

AIRPORTS AND ENVIRONMENTAL IMPACT ASSESSMENT

Naqib Daneshjo - Lenka Zvijáková - Baryalai Tahzib

Aviation is an increasingly important form of transport, providing vital connections to the wider world for both passengers and goods. The environmental impacts of aviation, have become increasingly important. Many options exist for mitigating these impacts, including aircraft and engine technologies, advances in air traffic management and operational procedures, alternative fuels, and government policies. One of the options is the environmental impact assessment process, the aim of which to ensure a high standard of environmental protection and to contribute to the integration of environmental aspects into the preparation and adoption of strategic documents, with a view of promoting sustainable development. This paper presents the EIA process related with airports and environmental impact which must be assessment in this process.

K e y w o r d s: environment, process, impact, airports, air transport, airplanes.

1 INTRODUCTION

Airports are unique entities that have profound economic, social, and environmental effects on a local, regional, and even national level. They provide the means for the efficient movement of passengers and goods to virtually anywhere in the world, playing a vital role in the trend toward “globalization” and the interconnections between international trade and local economies. While the economic benefits of airports and air travel are commonly recognized, there is a social and environmental cost associated with constructing and operating airports. Beginning in the late 1960s, studies that evaluated the environmental effects of airport projects became a prominent consideration during the decision-making process in the United States, followed shortly thereafter by similar studies of airport projects in Europe. These early studies were focused on identifying and attempting to quantify potential impacts on a project-by-project basis and were typically not started or even thought of until well after the planning and design process had concluded. This often resulted in costly changes to projects in order to avoid sensitive resources or features that were not considered during the planning and design process.

As environmental regulations and laws have evolved over time, so has the approach to assessing the environmental impacts of airports and airport projects. Airport owners and operators, for the most part, recognize the need to minimize the effects of airport projects and operations on the environment and surrounding community and are considering impacts much earlier in the planning process. They are also beginning to take a more holistic approach, identifying ways they can make their airports and operations more sustainable (1).

This paper provides an overview of the regulatory framework in which airports operate and the environmental impact assessment process in Slovakia and briefly discusses the major environmental issues that airports face.

2 EIA PROCESS

The procedure of EIA is regulated by legislation, and consequently it is generally different for different countries, or even between regions of the same country. EIA first appeared in a national legislation in the USA in

1969 (National Environmental Policy Act). Ever since, it has found its way in the legislation of many countries, within both the industrial and the developing regions of the world.

In the European Union the common principles for the environmental assessment of individual public and private projects were initially defined in the 1985 EIA Directive and amended in 1997, 2003 and 2009. To help Member States' authorities and developers manage the environmental consequences of construction projects more easily, the Commission has brought together all existing EU legislation governing EIA. The original EIA Directive and its three subsequent revisions have been combined to create a more compact, clearly translated and user-friendly version which came into force 17.02.2012

Despite the different legal prescriptions around the world, EIA consists of a rather standard set of logically organized stages (Fig. 1) that lead to the generation of a formal document, the Environmental Impact Statement (EIS).

The steps in bold must be followed under Directive 2011/92/EU. The steps which are not highlighted form part of good practice in EIA and have been formalised in some Member States.

Thanks to the European Union, investors in the Member States have to meet certain minimum requirements with a view to protecting the environment. The regulations of Member States currently in force are fully in line with the directives and regulations of the European Union.

According EIA Directive 2011/92/EU, the principles of the assessment of environmental effects should be harmonised, in particular with reference to the projects which should be subject to assessment, the main obligations of the developers and the content of the assessment. The Member States may lay down stricter rules to protect the environment.

In Slovakia EIA procedures for public and private projects that are likely to have significant effects on the environment have been in place since the adoption of the EIA Law in 1994. In 2006, a new EIA Law was approved, and EIA procedures began to be applied to buildings under the 2006 Planning Law (3). At present Law No. 408/2011 Coll., amending and supplementing Law No. 24/2006 Coll. on the assessment of environmental influences, has been effective from 1st December 2011.

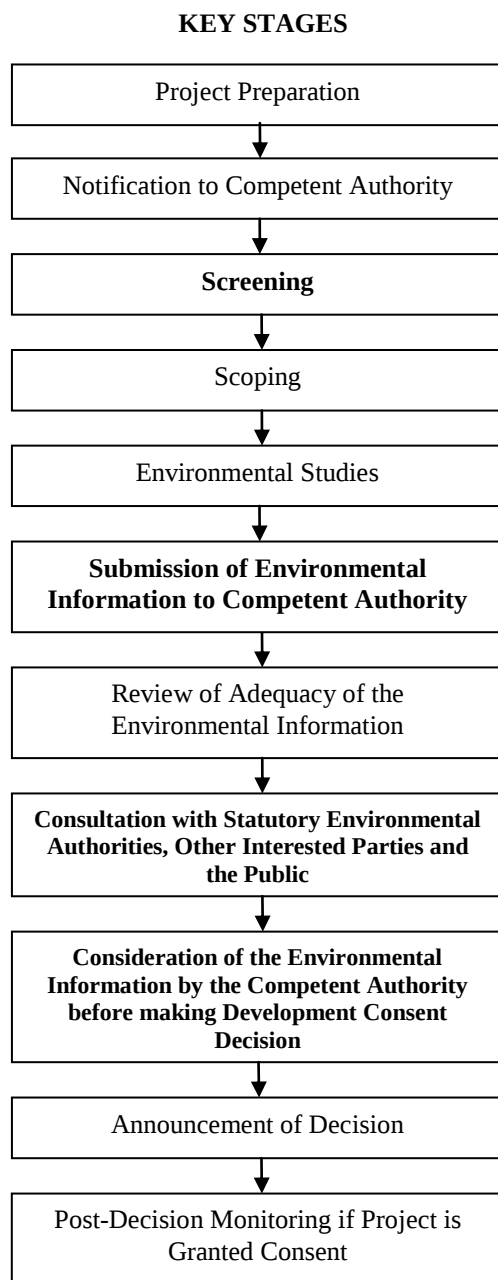


Fig. 1 Flow-chart of the different stages in a EIA (2)

3 EIA PROCESS FOR AIRPORTS, AIR TRANSPORT AND OTHER

Act of Law No. 24/2006 from December 14th 2005 on Environmental Impact Assessment and on amendments to certain acts regulates (3):

- the procedure for the expert and public assessment of expected environmental impacts of
 1. strategic documents before their approval,
 2. proposed activities before the decision on their location or their permission under special provisions.

3.1 Assessment of strategic documents

The subject of the assessment are draft strategic documents set forth in Annex No. 1. According to this annex with airports and air transport related this section:

- Policies, conceptions, plans and programmes from the fields of **7. Transport and telecommunications**
 - restructuring of airports
 - conception of the development of air transport

3.2 Assessment of proposed activities

The subjects of the assessment are the proposed activities set forth in Annex No. 8. According to this annex with airports and air transport related this section:

- Engineering and electrotechnical industry, Tab. 1 Departmental authority: Ministry of Economy of the Slovak Republic

Tab. 1 Assessment of proposed activities according section 7 (3)

Activity, facilities and installations	Threshold values	
	Part A (compulsory assessment)	Part B (screening procedure)
Installations for the production and repairs of airplanes		without limit

- Transport and telecommunications, Tab. 2 Departmental authority: Ministry of Transport, Posts and Telecommunications of the Slovak Republic

Tab. 2 Assessment of proposed activities according section 12 (3)

Activity, facilities and installations	Threshold values	
	Part A (compulsory assessment)	Part B (screening procedure)
Construction of airports with a basic runway length	over 2100 m	up to 2100 m

The list of activities requiring international assessment from the point of view of their transboundary impacts on environment, according Annex No. 13 to the Act no. 24/2006 Coll. shows

- 7. Construction of motorways, express roads and lines for long-distance railway traffic and of airports with a basic runway length of 2,100 metres or more.

4 AIRPORTS ENVIRONMENTAL IMPACTS

In the next 15 years, air travel is projected to grow significantly. As a result, airport development and expansion projects will likely become increasingly

important. A potential challenge to the completion of these projects is community concern regarding airport environmental impacts (4). Airport operations involve a range of activities that affect the environment, including

- the operation of aircraft;
- the operation of airport and passenger vehicles, and airport ground service equipment (GSE);
- cleaning and maintenance of aircraft, GSE, and motor vehicles;
- deicing and anti-icing of aircraft and airfields;
- refueling and fuel storage of aircraft and vehicles;
- airport facility operations and maintenance; and
- construction.

4.1 Air emissions/quality

The effects of airports and aircraft on air quality are complex and controversial - effects not only occur in areas immediately surrounding airports but also occur on a regional and global level. Not only do emissions from airports and aircraft affect air quality in areas immediately surrounding airports, but aircraft exhaust is also emitted in the upper atmosphere during flight. Emission sources at airports typically include the following: aircraft emissions, an auxiliary power unit (APU), ground support equipment, construction emission sources, stationary sources.

An assessment of air quality effects at an airport needs to consider all of these factors. The vast number and types of activities that can affect air quality make understanding and properly characterizing these effects a complex and challenging process (1).

4.2 Biodiversity and natural resources

Airport development has a physical, direct effect on the environment through the construction of airfield, landside, and support facilities. While airport development may occur on previously disturbed land, some development also occurs on undisturbed, natural lands, particularly at airports located outside of urban areas. Biodiversity and natural resource impacts (effects to flora, fauna, endangered species, ecosystems, and natural habitats) can occur if sensitive species or habitats occur adjacent to or on airport property or if they exist underneath flight paths and are sensitive to aircraft noise. Some airports may also contain sensitive species or habitat within their property boundaries.

This can occur because airports contain relatively large land areas and because past actions by others may have led to habitat destruction or fragmentation in areas surrounding the airport. Thus, the best habitat for a species may exist on airport property and can result in airports containing isolated populations of sensitive species or habitat.

In these instances, almost any airport development may affect biodiversity and natural

resources, requiring extensive coordination with the responsible natural resource agencies (1).

4.3 Historic, archaeological, architectural, and cultural resources

Historic resources are places where events of local, regional, or national historic significance occurred, places associated with figures of historic importance, or structures that are representative of particular periods of history and are maintained in a setting that replicates that time period. Archaeological resources are artifacts, remnants, or fossils that provide information about habitats, settlements, cultures, or flora and fauna that existed in the distant past. Architectural resources are structures that are identified as being architecturally significant because they are unique or are good examples of specific architectural styles or of structures designed and built by noted architects. Cultural resources are places, artefacts, or remnants that hold cultural significance to specific tribes, ethnic groups, or religious groups.

Airport development and operation can affect historic, archaeological, architectural, or cultural resources in a number of ways. Direct impacts occur when airport development physically disturbs, displaces, or destroys these resources. Indirect impacts can occur from aircraft noise or visual impacts, which can disturb the enjoyment or experience of historic or cultural resources (1).

4.4. Noise and land use

Aircraft noise originates from both the engines and the airframe of an aircraft, but the engines are by far the more significant source of noise. Meteorological conditions affect the propagation (or transmission) of sound through the air. Wind speed and direction and the temperature immediately above ground level cause diffraction and displacement of sound waves. Humidity and temperature materially affect propagation of air-to-ground sound through absorption associated with the instability and viscosity of the air.

Effects of noise exposure can include sleep disturbance, interruption or interference with speech and communication, adverse academic performance, induced stress and stress-related illnesses, and annoyance. Because noise effects can be intrusive and the reaction to and perception of noise varies from person to person, it remains challenging for airports and airlines to develop and implement techniques that mitigate all noise effects (1).

4.5 Social and socioeconomic resources

The effects of airports on social and socioeconomic resources can be both positive and negative. Large commercial airports provide employment for a large number of people, including airport

management and maintenance staff, airline staff, fire-fighting personnel, security personnel, air traffic controllers, passenger and baggage screening personnel, and baggage handlers. In addition to direct employment generated by airports, indirect employment results from providing services to passengers, including car rentals, food vendors, taxi-cab drivers, hotel staff, restaurant staff, and gift and news shop vendors. When combined together, airports can have a significant economic impact on the surrounding region through the expenditures and tax revenue generated by employees and passengers. Some of the negative social and socioeconomic effects of airports can include displacement of homes and businesses, community disruption including effects on planned development, increased traffic congestion, risks to human health, and environmental justice concerns. The displacement of homes and businesses can occur with construction of new airports, expansion of existing airports, or efforts to mitigate significant noise impacts. Airports require a considerable amount of land to accommodate safely and efficiently runways and other infrastructure. Because airports represent significant investments by both the community and the government and these investments are closely tied to the economic well-being of a community or region, airport development or expansion needed to maintain the economic health of the airport may require the acquisition and relocation of nearby properties, including homes or businesses.

When airport development includes land acquisition and relocation, the overall effect on the community must be considered. Airport development can disrupt a community if a significant portion of a neighbourhood or community would be relocated or if the neighbourhood or community would be bisected by airport development. In these cases, an airport may be required to provide additional assistance to the homes and businesses that may not be directly affected by the project but would experience loss of community or may not be able to continue operating as a business due to the severity of impact. Airport development can also affect planned development if it prevents development from occurring as planned by the local planning agency. Other common negative effects of land acquisition programs are landlocked parcels (cutting off access to property), severed parcels (acquiring a portion of property that cuts it off from adjacent property owned by the same landowner), and uneconomical remnants (acquiring only the portion of property needed for development and leaving a piece that has no economic value to the landowner).

Airports also generate considerable amounts of vehicular traffic. Access trips by airline passengers, employees, suppliers, and cargo operators all can contribute to surface traffic volumes that may cause congestion on area intersections and roadways.

Projects that increase airport capacity can increase roadway congestion, interfere with existing traffic patterns, reduce the level of service of area intersections and roadways, route construction traffic

through residential areas, or have other negative effects on surface transportation. Consideration must be given to providing sufficient roadway capacity to accommodate increased airport traffic, reduce congestion, maintain the level of service on area intersections and roadways, and minimize construction traffic effects when planning and implementing airport projects (1).

4.6 Waste management

Waste management at airports includes consideration of both solid and hazardous waste. Solid waste is generated at airports during construction (demolition and construction debris), operation (passengers in the terminal and on airplanes), and maintenance activities (landscape debris, light bulbs, etc.). Hazardous waste can be present at airports due to aircraft fueling, aircraft maintenance (if present), rental car maintenance (waste oil), emergency generators, and other activities. Hazardous waste may also be present at an airport due to past activities that may have contaminated soil or water or because hazardous waste is being transported by plane or vehicle onto airport property. Environmental concerns related to solid waste include the volume of waste generated requiring disposal in area landfills and the location of landfills in relation to runways and flight paths. Many airports have active recycling and reuse programs aimed at reducing the amount of solid waste generated and transported to landfills (1).

4.7 Water resources

Airport construction and operation can directly and indirectly affect water resources through physical impacts to surface waters (such as streams, rivers, and lakes) or wetlands, through impacts to the quality of surface waters and groundwater, and through increases in storm water quantity. Direct, physical impacts to surface waters and wetlands occur when airport facilities are located such that they disrupt water movement through the placement of fill in a water body or through dredging.

During planning, consideration to avoiding the impact to a surface water or wetland should be considered, and if avoidance is not possible, consideration of minimizing the impact should be given. If development does directly affect a water resource, mitigation of the impact, such as improvements to wetland resources elsewhere, may be required. Impact to water quality is the most common water resource issue facing airports during construction and operation. Water quality effects typically result from impairing the quality of storm water runoff by increasing its load of contaminants.

During construction, removal of natural ground cover and other airport construction practices can result in soil erosion and sedimentation entering the storm water runoff and receiving water bodies. An increase in the sediment load in storm water runoff not only can lead to clogged drainage structures and flooding but also is

detrimental to biological activity, because it filters out light and covers the bottom of lakes and streams, which affects habitats supporting fish and plant species.

Storm water runoff can be affected by airport operations such as the use of chemicals for snow and ice removal, accidental fuel and oil spills on the aprons, and the discharge of fire-fighting foam used for aircraft emergencies. Wastes associated with the refueling, operation, and cleaning of aircraft may also be carried to nearby lakes and streams through the storm drainage system. Fuel spills and leaks, oil and grease deposits, and harsh cleaning detergents can be serious sources of water pollution unless such wastes are collected and treated. Other operational activities at an airport can affect water quality through contaminants in storm water runoff such as major aircraft overhaul activities that use toxic chemicals to remove paint and clean and re-chrome engine parts and other light-industrial-type activities (1).

5 CONCLUSION

The environmental impacts of aviation, in particular those related to community noise, air quality, and climate change, have become increasingly important over the last 50 years. Many options exist for mitigating these impacts, including aircraft and engine technologies, advances in air traffic management and operational procedures, alternative fuels, and government policies. However, in choosing among these options, it is important that we make good decisions (7). Airports are a critical component of the complex international aviation system that supports the movement of passengers and goods. In providing these essential services, airport operations and air travel have the potential to adversely affect the environment. As the demand for air travel continues to grow, without careful planning, those impacts are likely to increase.

Even though much of aviation's environmental impact occurs during flight and is outside an airport's control, the industry is working to better understand and mitigate impacts to the natural environment and local communities. Airports have identified projects and programs that not only minimize the impact of those activities within their control, but also help to reduce the impact of other sources such as aircraft, ground support equipment, and ground access vehicles (8).

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AUTHORS' ADDRESSES

Daneshjo Naqib, Doc., Ing., PhD.
Faculty of Aeronautics
Technical University of Košice
Rampová 7, 041 21 Košice, Slovakia
e-mail: naqib.daneshjo@tuke.sk

Zvijáková Lenka, Ing.
Technical University of Košice
Faculty of civil engineering
Department of Environmental Engineering
Vysokoškolská 4, 042 00, Košice, Slovakia
e-mail: lenka.zvijakova@tuke.sk

Baryalai Tahzib, Ing.
Technical University of Košice
Faculty of civil engineering
Department of Environmental Engineering
Vysokoškolská 4, 042 00, Košice, Slovakia
e-mail: Baryalai.tahzib@tuke.sk