

Airports *and the* Environment

Impacts and Improvements



*Transportation Infrastructure
Roads, Highways, Bridges,
Airports and Mass Transit*

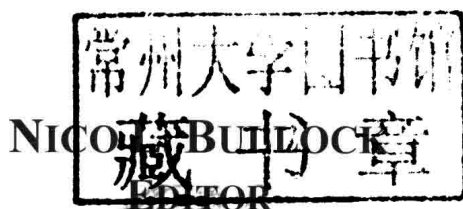
Nico L. Bullock
Editor

NOVA

TRANSPORTATION INFRASTRUCTURE - ROADS, HIGHWAYS, BRIDGES,
AIRPORTS AND MASS TRANSIT

AIRPORTS AND THE ENVIRONMENT

IMPACTS AND IMPROVEMENTS



 **nova**
publishers
New York

Copyright © 2013 by Nova Science Publishers, Inc.

All rights reserved. No part of this book may be reproduced, stored in a retrieval system or transmitted in any form or by any means: electronic, electrostatic, magnetic, tape, mechanical photocopying, recording or otherwise without the written permission of the Publisher.

For permission to use material from this book please contact us:
Telephone 631-231-7269; Fax 631-231-8175
Web Site: <http://www.novapublishers.com>

NOTICE TO THE READER

The Publisher has taken reasonable care in the preparation of this book, but makes no expressed or implied warranty of any kind and assumes no responsibility for any errors or omissions. No liability is assumed for incidental or consequential damages in connection with or arising out of information contained in this book. The Publisher shall not be liable for any special, consequential, or exemplary damages resulting, in whole or in part, from the readers' use of, or reliance upon, this material. Any parts of this book based on government reports are so indicated and copyright is claimed for those parts to the extent applicable to compilations of such works.

Independent verification should be sought for any data, advice or recommendations contained in this book. In addition, no responsibility is assumed by the publisher for any injury and/or damage to persons or property arising from any methods, products, instructions, ideas or otherwise contained in this publication.

This publication is designed to provide accurate and authoritative information with regard to the subject matter covered herein. It is sold with the clear understanding that the Publisher is not engaged in rendering legal or any other professional services. If legal or any other expert assistance is required, the services of a competent person should be sought.
FROM A DECLARATION OF PARTICIPANTS JOINTLY ADOPTED BY A COMMITTEE OF THE AMERICAN BAR ASSOCIATION AND A COMMITTEE OF PUBLISHERS.

Additional color graphics may be available in the e-book version of this book.

Library of Congress Cataloging-in-Publication Data

ISBN: 978-1-62417-225-0

Published by Nova Science Publishers, Inc. † New York

**TRANSPORTATION INFRASTRUCTURE - ROADS, HIGHWAYS, BRIDGES,
AIRPORTS AND MASS TRANSIT**

**AIRPORTS AND THE
ENVIRONMENT**

IMPACTS AND IMPROVEMENTS

TRANSPORTATION INFRASTRUCTURE - ROADS, HIGHWAYS, BRIDGES, AIRPORTS AND MASS TRANSIT

Additional books in this series can be found on Nova's website
under the Series tab.

Additional e-books in this series can be found on Nova's website
under the E-book tab.

ENVIRONMENTAL HEALTH - PHYSICAL, CHEMICAL AND BIOLOGICAL FACTORS

Additional books in this series can be found on Nova's website
under the Series tab.

Additional e-books in this series can be found on Nova's website
under the E-book tab.

PREFACE

Balancing the capacity enhancing needs of the national airspace system with the need to protect the environment can be challenging. The FAA estimates that the annual number of passengers traveling by air in the United States will grow from 750 million in 2012 to over 1 billion by 2023. It also forecasts a corresponding 20 percent increase in the number of flights, which could add to existing flight delays and air traffic congestion. Even while the aviation system has grown and continues to grow, airports have sought to limit the environmental impacts generated by their construction and operations--such as noise, water, air, and waste pollution--in part, to meet applicable legal requirements. However, airports' environmental impacts have been a source of friction with neighboring communities. This book addresses the actions that airports have taken to reduce the environmental impacts of airport operations and development; and the strategies they can adopt to mitigate delays in implementing capital projects and operational changes.

Chapter 1 - The Federal Aviation Administration (FAA) estimates that the number of flights in the United States will increase 20 percent by 2024. It also has identified numerous airports that will need to expand to handle more flights. However, increasing airport capacity and operations poses potentially significant impacts on the environment and quality of life for surrounding communities.

This chapter addresses (1) airports' actions to reduce their environmental impacts, (2) the extent airports believe environmental issues delay development or operational changes, and (3) the strategies airports can adopt to address environmental issues. GAO reviewed pertinent federal laws and regulations; interviewed airport officials, state and local regulatory agencies, metropolitan planning organizations, and community groups for 10 selected

airports, as well as federal officials and national industry and advocacy groups; and surveyed the 150 busiest airports as measured by the number of operations. This chapter does not contain recommendations. A draft was provided to the Department of Transportation, the Environmental Protection Agency, and two organizations representing airports and airport officials. GAO incorporated technical clarifications they provided as appropriate.

Chapter 2 - The Federal Aviation Administration (FAA) predicts that air traffic in the United States will increase 20 percent by 2024. If not mitigated, the noise associated with these flights could significantly diminish the quality of life for communities surrounding airports and constrain an airport's ability to expand. Over the last 30 years, Congress has provided billions of dollars in grants under the Airport Improvement Program to airports to reduce and mitigate significant noise exposure. FAA's overall strategic noise goal is to reduce the population exposed to significant noise to fewer than 300,000 people nationwide.

At your request, GAO (1) described how airport noise exposure has changed, (2) evaluated noise grant results, and (3) assessed potential future demand for these grants. GAO analyzed FAA data on noise grants, planned projects, and population exposure and reviewed relevant literature. GAO also conducted interviews with relevant airport and FAA officials and industry representatives, as well as visited seven airports that have used noise grants, judgmentally selected based on size, location, and other factors.

CONTENTS

Preface		vii
Chapter 1	Aviation and the Environment: Systematically Addressing Environmental Impacts and Community Concerns Can Help Airports Reduce Project Delays <i>United States Government Accountability Office</i>	1
Chapter 2	Airport Noise Grants: FAA Needs to Better Ensure Project Eligibility and Improve Strategic Goal and Performance Measures <i>United States Government Accountability Office</i>	55
Index		97

Chapter 1

**AVIATION AND THE ENVIRONMENT:
SYSTEMATICALLY ADDRESSING
ENVIRONMENTAL IMPACTS AND
COMMUNITY CONCERNS CAN HELP
AIRPORTS REDUCE PROJECT DELAYS***

United States Government Accountability Office

WHY GAO DID THIS STUDY

The Federal Aviation Administration (FAA) estimates that the number of flights in the United States will increase 20 percent by 2024. It also has identified numerous airports that will need to expand to handle more flights. However, increasing airport capacity and operations poses potentially significant impacts on the environment and quality of life for surrounding communities.

This chapter addresses (1) airports' actions to reduce their environmental impacts, (2) the extent airports believe environmental issues delay development or operational changes, and (3) the strategies airports can adopt to address environmental issues. GAO reviewed pertinent federal laws and regulations; interviewed airport officials, state and local regulatory agencies,

* This is an edited, reformatted and augmented version of the Highlights of GAO-10-50, a report to Congressional Requesters, dated September 2010.

metropolitan planning organizations, and community groups for 10 selected airports, as well as federal officials and national industry and advocacy groups; and surveyed the 150 busiest airports as measured by the number of operations. This chapter does not contain recommendations. A draft was provided to the Department of Transportation, the Environmental Protection Agency, and two organizations representing airports and airport officials. GAO incorporated technical clarifications they provided as appropriate.

WHAT GAO FOUND

Almost all the airports GAO surveyed took some actions to address their environmental impacts in four key areas: reducing noise levels, controlling water pollution, reducing emissions, and using environmentally sustainable practices. These include voluntary actions, such as asking pilots and controllers to use aircraft operational procedures that lower noise levels, as well as actions required by federal and state laws, such as in the areas of controlling water and air pollution. Larger airports, which can have more environmental impacts, were more likely than other surveyed airports to take a wider range of actions, such as soundproofing homes or installing loading bridges that supply aircraft with electric power to lower engine usage and emissions. Finally, GAO found that airports were moving toward a more holistic approach to environmental management, including following environmentally sustainable standards and implementing an Environmental Management System (EMS).

Less than half of the surveyed airports believe that addressing environmental issues somewhat or greatly delayed a development project (35 percent) or operational change (42 percent) at their airport over the last 5 years, even though the vast majority had undertaken a capital development project or operational change during this time period. Both the reported delay and the extent and significance of delay were determined by the responding airport. Less than half similarly believe that addressing environmental issues will cause delays in the next 5 years. More airports reported that they had been somewhat delayed than greatly delayed. Larger airports were somewhat less likely than all surveyed airports to believe that addressing environmental issues will cause a delay in development projects (30 percent) or operational changes (36 percent). Addressing water issues and noise issues was the most commonly cited environmental issue that led to delay in implementing development projects and operational changes, respectively.

A number of airports have adopted strategies to systematically address environmental impacts and community concerns, which can help both mitigate environmental impacts and anticipate and reduce problems with communities and other stakeholders that can lead to delays. Airports are integrating environmental considerations into their planning process, including 7 of the 10 airports GAO visited. Some airports are also finding success in streamlining the federal environmental review process and in integrating their EMS processes with the federal environmental review process. Finally, effective community outreach that solicits stakeholder input, fosters interactive communication with local communities, and evaluates its outreach efforts can help airports better anticipate and deal with community opposition.

ABBREVIATIONS

ACRP	Airport Cooperative Research Program
ACI-NA	Airports Council International – North America
AIP	Airport Improvement Program
ANCA	Airport Noise and Capacity Act
ASNA	Aviation Safety and Noise Abatement Act
ATC	Air Traffic Control
AAAE	American Association of Airport Executives
CAA	Clean Air Act
CAEP	Committee on Aviation Environmental Protection
CDA	Continuous Descent Approach
CEQ	Council on Environmental Quality
CFEMS	Compliance-Focused Environmental Management System
CFR	Code of Federal Regulations
CNEL	Community Noise Equivalent Level
CO	carbon monoxide
CWA	Clean Water Act
DNL	day-night level
DOE	Department of Energy
DOT	Department of Transportation
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration

FACT 2	Future Airport Capacity Task 2
GHG	greenhouse gas
GSE	ground support equipment
HAP	hazardous air pollutants
ICAO	International Civil Aviation Organization
ISO	International Organization for Standardization
JPDO	Joint Planning and Development Office
LED	light-emitting diode
LEED	Leadership in Energy and Environmental Design
Leq	Equivalent Sound Level
Lmax	Maximum Sound Level
MPO	Metropolitan Planning Organization
NAS	National Airspace System
NEPA	National Environmental Policy Act
NextGen	Next Generation Air Transportation System
NOx	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
OEP	Operational Evolution Partnership
Pb	lead
PFC	passenger facility charge
PM	particulate matter
RNP	Required Navigation Performance
SAM	Sustainable Airport Manual
SEL	Sound Exposure Level
SIP	State Implementation Plan
SOx	sulfur oxide
TRB	Transportation Research Board
USGBC	U.S. Green Building Council
VALE	Voluntary Airport Low Emissions

September 13, 2010

The Honorable Gabrielle Giffords
Chairman

The Honorable Pete Olson
Ranking Member

Subcommittee on Space and Aeronautics
Committee on Science and Technology
House of Representatives

The Honorable Jerry F. Costello
Chairman
The Honorable Thomas Petri
Ranking Member
Subcommittee on Aviation
Committee on Transportation and Infrastructure
House of Representatives

The Honorable Mark Udall
United States Senate

Balancing the capacity enhancing needs of the national airspace system (NAS) with the need to protect the environment can be challenging. The Federal Aviation Administration (FAA) estimates that the annual number of passengers traveling by air in the United States will grow from 750 million in 2012 to over 1 billion by 2023. It also forecasts a corresponding 20 percent increase in the number of flights, which could add to existing flight delays and air traffic congestion. We and others have reported that both the NAS and airport capacity will need to expand to handle the projected increase in traffic.¹ Even while the aviation system has grown and continues to grow, airports have sought to limit the environmental impacts generated by their construction and operations—such as noise, water, air, and waste pollution—in part, to meet applicable legal requirements. However, airports’ environmental impacts have been a source of friction with neighboring communities. As we have previously reported, community opposition due to concerns about aviation noise and other environmental impacts can arise during the public outreach required by federal law when federally-funded airport expansion projects are proposed and can contribute to project delays at some airports.² We have previously reported that new runway construction from initial planning to completion takes a median of 10 years, but delays from lawsuits or addressing environmental issues can add an additional 4 years to the median time.³ The Joint Planning and Development Office’s (JPDO) 2007 Concept of Operations document also projected that, based on current operational trends, environmental impacts, particularly noise, will be the primary constraint on the capacity and flexibility of the Next Generation Air Transportation System (NextGen) unless these impacts are managed and mitigated.

FAA is undertaking several efforts to ensure the safety and efficiency of the NAS, including NextGen—the transformation of the air transportation system by 2025 from the current radar-based system, into a more automated

aircraft-centered, satellite-based system. FAA has also undertaken several airspace redesign efforts, including those in the New York/New Jersey/Philadelphia airspace, and Florida's West Coast airspace that will result in changes in aircraft flight paths around airports there. Both efforts are intended to increase efficiency and reduce delays, and are expected to produce substantial environmental benefits, such as reducing emissions growth and decreasing aircraft noise. Their success depends in part on changes to operational procedures undertaken by aircraft during their arrival and departure and airport expansion and improvement projects. According to FAA, environmental and energy issues, such as noise levels in communities surrounding airports, will also significantly influence the future capacity and flexibility of the NAS.⁴

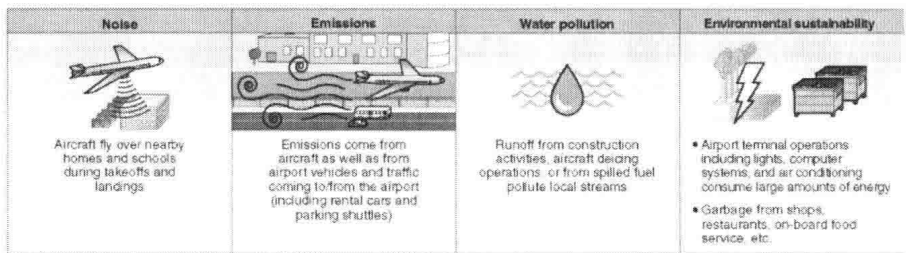
FAA has identified 35 of the busiest U.S. commercial airports as providing critical services to the NAS either in terms of passengers, cargo, or as connecting airports and which may require additional capacity. These 35 airports are known as Operational Evolution Partnership (OEP) airports.⁵ More than 70 percent of U.S. passengers travel through OEP airports. FAA has also identified 27 airports that it forecasts will be significantly congested by 2025 if currently planned improvements—such as new or extended runways, airspace redesign, and some NextGen improvements (e.g., reduced separation requirements for arrivals and departures)—do not occur at Future Airport Capacity Task 2 (FACT 2) airports.⁶ Nineteen of the 27 FACT 2 airports are OEP airports, and all but 1 of the OEP and FACT 2 airports are among the nation's 66 large and medium hub airports.⁷ Large and medium hub airports are referred to as larger airports throughout this chapter. We previously found that larger airports are best able to fund capital development projects.⁸

Given that successfully reducing airports' environmental impacts is critical to maximizing airport capacity, you asked that we update our work on airports' actions to address their environmental impacts. This chapter addresses (1) the actions that airports have taken to reduce environmental impacts of airport operations and development, (2) the extent to which airports believe that environmental issues have or will delay capital projects or operational changes, and (3) the strategies airports can adopt to mitigate delays in implementing capital projects and operational changes and address environmental issues.

To answer our three objectives, we conducted a Web-based survey of knowledgeable officials from the 150 busiest U.S. airports, which include commercial airports and general aviation airports.⁹ The full survey and

responses are contained in a separate e-supplement GAO-10-748SP . Of surveyed airports, 141 airports (94 percent) responded, including 63 of 66 larger airports—which include all 35 OEP airports and 26 of 27 FACT 2 airports¹⁰—12 small hubs, 15 non-hubs, and 51 general aviation airports.¹¹ Large and medium hub airports account for about 90 percent of U.S. passengers, 35 percent of operations, and are key to the efficiency of the NAS and have the greatest resources to fund projects, including capital development projects. To determine whether there were any differences in the environmental actions taken by, and perspectives of, these larger airports, we compared the survey results from large and medium hub airports to the data from airports in our survey. We administered our survey only to airport officials. We also interviewed officials from 10 airports, including Chicago O'Hare International Airport in Illinois; Long Beach/Daugherty Field and Los Angeles International Airports in California; Naples Municipal, Palm Beach International, and Southwest Florida International Airports in Florida; John F. Kennedy International Airport in New York; Philadelphia International Airport in Pennsylvania; Portland International Airport in Oregon; and Seattle-Tacoma International Airport in Washington. We selected these airports to include airports that have one or more of the following characteristics: have undertaken efforts to become “green” or more environmentally sustainable; have been identified through FAA’s OEP or FACT 2 as needing additional capacity; have community groups involved in environmental issues or have taken steps to reach out to such groups; are in nonattainment areas for identified criteria pollutants;¹² and are located in various regions of the country. See appendix II for a list of the airports that we visited or responded to our survey.

Additionally, we interviewed FAA representatives from headquarters and 5 regional offices; officials from 6 regional EPA offices and 12 relevant state and local environmental regulatory agencies; and 3 aviation environmental experts. We also interviewed representatives from 7 metropolitan planning organizations, 2 environmental advocacy groups, and 10 community groups. We also reviewed literature to determine leading practices in stakeholder and community involvement in environmental issues, notably our past reports, as well as those of the Airport Cooperative Research Program (ACRP), which is sponsored by FAA and managed by the Transportation Research Board (TRB), a unit of the National Research Council within the National Academy of Sciences. Additional information on our scope and methodology appears in appendix I.



Source: GAO.

Figure 1. Examples of Possible Airport Environmental Effects.

We conducted this performance audit from January 2008 through September 2010 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

BACKGROUND

Airports can affect the environment in a number of ways (see figure 1).¹³

- **Noise:** Airports can be a significant source of noise for surrounding communities, particularly from aircraft takeoffs and landings. The impact of aviation noise is usually analyzed in terms of the extent to which noise annoys people by interfering with their normal activities, such as sleep, relaxation, speech, telephone conversations, television viewing, and school. The generally accepted model for assessing the cumulative effects of airport noise exposure is the Integrated Noise Model. FAA requires use of the model, or an FAA approved equivalent, to predict noise levels for its Part 150 noise compatibility programs, which provide federal funding under the Airport Improvement Program (AIP) to airport sponsors that volunteer to mitigate present and future noise impacts.¹⁴ FAA also requires use of the model for environmental analyses to meet requirements under the National Environmental Policy Act of 1969 (NEPA).¹⁵ Among other functions, the model provides a correlation of the day-night level

(DNL)¹⁶ to the percentage of population highly annoyed by recurring noise sound events. For NEPA purposes, FAA defines a significant aviation noise impact as a DNL 1.5-decibel increase occurring over noise sensitive land uses located at or above a 65-decibel day night level (DNL 65 dB). Perceptions of aviation noise vary from one individual to another, and, as a result, even comparatively low levels of noise exposure can be annoying to some individuals. The Airport Noise and Capacity Act of 1990 (ANCA)¹⁷ required the retirement or modification of older, noisier jet aircraft that could not meet FAA noise standards, and this requirement was enabled by technological advancements to jet aircraft.¹⁸ According to FAA, this contributed to reducing the number of people exposed to significant aviation noise levels by more than a third from 2000 to 2006. Local government decisions that allow communities to expand land uses that are noise sensitive near airports may, however, erode some of the noise reduction gains, according to a 2004 FAA report to Congress.¹⁹ In addition, future increases in air traffic and changes in aircraft flight paths, which can expose neighborhoods to aircraft noise that had not been previously exposed to it or that concentrate more flights on some existing flight paths, could lead to more noise complaints from the community.

- **Emissions:** Aviation-related activities produce about 3 percent of total U.S. greenhouse gas (GHG) emissions and less than 1 percent of air pollutant concentrations nationwide, but these concentrations are expected to increase with forecasted growth in the aviation sector, according to FAA. According to the EPA, in areas with busy airports, aircraft contribute a larger amount of total mobile source emissions.²⁰ Aircraft are a significant source of airport emissions (e.g., idling at the gate, taxiing, takeoffs, and landings).²¹ Airport ground support equipment and passenger vehicles, as well as various stationary sources located on airport grounds, such as boilers, emergency generators, and incinerators, also produce emissions. Together, these sources emit nitrogen oxides and volatile organic compounds, which lead to the formation of ground-level ozone (that is, smog) and other substances that contribute to local air pollution, as well as carbon dioxide and other GHGs that rise into the atmosphere and contribute to climate change. These pollutants can also affect the quality of human life and health. For example, according to a National Research Council panel, ozone can aggravate respiratory ailments, and even