ENVIRONMENTAL STUDIES BOARD

JAMAICA BAY AND KENNEDY AIRPORT

A MULTIDISCIPLINARY ENVIRONMENTAL STUDY

Volume I: Conclusions, Recommendations, Summary

A REPORT OF THE
JAMAICA BAY ENVIRONMENTAL STUDY GROUP

NATIONAL ACADEMY OF SCIENCES NATIONAL ACADEMY OF ENGINEERING
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Dr. Philip Handler, President, National Academy of Sciences
Mr. Clarence H. Linder, President, National Academy of Engineering
Washington, D.C.

Gentlemen:

I am pleased to forward to you Volume I of the report, *Jamaica Bay and Kennedy Airport: A Multidisciplinary Environmental Study,* prepared by the Jamaica Bay Environmental Study Group. This group was appointed by the Environmental Studies Board to evaluate the potential impacts of expansions of Kennedy Airport upon Jamaica Bay and its environs, pursuant to a request from the Port of New York Authority to the Board.

The Port of New York Authority, without in any way intruding upon the conduct of the study, provided indispensable data, time, resources, and personal energies in response to the needs of the Study Group. For these exceptional considerations, the Board is deeply grateful.

Volume I includes the conclusions and recommendations, and a summary report, of the Study Group, which have been reviewed and endorsed by the Environmental Studies Board. The Board recommends their publication, in view of their broad public interest and with the hope that they will prove valuable in the critical decisions to which they relate.

Sincerely yours,

DAVID M. GATES
Chairman, Environmental Studies Board

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January 26, 1970

Dr. Gordon J. F. MacDonald
Chairman, Environmental Studies Board
National Academy of Sciences–National Academy of Engineering
Washington, D.C.

Dear Dr. MacDonald:

Following discussions held between staff members of The National Academy of Sciences and The Port of New York Authority, I am writing to request that the Academy give consideration at the earliest possible date to our request for the Academy's expert recommendations in a matter involving both the environment and economy of the New York/New Jersey Metropolitan Region and, indeed, of the nation.

The Port Authority is responsible, among other activities, for the operation and development of the regional airport system. The existing airports are badly overcrowded. Recommendations for a new major airport have not been adopted nor is there likelihood that they will be in the foreseeable future. As a consequence, New York City and Northern New Jersey are facing the economic consequences of not having airport facilities adequate to meet the growing needs of the commerce upon which this region exists. The national implications of this situation are most serious.

In an effort to determine the feasibility of expanding existing aviation resources, the Federal Aviation Administration has undertaken a study of the potential increase in airport capacity which could accrue from the construction of new runways in a portion of Jamaica Bay adjacent to John F. Kennedy International Airport. Regardless of the results of this evaluation, it is manifestly clear that the construction of the new runways could not be simply a matter of airport engineering. Jamaica Bay as a whole is designated as parkland, contains a wildlife sanctuary, and is a breeding ground for shell and fin fish.

The Port Authority, and I am sure the City of New York and the Federal Aviation Administration, believe it would be unthinkable to consider placing runways in a portion of the Bay without giving first attention to the ecological and environmental considerations, including the problem of aircraft noise. There is also extant a suggestion by the Department of the Interior to include Jamaica Bay within a national recreational area to be developed at the entrance to New York harbor.

Yet it is most pertinent to note that the whole of Jamaica Bay is badly polluted. Large volumes of sewage are discharged from adjacent residential communities into the Bay; no bathing is permitted and recreational activities are severely curtailed. Natural life exists under the handicap of a polluted environment. But the potential is there for great environmental improvement.

We have discussed these facts with staff of the National Academy of Sciences. The question Port Authority representatives have posed is *not* whether airport

extension into a portion of Jamaica Bay would affect the Bay. It is, on the contrary, whether through carefully employing the resources involved in an extension of the airport, a program could be developed that would result in a complete redevelopment of the entire Bay to achieve distinct environmental benefits for mankind and wildlife and sustain the region's economy.

It is this question which we wish to place formally before the National Academy of Sciences. We see the problems extending well beyond water pollution, concerning which the City of New York has already done constructive study work. We would hope that the Academy would undertake a complete examination of the many factors involved and give its conclusions and recommendations. We are prepared, of course, to give any assistance that might be needed.

We live in an era of proper and growing concern for the quality of our environment. Meanwhile, the expanding population and economy place ever-increasing demands on that environment. It is mandatory that both requirements be met. One can not be long neglected in favor of the other without extremely serious consequences for the future.

In the matter we lay before you, we hope and believe there is an opportunity to develop a program which can accommodate Man's economic needs, while at the same time improving and enhancing the environment from which these needs are filled. This is a challenging and complex problem and I sincerely hope that you will favorably consider our request for assistance.

A successful solution could establish a valuable national precedent of considerable significance.

Sincerely,

AUSTIN J. TOBIN
Executive Director
Port of New York Authority

March 13, 1970

Honorable Philip Handler
President
National Academy of Sciences
Washington, D.C.

Dear Dr. Handler:

I understand that the Academy is considering a study of the environmental factors related to a possible expansion of the John F. Kennedy International Airport in New York. As I previously informed you, the Department is extremely interested in this study because of its potential relevance not only to the immediate New York situation, but to the Nation as a whole.

Situations such as that in New York are becoming more common, and the Federal Government's role—and interest—in them is increasing. The recent growth in commercial aviation and the development of new aviation technology have generated urgent needs throughout the United States for both new airports and an expansion of existing facilities—either of which can have a serious impact on the environment. Positive action by Government is often required to ensure that genuine needs for additional facilities are not met at the expense of irrevocable harm to the quality and nature of the environment. An excellent example of this may be seen in the recent Everglades Jetport situation, when the Department of Transportation, working with the Department of the Interior, successfully concluded an agreement with the local authorities to safeguard the Everglades National Park.

In considering proposed airport modifications, we utilize standardized techniques to evaluate such factors as human response, air and surface traffic, and the impact on housing and industrial areas. We feel that similar techniques can be developed for the evaluation of ecological and environmental factors. Accordingly, the results of this study could be of great benefit to us in our efforts to deal with similar situations across the country. This is especially true as many of the factors encountered in New York—a dense urban population, contiguous water areas, and nearby recreational facilities—are symptomatic of those encountered in many such projects under consideration within the United States.

As you know, the possibility was raised as to the Department participating in this study. We would of course be pleased to cooperate fully in making information available to the NAS group and in maintaining staff liaison during its planning and operating phases.

In closing, I should like to emphasize our interest in this study. We firmly believe that it is a pilot effort which has the potential for providing meaningful assistance to the resolution of possible similar situations across the Nation.

Sincerely,

JOHN A. VOLPE
Secretary of Transportation

April 13, 1970

Mr. Austin J. Tobin
Executive Director
The Port of New York Authority
New York, New York

Dear Mr. Tobin:

I am pleased to note that the environmental study of Jamaica Bay which we discussed will be undertaken soon by the National Academy of Sciences. We would be most interested to receive a copy of the Study prospectus or to work with you in development of the prospectus if one has not been developed.

As I pointed out at the time we met, we are concerned, as you are, with any detrimental effect the proposed expansion of Kennedy Airport might have on the environmental qualities of the Bay. Despite present poor water quality, Jamaica Bay is a treasure of high ecological value and rare open space worthy of saving. We consider the Bay as an integral part of the proposed Gateway National Recreation Area. We do, however, recognize the severe aviation problems confronting New York and are hopeful that a compatible solution will evolve from studies and deliberations.

Your offer of close communication is greatly appreciated and we stand ready to cooperate to the fullest. I have designated Mr. John R. Quarles, Jr., and his assistant, Mr. Temple A. Reynolds, as my contacts on this matter. Thanks again for your interest and offer to maintain a close working relationship.

Sincerely yours,

WALTER J. HICKEL
Secretary of the Interior

ACKNOWLEDGMENTS

Outstanding contributions were made to the work of the Study Group by its Steering Committee. Originally, the Steering Committee gave assistance in the organization of the Study Group itself, and provided seminal ideas and insights relating to definition of the problem. In late August, it intensively reviewed the initial draft report, which was of great value in the fashioning of the final report.

The Study Group was assisted extensively during the course of its work by the Port of New York Authority and its staff. We sincerely appreciate the many forms of this assistance—technical, informational, and logistical—which effectively expedited our task.

The Study Group wishes to acknowledge indispensable administrative support from the staff of the National Academy of Sciences. Also, it is especially appreciative of the extraordinary contributions in the design and illustration of this report by Mr. George Lilly and Mr. Don Joyce of the Academy's Printing and Publishing Office.

Particular thanks are due Anne Greene Keatley and Denise Emery of the Environmental Studies Board staff for their unstinted efforts on behalf of the Jamaica Bay Study.

Many other organizations and individuals made contributions to the study. These are listed separately at the end of this report (pages 27–28).

PRINCIPAL CONCLUSIONS AND RECOMMENDATIONS

A major environmental decision faces the people of New York City. Should additional portions of Jamaica Bay be filled to provide more runway capacity for Kennedy Airport? It has been claimed that the proposed expansion might impede or make more costly an existing program to improve water quality, adversely affect the maintenance of an unusual wildlife sanctuary, and impair the ecological integrity of a major estuarine area of the New York metropolitan region. It is also feared that aircraft noise in surrounding communities would be increased and the recreational usage of the Bay would be curtailed. Can such environmental damage be avoided while still providing for a needed expansion in air transportation facilities?

This study was prompted by a concern for minimizing the environmental impact of a proposed airport expansion program. In proposing this study the Port of New York Authority suggested that an airport extension might even be compatible with a program for a complete redevelopment of the entire Bay that would yield both environmental and economic benefits to the metropolitan region.

The Study Group has examined several possible configurations of runways extending into Jamaica Bay from Kennedy Airport, one of which was suggested to us by the Port of New York Authority. We have considered these in relation to the natural ecosystem of the Bay, existing or proposed programs for water quality improvement, recreation, and conservation, and present and expected land-usage patterns near the airport. We have concluded that:

☐ Any runway construction will damage the natural environment of the Bay and reduce its potential use for conservation, recreation, and housing. The degree of this impairment will be dependent upon the amount of Bay area taken for this airport extension. A sufficiently large land-taking, such as that proposed by the Port of New York Authority (see Figure 4, Chapter 4, Volume II), could cause major irreversible ecological damage to the Bay.

The Study Group has also considered a variety of plans expected to enhance the values of the Bay area for the people who live there or within reach of it. These values were appraised in light of the history of the Bay's development, the present situation, and the likely effects of expanding or not expanding Kennedy Airport.

☐ It is possible to improve the Bay environment by technological means. Such improvements may be made independent of any airport expansion scheme, but any expansion would increase the economic costs or dilute the benefits of these improvements.

We have viewed the problem placed before us as a broad one of seeking means to meet many human needs —housing, transportation, recreation, waste disposal— in a manner compatible with protecting or even improving the environment of Jamaica Bay. New York City is not faced with a hard choice between forgoing any increase in badly needed air transport capacity and the destruction of a valuable natural resource. We have considered courses of action by which the air transpor-

tation needs of the metropolitan area may be satisfied while minimizing the environmental impact on the Bay. For the immediate future we recommend that:

1. The Port of New York Authority, in cooperation with the Civil Aeronautics Board and the Federal Aviation Administration, institute immediately a program of landing fees, consolidation of flight schedules, and other administrative devices that will eliminate existing congestion and allow for a more efficient utilization of existing system capacity. Only after complete implementation of these measures will it be possible to assess fully the need for and the timing of an airport expansion. Adoption of these measures will give priority usage of existing facilities at Kennedy Airport to commercial passenger transportation rather than to general aviation.

Such measures will not provide indefinitely for air transport needs. Other possibilities will have to be considered in the future. We further recommend that:

2. Since the evidence indicates that improved air-traffic-control systems would permit substantial increases in the capacity of the region's airports, such systems be developed and adopted as rapidly as possible.

3. If there is a proven need in the future for increased runway capacity at Kennedy Airport after the introduction of these much-needed technological and administrative improvements, then additional runways might be considered, such as those discussed in Chapter 4, Volume II, which would require minimal land-taking in the Bay. No new runways should be constructed or other measures taken to increase the capacity for aircraft movements unless it can be shown that the benefits exceed the costs, where benefits and costs include a full consideration of their impact upon people and the environment of the Bay area and the metropolitan region.

In the long run, planning for the air transportation needs of the New York metropolitan area will require greater federal participation than has been the case in the past. We therefore recommend that:

4. The Secretary of Transportation, the Governors of New York and New Jersey, and appropriate governing authorities in the region should plan now for the new regional air transportation facilities that will be needed in the future. They should proceed immediately to designate and acquire a site for a new regional jetport. The development of such an airport and the timing of its construction should be consistent with a demonstrated need for additional airport capacity in the region. They should also begin an intensive study of alternative systems for intercity air and ground transport, such as vertical or short takeoff and landing aircraft and high-speed trains, which might affect future regional jetport needs.

5. The Secretary of Transportation, in cooperation with appropriate state and local governmental agencies, should make an evaluation of the congestion problem, both at terminals and with respect to the ground access to the three major airports in the region, and propose plans to reduce this congestion.

Aircraft noise, and, to a lesser extent, air and water pollution related to airport operation are perceived as major environmental hazards by residents in communities surrounding commercial airports. We have examined these effects in the environs of Kennedy Airport, and have concluded that:

- The construction of new runways will not significantly reduce the number of residents of nearby areas exposed to intense aircraft noise. Major reduction in noise exposure can come only from use of quieter aircraft.

On both the local and federal level, measures need to be taken to reduce the impact of aircraft noise. We recommend that:

6. Public authorities in New York City and Nassau County should establish and vigorously enforce building construction standards that protect the health and welfare of occupants against aircraft noise. These standards should apply to all new construction, especially public buildings such as schools and publicly supported housing.

7. In view of the present impact of noise on the community around the Airport, all relevant public agencies, especially the Port of New York Authority, should press for the development and installation of "quiet engines" on aircraft.

8. The Department of Transportation should:

Require the installation of acoustically treated nacelles on all existing aircraft by 1975.

Accelerate, through increased funding and cooperation with the National Aeronautics and Space Administration and other federal agencies, the development of quiet engines, and establish a regulation requiring that all new aircraft have engines that are quieter by 10 EPNdb (effective perceived noise level) below present standards by 1975.

We have considered the many possible ways in which Jamaica Bay may be used to satisfy the needs of the people of the New York area. With respect to some of these uses, we have concluded that:

☐ The permanent conversion of any estuarine area to airport or other commercial or industrial use diminishes a national environmental asset of great potential value to future generations. Although Jamaica Bay has been greatly altered by man's activities, its ecological viability can be maintained indefinitely into the future by environmental improvements only if no additional major incursions into the Bay occur.

To achieve this potential for sustaining a livable environment for millions of people near the Bay, we recommend the following actions:

9. In the next ten years, the City of New York should develop Jamaica Bay extensively for conservation and recreational uses by its own citizens and for compatible housing. This requires completion of its existing sewage-treatment program, immediate termination of dredging and sanitary-landfill operations, and the extension of mass-transit connections to shoreside areas. The City should oppose federal programs for construction of a hurricane barrier and for creation of a national park in the forms now proposed, since these will impede the development of the Bay for the above uses.

10. The State of New York should establish a Jamaica Bay planning commission, composed of representatives of the Bay communities, the Port of New York Authority, and other relevant City, State, and Nassau County agencies, which should be charged with developing a comprehensive long-range plan for compatible development of the Bay and its contiguous land areas. The planning program should provide opportunity for direct community participation in the formulation of proposals and decisions affecting the uses of the Bay and its related land area, including airport improvements and operations that impinge on the quality of life in adjacent communities.

The ability of local communities to provide for increasing air transportation needs while improving the environment in the vicinity of airports is severely circumscribed by the nature of the air transportation system. A major airport, such as Kennedy, is a component of a national and international system serving air transportation needs of the whole nation. Federal authorities should aid local communities in the resolution of their problems by appropriate actions to bring about those beneficial changes in the entire system that lie beyond local control. In addition to federal action to abate aircraft noise generation, we recommend the following:

11. The Department of Transportation, through the Secretary or its agencies, should:

Take overall responsibility for present and future air-traffic-control system development; select a new and improved system from existing technology; and request the necessary funds and authority to install such a system by 1975.

Conduct an immediate inquiry into the operation of airports that are now or soon will be congested to determine how such operations can make more efficient use of existing capacity, and whether additional facilities are required.

When a need for a new airport has been demonstrated but local authorities have failed to site and construct it, select a site compatible with national environmental and urban growth objectives after consultation with local communities, and take necessary steps to ensure its construction.

Conduct an expanded research and development program for vertical and short takeoff and landing aircraft systems, and evaluate and make recommendations as to the integration of such systems into the total intercity transport system.

Develop ground access systems that can be integrated into an airport complex.

Recommend the modification, or, if necessary, the closing and replacement, of environmentally hazardous airports.

It is our hope that public understanding and discussion of these issues and the options that exist will eventually lead to wise decisions regarding actions to be taken. It is our fear that partisan debate will oversimplify the choices to "birds versus planes" or "jobs versus pollution." In our experience, no environmental problem can be comprehended in such limited terms, nor do we expect that the environmental improvement so sorely needed by our nation can be secured through decisions so narrowly informed.

The economic and political costs of implementing these recommendations may be large, but they are bearable. These are the unavoidable costs of maintaining a livable environment for urban populations. For Jamaica Bay, the environmental bill is due now.

SUMMARY

IMPROVING THE ENVIRONMENT IN THE FACE OF COMPETING NEEDS

Over the years, Jamaica Bay and its peripheral land areas have served the needs of New York City residents and visitors in many ways.* Some land for housing and other purposes was created by filling marshes with solid refuse. Other land was formed by dredging sand from the bottom of the Bay to fill marsh or water areas. In this manner, two large airports (Kennedy and Floyd Bennett) were created, serving both civilian and military air transport needs. While raw sanitary sewage is no longer discharged into the Bay, except in periods of excessive storm drainage flow, treated effluent from a large population is continuously emitted into Bay waters. A road and rail line bisecting the Bay, and a bridge at its mouth, provide vehicular access to the Rockaway peninsula. Construction of a parkway along the Bay's northern periphery created a ground transportation artery for southern Brooklyn and Queens. Distribution of oil and gasoline in the Bay region originates in part at shoreside terminals supplied by barges that move through the Bay channels. In the summertime, fishermen line the few accessible shore sites, and pleasure boats ply the Bay's waters. Visitors and schoolchildren explore the wildlife sanctuary the year round.

In its bird refuge and hospitable but imperfect marine environment, the Bay is an ecological unit productive of natural life of many forms. To the extent that man as a natural species inhabiting a biosphere depends upon an abundance and diversity of other living species, Jamaica Bay also helps to sustain human life in an indirect way. By providing both a quality and quantity of recreational and educational experience not normally found in urban environments, this natural ecological unit serves human needs that would remain unfulfilled if it were much less accessible to the large urban population in the surrounding communities.

As long as the demands upon the Bay for simultaneous multiple use were moderate, they were easily accommodated within its great area. But as the demands intensified, strains appeared. Increased raw sewage flow forced health officials to outlaw bathing and shellfishing. Solid-waste landfill operations lessened the pleasure of boating and fishing. The deep dredging of Grassy Bay to supply landfill for Kennedy Airport left a stagnant pool devoid of marine life. Dredging, filling, and oil spills took their toll of finfish populations. The construction of the Shore Parkway without adequate provision for foot or motor access to shorefront areas hindered the use of the few shoreside areas that were not covered with rubble or litter. Most of this environmental degradation could have been prevented by planning and regulatory activities of public authorities.

All these strains were minor compared with the environmental impact of Kennedy Airport. The last two decades have seen a multiplying of air traffic and the advent of screaming jet planes. Concurrently, large

* Figure 1 shows the principal features of Jamaica Bay.



FIGURE 1 Aerial photograph of Kennedy Airport, Jamaica Bay, and environs.



1 Brooklyn
2 Canarsie
3 Howard Beach
4 John F. Kennedy International Airport
5 Inwood
6 Broad Channel
7 Rockaways
8 Breezy Point Park
9 Floyd Bennett Field

areas of vacant land near the aircraft flight paths have become densely packed with housing. Through simultaneous construction of the airport on City-owned land and official approval for housing use of adjacent areas, New York City authorities unwittingly set in motion incompatible developments that now threaten a confrontation of citizen against citizen and citizen against his government. Urban-renewal projects being constructed to relieve the pressure for more and better housing will expose even more residents to intense aircraft noise. Nor is aircraft noise the only irritant, for the fear of an aircraft crash and the sight and smell of aircraft pollution add to the anxiety and discomfort of nearby residents. Ground traffic congestion induced by air passenger and freight movements spills over into nearby communities. For the nearest neighbors there is the additional apprehension over land condemnation for airport expansion or invasion by commercial development attracted by the airport. So severe is this impact that one must ask whether, under present circumstances, the airport is totally incompatible with surrounding urban life.

Despite these many serious failures to plan ahead, there are a few counter-examples of successful measures to reverse this environmental disruption. In the mid-1950's, the Parks Department created a wildlife refuge in the midst of the Bay by artificial means such as filling and planting. In the ensuing years, the numbers and variety of wild fowl using this refuge have grown to approach those formerly frequenting the Bay in its undegraded state. Through technological means and wise management and planning, a component of the ecological unit was repaired at a very minor cost to the public treasury. Because of its size and location, this refuge was not affected by, nor did it imperil through bird strikes, the use of the airport.

In more recent years, a program has been planned and started for upgrading the sewage-treatment procedures and terminating the discharge of untreated sanitary sewage accompanying storm-water overflow. When successfully completed, the new treatment facilities very likely will reduce the bacterial content and biochemical oxygen demand of treated waters to safe and nonpolluting levels. This publicly financed program, through use of recent technological developments or other alternatives, will so improve water quality that recreational use of the Bay can be greatly enlarged.

The difference between improvement and degradation of the environment of Jamaica Bay lies in the creation of alternatives, in part through technological and scientific advance, and in the wise selection from among them of a compatible set of actions to meet as completely as possible a variety of human needs.

Where competing needs are very pressing, and the alternatives for meeting them are clearly incompatible, decisions must be based on the values attached to the costs and benefits of alternative uses, both present and future. In these circumstances, greater weight should be given to the course of action that is less irreversible or that holds open the greater number of options for future choice.

The alteration of the environment through use of public resources to satisfy legitimate human needs is a central problem of the modern world. Many scientists believe that the physical environment, in which all life evolved and now flourishes, is being irreversibly changed in ways that may limit the opportunities of future generations. To the urban dweller this may appear in the form of a public swimming beach closed because of pollution, a neighborhood park taken for construction of a freeway, or rising levels of air pollution or noise generated by a nearby public facility. Increasing public awareness of the changing environment is a necessary precursor of the inevitable adjustment society must make between escalating demands and the limited capacity for their fulfillment.

Because the environment is a public resource, decisions to control or prevent its degradation must be public decisions, openly arrived at after informed discussion. Individuals, local communities, and public and private agencies at the local, regional, and national level must all declare their interests and assess the consequences of various possible actions. In large measure, the current high intensity of controversy over environmental issues is a consequence of past and present failures of public officials to incorporate adequate and continuing participation of all affected parties, especially local communities, in the decision-making process. This will assume even more importance in the future as it becomes more difficult to find and more costly to use new technological means of simultaneously satisfying different human needs competing for the same limited environmental resources.

AIR AND GROUND TRANSPORTATION

The Need for Air Transportation

It should not be supposed that air transportation affects the quality of life of only a small proportion of Americans. In 1970, the mode of life of almost all Americans depends upon air transportation, whether or not they ever travel on airplanes.

A great many Americans do, in fact, travel on airplanes. Thirty-four million did so in 1969. Even though

commercial air transportation in this country is hardly 50 years of age, it has superseded every other means of long-distance travel except the private automobile. Not only is it the fastest and most comfortable way to travel over distances greater than several hundred miles, it is also one of the cheapest ways. For public travel to many cities and towns in the country, it is almost the only way, since there is no longer rail passenger service to many places, and bus travel is often inadequate. Even where railroad trains or passenger ships are still available, they are few. If all the Americans who now travel by air to Hawaii, or Alaska, or Europe, or even Chicago, were suddenly to seek other ways to get there, the remaining ships and trains would be unable to accommodate them.

Large numbers of those who travel by air, some of them quite poor, do so for personal reasons; but a great many air travelers are managerial, technical, professional, and sales people, at all levels, who are engaged in commercial, governmental, scientific, professional, and technical activities of many sorts. During the last few decades, American business, government, science, and technology have come to rely upon rapid air travel, direct inspection and supervision, and face-to-face meetings of key people in order to carry out their functions. The major human activities that are dependent upon air travel today are far more than those that are directly or indirectly related to the aircraft industry and to air travel; they include almost all the major human activities of our time. It is not just people who travel by air. Goods of all sorts also travel by air, especially critical items: mail, reports and publications, bank checks, video-tapes, the plates to print magazines and newspapers, and replacement parts for all sorts of machinery. Many other less critical and relatively light items such as new clothing, baby chicks, and cut flowers travel by air as well.

Every major human society has modes of transportation upon which its patterns of life depend. During the past half century, air transportation has moved into such a role in American society. To whatever extent the high productivity of our present economy and the high standard of living of many Americans are dependent upon rapid transportation, they are in part dependent upon air transportation. As ours has become a nation of automobiles, highways, television, telephones, and teletypes, it has also become a nation of airports and airplanes—a society based upon rapid communication and rapid access, widespread and very rapid distribution of information, goods, and services, and the close integration of widely separated activities that this makes possible. American society could hardly exist as it does in 1970 without air transportation.

Many of the activities of New York City in particular depend upon rapid access and distribution. To a very large extent this means that they depend upon air transportation. Prominent among these are the "center functions" of the city—as an international center for banking and finance; as a national center for corporate headquarters, for publishing, for communications, for entertainment, for the arts, and for many industries; and, of course, as the site of the United Nations. The City has its own industries also, some of which, like the garment industry, depend for competitive advantage on their ability to ship their goods by air. Probably New York is more dependent upon air transport than most other cities in the world.

Current estimates of future need for air transportation are based on projections of demand for air travel. This demand forecast is based on extrapolation into the future of existing relationships between air travel and such indicators as personal income and age, including projections of temporal changes in these indicators. It is assumed that future demand expresses the need of the metropolitan area for air service. Future requirements for airport and airline expansion are based on these demand forecasts.

The existence of a public need for a service such as air transportation does not automatically pre-empt scarce public resources for its satisfaction, especially in view of other competing essential needs. The travel need must be seen in its true dimensions and in relation to others that are equally pressing. In every case, the use of public resources to satisfy a need must meet the test of good stewardship, namely, that these scarce resources are used efficiently and economically rather than wastefully.

The Benefits and Costs of Providing Air Transportation

It is difficult to quantify all the economic benefits of air transportation to New York City. Other than the compilation of statistics on employment in airport- and airline-related activities and the spending habits of tourists and other visitors who travel by air, there has been no substantive study of the impact of air travel on the regional economy. Although it is universally claimed by public and private officials that convenient air transportation is essential to the maintenance and growth of the "national center" complex in Manhattan, the same would also be true for the communications system, which links it to the nation and the world; the mass transportation system, which carries its employees

to one of the most intensively utilized pieces of real estate on earth; and the building complex, which provides housing, heat, light, and other amenities for all this human activity. Air transportation is but one of many essential services required for the functioning of a modern industrial society. This society must determine how much of each of these essential services it needs and can afford to purchase. What is immediately at issue is not the benefits of air transportation, but its social cost to the community as distinct from the economic cost to the traveler.

The benefits of air travel to the individual are related to the quality of the service. Safety, reliability, punctuality, flight frequency and duration, comfort, absence of delays on the ground as well as in the air, and ability to secure reservations at preferred times are some of the desired attributes. Attempts to increase the quantity of air travel by scheduling more flights than can be handled by the airport may degrade the quality through a decrease in safety and reliability and an increase in flight delays and discomfort. The total benefits to the community, which depend upon both the quantity and the quality of air transportation, may be decreased through such ill-considered attempts to expand service.

To the extent that air service is supplied by a private airline, a share of the cost of air travel is paid by the traveler, who purchases its benefits in an open market in which other services (including competing forms of travel) are sold. But the air-traffic-control and regulatory system, as well as most airports, are publicly owned and not entirely supported by user fees, so that part of the travel cost is carried by the general public. Some of this cost may fall on the local community in the form of loss of tax income from land taken for airport use. Presumably, these costs are justified by the benefits of air transportation to the entire community. Difficult as it may be to measure precisely these economic benefits and costs, the public decision to build airports and subsidize airlines where necessary expresses the public judgment that the community benefits outweigh the social costs.

But there are community costs other than the economic ones. Modern air transportation has brought nearly unbearable noise to millions of Americans who live or work near airports. This environmental hazard must be suffered by some part of the community—often that part that scarcely benefits either directly or indirectly from air travel itself. Under present law, few of those impacted individuals can seek recompense for or relief from this damage to their lives from either the airport owner or the airline. As a consequence, this environmental cost is not "internalized" and is not paid by either the traveler or the whole community that benefits from the provision of air service; nor has there been, except for those directly affected by it, any public or private incentive or initiative to abate the environmental nuisance. As a consequence, the "cost" of aircraft noise has been incorporated into the political process and is manifested as adamant opposition by many communities to airport construction or expansion.

There are other social costs that are not paid by the air traveler. The ground transportation of air travelers is not considered part of the air transportation system, but must be provided by the local community as a part of its public transportation system in the form of highways and, in rare instances, mass transportation links. Since the number of air passengers to an urban area is but a small percentage of the total number of daily travelers into the area, mass transportation links exclusively serving airports are very uneconomical. Ground access to airports is mostly by automobile or bus, causing added congestion on highways and resulting in ground travel delays for both the air passenger and the local commuter. Congestion and delay for the air traveler increases the premium for locating airports closer to urban centers, and thereby also increases both the direct economic costs to the community of land-taking and the social costs of operating noisy planes near areas that are, or soon will be, densely occupied by homes. This unhappy spiral of social and other community costs is a consequence of failure to plan an integrated ground/air transportation system that properly allocates the direct and social costs to both the traveler and the community, both of which benefit from the provision of this service.

In the case of a Kennedy Airport expansion, another social cost would be involved—namely, the opportunity cost of that area of Jamaica Bay needed for runway extensions that might otherwise be used for recreation and conservation. (This, of course, applied also to the present airport site, which is located on what was once a marsh area of the Bay.) To the extent that use of some Bay area for runways reduces the recreational potential of the Bay, the future opportunity for recreation of some New York City residents will be lost so that others may have the benefits of air travel. But because both the airport land and Jamaica Bay are owned by the City, there will be no direct charge to the air traveler for his use of this Bay land if the airport is expanded, as there would be no charge to recreational users if the airport is not expanded. The public decision to use the Bay for one or the other of these purposes will involve a transfer of the corresponding social cost from one segment of the community to another without any compensation from the users who benefit directly.

Technological Factors and Remedies in Air Transport Capacity

The capacity of an airport—that is, the sustainable rate of movement of passengers or freight—is limited by technological features of aircraft and their control systems. Simply put, the passenger capacity is determined by the maximum number of scheduled aircraft movements under adverse weather conditions and the average seating capacity of the aircraft in use.

To avoid collisions, aircraft approach or leave an airport under the guidance of an air-traffic-control system. Air-traffic controllers direct pilots to maintain safe distances between aircraft and prevent aircraft from approaching or leaving the airport more frequently than can be accommodated safely by the runway system. It is possible to handle more aircraft in fair weather than in poor weather. In poor weather, when aircraft follow instrument flight rules, the landing rate is limited by the number of runways equipped with instrument-landing systems. The capacity of an airport like Kennedy to sustain scheduled flights under all weather conditions is determined by the flight characteristics of the aircraft being used and the electronic instruments that guide them, both on the ground and in the air. For any given level of technology, this capacity is limited by the paramount requirement that aircraft operation be safe. The judgment of aircraft pilots and ground-based air-traffic controllers is a factor in determining safe operations.

The land area needed for runway construction is determined by the aircraft performance characteristics and the air-traffic-control system. Runways must be sufficiently long to permit a heavily loaded aircraft to take off safely. When parallel runways are used, such as at Kennedy Airport, their lateral separation is determined by air-traffic-control capability of preventing collision of aircraft using both runways simultaneously. Runways must face the principal wind directions, since aircraft cannot land safely in strong crosswinds. Moreover, taxiways are needed to keep runways clear for use of aircraft landing or taking off.

The number of runways equipped with instrument-landing systems and the characteristics of the air-traffic-control system are major determinants of aircraft-handling capacity. This capacity cannot be increased marginally, but can grow only in steps through construction of more instrumented runways or development of more advanced air-traffic-control systems for existing runways.

The other factor in passenger-handling capacity is the average number of seats per aircraft. As more long-haul and medium-haul jumbo jets (747, 1011, etc.) replace smaller jet aircraft in the commercial fleet in the next five to ten years, it will be possible to handle more air travelers without requiring more aircraft-handling capacity. One projection for airline aircraft movements for Kennedy Airport shows that in 1980 there will be no need for an increase in such movements over the 1967 volume despite a doubling of air passenger movements.

An offsetting factor in the expected growth in average seating capacity is the continued use of scarce instrument-flight-rule runway capacity by general-aviation aircraft. Whether these are the aerial equivalent of taxis or private automobiles, they carry substantially fewer passengers per aircraft movement than do the commercial aircraft. This disparity will increase in the future. These aircraft are clearly inefficient and heavily subsidized users of a scarce public resource.

The present air-traffic-control system is outdated. The technology for an improved system already exists. Its development into a national and international system can occur only through action by Congress and federal authorities. While the cost of this new system would ultimately be shared by the air traveler and the general public, it would bring great benefits to local communities by increasing the utilization of existing facilities and decreasing the demand for additional land for airport expansion. Without improved air-traffic-control, the air space will be underutilized while airports proliferate, pre-empting land that might better serve other purposes.

Our study has evaluated several suggested runway configurations for Kennedy Airport that would increase instrument-flight-rule plane-movement rates (see Chapter 4, Volume II). Each configuration is associated with a different degree of improvement in the air-traffic-control system. As control capability increases, the land area needed for runway extensions decreases, as does the environmental impact of the corresponding airport expansion.

The development and widespread use of STOL (short takeoff and landing) and VTOL (vertical takeoff and landing) aircraft and their corresponding air-traffic-control systems would very likely decrease the need for expanding conventional airport facilities. These aircraft would attract many interurban and short-haul passengers from conventional aircraft by delivering them more quickly to in-town V/STOL airport sites. However, there are serious technological and financial obstacles to deployment of such systems in the immediate future. As in the development of high-speed ground transportation systems, which could also meet part of the demand for rapid intercity travel, the cost of development and subsequent construction of a system of sufficient size

to be economically viable, compared with the smaller cost of marginal increase in the conventional air transportation system, is a major deterrent. Nevertheless, a continuing effort to develop such systems is warranted.

Administrative Factors and Remedies

While technological features limit what can be done by an air transport system, administrative practices of the airport operators, the airlines, and the relevant federal agencies determine what will be done. Inefficient and inconsistent practices may cause the quality and quantity of air travel to fall far below what is technologically possible. Just as the technological system may underutilize the land and air space it controls, the management system may underutilize the technological system it owns and controls.

The New York metropolitan air transportation needs are met principally by the three regional airports, Kennedy, Newark, and La Guardia (Figure 2). Because of their close proximity, these three airports form an integrated metropolitan air transport system. While Kennedy handles all international flights and La Guardia cannot land the largest jet planes, the remaining traffic can be reallocated where capacity permits, if necessary. The proposed expansion of Kennedy Airport must be viewed as an enlargement of the instrument-flight-rule capacity of the metropolitan system.

A study of the existing usage of the present system during peak hours under instrument-flight-rule conditions shows that congestion and attendant airside delays are caused by scheduling of too many airline flights and overusage by general-aviation aircraft attracted in part by an uneconomic schedule of landing fees. As the number of aircraft using an airport approaches the airport's capacity, the delay time in the air becomes excessive. It is therefore very wasteful to permit or encourage use at a rate that is close to (or even worse, exceeds) airport capacity. Not only does this situation exist at the present time, but there are prospects that it would continue into the future even if Kennedy Airport were expanded.

It has been estimated that the use of peak-hour instrument-flight-rule capacity by a general-aviation aircraft imposes a delay cost on airline users of $1,200 to $3,800 per flight. This contrasts with the average landing fee of only $10 for a general-aviation aircraft. Raising the landing fee to $100 would reduce this usage and thus reduce the delay penalty to scheduled airlines. Increases in the capacity of Kennedy Airport by runway extensions in order to accommodate more general-aviation users cannot be economically justified on the basis of existing landing fees.

Even if the demand placed upon scarce instrument-flight-rule capacity by general aviation were reduced through levying of higher landing fees, this capacity would probably still be overused by commercial airlines because of the wasteful overscheduling of airline flights in some city-pair markets. Since air fares are identical for all airlines, increased patronage is sought by scheduling more frequent flights, especially at the more desirable hours. For any one airline, the increased patronage may more than offset the cost of additional flights. On the other hand, the consequent increase in congestion and delay to all other airlines may exact a cost to the entire system that is much higher than the benefit to the aggressive airline. Clearly, what is good for XYZ Airlines can be bad for the air transportation system.

A brief study of existing peak-hour schedules serving New York indicates considerable scope for reducing flight frequency in several markets. More efficient scheduling could free openings for other uses (including possible future expansion of service) without reducing the quality of service offered to the traveler. A hypothetical study indicates that, using existing aircraft, 34 flights (out of 155) could be eliminated during the busiest peak hour, still maintaining hourly service to all markets and for all passengers now served during that hour. Use of the air bus would permit a further reduction of 22 peak-hour flights, but only if the frequency of service is reduced. It is likely that a more exhaustive study of the passenger usage of the present flight schedule would identify additional potential gains.

The scheduling of air service is regulated by the Civil Aeronautics Board (CAB), and the maintenance of safe flight practices is supervised by the Federal Aviation Administration (FAA), yet neither agency is concerned with efficient use of the airways. When airport airside capacity is being strained, as it is today in the New York metropolitan region, the most efficient utilization of the existing air space and facilities cannot be achieved under the present circumstances, in which the FAA, the CAB, the commercial airlines, the general-aviation aircraft owners and the airport operators (the Port of New York Authority) are able to act almost independently of each other. The practices of each are designed to maximize the gain to each rather than to minimize the cost to the system. As a consequence, the system becomes needlessly overloaded, resulting in congestion and delays and further demands to expand runway capacity. This inefficient operation of the air transport system is translated into premature demands for more land for airport use.

Among the economic or administrative measures for increasing the efficiency of airport usage are:

- Higher landing fees scaled to discourage general-aviation use during peak hours and excessive schedule frequency by air carriers. Fees should be set at the level that equates airport capacity with use. Income from fees in excess of operating costs can be used to alleviate adverse environmental effects of the airport.
- Airline scheduling that eliminates wasteful duplication among competing airlines simultaneously serving the same markets.
- Air-fare differentials that will encourage a shift of patronage to off-peak hours.

While we cannot guarantee that these measures, if adopted, would make the expansion of aircraft capacity at Kennedy Airport unnecessary before 1980, there is a high probability that the current estimates of the degree of expansion of the metropolitan system, including the necessity of a fourth jetport, would be greatly modified by their adoption. We are unable to justify the magnitude of the demands upon land use that are presently contemplated, for the Kennedy Airport expansion as well as a possible fourth jetport, on the basis of an inconsiderate expansion of the present inefficient system, especially in the face of alternate uses of this land for equally demanding social purposes. Given the possibility, although by no means the certainty, that further land-taking in Jamaica Bay for Kennedy Airport might not be necessary if the existing system were operated efficiently, and that the long-term needs of the metropolitan area may be met in part through a new regional airport, the immediate authorization of runway construction in the Bay would be a most unwise and precipitous choice of action at this time.

Ground Facilities and Transportation

The typical air traveler to Kennedy Airport experiences as much delay on the ground as in the air. Whether access to the airport is by private automobile, taxi, or airport bus or limousine, congestion inside the confines of the airport is as bad as that on the approaching highways, which the traveler shares with multitudes of commuters. Since air freight movement by truck is prohibited on the Belt Parkway, truck congestion on the side streets of Queens is particularly severe.

A proposed Metropolitan Transportation Authority link from Manhattan and Jamaica to Kennedy Airport via the Long Island Railroad would probably carry but a small fraction of the air passengers, mostly those traveling on business to Manhattan. At an estimated construction cost of $100 million, this link would be publicly subsidized as a part of the railroad commuter system although it would not carry any commuters. Because most of the air passengers would still travel to the airport on rubber tires, it is uncertain whether the elaborate terminal required to distribute the train passengers to the airline gate would be economically justified.

Airport owners seek to minimize the costs to them of providing ground access to the aircraft. The passenger is urged to travel to the front door of the terminal by private auto or taxi, for which the airport provides a minimal roadway connection to the nearest congested interstate highway or municipal freeway. The capital and operating costs to the airport are least for this system, but the land requirements for internal roadways and parking lots are maximum. Kennedy is no exception to the rule that groundside airport transportation is even less well planned than airside.

The Port of New York Authority (PONYA) has plans for development of ground transportation within the airport limits to handle the expected doubling of the number of air passengers at Kennedy Airport by 1980. Except for the commuter railroad link, these plans make no provision for decreasing the congestion problem outside the airport. Unless alternate means of transportation, such as bus travel from outlying terminals (especially in suburban areas), are employed, and private automobile travel directly to the airport is discouraged, ground congestion and delay will continue to make travel via Kennedy Airport a harrowing experience.

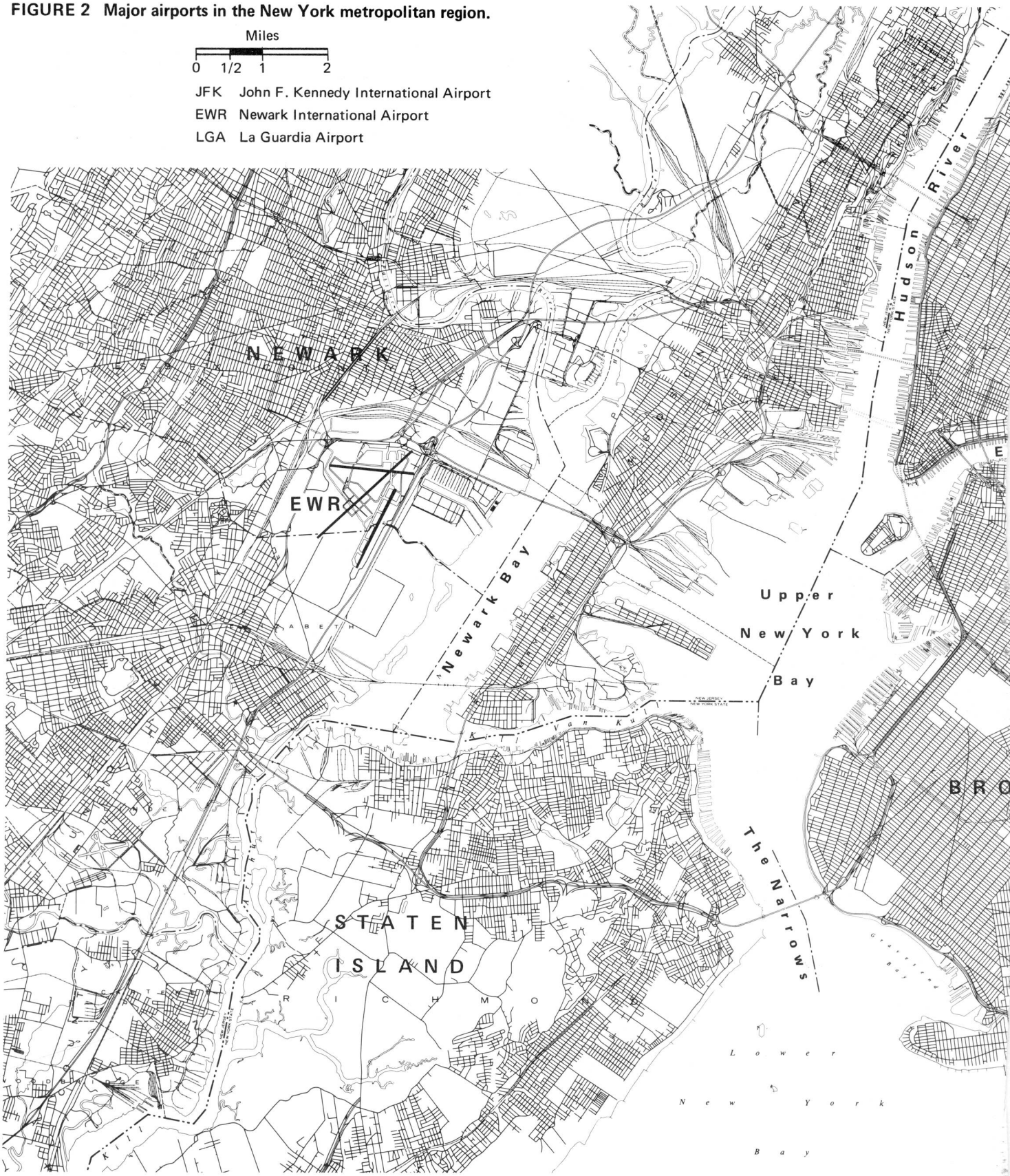
THE FUTURE OF JAMAICA BAY

An Undeveloped Resource

Although the present size of Jamaica Bay (about 13,000 acres) is only half its original primitive extent, the Bay is by far the largest open area within New York City. Within walking distance or a short ride by automobile or public transportation live several million City residents. Still a functioning estuarine area, albeit a severely impaired one, the Bay is an irreplaceable asset in its size, its ready accessibility, and its ecological viability. Nothing similar to it is to be found in any other major city of the world.

The draining and filling of the marshy borders of the Bay provided open land for housing around its periphery. The availability of public transportation to downtown City areas made the housing accessible, and the open vistas and fresh ocean breezes made it very desirable. Except for the airports, very little of the Bay's border is used for commercial or industrial

FIGURE 2 Major airports in the New York metropolitan region.




LGA
QUEENS
JFK
Jamaica Bay
TOWN OF HEMPSTEAD
ROCKAWAYS
Rockaway Inlet
NORTH HILLS
East River
Little Neck Bay
Sheepshead Bay
EAST ATLANTIC BEACH

purposes, which enhances its value for housing. Most of the nearby housing is of low density, consisting of single-family dwellings.

Recreational use of the Bay is confined to boating and shoreside fishing at a few locations, notably Canarsie Pier, and some swimming. While water pollution has made swimming unhealthy in parts of the Bay, a major obstacle to increased recreational use is its lack of shoreside facilities and the difficulty of access across the Belt Parkway to the northern shoreside. The existence of a fine beach on the ocean side of the Rockaways has undoubtedly served to remove pressure for recreational development of the Bay, especially from those who travel by automobile to Riis Park or the Rockaways on summer afternoons. While a million bathers may use this ocean beach on a weekend day, and another million will travel by subway to Coney Island, only several thousand will be able to reach the inner borders of the Bay.

Jamaica Bay is crucially situated at the confluence of two principal flyways of migrating waterfowl. As smaller estuaries along the nearby coast were eliminated by draining and filling, the Bay became more important as a resting and feeding area for migrating birds. Only its vast size (as estuaries go) protected it from annihilation. The large marshy areas in the center of the Bay have been made into a very productive wildlife refuge by the Park Department's artful development of areas for freshwater storage and growth of food.

Polluted as parts of the Bay may be, it is still a major breeding ground of marine life in the New York Harbor region, especially since it is less polluted than the Hudson and other rivers tributary to the harbor. Even now, recreational fishing in the Bay and lower harbor is better than can be found in most major American ports. Abatement of water pollution in the New York area would undoubtedly greatly enhance the quality and quantity of fishing.

In the past, much of Jamaica Bay was developed for commercial or industrial purposes or used for waste disposal. The airports and peripheral highways were constructed on landfill dredged from the bottom of the Bay. Channels were dredged to permit barge transportation of oil to shoreside depots, and liquid waste, treated or not, was dumped into the deepened channels. Solid-waste landfill obliterated marshy areas. While these uses are compatible with each other, they seriously interfere with the present and potential use of the Bay and its environs for housing, recreation, and conservation. Although the prosaic needs of transportation and waste disposal are as pressing as the others, this preferential development of the Bay's resources for commercial purposes reflects an older policy regarding the most beneficial use of the Bay, which is currently being questioned.

We believe that the time has come for a reassessment of these unexamined developmental policies. We attempt to show here how the possible future development of the Bay for housing, recreation, and conservation could meet important unfulfilled needs of the people of New York, and how the potential for this development would be impaired by further commercial use of the Bay for airports, waste disposal, dredging, and other similar purposes. Any alternative development plan that placed first priority on the latter uses would be so inconsistent with existing national, state, and city environmental goals and so incompatible with the expected evolution of existing Bay communities as to be of only hypothetical interest.

Development of the Bay for Housing, Recreation, and Conservation

While the problem of land use along the Bay periphery is treated at greater length below, we wish to emphasize here that the quality of the Bay environment could be its most attractive feature to nearby dwellers. Fresh clean air, open spaces, and the esthetic appeal of a shorefront and open water enhance the environment of neighboring communities. A properly developed shorefront can be a focal point for community recreational and educational facilities and a neighborhood center. In large measure, the value of the Bay to nearby residents is intimately connected with its carefully planned development for recreational use, especially for the inhabitants of peripheral communities.

People of all ages, especially city dwellers, need a variety of recreational experiences. They need them daily, on weekends, and during annual vacations. Children need playgrounds, adolescents need game fields, parents need a park to stroll in and a beach for swimming with their children, fathers and sons need a place to fish, and the elderly need a quiet place in the sun. A recreational area must be easily accessible by walking or public transportation if it is to be used by the many who need it but do not have ready use of private automobiles. If the tension of city life is to be eased and its quality improved, inexpensive and accessible recreation must be made available to all city dwellers.

Jamaica Bay has an unrecognized potential for development as a sorely needed recreational area. Shoreside parks and playgrounds would obviously be used year round by local residents and would certainly be desirable to the inner-city resident looking for more open

spaces than he could find in his corner park (if one exists). Provision of beaches with contiguous areas for picnicking and athletics would open up an untapped recreational use of the Bay. We estimate that beaches along the northeastern sector of the Bay, which could be developed for about $7 million, would provide uncrowded swimming facilities for 200,000 people a day. If suitable additions and rerouting of proposed subway extensions in southern Brooklyn were also provided (at an estimated cost of $40 million), these beaches would be easily accessible by mass transportation to a population of several million residents of Brooklyn and Queens. Swimming in the warmer, calmer Bay waters would undoubtedly be an attractive alternative to use of the less accessible ocean beaches in the Rockaways.

By any measure, the per capita recreational resources of New York City rate very low compared with those of other major American cities. Given its great size and population, only development of major open areas adjacent to mass transportation can significantly add to the recreational potential of the City. Jamaica Bay alone can meet these qualifications. While it obviously would be inconvenient to residents of the Bronx, Jamaica Bay could serve as the major recreational resource for two to three million people, principally in Brooklyn and Queens. Substantial benefits could be gained at a very modest cost.

In the contest for the City budget dollar, recreation invariably fares badly. Upkeep of inner-city parks and playgrounds is very expensive because they are so overused. It is very likely that the per capita first cost and upkeep of Jamaica Bay park land would be lower than the average for other City parks and playgrounds.

The Parks, Recreation and Cultural Affairs Administration has overlooked a promising opportunity to provide more and better recreation at less cost by developing Jamaica Bay for this purpose. While public officials and private groups squabble over the use of an acre or two of Central Park, thousands of acres of prime recreational land along the shores of Jamaica Bay lie fallow.

The Jamaica Bay Wildlife Refuge is protected by its relative isolation in the center of the Bay. Its productivity will be increased as water-pollution abatement programs advance and can undoubtedly be helped by extension of the management practices now employed near the Broad Channel area. In our opinion, the continued viability of this area would not be threatened by the expansion of recreational usage of the Bay. But the greatest improvement would come from the construction there of an educational center, which would make available to City schoolchildren, as well as to the general public, an open ecological laboratory and natural wildlife habitat that is only palely reflected in the cramped quarters of New York City's zoos. The educational benefits would far outweigh the moderate costs of providing facilities for numbers of visitors considerably in excess of the 50,000 or so per annum who now visit the refuge.

Both the use of the Bay for swimming and its expanded use for fishing and conservation critically depend upon the completion of New York City's sewage-treatment program in the Jamaica Bay area. Upgrading of existing treatment plants and the installation of a storm-water/sanitary-sewage overflow-control system, of which the Spring Creek plant is the first unit, will be necessary to ensure bathing-water quality in the Bay and to bring the entire Bay ecological system back to a healthy state. We believe that the completion of the contemplated program will achieve these objectives.

The Incompatibilities of Commercial Development of Jamaica Bay

It is beyond contention that the construction and operation of Kennedy Airport has adversely affected the ecological viability of the Bay and the environment of millions of people within earshot of its air traffic. The taking of 4,500 acres of marshland and the dredging of Grassy Bay for airport fill destroyed one sixth of the original Bay area. Air pollution from aircraft and airport-generated ground traffic, as well as oil pollution from airport activities, has affected all forms of life both above and below sea level. Above all, the whine and roar of jet planes has cast a noisy pall over areas far removed from the Bay, and they are certainly nearly unbearable in the communities close by. Any steps that could alleviate any of these ill effects should certainly be taken.

The total effect of the airport on Bay community growth and improvement is discussed at greater length below. Here we are concerned with its effect on use of the Bay for recreation and conservation.

There is no doubt that aircraft noise will lessen the value of the recreational experience. Present noise levels in the Canarsie Pier area are sufficient to impair conversation and the rest and relaxation that should be normal experiences in afternoons at the beach. But so great is the need for recreation in New York City that new playgrounds, parks, and beaches along the Bay would be filled to capacity regardless of the degree of aircraft noise. For nearly all the prospective recreationers, there would be no comparable alternative.

Wildlife, being less intelligent than human beings, adapts even more readily to aircraft noise. Bird and

marine species that can maintain their instinctive patterns of survival in the presence of a man-altered environment will persist in Jamaica Bay as long as a supply of oxygen and unpoisoned food and a benign habitat for reproduction are available. As the natural environment deteriorates, the number of viable species declines, until only pigeons, rats, and sea gulls are left to remind the city dweller of his natural contemporaries. While Jamaica Bay is far from such a sorry state, a filling of major areas of the remaining marsh would be a giant step in that direction.

Water quality in the Bay is degraded by dumping into it organic matter, which consumes dissolved oxygen needed by marine species as well as introducing nutrients that stimulate the unbalanced growth of lower forms of marine life. (The discharge of inadequately treated sewage carries the additional hazard of organisms dangerous to human health.) Oil and industrial wastes, whether they reach the Bay via the sewage-treatment system or directly from uncontrolled surface drainage, are generally poisonous to marine species. When the background of biochemical oxygen demand and nutrient inputs to the Bay are minimized through the sewage-treatment programs, the pollution by oil and chemical wastes may become more noticeable. Steps to control and abate this pollution should be taken now.

Were it not mostly for the tidal inflow of cleaner seawater from the ocean, Jamaica Bay would fit the exaggerated description now inaccurately given it, namely, an open sewer. It is a common misconception that dredging the bay floor will aid the flushing action of the tidal motion, helping to clean out the pollutants dumped into the Bay. Both dredging for landfill, which increases the water volume in the Bay, and filling of marshy and shallow-water areas, which decreases the volume of tidal flow, increase the retention time, i.e., the time that a pollutant particle remains in the Bay before being flushed out to sea. Either dredging or filling, for whatever purposes, increases the damage caused by any given degree of pollution inflow. Filling parts of the Bay for airport runways will certainly intensify the problem of reducing water pollution. Dredging the bay for this or other fill would only compound the difficulty. As a matter of fact, a case can be made for the necessity of restoring the anaerobic stagnant areas, such as Grassy Bay, to their original shallow depths with fill transported into the Bay from offshore areas. Dredging or filling for any but the most exigent purpose should be forbidden.

Air pollution from Kennedy Airport does not appear to be more severe than that from surrounding areas, although the New York City authorities have made no recent adequate study of the matter. There is some suspicion that marshy plant damage in the Bay is caused by aircraft exhaust or by raw fuel regularly dumped from aircraft near takeoff. Unless aircraft pollution is abated through adoption of aircraft engine emission regulations by the cognizant federal agency, the air pollution from Kennedy Airport will only worsen, both absolutely and in relation to the other sources that are being brought under control.

The City's filling of marshy areas with solid waste has nearly reached an end, although strong pressures remain to continue this practice. If the Bay is to be protected against further loss of water or marsh area, expansion of the official landfill operation must be prevented, and the entire waterfront must be protected assiduously against wildcat refuse disposal and landfill operations, which are now common on the Bay periphery.

As long as oil is transported by barge through the Bay, whether to the airport or to other oil terminals, such as at Head of Bay, there will be oil spills. Certainly, growth of this commercial activity should be discouraged, and delivery of oil products by pipeline, as is now done for jet fuel at Kennedy Airport, should eventually be sought. Alternatively, these oil-handling facilities should be phased out and the land used for purposes more compatible with maintaining high environmental quality.

Federal Programs for Jamaica Bay

The Army Corps of Engineers has under study a hurricane flood-control barrier, which would be erected across the mouth of Jamaica Bay and along the beachfront of the Rockaway peninsula. This barrier is designed to prevent flooding damage to populated areas bordering the Bay under hurricane conditions so severe as to be only remotely likely to occur. Thus far, the study, as restricted by Congress, has ignored the programs for improving water quality in the Bay and the possible recreational development of the Bay, as well as existing recreational use of the Rockaway beaches. We recommend that no such barrier be constructed until its effects upon the entire plan for the development of the Bay have been evaluated and found to be supportive rather than destructive.

The National Park Service's plan for a Gateway National Recreation Area, which would geographically include the water areas of Jamaica Bay, is concerned with the recreational development of the ocean beaches of Breezy Point and Sandy Hook. Ignoring the recreational potential of the inner Bay beaches and shore-

front areas and their potential accessibility to large populations via extended mass transit, the plan tries unsuccessfully to cope with the formidable difficulties of transporting large numbers of inner-city residents to the most remote oceanfront regions of the metropolitan area. We are concerned that the implementation of this plan would prevent the City from making more immediate and more effective use by large numbers of City residents of recreational areas in the Bay, which would otherwise be locked up in a federal park beyond the control or influence of City residents. Direct federal aid to New York City for expansion of its own park facilities in Jamaica Bay would be more beneficial to City residents than would inclusion of the Bay in a national park.

KENNEDY AIRPORT AND COMMUNITY DEVELOPMENT

Characteristics of the Bay Communities

Three fourths of the Bay periphery lies in Queens, a borough in which the population is still increasing, even though that of New York City is declining. In the Bay communities, this growth is reaching its limit, as vacant land has nearly disappeared. About two thirds of the residents own their homes, giving these communities a stability and sense of identity more nearly like those of a suburb than those of a city area. Like the suburbs, many of these communities are predominantly white. City Hall, and even the borough hall, seem remote to many of the residents.

This growth has brought many problems in its wake. Public mass transportation is inadequate, subway service never having reached the extent and capacity found in neighboring Brooklyn. Schools are overcrowded, and more than two thirds of them are over 25 years old. Recreational facilities are very limited. Because much of the land near the Bay has little elevation above sea level, storm drainage is inadequate, and flooding of streets and homes is not uncommon. Street paving and maintenance are poor. In short, the population growth, much of which occurred during the 1930's and 1940's when public funds were scarce, has outrun the ability of the City to provide adequate public services. In the view of the local residents, the City administration has placed a higher priority on providing air transportation for the City and metropolitan region than on the provision of schools, subways, and sewers for the Bay communities.

Despite the growth in numbers of new homes, there are areas of deteriorating housing, very often built to substandard specifications. Urban-renewal programs are presently in progress in South Jamaica and Arverne, both within the present high-noise zone of Kennedy Airport. Other communities, such as Hamilton Beach and Broad Channel, would qualify as renewal areas. Communities such as South Ozone Park and Springfield Gardens are experiencing increasing housing pressures as inner-city minority groups move outward, seeking more adequate housing. It seems inevitable that the population of the Bay communities will continue to grow as higher density replacement housing is constructed and the few remaining open areas become likely prospects for more public housing. Growth of the airport and its related activities, by increasing the demand for and speculation in nearby land for commercial use, will so raise land values that higher density housing, whether public or private, is certain to increase.

Aircraft Noise and Other Effects of the Airport

Scientific studies of the reactions of people to aircraft noise have led to a quantitative scale for measuring its annoyance, called the Noise Exposure Forecast (NEF). This scale accounts for the loudness of the noise, its quality (screech or roar), its duration, the frequency of its occurrence, and the time of day when it occurs. At each level on this scale, the average response of people to aircraft noise can be predicted. For example, at NEF 30, conversation will be repeatedly interrupted for a cumulative duration of about one half hour per day, and about 50 percent of the people will experience an interruption of sleep (with a much higher percentage among elderly people). There will be organized efforts to seek noise abatement in communities subjected to this level. For the purposes of our study, we have selected a value of NEF 30 or higher to define the noise-impacted areas surrounding Kennedy Airport, although we recognize that a lower value should be used as an acceptable standard for residential usage.

At the present time, about 700,000 people live in areas near Kennedy Airport that are subject to a noise exposure greater than NEF 30. About 120,000 of them live in homes subject to an exposure exceeding NEF 40, which should be considered tolerable only for commercial usage in which noise-proofed buildings are used. These large numbers of noise-impacted residents are a result of two factors, both of which have increased with time: the increasing population density in areas surrounding the airport, resulting from housing construction, and the increasing area subject to NEF 30 or greater, caused by more and noisier aircraft operations. Unless circumstances change, both of these trends forecast increasing numbers of people exposed to greater aircraft noise.

Within the present impacted area (NEF 30 or

greater) there are 220 schools attended by 280,000 pupils. With normal schoolroom usage, this implies about an hour's interruption of classroom teaching each day and the development by the teachers of the "jet pause" teaching technique to accommodate the impossibility of communicating with pupils as an aircraft passes overhead. The noise interference with the teaching process goes beyond the periods of enforced noncommunication, for it destroys the spontaneity of the educational process and subjects it to the rhythm of the aeronautical control system. Given the advanced age of many of these schools, noise-proofing (where possible) would cost an appreciable fraction of their replacement cost.

A significant improvement in the noise environment around Kennedy Airport can be produced only by equipping aircraft with less noisy engines. If engine noise were reduced to levels consistent with the projections of the National Aeronautics and Space Administration "quiet engine" development program, which is estimated to be 10 EPNdb (effective perceived noise level) below present FAA standards for new engines, the number of people exposed to NEF 30 would be reduced dramatically from about 700,000 to 60,000, even if present runways were used. While the use of quieter engines would not eliminate the noise problem in communities surrounding Kennedy Airport, it would so reduce its severity as to permit the implementation of a long-range plan for completely compatible land use in the environs of the airport. Until aircraft are equipped with quiet engines, compatible land use is not a realistic possibility within the foreseeable future.

While noise is an overriding consideration, other airport-induced nuisances are felt in surrounding communities. The oft-expressed fear of an aircraft disaster, perhaps engendered by the constant sight and sound of aircraft overhead, is reinforced about once a year by an airliner accident near the airport. The sight of aircraft smoke trails and the smell of jet fuel downwind of the airport may cause exaggerated claims of excessive air pollution, but these cannot be discounted in the absence of clear scientific evidence to the contrary. Oil slicks in Bergen Basin and adjacent Bay waters are perceived as a fire hazard as well as a water pollutant. The ground traffic attracted by the airport, especially the rapidly growing truck traffic transporting air freight, appears to place extra burdens on the inadequate roads in nearby communities. The fear of the taking of homes, either by eminent domain or by purchase for commerical usage related to airport activities, destabilizes neighborhoods near the airport. Altogether, these effects make the airport an undesirable and even threatening neighbor.

Community Response to Environmental Effects

Seen from the view of Bay area residents, there is no government agency, local, state, or federal, that has been able to protect them from the inexorable encroachment of the airport and the deteriorated environment it brings. An ordinance of the Town of Hempstead to limit aircraft noise has been invalidated by the courts. The City and State environmental-protection agencies can control neither aircraft noise nor air pollution. City agencies approve housing renewal projects located in high-noise zones directly under flight paths. The FAA, while proposing engine-noise standards for new aircraft (which have not yet been met by new 747's), vacillates on more stringent but feasible standards for existing aircraft and defers the adoption of air-pollution emission standards.

It is an anomaly in this sorry record that PONYA, which in the eyes of many area residents is the villain of this "conspiracy," is the sole agency to have taken steps to control excessive aircraft noise. Within the limitations imposed upon it by FAA safety regulations and against the objections of aircraft pilots and airline managers, PONYA has specified and monitored takeoff procedures that will lessen noise relative to that associated with uncontrolled flights. While it is claimed that these procedures are evaded, they constitute the sole ameliorative measures undertaken by anyone, however limited in effect they may be. The fact that no improvement noticeable to nearby inhabitants has ensued from the implementation of these measures is direct evidence that manipulating aircraft flight patterns and procedures has only a negligible perceived effect on the noise impact on surrounding communities.

In the absence of any public agency able to cope with this problem, residents have organized citizens' groups to protest airport noise and to press for remedial measures. These groups have been joined by others concerned with broader environmental issues. They have enlisted the support of elected officials, particularly in the legislature, at all levels of government. In some instances, these citizens have been moved to adopt near-violent tactics to press for consideration of their grievances. Considering that many of these activists are respectable middle-class, middle-aged solid citizens, extreme provocation must exist to account for their impassioned response. That no remedy to their distress is in sight and no official redress of their grievances has occurred can only promise an escalation of their discontent and an exacerbation of the conflict between the citizen and his government.

Viewed realistically, only the federal government can initiate remedies that would significantly reduce the environmental impact of Kennedy Airport on the Jamaica

Bay communities. Only the setting of stringent noise and air-pollution emission standards by FAA (or the federal Environmental Protection Agency) will result in any appreciable reduction in airport noise and pollution. Only improvement of FAA air-traffic-control systems will permit the intensification of airport land usage and a consequent decrease in demand for more land for runways. Nevertheless, local and state governmental agencies should press for such measures on behalf of local citizens, who are otherwise poorly equipped to deal with the technicalities involved. Failure to do so will force local agencies to cope with a problem that is insoluble at their level.

Community Planning for Airport Needs

The expansion of the air transport industry and the change in aircraft technology have occurred so rapidly that the planners of Kennedy Airport could not have foreseen in 1947 the impact of these developments on the environment. Yet in the intervening years, as the expanding airport and the growing residential communities surrounding it headed on a collision course, no limits to either expansion were even proposed, much less enforced. The present situation is a result of improvident actions of City officials, airport authorities, and land speculators, and it exacts from nearly a million people a daily penance for the sins of oversight of public and private planners.

There are prospects of considerable alleviation of the plight of nearby residents through improvements in technology that would reduce noise and air pollution and restrict demands for more land for runways. Such improvements would not, however, remove the necessity for developing and implementing a compatible land-use plan for Kennedy Airport and the Bay area. Both the airport and the surrounding communities must recognize the limits on their usage of the land and must be prevented from encroaching on each other. This planning cannot be effective unless the airport's long-range development plans are incorporated into the planning process of New York City and Nassau County.

Some of the hazards to humans of aircraft noise can be alleviated by sound-insulation in buildings. Design and construction standards for buildings in noise-exposed areas should be set and rigorously enforced by local officials. These standards should be applied with equal force to public construction, whether schools or housing. An agreement by a state or federal agency to waive or ignore its own rules against financing sub-standard housing in noise-exposed areas can be checked at the local level by requiring strict adherence to noise-reducing standards of construction. The ability to maintain compatible land usage in the vicinity of airports also depends in part on the economic disincentives, such as increased construction costs, of alleviating the effects of incompatible uses.

The commitment of the City of New York to the creation and continuance of Kennedy Airport has not been matched by a corresponding commitment to protect the surrounding communities from the adverse environmental effects of the airport. Difficult as it may have been to forecast the extent and severity of this problem, and difficult as it may now be for the City, through its own efforts, to alleviate it in any significant way, there can be no further excuse for continuing the present disastrous policy of permitting and even encouraging marginal increases in size of impacted areas or numbers of people affected by them. That neither state nor federal agencies, nor the air transport industry, nor even the Congress or the national administration, has in any significant way helped the City to cope with its problem, cannot excuse the City from taking all measures within its command to alleviate an environmental hazard it has helped to create. At the very least, the City must avoid expedient actions that will intensify the conflict between the airport and the surrounding communities.

Environmental Evaluation of Some Runway Configurations for an Expanded Kennedy Airport

Increasing the aircraft-movement capacity of Kennedy Airport by improving the air-traffic-control system, by extending existing runways or constructing new ones, or by any combination of these, will have environmental effects on the surrounding communities and on Jamaica Bay. We have found that the noise effects are strongly dependent upon the technology of aircraft engines, while the other environmental damage is related primarily to the amount and location of land or water area needed for the new or extended runways. In turn, the latter is closely related to the characteristics of technologically improved air-traffic-control systems. In order to better understand the environmental costs associated with increasing aircraft-handling capacity and the technological methods for reducing them, we have evaluated the effects of four runway configurations, each of which is premised on different assumptions as to air-traffic-control capability. We believe these typify, but do not exhaust, the realistic possibilities for the near future.

The improvements in air-traffic control that we have considered would make possible a reduction in separation between parallel runways being operated inde-

pendently to as little as 2,500 feet (compared with the present requirements of 5,000 feet) or the operation of dual runways spaced 1,000 feet apart for takeoff and landing operations. For the various configurations considered, the computed capacity lies between the present value of 35 landings per hour and a maximum of 100 per hour, the latter being well in excess of the estimated 1980 demand of 45.

Reduction in aircraft-engine noise is possible through two recent technological developments. The first involves replacing (called retrofitting) existing engine nacelles with acoustically treated ones that reduce noise to levels closer to the Department of Transportation standards now in force for new aircraft. The nacelle treatment, costing about $500,000 per plane, could be fully implemented by 1975 if it were required. The second approach involves redesign of engines in the manner exemplified in the National Aeronautics and Space Administration's quiet-engine program. It is estimated that the quiet-engine noise level would lie 10 EPNdb below the present Transportation Department rule. Such engines, which could be available by 1975, would cost about $4,000,000 to install on existing four-engine aircraft, but could be used on new aircraft at only a 10 percent cost penalty.

The noise effects of aircraft in the surrounding communities depend upon the noise characteristics of the aircraft being used, the number of aircraft operations (both day and night), and the location and relative usage of the runway system under consideration. Since engine technology can be advanced independent of airport operations, we have examined the effects of the former for each runway configuration and the level of usage predicted for Kennedy Airport in 1980. The most significant reductions in number of people exposed to excessive noise (above NEF 30) are the result of use of retrofitted aircraft or those equipped with quiet engines, while much less improvement can be achieved by building new runways farther out into the Bay (see Table 4-5, Chapter 4, Volume II). Of course, additional runways would permit increased aircraft usage, tending to offset some of the gains from moving the traffic away from residential areas. Detailed calculations of NEF contours show that the reduction in number of people exposed to NEF 30 or greater that would ensue from the proposed extensions would never exceed about 100,000. The reduction would be much greater if quieter engines were used. In any event, no great reduction in noise impact can be achieved by runway extensions alone.

Construction of runways in Jamaica Bay will require dredging and filling operations that will have direct effects on the Bay's water quality and ecological system. Among these effects will be a reduction in water-surface area and marsh area, a reduction in tidal volume, a possible increase in retention time, and an interference with existing patterns of surface drainage and water circulation within the Bay. In addition, there will be a major problem in acquisition and disposal of fill material. There will also be numerous indirect effects attendant upon increased airport usage, among which are increased danger of oil spills from larger aircraft-fuel demands, increased demand on sewage-treatment facilities, interference with potential recreational usage of adjacent waters, greater air pollution, and a markedly increased danger of birds striking aircraft.

The various configurations considered will require the taking of between 5 and 28 percent of the Bay water area and from 1 to 26 percent of the present marshland. The filling of the greater areas would certainly endanger the viability of the marsh and marine ecosystems and seriously degrade water quality in the eastern end of the Bay. The relocation of treated sewage outfalls may be required.

Fill requirements of 20 to 175 million cubic yards would have to be obtained outside the Bay, as would disposal of up to 18 million cubic yards of spoil. The effects of the required filling and dredging on circulation patterns of the Bay cannot be ascertained without further study.

The more extensive runway configurations raise questions concerning a possible increase in bird strikes and the consequent danger to aircraft safety that they pose. At present there are more bird strikes at Kennedy than at any other U.S. airport. The number and size of birds being hit will increase as the runways intrude farther into the heart of the Bay. For this reason, extensive filling of water and marsh areas near and between runways will be required.

In summary, the environmental defects generated by extending runways into Jamaica Bay increase with the amount of area taken for such construction. Some ameliorative measures may be taken to reduce these adverse effects, but some degree of permanent degradation of the Bay environment seems inescapable.

NATIONAL AIR TRANSPORTATION POLICY

Implications of the Kennedy Study

While the proposed expansion of Kennedy Airport into Jamaica Bay appears to be a local issue to be resolved by local agencies, both the impetus for the expansion and the effective remedies for preventing environmental degradation lie at the national level. Federal and regional indecision has thrown an insoluble problem into

the lap of harried local officials powerless to cope with it. While the concern for environmental effects has called forth, for the time being, some coordinated interest on the part of local, state, and federal officials, this cannot properly serve as a substitute for a rational, coordinated plan to develop a national air transportation system that efficiently serves the needs of the nation without disrupting the environment of millions of people. In the absence of such a plan, disputes as virulent as those now surrounding the Kennedy Airport expansion proposal will erupt in other major U.S. cities as local citizens resist bearing the brunt of environmental costs evaded by the air transport industry and ignored by public officials.

Air travel to and from the New York metropolitan region in part serves regional needs, but it also helps to sustain the national and international business and financial center in New York City. To a great extent, Kennedy Airport therefore serves a national interest, especially since it is our largest international airport. But the planning for this airport and its possible expansion has proceeded on a local and regional basis, and the burden of land-taking and environmental disruption has fallen principally upon a city that benefits only partially from the national air transport system. Because these environmental costs have been borne locally, no effort has been made to eradicate them through the technological improvements on a national scale of which the national system is capable. Equivalent situations exist in other major U.S. cities and will undoubtedly become as acute as that at Kennedy Airport as the demand for air travel increases. It does not seem possible to solve these local airport planning, construction, and management problems independent of a federal plan for development of the national air transportation system.

Because of its massive and unfavorable environmental impact, an airport is no longer considered an unmixed blessing to a local community. The almost certain opposition by local residents to the siting of new airports had made the expansion of existing airports a more attractive alternative to airport authorities faced with a need for providing more flight capacity. It can be seriously questioned whether it is in the best long-run interest to expand an older airport near the heart of an urban area rather than provide for more future capacity in a more remote location in which proper environmental safeguards can be established. Any study of national policy on airport siting would have to consider whether urban airports such as Kennedy should not be phased out at a future stage in the development of an environmentally compatible national air transport system.

Fragmentation in Planning for Airport Siting and Expansion

At the federal level there is not yet a comprehensive plan and authority for managing a rational expansion of the air transportation system. The FAA is principally concerned with aircraft safety, and the CAB with aircraft scheduling and air fares, but the problem of airport siting and its environmental effects has not received equal attention at the national level. There is also little evidence of recognition that ground transportation connections to airports are equally a part of the air transportation system and the airport-location problem.

Contrary to common opinion, regional agencies do not have a free hand in siting or expanding airports. The history of PONYA's attempts to locate a fourth jetport is one of repeated failure to secure agreement among the many state and local interest groups, including private ones, as to who should bear the undesirable costs for the benefit of the metropolitan region. By default, the search for more regional air capacity has now narrowed to Jamaica Bay. Even if New York City should agree to the proposed expansion, it might be blocked by state authorities or private legal action. The provision of new airport capacity is not made more rational by being played out at more parochial governmental levels. On the contrary, the siting of an airport is thus more likely to be determined by the capitulation of the politically weakest community rather than by a balancing of costs and benefits to the region and the nation.

We therefore recommend that the Secretary of Transportation prepare a plan for the expansion of airport capacity in regions that are now congested, recommend sites for new airports, and acquire them if necessary to ensure the construction of adequate airports and ground access systems as a part of a national air transportation system. Congress should be requested to authorize these actions where necessary. Such site selection and development must provide for full local participation and prevent the creation of environmental hazards.

Improving the Air Transport System

The expected increase in air travel in the next several decades calls into question the appropriate future use for urban airports such as Kennedy. Regional jetports should properly be located away from urban centers, surrounded by adequate noise buffer zones and linked to the city by high-speed ground transport. Inner-city airports should be retained for V/STOL or interurban

usage, or phased out altogether. A long-range plan for future use of existing airports should be prepared by the Department of Transportation to guide the orderly development of the national air transport system.

The capacity of airports and the airways to handle aircraft is limited by the air-traffic-control system. It is generally acknowledged that the present system is obsolete and that improved systems are available that would increase the capacity of the existing airspace and airports to handle more aircraft more safely. The selection and implementation by the FAA of an advanced air-traffic-control system are urgently needed if a more efficient utilization of existing (and proposed) airports is to be achieved.

The present usage of existing capacity at Kennedy and other congested airports is very wasteful. The promotional policies of both the FAA and the CAB have encouraged maximum loading of the airspace and scheduling of air service. Only recently has the FAA limited the use of congested airports in order to reduce passenger delays. But the FAA and the CAB should act together to so limit the usage of overcrowded airports and airlanes that the maximum number of passengers may be safely and conveniently carried by the existing system. This may require imposition of landing fees and the restricting of peak-hour flight schedules by competing airlines where wasteful duplication of service exists. The FAA and the CAB should jointly undertake a complete study of the procedures for maximizing the system passenger capacity while minimizing congestion and flight delay, and should recommend corrective action.

For the short-term future, increased passenger capacity at Kennedy Airport will be a result of increasing aircraft size rather than growth in aircraft-handling capacity of the airport. But the new jumbo jets will be used for long-distance or heavily traveled routes. For short interurban or regional routes, V/STOL aircraft are likely to become increasingly important as passenger carriers that can use urban airports. Demonstration V/STOL programs should be tried soon to test the usefulness of this new mode of air transportation.

The development of new technology to increase the passenger handling capacity on the ground side of the airport has been sadly neglected. Each airport is left to solve its own ground transportation problems, which it passes on to the local community by asking for highway construction or rail links. Federal recognition of the necessity for development of ground transportation systems for airport access is a necessary first step.

Protecting the Environment from Airports

Under present circumstances, and for the foreseeable future, an airport is a great environmental hazard to the surrounding area. In choosing a new site or expanding an existing one, we are faced with the prospect of an irreversible change for the worse. Ideally, we should look for a large area of land (for buffer purposes) of otherwise low value that can be made accessible to urban areas by ground transportation. The possibility of technological improvements in ground and air transportation that reduce the requirements for land area and accessibility to the urban center, and thereby reduce the environmental cost, must be considered. Because of their demands upon land area, airports will most often compete with conservation and recreation areas for the scarce open lands in urban and suburban regions. Environmental quality for urban dwellers cannot be maintained unless a diversity of land usage, including parks and recreation areas, is preserved against constant encroachment for commercial uses.

The federal safeguards in the Environmental Policy Act of 1969 require careful investigation of environmental effects before approval of airport construction or expansion by the federal agencies involved. But these required environmental assessments of a proposed plan cannot substitute for a national environmental policy for airport siting in which environmental costs are a determining factor in site selection.

Substantial reduction of noise and air pollution from existing or new aircraft would bring major environmental relief to the environs of the nation's airports. The FAA and the new Environmental Protection Agency should promulgate the necessary stringent standards to which the manufacturer and user of aircraft must conform. These agencies should also recommend community noise and air-pollution standards to guide local or regional authorities in the construction and operation of airports and the development of communities surrounding them.

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George Spater, President, American Airlines and President, Aviation Development Council
Aviation Development Council: James T. Pyle, Executive Director
The Parks Council: Herschel E. Post, Jr., Executive Director
Richard L. Plunkett, National Audubon Society and The Linnaean Society of New York
Regional Plan Association: John P. Keith, President; Boris Pushkarev, Vice President for Research and Planning
Professional Air Traffic Controllers Organization: Jack L. Maher, Northeastern Regional Vice President
Air Transport Association: Stuart Tipton, President; James V. McGinn, Regional Vice President
Airlines Pilots Association: D. B. Peat, Acting Safety Chairman, Region I
Council on Environmental Quality: Gordon J. F. MacDonald
Harvey Hubbard, National Aeronautics and Space Administration, Langley Research Center
Michael Beesley, London Graduate School of Business
Engineering-Science, Inc./New York: David W. Eckhoff, Neal Armstrong
The RAND Corporation: Jan J. Leendertze
New York Department of Environmental Conservation: Anthony S. Taormina
The Reverend Kieran Martin, St. Virgilius Roman Catholic Church
Joseph Petrillo, Director, Community Renewal Program, Town of Hempstead
U.S. Army Corps of Engineers: Col. James W. Barnett, District Engineer for New York; Robert H. Wuestefeld, Assistant Chief, Operations Division, New York District Office; F. R. Pagano, Assistant Chief, Engineering Division, New York District Office; Frank Coppinger, Assistant Chief, Soils Branch; Jack Gelberman, Chief, Operations Division, New York District Office
Arthur Kunz, Planning Coordinator, Nassau-Suffolk Regional Planning Board
Clifford H. Deeds, Town-Village Aircraft Safety and Noise Abatement Committee