

DEVELOPING AN ENVIRONMENTAL ASSESSMENT REPORT FOR A REGIONAL AIRPORT-INDUSTRIAL COMPLEX

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Complex projects such as regional airport development require early consideration of potential environmental impacts and a comprehensive environmental impact assessment report. Environmental impact assessment reports prepared by the proponent of the proposed airport should be constructed so that the final environmental impact statement can be developed by adding sections that cover specific steps in the planning process. These sections would describe potential environmental impacts of an airport on economics, air pollution, water pollution, noise pollution, solid waste, displacement of families and businesses, and the natural environment. This paper describes the environmental assessment process and the local, state, and federal review procedures that prepare the environmental assessment impact report for its acceptance as an environmental impact statement.

*THE NATIONAL Environmental Policy Act of 1969 clearly stipulates that environmental planning shall occur in the early stages of proposed projects. Complex projects such as regional airport development require not only an early consideration of potential environmental impacts but also a comprehensive environmental impact assessment report (the initial resource document that compiles information and covers reference documents). This report is prepared by the proponent of a proposed airport or by an organization selected by the proponent. Environmental impact assessment reports should be constructed so that the final environmental impact statement can be developed by adding sections covering specific stages of the planning process as information is reviewed. This add-on process reflects the review process and permits officials to resolve issues to be reviewed.

The environmental impact assessment report may be used as the supporting document to the draft environmental impact statement, which is the responsibility of a federal agency. The draft environmental impact statement is the document endorsed and distributed by the Federal Aviation Agency to other federal agencies for their review, comment, and coordination. Because the goal of the assessment report is to meet the requirements of the environmental impact statement, the basic outline shown below should be reviewed.

- I. Description of proposed action
 - A. Purpose of project
 - B. Location
 - C. Design
 - D. Time setting
 - E. Interrelationships with other projects or proposals
 - F. Development and population trends in the project area
 - G. Maps, photos, and artist sketches to depict the environmental setting

- II. Relationship of the proposed action to land use plans, policies, and controls
 - A. Description of proposed land use and development generated by the proposed airport
 - B. Discussion of conformities and conflicts of proposed land use with federal, state, and local land uses, controls, and policies
- III. Environmental impact of the proposed action
 - A. Description of primary (direct) and secondary (indirect) environmental impacts, both beneficial and adverse and short- and long-term
 - 1. Aircraft noise
 - 2. Air quality
 - 3. Water quality
 - 4. Solid waste
 - 5. Hydrology
 - 6. Conservation
 - B. Description of environmental control techniques
 - 1. Aircraft noise
 - 2. Air quality
 - 3. Water quality
 - 4. Solid waste
 - 5. Hydrology
 - 6. Conservation
- IV. Alternatives to the proposed action
 - A. Description of proposed alternatives
 - 1. Preliminary alternatives
 - 2. Do-nothing alternatives
 - 3. Three or 4 selected alternatives
 - B. Environmental differences among alternative sites
 - C. Design differences among proposed airport designs
 - D. Benefits and costs among alternatives
 - E. Method used to determine best course of action and reasons why proposed action was chosen
- V. Probable adverse environmental effects that cannot be avoided should the proposal be implemented
 - A. Description of adverse environmental impacts that cannot be reduced to accepted standards
 - B. Reasons for noncompliance with acceptable levels
 - C. Effects of adverse environmental impacts
 - D. Description of other adverse environmental impacts that will be mitigated
- VI. Relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity
 - A. Description of short-term environmental gains and losses
 - B. Description of long-term environmental gains and losses
 - C. Extent to which the proposed action forecloses future options
- VII. Irreversible and irretrievable commitments of resources that would be involved if the proposed action is implemented
- VIII. Discussion of what other interests and considerations of federal, state, and local policy are thought to offset the adverse environmental effects of the proposed action
 - A. Discussion of the other interests and considerations
 - B. Discussion of the extent to which the stated countervailing benefits could be realized by the proposed action and alternates.

Potential considerations in regional airport development include economics; air, water, and noise pollution; solid waste disposal; displacement of families and businesses; and disruption of the natural environment. The major economic impact is usually generation and focus of new employment in the area of the proposed airport. The major environmental impacts are the effects of aircraft noise (long term) and displacement of families (short term). Intermediate and minor impacts, depending on the immediate environment of the proposed site, include natural environment disruption, water and air pollution, solid waste disposal, and land use.

NOISE POLLUTION

Noise pollution is the most important environmental impact because of its far-reaching

and immediate effects on communities, residences, and activities within the aircraft noise area and because of possible long-term effects. Assistance in forecasting the impact of aircraft noise and determining affected noise areas is available from the U.S. Environmental Protection Agency (EPA) and the Federal Aviation Agency (FAA). Noise impact usually is determined by a rating technique that combines direct noise measurement and numerical values representing background noise levels, time of day, and residents' previous exposure to noise. The affected noise areas must then be studied to determine impacts on humans, structures, wildlife, domestic animals, cemeteries, outdoor theaters, schools, golf courses, hospitals, churches, historic sites, and other areas. Alternative sites may then be compared with respect to noise impact as a function of the number of activities, population, users of activities, and other recipients affected.

DISPLACEMENT OF FAMILIES, ACTIVITY CENTERS, AND BUSINESSES

A new airport usually displaces both persons and structures in the course of the acquisition of sufficient land for a construction site and an adequate noise buffer zone. Data gathered for noise pollution analysis can be used as base data in displacement analysis; however, compliance with Public Law 91-646, Uniform Relocation Assistance and Land Acquisition Policies Act of 1970, is required. Each airport site should be evaluated to determine not only the number of displaced persons and activities but also length of residence, density, home ownership, income, and related socioeconomic factors. The relocation impact study should compare alternatives on the basis of the required construction area (clear zone), noise impact area, and maximum potential relocation relative to the major sections of Public Law 91-646 defining relocation entitlements. The construction area is that area from which all persons must be relocated and properties must be cleared of all structures. The noise impact area is the area in which quality of life would be significantly derogated, and residents would wish to relocate. Maximum potential relocation includes all affected properties partially or wholly within the noise impact area and persons, structures, and other human-related elements contained on these properties. Both drive-through and questionnaire surveys (the latter with statistical sampling) should be used.

The cost of relocation is best defined as the cost of moving people and attendant socioeconomic organizations individually from an existing location to some other location. Cost estimating for relocation includes the following: moving expenses, relocation allowance, replacement housing, mortgage interest differential, mortgage and title insurance, closing costs, incidental expenses, rent differential, down-payment assistance, and administrative costs. Cost estimates of relocation and relocation impacts per se then may be compared to those for alternative sites. The cost of cemetery relocation usually is based only on those graves within the construction clear zone. Relocation of graves is a highly sensitive matter and normally it is avoided whenever possible.

LAND USE IMPACT

The relationship of the proposed action to land use plans, policies, and controls in the affected area should be described in detail. This requires a working relationship with federal, state, and local land use planning agencies and a thorough evaluation of how the proposed action may conflict with existing and future land use. Population projections and development trends for the immediate area of the proposed airport should be reviewed by these agencies; their comments should be included in the assessment report.

NATURAL ENVIRONMENT DISRUPTION

Natural environment data in the areas of hydrology, geology, physiography, vegetation, wildlife, and agricultural capability should be inventoried for each site and its environs. The report should include not only a detailed inventory of the natural environment factors but also an evaluation of the impact airport construction would have on the natural environment. Long-term natural environmental effects also must be considered.

WATER POLLUTION

The problem of water quality degradation in the area may arise during airport construction and operation. Difficulties should be anticipated and solutions should be developed during planning because the expense of remodeling a water system after construction is quite high.

Potential water quality impacts will be most pronounced on the airport site itself, but some impact will occur in surrounding areas. The 4 major factors contributing to degradation of water quality are physical structure of the airport, construction, facility operations, and induced development. The airport's physical structure includes runways, roads, and terminals. The structure may cover land that has never before been covered by construction materials, concrete, or blacktop. Because construction materials are not as porous as the soil, they will allow increased water runoff to receiving streams. This surface runoff increase coupled with a decrease in the time of concentration will cause larger peak flows of surface water over shorter time spans. Physical factors may cause changes in groundwater flow patterns, which influence salinity and stagnation of water. Therefore, great effort must be made to avoid sealing important groundwater supplies from recharge or changing the quality of water being recharged. Construction practices can easily cause a change in water quality if proper care is not taken as the land is stripped of its natural cover and construction wastes are produced. In clearing for pavement surfacing, building, and grading, the potential for increases in erosion and sediment volumes in streams will become greater. Increased sediment loads can clog waterways, which results in flooding problems, loss of capacity in reservoirs, adverse aesthetic conditions, and changes in the biological makeup of the stream.

Construction wastes such as wash water for concrete and aggregates that carry high levels of sediment and chemicals and sanitary wastes from construction personnel can find their way into the local groundwater supply and thus pollute it. Therefore, all construction wastes must be disposed of properly.

Operation of the airport facilities will generate wastewater that must be treated. The sources of wastewater will be sanitary sewage, aircraft-handling wastes, pollution of storm water, and industrial wastes. Sanitary wastes are the product of passenger services, which use large volumes of water for drinking, food preparation, washing, and toilets. A reasonably accurate estimate of water use is 20 gal (75.7 liters) per passenger per day, plus 10 gal (37.9 liters) per visitor. Of this, approximately 90 percent will be returned to the sewage system. Water requirements that are associated with aircraft handling are estimated to be 100 gal (378.5 liters) per employee per day. The return factor on this operation is 80 to 90 percent. Aircraft-handling water use is limited mainly to cleaning—washing the aircraft, fuel storage facilities, hangars, and maintenance areas. Therefore, the water contaminants are gasoline, oil, grease, dirt, solvents, and detergents.

Pollution from storm water includes actual storm water plus substances collected on the apron, taxiway, and runway. Storm drains will have to be installed to collect water runoff. Contaminants to be expected in storm water are

1. Concentrated, homogenized, colloidal suspension of hydrolyzed proteins with stabilizers and metallic salts from fire-fighting foam;
2. Fuel and oil from random spills;

3. Chemicals such as chlorides or hot sand from reduction of ice in winter;
4. Herbicides and pesticides; and
5. Air pollutants removed by rainfall.

In major aircraft overhauls, the following 3 operations take place that produce 3 entirely different pollutants:

1. Cleaning of engine parts with cyanide-based compounds,
2. Rechroming of engine parts, and
3. Cleaning and stripping of aircraft paint and parts.

All of this type of waste must be chemically treated.

Induced development will take place that will add to the airport's water demand and sewage. The design of the sewer system must anticipate handling these wastes. The demand for water created by the airport and new developments will necessitate construction of new facilities for water purification and sewage treatment. Therefore, potential water pollution impact arising from sanitary, aircraft-related, storm-water, and industrial wastes must be detailed along with possible control techniques. An important aspect of this impact will be the determination of the assimilative capacities of receiving streams at or near each site and the degree of control required for point and nonpoint water pollution sources.

AIR POLLUTION

Concern about air pollution from aircraft surfaced in the late 1950s. The introduction of commercial turbine-engine aircraft with visible exhaust plumes and increased exhaust odors indicated that air pollution from aircraft contributed significantly to a community's general level of air pollution. Public complaints led to investigations and continuing study of aircraft air pollution. Section 231 of the Clean Air Amendments of 1970 directs the Environmental Protection Agency to study air pollution emissions from aircraft to determine the following:

1. The extent to which aircraft emissions affect air quality in a given air quality region (usually a standard metropolitan statistical area),
2. The technical feasibility of controlling such emissions, and
3. Emission standards and implementation schedules by class of aircraft.

Aircraft is not the only source of air pollution at airports. Automobiles, heating plants, fuel storage, and minor facilities are other sources of air pollution. However, automobiles are usually the only other major source at such facilities.

Although air quality standards pertaining to aircraft have not yet been made final by the EPA, airports must meet regional air quality standards. Determining the extent to which an airport affects air quality in a community includes total emission by mass, air quality monitoring, and mathematical dispersion models.

Air Pollution Sources

Within an airport's boundary, there are numerous air pollution sources that must be considered in an air quality analysis including aircraft, automobiles, aircraft fueling systems, gasoline-fueled ground service equipment, airport heating plant, fuel storage losses, and miscellaneous minor sources. The predominant sources of pollutants are the aircraft and the automobile.

Emissions

The major air pollutants generated at airports are particulate matter, carbon monoxide, photochemical oxidants, hydrocarbons, nitrogen oxides, and sulfur dioxide. Air pollution diffusion modeling uses mathematical equations to predict how a pollutant will disperse into the atmosphere. Models are used to determine concentrations of a pollutant at various distances from its source. The accuracy of a diffusion model depends on several factors such as accuracy of equations, number of factors taken into account, and accuracy of input data. Factors used in a detailed diffusion model are emission sources, meteorology, topography, and dispersion parameters. Accurate data on these factors are difficult and time consuming to obtain and correlate. The EPA has a detailed computer model that can be used for diffusion modeling.

SOLID WASTE

Solid waste quantities, types, handling, and disposal methods must be described to ensure compliance with federal, state, and local solid waste regulations. Solid waste is defined as any matter that is neither liquid nor gas and is discarded. An airport generates quantities of solid waste starting with construction and continuing through regular operation. Plans for handling this waste must be made before construction so that problems or hazards may be minimized. In planning for handling of solid waste, one must take 4 factors into consideration:

1. Quantity of solid waste,
2. Types of solid waste,
3. Present methods of handling solid waste at the site, and
4. Private contractors that handle solid waste.

A prediction of the quantity and types of solid waste a new airport development will generate is necessary to determine the magnitude of the problem and how it may be handled. The types of solid waste generated by an airport and associated facilities are construction waste, mixed garbage, rubbish, and light industrial and aircraft maintenance facilities waste. Construction wastes consist of unusable building materials and construction debris. These materials are typically concrete, blacktop, brick, wood and trees, and earth. The best method for disposing of these materials is the use of a landfill. Mixed garbage and rubbish, found in trash containers and restaurant garbage, consist of food wastes, paper, plastics, and metal. These are the dominant forms of airport solid waste. Light industry and aircraft maintenance facilities generate metal, paper, plastics, rubber, and any special wastes peculiar to a given industry. Miscellaneous solid wastes include street sweepings, abandoned cars, and sewage sludge. Maintenance of the grounds and buildings also will generate an appreciable amount of waste. If it is decided that the airport should have its own sewage treatment plant, then the sludge from it will become an airport solid waste problem.

At present, there are 3 ways to handle solid waste for proposed airport development—recycling, incineration, and landfilling. Recycling of materials is the best method from an environmental viewpoint although this method alone would not be economical. In the future, a regional effort may make this method feasible. Incineration is the burning of combustible solid waste. This method would not be acceptable near an airport because the stacks of an incinerator would be high enough to cause possible landing hazards, and incineration of the solid waste would add to the air pollution problem and reduce visibility. Sanitary landfilling means burial of solid waste by techniques that minimize public health and environmental problems. This method is the most feasible and economical way to handle solid waste where land values and population densities are not too high.

ECONOMICS

An integral part of expanding an airport or constructing a new facility is acquisition of a large tract of property for the site. Construction of a new airport will have a substantial impact on regional and state economies. This development will generate and focus new employment both on the site and off the site. Employment resulting from the airport development will provide not only new job opportunities but also a new major economic base for the regional economy. A major economic effect will be stimulation of construction and related industries. Materials and services required for construction will be purchased largely within the region.

To estimate the economic impact of the alternatives, one must compile varying sets of assumptions relative to land absorption, inflation rate for construction costs, effect of airport distance from center of user demand, and construction cost contingencies. Major input data are estimates of enplanements, construction costs, and buffer land development. From these input data direct employment, direct payroll, and direct tax yields may be derived.

From the direct industrial employment and an economic base multiplier developed specifically for the region, total induced employment may be determined to account for the additional jobs necessary to support industrial workers, including barbers, bankers, doctors, retail clerks, and other construction and industrial employees. This induced employment generates induced payroll and tax yields, which contribute to total tax yield for the region.

From an estimate of the scheduled site construction costs and information on the extent of federal reimbursements, total long-term debt requirements may be calculated to develop a long-term financing plan. The financing plan and a projection of enplanements and buffer land development are used to compute annual net revenues and cash reserves on hand at the end of each year. The extent of short-term debt and outside financial support also is determined for each year. In addition to data on construction costs, enplanements, and land absorption, other major inputs include

1. Short-term interest rates;
2. Outside revenues expected from the airport's operations;
3. Inflation rates for land values, construction costs, and operating revenues and expenses;
4. Effect of distance from the calculated center of user demand on enplanements and land prices;
5. Contingency to be applied to construction cost estimates;
6. Delay in obtaining federal reimbursements; and
7. Method used to derive operating revenues and expenses from the projection of enplanements.

Financial analysis of alternatives should be undertaken under the following sets of conditions for each site:

1. Those most financially detrimental,
2. Those most likely to occur, and
3. Those most financially beneficial.

PUBLIC PARTICIPATION

Public participation early in the planning process is necessary to ensure that the format of the environmental assessment includes all significant items. Public hearings, local and state reviews, presentations to interested groups and the news media, and evaluation of community attitudes all should be part of the data gathering process.

LOCAL AND STATE REVIEW PROCEDURES

Formal review begins at the local level. The vehicle for this review is the environmental assessment report. Early consultation with airport personnel is prudent and should include discussion of the following:

1. Action choices,
2. Key decision-making issues,
3. Alternatives,
4. Environmental assessment criteria,
5. Project schedule considerations,
6. Public involvement,
7. Proponent coordination,
8. Reproduction and publication requirements, and
9. Follow-up assistance.

Normally, review of airport development actions by state and local government organizations occurs through procedures set forth in the Office of Management and Budget (OMB) Circular A-95 (Revised). The purpose of the OMB A-95 clearinghouse process is to ensure that proposed federally assisted programs and projects are methodically scrutinized and evaluated in advance in terms of potential impact on or conflict with state or local planning or programs. Review of planning grants according to OMB A-95 under the Airport Act is limited to avoiding duplication (in the case of system plans) and determining consistency with other planning efforts in the area. This includes additional review as may be required by appropriate state, metropolitan, regional, or local agencies authorized to develop and enforce environmental standards. The burden of compliance with OMB A-95 rests with the sponsor, who must notify the appropriate clearinghouse of intent to seek a FAA grant. Included in the notification is a brief statement indicating whether a review of environmental impact is required and the nature and extent of such impact, if it can be anticipated. The comments and recommendations made by and through the clearinghouse become input to the environmental assessment the sponsor submits to the FAA with the request for federal assistance.

The OMB A-95 review involves 2 time periods, which may total a maximum of 60 days prior to submission of an environmental assessment to the FAA. After receipt of the initial project notification, the clearinghouse has 30 days to inform appropriate state and local agencies (including those authorized to develop and enforce environmental standards) of the proposed project. During this period, the clearinghouse may act as liaison between the affected agencies and the sponsor and arrange meetings and any other forms of consultation necessary to resolve problems raised by the proposed project. This is an excellent opportunity for agencies with environmental expertise to provide input to the environmental assessment. During the initial clearinghouse review period, the request for federal aid may be completed and the preliminary environmental assessment may be prepared. After the initial review, the clearinghouse may, if necessary, have an additional 30 days to review the completed request for aid and the environmental assessment and provide additional comments or recommendations on unresolved issues, if warranted. For more simple projects, the initial notification to the clearinghouse stating the anticipated environmental impact may serve as the environmental assessment.

FAA SUBMISSION

Upon completion of local and state review, a proposed draft environmental impact statement is prepared and submitted to the FAA. It should contain the environmental assessment report, comments and recommendations made by or through the A-95 clearinghouse, a detailed summary of environmental issues developed in public hearings, and responses to comments on the environmental assessment report. If the review process shows it to be inadequate, the report should be revised. Transcripts of public hearings

must be available, if requested by the FAA. The number of copies of documentation submitted to the FAA should be determined by consultation with that agency and should include a copy designated as a reproducible master.

EVALUATION OF ALTERNATIVES

Detailed evaluation of 3 or 4 feasible alternatives must include environmental assessment of all environmental factors as well as assessment of short-term, long-term, irreversible, and irretrievable impacts and public participation, comment, and review. The collection of data through the environmental assessment report to describe environmental impact adequately will assist in overall planning and understanding of selected alternatives.

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