to adjust the data from any previous traffic counts to the anticipated values in the assessment year, a growth factor must be applied starting on the date of the count.

However, it is thought that the effects of the airport expansion on traffic flows could be significant, and mitigation in the form of promoting the use of public transportation as a key method of reducing dependence on private vehicles, along with other measures (such as careful highway and car parking design, and use of traffic control systems), will also be required (Bristol International Airport, 2005, 2006). Road users' increased vehicular activity would have consequences in terms of road safety on vulnerable road users and increase potential risk of accidents.

2.2.7 Biodiversity

It is not feasible for an ecological evaluation to take into account every single species and habitat that could be impacted by a development. Instead, it ought to concentrate on legally protected species and "important ecological sensors."

Within a 2 km radius, records of specific highlights of species that are legally protected include (Bristol International Airport, 2005, 2006);

- crested newt (*Triturus cristatus*) within 500m of the west of the runway
- horseshoe bats associated with the North Somerset
- bats being recorded within Cornerpool Farm, other fields adjacent to the south of the airside boundary, and within the airport itself
- badger (*Meles meles*) setts located along the current southern boundary of the airport
- slow worm (*Anguis fragilis*) recorded in the southern boundary of the airfield

Before the next steps in the process can be determined, desk studies are still employed as the initial stage of researching a place. Recent scooping reports included desk studies for the Mumbles Lifeboat Station, Heathrow and Gatwick Airports, and other locations (Statement, 2010; Heathrow Airport, 2018; Gatwick Airport, 2019; Glasson, 2019). Desk studies, on the other hand, are carried out from distant office locations and might not take into account local expertise or unrecorded key species in a scooping report, for instance. As a result, new species may have established in a region but may not be noted in secondary data sets (Glasson; 2019).

Several priority species were identified by the desktop study 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 16 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).

Potential impacts to the biodiversity as follow;

	Receptor	Potential impact
1.	Vegetation in Felton Common County Wildlife Site	Increased dust deposition from construction activity affecting growth/survival of plants
2.	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)
3.	Great crested newt (if present)	Permanent land takes causing death/injury/disturbance/loss of resting places
4.	Badger	Damage and/or disturbance to setts, loss of some foraging habitat, and/or access to some foraging habitat.
5.	Slow worm and other reptiles	Damage or disturbance to individual reptiles or resting places, and/or loss of foraging habitat
6.	Nesting birds	Damage or disturbance to nesting birds, nests, or their young by construction activities
7.	Semi-improved calcareous grassland	Loss of areas of the grassland through construction activities

8.	Groundwater fed watercourses	Increase in pollution transmitted through groundwater to watercourses resulting in a change in biodiversity
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Table 2.1- Potential impacts to the biodiversity (Bristol International Airport, 2005)

Appropriate mature trees and hedgerows shall be preserved as mitigating methods. When planting new parts of the landscape, native plants with a local provenance will be used, especially if the planting is close to existing hedgerows, trees, or scrub (Bristol International Airport, 2005).

New habitats will be developed as part of the airport development, and/or existing habitats will be improved. Some of Cornerpool Farm and/or other distinct pieces of land to the east of the A38 may fall under this category. The establishment or improvement of such habitats would be in line with offering more opportunities for locally recognised natural resources (such as bats, badgers, and reptiles), and where practical, would strive to contribute to LBAP targets (Bristol International Airport, 2005,2006)

CHAPTER 3

Conclusion

Since the Environmental Impact Assessment (EIA) was formally adopted in the UK in 1988 and included in the Town and Country Planning Regulations for England and Wales as well as the Environmental Assessment Regulations for Scotland and Northern Ireland, it has been more than 25 years. Environmental assessment is used as a quick assessment tool to determine the current state of the environment and to evaluate how important activities affect environmental parameters. EIAs are a relatively recent planning and decision-making tool that were originally codified in the National Environmental Policy Act of 1969 in the United States (Ingole, 2007). It is a rigorous research procedure used to foresee how any development initiative will affect the environment. EIA ensures that potential issues are identified and addressed early on in the project planning and design process. To promote sustainable economic development and to ensure that socio-economic development projects adhere to environmental safety, it is essential to establish an Environmental Impact Assessment (EIA) framework. Given that development is a constantly expanding activity; its effects on the environment are also continuously growing, which causes the ecosystem to rapidly deteriorate. Environmental analysis thus offers a logical strategy for sustainable development. It also enables us to perform an early stage environmental cost-benefit analysis of projects. It serves as a precursor to more in-depth analyses of environmental repercussions, which are only conducted once a necessity for them is proven. Typically, a thorough EIA is carried out following a quick EIA and after receiving formal clearance. It aids in the design and implementation of long-term actions for efficient management and environmental conservation (GOV.UK).

CHAPTER 4

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