San Fernando Valley State College

AIRPORT NOISE AT LAX AND ADJACENT URBAN DEVELOPMENT

A thesis submitted in partial satisfaction of the requirements for the degree of Master of Arts in

Geography

by

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June, 1971
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ABSTRACT

AIRPORT NOISE AT LAX AND ADJACENT URBAN DEVELOPMENT

by

Robert Allen Schweim

Master of Arts in Geography

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The heart of airport-urban compatibility problems lies in rapid and uncontrolled urban growth around what were once isolated airports. The most important element of the compatibility problems is jet noise. A case study of Los Angeles International Airport (LAX) and portions of the adjacent community of Westchester relates proximity of commercial jet operations to incompatible residential developments.

Only with the postwar settlement of Westchester and the coming of the jet, was the noise problem fully recognized in Los Angeles as urban development surrounded LAX. The noise problem was created by the new models of aircraft which were noisier than previous models because of their larger size and because they were powered by jet engines. Moreover, commercial air traffic increased at LAX to the point that planes were operating during all hours of the
day and night. This situation and recognition of incompatible zoning practices put LAX and the Westchester community at odds over possible concepts for relief.

Among the choices for relief of jet noise around LAX are the development and use of quieter jet engines, zoning and land use changes, and some necessary area redevelopment. This problem at LAX suggests that programs of sound urban planning are necessary to prevent or control airport noise and incompatible urban development.
CHAPTER I

INTRODUCTION

The heart of airport-urban compatibility problems lies in rapid urban growth around what were once relatively quiet and isolated municipal airports. As urban areas built up, desirable land was developed, and airport areas found themselves with sprawling residential and shopping areas as neighbors; for example,

A recent study by the United States Department of Housing and Urban Development indicates that in the 21 U.S. large hub areas, 28 of the 36 air carrier airports are presently more than 50 per cent impacted, with 43 per cent of these airports 100 per cent impacted (completely surrounded by high density developments) (Lukens, 1970, p. 158).

The surrounded airport and the coming of the jet airliner have spawned many of the airport-urban compatibility problems we have today. The most important manifestation of this compatibility problem is jet noise. "The conflicting pressures both for expansion of our air transportation system and for urban growth cannot be accommodated unless this problem is solved or substantially minimized" (Lukens, 1970, p. 158).
Los Angeles International Airport and its northern neighbor, the community of Westchester, present an ideal case of the airport noise-urban development problem. In this instance, it is the proximity of two airport runways to residential developments (approximately 1,000 to 1,500 feet), and the noise from commercial jet operations (especially landings and takeoffs), that are responsible for the local airport-urban compatibility problem. Moreover, as previously mentioned, this type of problem is currently being recreated at numerous locations across the nation.

Newspapers, journals, technical reports, a best-selling novel entitled Airport, and the public in general, all recognize the problem and the need for a solution. For example, "Procedures for Developing Noise Exposure Forecast Areas for Aircraft Flight Operations," produced by Bolt, Beranek and Newman, Inc. for the Federal Aviation Administration is representative of work analyzing the growing jet noise problems in the vicinity of such airports as John F. Kennedy, O'Hare, and Los Angeles, and of work attempting to find some solutions which will enable communities to cope with jet noise through abatement and control. Additionally, recommendations of the Office of Science and Technology Ad Hoc Jet Aircraft Noise Panel, "called for later extension of the systems analysis study
to 20 or so other major metropolitan areas where civil or military aircraft noise is, or promises to become, a difficult community problem" (Bishop and Horonjeff, 1967, p. 1).

As a result of the public's increasing demand for air travel, it is imperative that some relief be found for the current airport noise-urban development problem, typified by conditions around Los Angeles International Airport. As an important transfer point in the movement of people and goods, airports must be free to function at peak efficiency and be allowed to expand as the air traffic demand increases. On the other hand, urban noise of which jet noise is a significant part, must be reduced if cities and communities like Westchester are to be desirable communities. In this manner, commercial airports, of which Los Angeles International is but an example, should be studied in order to better understand their role in the shaping of the urban environment.
CHAPTER II

PROBLEM AND STUDY AREA DELIMITED

Problem Statement

The precise purpose of this study is to examine the growth and development of Los Angeles International Airport in relation to the growth and development of a part of the Westchester community, and to consider possible links between the area's pattern of growth and present aircraft noise problems. In attempting to establish these links essential questions are:

1. What is the nature of the noise problem at Los Angeles International Airport?

2. What are the causes of the resultant airport community compatibility problems?

3. Was this particular compatibility problem controllable or preventable at Los Angeles International Airport?

4. What can be done to alleviate the current situation in the local study area and possibly prevent or control it at other locations?
**Principal Findings**

The principal findings of this case study of the Los Angeles International Airport area are that rapid urban development near a major airport, coupled with the advent of commercial jetliner operations and a lack of effective and comprehensive city planning and zoning ordinances, deny or fail to recognize the importance of an airport's role in the shaping of the urban environment. An additional finding at Los Angeles International Airport is that airport noise-urban development problems may be controllable and preventable.

These findings are based upon the following premises:

1. The jet noise and urban development problems around Los Angeles International Airport are not unique. Instead, similar compatibility problems are evident at airports all across the nation;

2. Urban encroachment around an airport can effectively strangle necessary future airport growth;

3. Residential urban developments adjacent to major airports like Los Angeles International Airport are incompatible, and

4. Any attempt to implement comprehensive, long-range, flexible, goal-oriented urban planning must include
study of the airport, the community adjacent to the airport, and the relationships between them.

Methodology

This Los Angeles International Airport (LAX) case study involves four steps. First, aircraft noise is defined and described for LAX. Also, the community and its response to jet noise is documented and examined. Second, with a basic understanding of jet noise and community response, the physical development of the Los Angeles International Airport study area is considered. This leads to the third step, which documents the growth of air traffic operations at Los Angeles International Airport, and changes or lack of changes in growth patterns in the residential portion of the study area. The fourth and final step involves a consideration of several ways to relieve jet noise and the incompatible airport-residential developments. In summary, some brief conclusions concerning the need for sound, comprehensive planning for airports like Los Angeles International and nearby communities like Westchester are presented in the hope that the airport noise-urban development problem can presently be controlled and prevented in the future.
Study Area

This case study includes Los Angeles International Airport and portions of the Westchester section of Los Angeles (Figure 1). This area is located in the southwest portion of metropolitan Los Angeles adjacent to the Pacific Ocean. Westchester is primarily composed of middle class, single-family dwellings. There are also a number of apartment buildings and strip commercial developments throughout the area.

The study area embraces a roughly quadrilateral-shaped zone bordered by Manchester Avenue (north), Imperial Highway (south), Aviation Boulevard (east), and the Pacific Ocean (west) (Figure 2). These limits leave out large portions of Westchester and El Segundo; however, they include the sections that are located closest to LAX, as well as those which are affected most by normal airport operations and the physical layout of the northern runways. These are also the areas which would be affected most by proposed expansion of LAX, new access routes to LAX, and by the new zoning and land use plans that would surely follow.

Figure 2 shows that LAX is an imposing feature on the landscape of southwest Los Angeles. Extending over two and one-half miles inland from the Pacific Ocean and running
Figure 1: Location of the Study Area in the Greater Los Angeles Coastal Area.
Figure 2: The LAX-Westchester Study Area.
(Source: Los Angeles Department of Airports, 1970).
over a mile wide at some points, Los Angeles International Airport encompasses some 3,000 acres. Therein, activity continues twenty-four hours a day, and is reflected by annual passenger statistics for 1968-69, which total more than twenty million passengers (Los Angeles Department of Airports, 1970, p. 18).

Los Angeles International Airport is studied since its inception in 1929. The Westchester area, on the other hand, did not experience any substantial growth until after World War II. Hence, Westchester is viewed only from 1948.
CHAPTER III

AIRCRAFT NOISE AND COMMUNITY RESPONSE

Introduction

The problem of airport noise in urban residential areas can be approached in two ways: from the standpoint of long-term zoning inconsistencies within the study area, and from the standpoint of aircraft noise and the community's response thereto. The latter is the subject of the present discussion. This does not mean that jet noise is to be treated as an issue separate from zoning problems. On the contrary, jet aircraft noise by itself is not the problem. Instead, it is jet noise coupled with urban development adjacent to an airport, which elicits community response, and causes compatibility issues typified in the area around LAX.

Jet Noise Defined

Jet aircraft noise is comprised of two noises emanating from the same jet engine(s). These are [1] "produced by the turbulent mixing of exhaust gases with the atmosphere . . . and . . . [2] by the flow of air
through the compressor and fan blades" (Hansen, 1969, p. 6).

There are two specific situations during which jet aircraft noise occurs that are consequential to the questions under consideration here:

(1) Noise from lowflying aircraft on their landing approach.

(2) Noise from aircraft during their takeoff and climbout.

These are the two types of jet noise that plague residential and commercial parts of the study area.

Perceived Noise Levels (PNL)

To cope with the noise problem at LAX, the basic characteristics of noise should be understood. The measurement of perceived noise is difficult because it involves several variables. The unit of measure used is the perceived noise decibel (PNdB), a quantity derived from measured noise levels. The measurement of a noise level from an aircraft flyover can only be approximated, because of the presence of a large number of variables, each of which can have a decided effect on the perceived noise level of an aircraft passing over a noise monitoring station. Noise is associated with the type of aircraft and
the number and type of engines. Noise is also associated with, "aircraft gross weight, aircraft altitude . . ., pilot technique, temperature, humidity, and wind" (Hansen, 1969, p. 6). In addition, the surface and the composition of the land over which the noise is propagated are also important.

The most important factor in noise perception, however, is the distance between aircraft and observer. Bolt, Beranek and Newman, Inc., acting as noise consultants for the FAA and U. S. Department of Transportation, conducted numerous tests of perceived noise levels of jet aircraft. Figures 3 and 4 and Table 1 present generalized examples of perceived noise levels in the two jet aircraft noise situations critical here: aircraft on a landing approach; and aircraft on a takeoff roll and climb. These data are plotted against distance from the aircraft in feet.

From data in Figures 3 and 4, it is clear that perceived noise levels exceed 100 PNdB within about 1,500 feet of any jet aircraft on landing approach. One hundred PNdB is the generally accepted limit of noise tolerance, beyond which the passing noise will interrupt most daily activities. In takeoff and climbout, the 100 PNdB limit is exceeded up to approximately 3,000 feet of any jet transport plane.
Figure 3: Variation in Perceived Noise Levels (PNL) for Selected Jet Transport Aircraft in the Approach (Landing) Power Mode.

Large Turbofan Transport Aircraft

Large Turbojet Transport Aircraft

Two and Three Engine Turbofan Transport Aircraft

Perceived Noise Level in PNdB

Distance from Aircraft in feet

200 400 600 800 1000 2000 4000 8000

140 130 120 110 100 90
Figure 4: Variation in Perceived Noise Levels for Selected Jet Transport Aircraft in the Takeoff Power Mode.

TABLE 1
CLASSIFICATION OF CURRENT JET AIRCRAFT, 1965

Large Turbojet Transport Aircraft

This classification includes Boeing 707 and 720 and Douglas DC-8 series aircraft equipped with Pratt and Whitney JT3C and JT4A series engines or Rolls Royce RCo-12 engines, and the Convair 880.

Large Turbofan Transport Aircraft

This includes Boeing 707 and 720 and Douglas DC-8 series aircraft equipped with Pratt and Whitney JT3D series engines, and the Convair 990.

Two- and Three-Engine Turbofan Transport Aircraft

This classification includes the BAC-111, Boeing 727 and Douglas DC-9 aircraft.


Such perceived noise levels, definitive as they are, do not spell out the entire story of jet aircraft noise. Instead, perceived jet aircraft noise, as shown above, is a multivariate function which tends to make each jet aircraft flyover an individual case which deviates in some degree from the general. Therefore, it is instructive to speak of perceived noise levels in generalized terms, and to compare them with both human tolerance levels and
perceived noise levels for some everyday activities.

Human tolerance levels in areas around airports such as LAX depend on such variables as time of day, season of the year, interval between exposure to jet noise, duration of each exposure, intensity of each exposure, and interruption of daily activities (i.e., speech). Among noise consultants it is generally agreed that a perceived noise level exceeding 100-105 PNdB is considered at the upper limit of acceptability. Beyond the level of 100 PNdB community response in the form of individual complaints or group action is to be expected.

To place jet aircraft noise in proper perspective relative to other community noises, some rough comparisons are offered in Figure 5. From these examples, it is seen that perceived noise levels of jet aircraft (especially those equipped with turbofan engines) are generally unacceptable if the aircraft are within 2,000 feet of the observer.

---

Figure 5: Comparisons of PNL for Jet Aircraft and Other Everyday Activities.

(Source: Adapted from Hansen, 1969, p. 8).
The foregoing comparisons provide guidelines with which to construct a simple example of generalized perceived noise level contours, superimposed over a map of the study area (Figure 6). The 100 PNdB line encompasses well over one-half of the study area bordering the north runways, assuming takeoffs and landings are made on the northernmost of the two north runways. Similarly, nearly all of the study area east of the northern runways is within the 100 PNdB contour. Thus, at least fifty per cent of the approximately 20,000 people residing in the study area are subjected to numerous instances of short-duration jet aircraft noise that exceeds levels generally defined as tolerable. This situation, along with other factors, provides data which culminate in the derivation of, "the quantity called Composite Noise Rating (CNR) from which the expected community response is determined" (California Department of Aeronautics, 1969, page not given).

1 Similar contours could be constructed for each of the three remaining runways, which would show the pattern of noise for the entire airport as well as areas to the east and south.

2 Population of the study area is based on Census Tract data compiled from the U. S. Census, 1960.
Figure 6: Generalized Perceived Noise Level Contours for LAX (in PNdB).
Community Response

In recent years, the number of jets frequenting LAX has increased, and the times of arrival and departure now include all twenty-four hours. The resulting pattern of noise has stirred numerous citizens and homeowners' organizations into action. Community response is now taking the form of angry and loud protests at public meetings, and lawsuits against the airport, airlines, and aircraft and jet engine manufacturers. In the political arena, attempts are often made to restrict airport operations. Such an example is seen from a recent article in the Los Angeles Times, "Restrict Use of New Runway, Council Urges Airport Board." The article states that an appeal by the City Council to restrict use of part of LAX's runway system was based on an emotional plea by a Council member who complained that, "... people living close to the runway were being 'punished worse than we had anticipated' by the jet noise" (Los Angeles Times, July 3, 1970, Part II, p. 1). The article goes on to state that the appeal was the result of an angry protest by housewives who demanded that the newly-opened northern runway be closed because of the detrimental effects of jet noise on the inhabitants of areas that border the airport on the north.
The previous example is but one of a multitude of pleas and protests caused by jet noise and other aspects of incompatible development of LAX and Westchester. The point is that despite the outcome of various appeals, rulings, and lawsuits of the past five years, the trend is likely to continue, as long as noise persists, and as long as LAX seeks to expand operations. This continuing pattern of less-than-harmonious airport-community relations is seen in developments surrounding the noise problem at LAX during the past few years. At least one suit over jet noise at LAX has been settled in favor of homeowners in the area, and other lawsuits against LAX are being pressed. "Residents of the Inglewood area to the east of LAX . . . have the right to prosecute their 2.875 billion dollar suit against the city of Los Angeles because of the noise . . . of International Airport" (Los Angeles Times, Oct. 23, 1970 Part II, p. 5).

Another protest over noise was made by "... North Runway Residents, an organization of homeowners which fought unsuccessfully to keep the airport's second north runway from going into operation" (Los Angeles Times, June 30, 1970, Part I, p. 1). This unsuccessful protest, taken to court, is characteristic of community responses by people who live in or near the study area. These
people, by virtue of the location of their homes, schools, and businesses, find themselves living and working largely within the 100 PNdB contour line for the northern runway system of LAX. As stated by the presiding judge in a Superior Court ruling against restrictions of runway use at LAX, "it is acknowledged that the homeowners are damaged by the jet flights at LAX." He said though, "... that private hardship must be balanced against the 'public interest' involved in the airport operation" (Los Angeles Herald-Examiner, June 16, 1970, p. A-5).

The Study Area and Its People

To complete the background to the compatibility problem, some material concerning the study area and the people who must endure their "private hardship," is useful at this point. The City Planning Department of Los Angeles provided most of these data. These data are the result of a questionnaire circulated during twelve publicly announced meetings, held in Westchester, by the staff of the City Planning Department. The purpose of the meetings, held between June and October of 1969, and of the questionnaire, was to determine the opinions and recommendations of citizens concerning a development plan for LAX and the Westchester community. The responses to that questionnaire
(1,000 out of a total meeting attendance of about 1,900) provide an index of community response to jet operations at LAX. Moreover, some insight into the socioeconomic status of the area is also gained. The material that follows is selected and adapted from the raw data tabulated from the 1000-odd responses (Los Angeles Department of City Planning, December 1969b, pp. 2-15).

Reasons for the influx of population into the study area are varied, though somewhat predictable. It is found, that approximately 43 per cent of the respondents chose the study area because of its weather and climate. Other reasons cited were the area's natural beauty (8 per cent), and employment opportunities (7 per cent). Once there, over 70 per cent of the people were satisfied with the area as a place to live. This fact though, does not deter the people from listing their complaints about the area and their recommendations for its improvements. The largest complaint, cited in nearly 65 per cent of the questionnaires is aircraft noise, followed at a distance by air pollution (4.5 per cent) and danger from mid-air collisions (3 per cent).

1960 Census data for Los Angeles-Long Beach SMSA largely corroborates figures cited in the questionnaire. A complete list of questions and responses is given in Appendix B.
Comparisons such as these are informative, but alone they provide no real information about the area or type of people voicing such complaints. Therefore, the following data, also derived from responses to the City Planning Department questionnaire, help to determine the socio-economic nature of the inhabitants of the study area.¹ For ease of comparison, these data are presented in Table 2.

Information presented in the table shows the study area as being basically middle class, with most residents living there for at least ten years, in owner-occupied, single-family dwellings. It can be inferred that the study area is a place of considerable personal and financial investment, investment which is threatened by jet noise and by the presence of LAX.

This threat to the stability and tranquility of residential areas north of LAX was evident when the City Planning Department asked for recommendations concerning district plans covering the whole Westchester-LAX area. For example, when asked for their reaction to the proposed Laurel Canyon and Pacific Coast Freeways, which would relieve surface traffic congestion in the study area,

¹Again, 1960 Census data for the Los Angeles-Long Beach SMSA largely corroborates the figures cited.
### TABLE 2

**SOCIO-ECONOMIC CHARACTERISTICS, 1969**

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<tr>
<th>Characteristic</th>
<th>Mode</th>
<th>Per cent of Total</th>
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<tr>
<td>Age of Population</td>
<td>41-50 years</td>
<td>34</td>
</tr>
<tr>
<td>Adults in each Household</td>
<td>2</td>
<td>72</td>
</tr>
<tr>
<td>Children in each Household</td>
<td>0</td>
<td>29</td>
</tr>
<tr>
<td>Yearly Family Income</td>
<td>$10,000 - $15,000</td>
<td>32</td>
</tr>
<tr>
<td>Estimated Home Value</td>
<td>$30,000 - $40,000</td>
<td>33.5</td>
</tr>
<tr>
<td>Owner-Occupied Dwellings</td>
<td></td>
<td>96.5</td>
</tr>
<tr>
<td>Type of Dwelling Unit</td>
<td>Single-Family</td>
<td>87</td>
</tr>
<tr>
<td>Length of Stay in Area</td>
<td>Over 10 years</td>
<td>56</td>
</tr>
<tr>
<td>Commuting Distance</td>
<td>1-5 miles</td>
<td>36</td>
</tr>
</tbody>
</table>

Source: Adapted from Los Angeles Department of City Planning, December 1969b, pp. 2-15.

approximately 62 per cent of those responding were opposed to the idea.\(^1\) Another example, and perhaps most important of all, was a question worded in two different ways, which asked respondents for a realistic solution to the compatibility problem with LAX. In the original wording,

\[\text{These freeways are designed to encircle LAX, provide more and better airport access, and to act as a buffer between the airport and residential areas.}\]
incompatibility was admitted and a solution was sought. The result follows: 61.5 per cent of the people asked for the closing of the north runways, and 28 per cent asked for negotiated acquisition of the disturbed homes. In its revised wording, the questionnaire recognized the dispute over the north runways and asked for solutions, assuming that the courts ruled in favor of the airport. In this case, the people chose acquisition of the disturbed homes by the airport (47 per cent), and redevelopment to more compatible uses (24.5 per cent).\(^1\) It is paradoxical that, according to questionnaire responses, 22 per cent of the people in the Westchester-Playa Del Rey district cited no experience with Los Angeles City Government; 42 per cent had no experience with the Airport Department; and, 59 per cent had no experience with the Planning Department.

The purpose of the aforementioned public meetings from which the preceding statistical comparisons were derived, was to obtain an objective, [and hopefully] random opinion from the populace of Westchester. This unfortunately was not entirely the case. Even though the

\(^1\)A more complete list of recommendations is listed, along with the questions and responses to the City Planning Department in Appendix B.
sample size and the number of responses from the population sample were fairly large, the fact that responses were solicited from only those attending the local public meetings invalidated the representativeness (and randomness) of the population sample. That is, the statistics were biased because the audiences at the meetings (which considered issues such as new freeways and airport noise) were usually composed of people or interest groups who had already become highly opinionated on the issues at hand. Hence, when asked for recommendations, the responses were often biased towards one point of view, the view of those attending the meeting. In the case of Westchester, the opinions appeared decidedly anti-airport, which could be expected. Therefore, even though opinions expressed at the public meetings were not truly the views of the entire Westchester community, the responses to the City Planning Department questionnaire did indicate that a significant portion of the local population was dissatisfied with living conditions near LAX and with proposed plans for area redevelopment.

**Conclusion**

In this chapter, from perceived noise levels, to community solutions, the nature of the compatibility problem
has indeed proven complex. Moreover, it would seem that various reports so often seen in the media, which speak of large-scale complaints about the airport and threats or acts of legal action against the City of Los Angeles, are open to some question. In any event, the problem of aircraft noise and community response is likely to go unsettled until both sides clearly recognize and fully comprehend the problem that exists; the positive steps that can be taken; and, the fact that the cost of correcting the past mistakes will be expensive.
CHAPTER IV

SITE DEVELOPMENT

Historical Development to 1945

The land that was to become LAX was part of an agricultural area outside Los Angeles that remained basically undeveloped until about 1920. Though the land had changed hands a number of times, no aircraft visited the site until the early 1920's. It was then that "William Mines leased a small section [of land] . . . for an aircraft landing strip . . . Mines Field. In 1928, the City of Los Angeles leased part of the present site of the airport (640 acres) as the first municipal airport" (Los Angeles, Department of City Planning, November 1969, p. 1) (Plates I and II).

One man who was there when the airport opened is Henry Bakes, former Director of Operations and Security at LAX. In a recent interview, it was confirmed by Mr. Bakes that the airport area was undeveloped and relatively isolated in the 1920's and 1930's, except for a few scattered
Plate I: Map of the Mines Field Location, 1930.

(Source: USGS, 1930).
Plate II: Aerial View of Mines Field from the southwest, 1929.
(Source: Spence Air Photos).
farmhouses and a few bean and barley fields.\textsuperscript{1} The Los Angeles Times, in an article entitled "LAX", quoted Bakes on the airport's early problems: "The City Council thought the place was too far out ever to amount to much and we couldn't even get them to put up the money to finish our hangars" (Murray, Aug. 9, 1970, p. 23).

By the late 1930's, the suburbs of Los Angeles were still relatively far away from the airport. However, the year 1937 heralded the first of many changes in the operation of Los Angeles Municipal Airport. In 1937 the city of Los Angeles purchased the land. Growth of air travel and the coming of World War II also produced some marked changes in physical development of the airport (Plate III).

During the war years, the military assumed operation of the airport for national security. The principal benefit derived from the period, according to Henry Bakes, was construction of a larger and more elaborate runway system. Another benefit was establishment of a North American aircraft plant on the southeast corner of the field shortly

\textsuperscript{1}Henry Bakes' career with the Los Angeles Airport spans a total of 42 years. From the position of Airport Attendant in 1928, he rose as LAX grew to Director of Operations and Security. He retired from DOA in December of 1970.
Plate III: Aerial View of Los Angeles Airport from the south, 1939.
(Source: Los Angeles Department of Airports).
before the war. It was also during the war years that the airport was given its official title: "By the early 1940's, a Board of Municipal Airport Commissioners had been established and the official title of Los Angeles Airport was established by ordinance" (Los Angeles Department of City Planning, Nov. 1969, p. 2).

Postwar Development

The postwar era ushered in a series of far-reaching changes. Among the most important was the introduction of commercial airline operations by the end of 1946. By 1948 the airport facilities expanded and moved into terminals on Avion Drive. "In 1949 the airport was officially named Los Angeles International Airport" (Los Angeles Department of City Planning, Nov. 1969, p. 2). By this time, industrialization and urbanization were taking their toll of surrounding open land (Plates IV and V).

Two more marked changes in the pattern of site development occurred during 1950. First, urbanization of the northern and western sections of the study area was rapidly taking place (Plate VI), because of favorable climate, location of the airport and related industry, and because of the national trend for migration to the suburbs which was also being felt in the Westchester area. The
Plate IV: Map of Los Angeles Airport and Part of the Study Area, 1948.

(Source: USGS, 1948).
Plate V: Aerial View of Los Angeles Airport and Part of the Study Area from the southwest, 1949.

(Source: Los Angeles Department of Airports).
Plate VI: Map of Los Angeles International Airport (LAX), the Study Area, and the Airport Expansion Area, 1950.

(Source: USGS, 1950).
second marked change in 1950 was the expansion of the airport. Until this date, Los Angeles International Airport and its predecessors had general boundaries of Century Boulevard, Imperial Highway, Aviation Boulevard, and Sepulveda Boulevard. In 1950 the Department of Airports (DOA) purchased additional land west of Sepulveda Boulevard for future expansion (Plate VI). "The expansion in 1950 brought the total area inside the airport boundary to approximately 3,000 acres. Also, public notices in local newspapers and signs posted along the new boundary stated the intended use of this land" (Bakes, July 20, 1970, interview).

Despite airport expansion and public notices, Westchester's growth continued. The mid-1950's were prosperous years for land developers and real estate brokers in Westchester. A street map published by a leading realtor and developer in southwest Los Angeles spoke of "sensational growth" and encouraged purchase of homes in new developments adjacent to LAX. The same map also shows, in detail, plans for expanded runways at Los Angeles International Airport -- adjacent to residential areas (Figure 7). Aerial photographs of the locale show its phenomenal growth (compare Plates II, III, VII, and VIII).

By 1964, nearly every parcel of open land outside the airport boundary was developed. LAX, on the other hand,
Figure 7: Map of LAX and Parts of Westchester, 1956.

(Source: Adapted from Marlow & Co., 1956).

Shown is an adaption of a copyrighted promotional map published by a prominent realtor and land developer in the airport area.
Plate VII: Aerial View from the east of LAX and the Study Area, 1957.
(Source: Los Angeles Department of Airports).
Plate VIII: Aerial View from the south of LAX and Part of the Study Area, 1959.
(Source: Los Angeles Department of Airports).
was in the midst of a massive expansion program, within its boundaries, designed to provide new ground facilities for the jet age, already a reality. By the end of 1962, some airlines and the FAA had moved into new facilities on World Way. The physical plant was completed by 1964, except for changes in surface access routes to the airport and additional parking facilities.

Major changes of the late 1960's related to rising operational levels of the airport, and to the construction and use of a new runway adjacent to housing areas in Westchester (Plates IX and X). Today, there is a major conflict between use of the so-called "northern runways," and these adjacent residential areas.

Summary

In summary, the crucial observation thus far concerning site development is the independent evolution of Los Angeles International Airport and the Westchester community. In response to a question concerning factors inhibiting growth at LAX, Joseph R. Clair, Assistant Airport Manager, emphasized the problem by stating, "aircraft noise and community response" (Clair, July 20, 1970, interview).
Plate IX: Map of LAX and the Study Area, 1964.
Plate X: Aerial View from the south of LAX and Part of the Study Area, 1969.

(Source: Los Angeles Department of Airports).
CHAPTER V

SITUATION DEVELOPMENT

Introduction

This chapter explores some of the conditions contributing to incompatibility between LAX and Westchester. Airport-urban incompatibility is viewed from two perspectives: in the context of airport operations growth since 1960; and in the context of land use zoning practices in the study area since 1945.

Growth of Airport Operations

Los Angeles International Airport has experienced phenomenal growth since the first planes touched down at Mines Field in 1929. "Last year [1969] about 22 million passengers passed through LAX, nine times the figure for 1955 . . ." (Murray, August 9, 1970, p. 23). Modern air travel was quite a bit different in 1929.

Forty years ago, passengers planning a flight to New York (and there weren't many) drove to the airport, a very primitive one from today's viewpoint, and bravely boarded a Ford tri-motor plane to embark on a 48-hour expedition that would combine flying with train travel and end up at New

The most important period of airport growth, as far as its effect on the study area is concerned, occurred between fiscal 1959-60 and the present. During this period commercial jetliners came into service, and Westchester experienced rapid growth. This growth is not at an end, since Department of Airports sources predict 40 million passengers per year by 1973-76. Therefore, the following comparisons are valuable if viewed in the context of LAX's small beginning and its predicted future.

Perhaps the most relevant operating figures at LAX involve numbers of aircraft arriving and departing each fiscal year. The unit of measure is called aircraft movement; and, each movement pertains to either an arrival or departure. Table 3 reveals an upsurge in aviation activity at Los Angeles International Airport, with only modest decreases for three of the years reported. More significant was the explosive 22 per cent growth in aircraft movements from 1966-67 to 1967-68. The trend continues, with an increase of 18 per cent in 1968-69.

Two other significant sets of operating statistics involve numbers of passengers and total air cargo handled
<table>
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<th>Fiscal Year</th>
<th>Movements</th>
<th>Per cent Change</th>
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<tbody>
<tr>
<td>1959-60</td>
<td>304,361</td>
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<td>302,131</td>
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<td>1964-65</td>
<td>358,859</td>
<td>-1.6</td>
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<tr>
<td>1965-66</td>
<td>400,284</td>
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<td>1966-67</td>
<td>437,777</td>
<td>9.4</td>
</tr>
<tr>
<td>1967-68</td>
<td>534,234</td>
<td>22.0</td>
</tr>
<tr>
<td>1968-69</td>
<td>630,623</td>
<td>18.0</td>
</tr>
</tbody>
</table>

Source: Adapted from Los Angeles Department of Airports 1969 Annual Report, p. 18.

at LAX during a fiscal year. As expected, the figures for passengers and total air cargo exhibit increases similar to those of aircraft movements, with three exceptions (Tables 4 and 5). First, the increases are larger each year, on

1Total air cargo includes all freight, mail, and express.
TABLE 4

PASSENGERS HANDLED, 1959-60, 1968-69

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Volume</th>
<th>Per cent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1959-60</td>
<td>6,366,804</td>
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<tr>
<td>1960-61</td>
<td>6,756,109</td>
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<td>1961-62</td>
<td>7,305,085</td>
<td>8.1</td>
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<td>1962-63</td>
<td>8,122,642</td>
<td>11.2</td>
</tr>
<tr>
<td>1963-64</td>
<td>9,914,785</td>
<td>22.1</td>
</tr>
<tr>
<td>1964-65</td>
<td>11,460,178</td>
<td>15.6</td>
</tr>
<tr>
<td>1965-66</td>
<td>13,984,017</td>
<td>22.0</td>
</tr>
<tr>
<td>1966-67</td>
<td>16,412,269</td>
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</tr>
<tr>
<td>1967-68</td>
<td>19,353,405</td>
<td>17.9</td>
</tr>
<tr>
<td>1968-69</td>
<td>20,998,989</td>
<td>8.5</td>
</tr>
</tbody>
</table>

Source: Adapted from Los Angeles Department of Airports, 1969 Annual Report, p. 18.

average, than those of aircraft movements. Second, there are no decreases in either passengers or total air cargo for any of the years reported. In fact, the smallest increases are 6.1 per cent for passengers handled in 1960-61, and 12.6 per cent for total air cargo in 1960-61. Third and finally, while aircraft movements doubled between 1959-1969, passenger volume tripled and total air cargo volume increased nearly five-fold.
TABLE 5
TOTAL AIR CARGO, 1959-60, 1968-69

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Volume in Pounds</th>
<th>Per cent Change</th>
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<tr>
<td>1959-60</td>
<td>187,554,169</td>
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<td>1960-61</td>
<td>211,130,361</td>
<td>12.6</td>
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<tr>
<td>1961-62</td>
<td>273,210,790</td>
<td>29.4</td>
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<tr>
<td>1962-63</td>
<td>313,943,969</td>
<td>14.9</td>
</tr>
<tr>
<td>1963-64</td>
<td>400,165,408</td>
<td>27.9</td>
</tr>
<tr>
<td>1964-65</td>
<td>472,336,115</td>
<td>18.0</td>
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<tr>
<td>1965-66</td>
<td>579,068,772</td>
<td>22.6</td>
</tr>
<tr>
<td>1966-67</td>
<td>657,573,729</td>
<td>13.6</td>
</tr>
<tr>
<td>1967-68</td>
<td>772,248,166</td>
<td>17.4</td>
</tr>
<tr>
<td>1968-69</td>
<td>905,487,664</td>
<td>17.3</td>
</tr>
</tbody>
</table>

Source: Adapted from Los Angeles Department of Airports 1969 Annual Report, p. 19.

The more rapid increase of passenger and air cargo volumes, relative to aircraft movements, signaled the coming of larger and faster jet transport aircraft. Also, increased aircraft activity, together with the coming of jetliners, set a trend that prevailed and intensified through the 1960's, and led to the situation we have today. Specifically, the airport is beginning to reach its
operating capacity, and is attempting to expand and improve its facilities to stay ahead of growth in commercial aviation activity.

Zoning Patterns Since 1945

Urban development did not become an important factor in the study area until after World War II. Therefore, the immediate postwar period is an appropriate starting point for tracing change in the parts of Westchester included in the study area. Aerial photographs and maps (Plates III-VI, Chapter III), reveal that urban development in the study area was just beginning to gain a foothold in 1948-50. Of course, before any land development could take place, prospective developers had to assure City government that all development conformed to the zoning ordinances of the particular area in question. If there was a conflict, it then became a matter of obtaining the fairly common zoning variance, conditional use permit, or permanent zoning change. It is thus of importance to examine zoning in effect in the study area, when urbanization and development began (Figure 8).

In 1948 LAX was largely confined to an area south of Century Boulevard and east of Sepulveda Boulevard. Most
Figure 8: Generalized Zoning Patterns, 1948-51.

(Source: Adapted from Brewster Maps, 1948). Base map is 1970.
HEAVY INDUSTRIAL (M3)  LIGHT INDUSTRIAL (M2)  COMMERCIAL (C)  RESIDENTIAL (R)  AIRPORT BOUNDARY  RUNWAYS AND TAXWAYS
of this area was zoned for light industrial land uses (M2).\(^1\) The area immediately to the west and north was undeveloped and was zoned for heavy industry (M3), and for single-family residences (R1). Most of the developed parts of the study area were zoned R1, for single-family residences, with exceptions for commercial shopping areas (C1, C2, C4) and some light industrial sections (M1, M2) in the northeast corner of the study area. All in all, the zoning pattern might seem reasonable, except for two glaring flaws. First, the zoning codes for Los Angeles state that airport areas must be zoned heavy industrial (M3), not light industrial (M2) as shown.\(^2\) Second, heavy industrial and single-family residence zones (M3 and R1) are placed next to each other, with no transition zoning between them. This zoning arrangement, less than desirable, became more acute as land developers continued to sell in the Westchester-Playa Del Rey residential areas.

By about 1960, long after the Department of Airports had acquired the land on which LAX now rests, one would

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\(^1\)A generalized list of zoning classifications for the city of Los Angeles is given in Appendix A.

\(^2\)This section of the zoning ordinance was subsequently verified in two telephone conversations with representatives of the City Planning Department.
think that steps would have been taken to permanently correct earlier zoning problems and prevent new ones from occurring. Examination of Figure 9 shows that after twelve years of continued growth in the study area, just the opposite had occurred. The old airport and terminal area, east of Sepulveda Boulevard, was still improperly zoned for light industry. Secondly, the lack of transition zoning between heavy industrial zones and residential zones persisted. Most important, however, is that the parts of the airport lying north and west of the intersection of Sepulveda and Century Boulevards were still zoned R1, residential. This area included two runways and a sizable portion of the new terminal and maintenance areas. Another area zoned R1 was located near Pershing Drive, at the west boundary of the airport, adjacent to the airport maintenance areas and the heavily-used south runways.¹

This situation, the result of improper zoning practices, is central to this example of airport-urban compatibility. One can hypothesize that either no action was taken to correct significant flaws in zoning patterns

Figure 9: Generalized Zoning Patterns, 1960.
(Source: Adapted from Brewster Maps, 1960). Base map is 1970.
around Los Angeles International Airport, or that questionable zoning variations or conditional uses were allowed. In view of an almost total lack of zoning changes between 1948 and 1960, it seems that either was possible. Zoning patterns in the study area in June, 1971, are virtually a carbon copy of those in 1960 (Figures 9 and 10). The same zoning conditions, good or bad, still exist; however, three new factors which aggravate an already serious situation have come into play.

The first factor is the intrusion of the jet into an area that is zoned for residential living. Specifically, this includes the placement of two jet runways immediately adjacent to a residential environment.¹ Second, the frequency of aircraft arrivals and departures in 1969 was three times what it was in 1959. Thus, there was more noise, more often, than ten years previously. Third, the use of the north runways which were only partly constructed in 1960, brings the planes to within one quarter-mile of residents in some places. By 1970, then, the effects of

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¹The utilization of residential land (R1) for airport uses (M3) under the provisions of a conditional use permit was confirmed in a conversation with Joseph R. Clair, Assistant Airport Manager, on May 17, 1971.
Figure 10: Generalized Zoning Patterns, 1970.
(Source: Adapted from Brewster Maps, 1970.)
zoning have become critical to both LAX and the Westchester study area. It is this situation, resulting from improper site development, with which the people must now deal.

Summary

This chapter viewed the changing situation in the LAX area from two perspectives. First, the nature of operations has changed markedly and their intensity has increased dramatically in the last ten years. More people and cargo now fly in more planes more often than ever before. Second, zoning patterns in existence in 1945, are now completely outdated and obsolete. Furthermore, instead of zoning ordinances being changed to make compatible growth possible, conditional use permits and other zoning adaptations were allowed and resulted in the improper land use developments that exist today.

For citizens residing in the study area, the situation is unfortunate. On the one hand, people wish to live in relative peace and tranquility. On the other hand, LAX as an air transportation center, must provide the best possible service for the largest possible number of travelers and shippers. To do this, LAX must be able to operate at peak efficiency and be allowed to expand and improve its facilities as aviation needs dictate. Regrettably, the
goals of the local residents and the airport are opposed to each other. This, then, results in an impasse in airport-community relations, and in a pressing need for some concepts for relief, which are the focal points of the next chapter.
CHAPTER VI

SUMMARY AND POSSIBLE SOLUTIONS TO THE
AIRPORT-URBAN INCOMPATIBILITY PROBLEM

Introduction

Aircraft will continue to fly and their engines will continue to generate noise for the foreseeable future. The level of . . . airfield-community relationships can only continue to deteriorate if preventive measures are not applied with uniformity and vigor (Guild, et al., 1964, p. 723).

This is an accurate account of the present situation in the LAX-Westchester study area. This position is reflected in the hardening attitudes of area citizens and airport personnel alike, as expressed in suits over noise and the airport operations and expansion. Further evidence of deterioration lies in a dispute over residential land and home values in the noise-affected areas. According to a Los Angeles Herald-Examiner article, "Airport Property Panel Set," there was a dispute between Los Angeles International Airport and Westchester residents over the price that should be paid for homes and land acquired by the airport through condemnation. "Many property owners . . .

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have complained their property has dropped in value [due to the noise] and the market value at the time of acquisition is unfair" (Los Angeles Herald-Examiner, March 18, 1970, p. A-9). Therefore, the mayor immediately established a panel to determine a more equitable price for the acquired property. The case outlined above points to the need for positive and immediate action to alleviate present and predicted compatibility problems.¹

**Concepts for Relief**

A logical step toward a solution of airport-homeowner problems is acknowledgment of the necessity for compromise in the search for permanent solutions. This attitude immediately negates the validity of any attempts to force the closure of Los Angeles International Airport. Reasons for this are several. First, LAX is immobile and cannot simply be transferred to another location, like can many forms of agriculture and dairying. Second, other air carrier airports in the Los Angeles area are incapable of absorbing either the passengers or the operations if LAX

¹A complete discussion of proposed expansion plans at LAX is given in, "Alternative Development Plans for Los Angeles International Airport: A Comparison and Evaluation," January, 1971, Primary data.
were to close. Third, Los Angeles International Airport represents an enormous economic investment to both Los Angeles and the communities surrounding the airport. To close or move LAX would be to create an economic vacuum over the entire airport area. Furthermore, recognizing that the airport was the initial development in the area, that the airport has a decided influence on the area's economy, and that LAX operates in the public interest of Greater Los Angeles, it is unlikely that court action would result in the curtailment of normal airport operations. Instead, court action results in only an occasional payment to homeowners over jet noise. This type of action does little to solve problems at hand. The planes still fly, the noise continues, and the homeowners still suffer. Perhaps a change in attitudes by both residents and airport personnel would reduce the need for lawsuits. This concept is justifiable because as long as a hardened relationship exists between LAX and the residents of the surrounding area, little real progress and cooperation can be expected.

A second step would be to attack the noise problem at its source, the jet aircraft engine. This means that quieter jet engines can and must be built. By accomplishing this, the noise-affected areas around LAX, or any airport with similar problems, would be significantly reduced
in size. This, in turn, would make it easier and less costly to modify existing zoning and land uses.

To accomplish this task of noise reduction will require far stronger steps than presently outlined by the City Planning Department. To be more precise, it is known from recent development of the Boeing 747, McDonnell-Douglas DC-10, and Lockheed L-1011, that quieter engines can presently be built. Similarly, it is known that the same technology which can build quieter engines, can also reduce by half the noise of engines now in use. It is a firm belief that the "retrofitting," or installation of sound-suppressing equipment on present engines can be accomplished within five years.

All that is lacking is industry determination . . . and a method to meet the substantial cost of a retrofit program. Retrofit of the existing fleet of about 2,000 jet aircraft, at the estimated $500,000 to $1,000,000 per aircraft . . . would cost between one and two billion dollars, or a fraction of the billions of dollars it would cost to convert land use at the 28 major U. S. airports (Lukens, 1970, p. 159).

The partial solution of the noise compatibility problem at LAX awaits Federal, State, and local leadership to

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\(^1\) A discussion of noise abatement procedures proposed is offered in the Los Angeles International Airport Development Plan, Staff Report, November 1969, pp. 6-7.
require, not encourage, a retrofit program and a governmental plan to provide the airlines with financial aid to accomplish this expensive engine modification. Los Angeles can do its share in this regard by exerting pressure on the airlines using LAX, and by exerting pressure on the State and Federal governments to initiate such a sound abatement program. It then becomes the people's responsibility to see that the program is carried out. This course of action could make the noise compatibility problem more manageable.

The third step would involve the government of the City of Los Angeles. Lack of an appropriate land planning program for the Los Angeles International Airport area has resulted in zoning and land use inconsistencies. By-products of inefficient planning are lawsuits against LAX and the City of Los Angeles, against the airlines and aircraft and jet engine manufacturers. It would be in the public interest of the inhabitants of Los Angeles to have land planning and rigorous aircraft noise limitations similar to those enforced by the Port of New York Authority at Kennedy International Airport.

A final step discussed here involves changes in zoning and land use within the study area. The crux here is the zoning inconsistencies described in Chapter V.
For example, airport facilities zoned for residential uses and residential and heavy industrial zones located side by side reveal that the current zoning arrangement is unsatisfactory. Moreover, such situations are in violation of the city's own zoning regulations. Of course, this does not account for the probable zoning variances and conditional use permits which enable these zoning irregularities to persist. What is at stake is not the legality of the zoning, but its practical applications.

Although it is not the complete solution to the problems of airport-community relations, zoning is the prime method of protecting the respective interests of both airports and those occupying the land around it, since it achieves regulation without compensation of the landowners (Horonjef£, 1962, pp. 149-50).

In this respect, zoning is the legal expression of land use planning. The major obstacle, though, is the generally accepted doctrine of non-conforming uses. This means that, "noise-sensitive uses [cannot] be zoned out of existence even though they might be within areas zoned against such use in the future" (Lukens, 1970, p. 160). Therefore, zoning that would accompany a comprehensive development plan, can be only part of the answer to the complex problem of compatibility.

**Study Area Redevelopment**

In order to implement compatible zoning and land uses
around LAX, some redevelopment of residential land uses probably will be necessary. The purpose of such redevelopment is to provide for a noise buffer zone between the runways and the residential areas of Westchester. It is proposed that part of the freeway loop destined to encircle LAX, be oriented to separate the residential areas from those areas to be redeveloped into airport-oriented uses (compare Figure 11 and Figure 6). Though this approach might be highly disruptive to the residential community, it is perhaps one course of action that will help settle the noise problem adjacent to LAX. Since it is now evident that residential land uses are incompatible with airports, then the noise-affected area should be composed of uses compatible with airports, and these new areas should act as a zoning transition for the residential areas to the north. Thus, when the Department of Airports speaks of acquiring a strip of land for a noise buffer zone, the residents of the area have a right to demand and expect a clear set of proposals and plans for the area in question, not a bureaucratic pledge to initiate planning for compatible development in the acquired area.

In light of the analysis of the current zoning and land-use problems, several suggestions for compatible development are offered (Figure 11). First, to relieve
Figure 11: Projected LAX and Study Area Redevelopment.

(Source: Los Angeles City Planning Department, 1969).
AIRPORT (M3)
AIRPORT QUIET ZONE (M-C)
(no aircraft under power)
INDUSTRIAL (M2-M3)
COMMERCIAL (C)
RESIDENTIAL (R)
OPEN SPACE-PUBLIC LAND
PROPOSED FREEWAY ROUTES
AIRPORT BOUNDARY
MAJOR STREETS AND HIGHWAYS
present and projected traffic congestion in the airport area; the proposed freeway loop around LAX should be completed. These freeways should be constructed so that they can be connected into the expanded surface access system at LAX, which is now being planned. Also, alignment of the freeway on the north should act as a divider between airport-oriented land uses on the south and residential uses on the north. This alignment, just south of Manchester Avenue, should mark the outside limit of the noise-affected area (100 PNdB contour line).

Within the proposed freeway loop, land use changes should be encouraged, through necessary changes in zoning. The new land uses should be essentially airport-oriented and therefore not bothered by periodic noise and vibration. Some examples of these uses include offices, commercial development, some light industries, airport support services, and green-belt open spaces. An important regulation in this redevelopment program is that no land uses which require the presence of an aircraft under its own power are to be permitted. The land uses proposed are not all inclusive, but they represent several possibilities, all of which can function in an airport environment. Though this plan does not promise an end to the noise, it does provide a framework for relief, through the orderly
acquisition and redevelopment of the noise-sensitive study area.

**Summary**

The approaches discussed offer hope for some degree of relief for parts of Westchester. Unfortunately, some of these same concepts carry an expensive price at the local level: disruption of a large residential area, and large expenditures for the necessary redevelopment. LAX, as an economic asset and vital transportation center for the area and city as a whole, and for the Southwest, must be allowed to function normally at all times. The only way to guarantee this situation is to recognize the needs of the City and the region as a single unit. These needs must come first. To delay in making the difficult but necessary decisions only increases animosities as well as the social and economic costs to the Westchester community and the City of Los Angeles.


Clair, Joseph R. Los Angeles Department of Airports. Interview, January 28, 1970.

_____ Los Angeles Department of Airports. Interview, July 20, 1970.

_____ Los Angeles Department of Airports. Interview, May 17, 1971.

Guild, Elizabeth; Cole, John N.; Gierke, Henning E. von; Galloway, William J.; and Pietrasanta, Adone C. "Land Use Planning with Respect to Aircraft Noise: Discussion of a New Procedure." Aerospace Medicine, 35 (August, 1964), 719-723.


Los Angeles Department of City Planning. Los Angeles International Airport Development Plan. City Plan Case 21232, by the Transportation Committee of the General Plan Advisory Board. Los Angeles, California: Department of City Planning, November, 1969 (includes Staff Report).

Westchester-Playa Del Rey District Plan. City Plan Case 20345. Los Angeles, California: Department of City Planning, December, 1969a (includes Staff Report).

Westchester-Playa Del Rey District Plan, Staff Recommendation, City Plan Case 20345. Los Angeles, California: Department of City Planning, December, 1969b.


"No Court Ban Against Runways." June 16, 1970.


"Judge Upholds Right to Sue Over Airport." October 23, 1970.


ADDITIONAL WORKS CONSULTED


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APPENDIX A

GENERALIZED ZONING CLASSIFICATIONS FOR LOS ANGELES

The following is a partial list of zoning classifications, most of which are found in or adjacent to the study area. There are other zoning classifications as well as further descriptions of the examples cited; in these cases, either the City Planning Department or Brewster Maps, Los Angeles, should be consulted.

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</tr>
<tr>
<td>D</td>
</tr>
<tr>
<td>C1</td>
</tr>
<tr>
<td>C2</td>
</tr>
</tbody>
</table>
C5  Commercial, with C2 uses and limited floor space areas for light manufacturing.

CR  Limited Commercial, (Offices), with R5 uses.


M1  Limited Industrial, limited CM uses, no R uses.

M2  Light Industrial, also M1 uses and additional industrial uses, no R uses.

M3  Heavy Industrial, also M2 uses and airports.

Source: Adapted from Brewster Maps, Los Angeles, California, 1970.
APPENDIX B

EXAMPLE OF THE CITY PLANNING DEPARTMENT

QUESTIONNAIRE AND RESPONSES FOR THE STUDY AREA

The following is a list of the questions and responses to the questionnaire circulated at twelve publicly announced meetings in the Westchester area during 1969. The sample size is rated at approximately 1,000 by the City Planning Department, who devised, conducted, and scored the questionnaire. Percentage scores after each response are those of the study area as an approximate per cent of the total response to each question.

1. Which five of the following contributed most to your selection of Westchester-Playa del Rey as a place to live?

<table>
<thead>
<tr>
<th>Question</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather and climate</td>
<td>43.0%</td>
</tr>
<tr>
<td>Natural Beauty</td>
<td>8.0</td>
</tr>
<tr>
<td>Diversity of activities available</td>
<td>2.0</td>
</tr>
<tr>
<td>Employment opportunities</td>
<td>7.0</td>
</tr>
<tr>
<td>Governmental services - City, County, State</td>
<td>0.0</td>
</tr>
<tr>
<td>Educational opportunities</td>
<td>2.0</td>
</tr>
<tr>
<td>The Beach</td>
<td>5.0</td>
</tr>
<tr>
<td>Access to shopping</td>
<td>1.5</td>
</tr>
</tbody>
</table>
Homogeneity of living (are all alike in terms of education, occupation, stability of homes, etc.) 7.0%

Other 1.5

2. Which of the following do you dislike most about Westchester-Playa del Rey?

- Air Pollution 4.5%
- Vehicular traffic congestion 1.0
- Aircraft noise 64.5
- General congestion 0.0
- Danger of air collisions 3.0
- Poor local governmental representation 0.5
- Poor physical condition of the area 0.0
- Lack of recreation 0.5
- Amount of crime in the district 0.0
- Poor educational opportunities 0.0
- Bussing of many of the school children 0.0
- High taxes 2.0
- Other 1.0

3. In general, how satisfied are you with Westchester-Playa del Rey as a place to live?

- Very satisfied 48.0%
- Satisfied 23.5
- Dissatisfied 11.0
Very dissatisfied 11.5%
No response 6.0

4. In considering the future in terms of people and jobs, which would you prefer seeing in Westchester-Playa del Rey:

- Growth at a faster rate than present 3.0%
- Continue to grow at present rate 45.0
- Slowing down of present growth rate 40.5
- No response 7.0

5. The Laurel Canyon and Pacific Coast Freeways have been suggested as likely new freeways to relieve the surface traffic congestion in Westchester-Playa del Rey. Your initial reaction to construction of such freeways is:

- Strong opposition 46.5%
- Opposition 15.0
- Indifference 3.0
- Favorable 22.0
- Highly favorable 6.0
- No response 7.5

6. Certain residential areas surrounding the airport are highly incompatible with the airport noise. What realistic solution do you suggest?

- No solution 2.5%
- Closing down the airport's two north runways 61.5
Relocation of the entire airport facility 3.5%
Acquisition of the disturbed homes by the airport through negotiation 28.0
Acquisition of disturbed homes by airport through condemnation procedures 3.5
No response 1.0

6 Revised. There are lawsuits pending which are intended to determine, in effect, whether the north runways at the airport can be fully operational runways. If it is assumed for purposes of planning, that the courts rule in favor of the airport, then certain residential areas surrounding the airport will be incompatible with jet aircraft noise. What solution do you suggest?

Soundproofing of structures 8.0%
Acquisition of disturbed homes by the airport 47.0
Redevelopment to more compatible uses 24.5
See no solution 9.0
No response 11.5

7. Recognizing that new space for parks and recreation facilities is limited, which one of the following would you prefer for your District?

One additional regional park (large) 16.0%
Several community parks (medium size) 42.0
Many small neighborhood parks (small) 17.0
No additional parks of any kind 15.5%
No response 7.5%

8. Your category is

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 21</td>
<td>.5%</td>
</tr>
<tr>
<td>21-30</td>
<td>2.0</td>
</tr>
<tr>
<td>31-40</td>
<td>19.0</td>
</tr>
<tr>
<td>41-50</td>
<td>34.0</td>
</tr>
<tr>
<td>51-60</td>
<td>31.0</td>
</tr>
<tr>
<td>Over 60</td>
<td>6.0</td>
</tr>
<tr>
<td>No response</td>
<td>4.0</td>
</tr>
</tbody>
</table>

9. Your yearly family income is

<table>
<thead>
<tr>
<th>Income Range</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under $5,000</td>
<td>2.0%</td>
</tr>
<tr>
<td>$5,000 - $10,000</td>
<td>10.0</td>
</tr>
<tr>
<td>$10,000 - $15,000</td>
<td>31.0</td>
</tr>
<tr>
<td>$15,000 - $20,000</td>
<td>32.0</td>
</tr>
<tr>
<td>Over $20,000</td>
<td>20.0</td>
</tr>
<tr>
<td>No response</td>
<td>5.0</td>
</tr>
</tbody>
</table>

10. The estimated value of your home is (in your opinion)

<table>
<thead>
<tr>
<th>Home Value Range</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $20,000</td>
<td>0.0%</td>
</tr>
<tr>
<td>$20,000 - $25,000</td>
<td>2.5</td>
</tr>
<tr>
<td>$25,000 - $30,000</td>
<td>16.0</td>
</tr>
<tr>
<td>$30,000 - $40,000</td>
<td>33.5</td>
</tr>
<tr>
<td>$40,000 - $50,000</td>
<td>27.0</td>
</tr>
<tr>
<td>Income Level</td>
<td>Percentage</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Over $50,000</td>
<td>17.0%</td>
</tr>
<tr>
<td>No response</td>
<td>4.0</td>
</tr>
</tbody>
</table>

11. Do you think police and fire protection is adequate?

<table>
<thead>
<tr>
<th>Opinion</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>60.0%</td>
</tr>
<tr>
<td>Not sure</td>
<td>27.0</td>
</tr>
<tr>
<td>No</td>
<td>7.5</td>
</tr>
<tr>
<td>No response</td>
<td>5.5</td>
</tr>
</tbody>
</table>

12. How would you rate the quality of schools in your District?

<table>
<thead>
<tr>
<th>Quality</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>31.0%</td>
</tr>
<tr>
<td>Good</td>
<td>42.5</td>
</tr>
<tr>
<td>Average</td>
<td>15.0</td>
</tr>
<tr>
<td>Poor</td>
<td>3.0</td>
</tr>
<tr>
<td>Very poor</td>
<td>0.0</td>
</tr>
<tr>
<td>No response</td>
<td>8.0</td>
</tr>
</tbody>
</table>

13. How would you rate the District Plan Study for Westchester-Playa del Rey in terms of presenting a realistic and meaningful range of choices for development?

<table>
<thead>
<tr>
<th>Quality</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>3.0%</td>
</tr>
<tr>
<td>Good</td>
<td>25.5</td>
</tr>
<tr>
<td>Average</td>
<td>15.5</td>
</tr>
<tr>
<td>Poor</td>
<td>13.0</td>
</tr>
<tr>
<td>Very poor</td>
<td>20.0</td>
</tr>
<tr>
<td>No response</td>
<td>20.0</td>
</tr>
</tbody>
</table>
14. How far do you travel to work?

<table>
<thead>
<tr>
<th>Distance</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than one mile</td>
<td>12.0%</td>
</tr>
<tr>
<td>1 - 5 miles</td>
<td>36.0</td>
</tr>
<tr>
<td>5 - 10 miles</td>
<td>13.0</td>
</tr>
<tr>
<td>10 - 15 miles</td>
<td>13.0</td>
</tr>
<tr>
<td>Over 15 miles</td>
<td>12.0</td>
</tr>
<tr>
<td>No response</td>
<td>14.0</td>
</tr>
</tbody>
</table>

15. What type of residence do you presently live in?

<table>
<thead>
<tr>
<th>Residence Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-family</td>
<td>87.0%</td>
</tr>
<tr>
<td>Small apartment complex</td>
<td>11.0</td>
</tr>
<tr>
<td>Large apartment complex</td>
<td>0.0</td>
</tr>
<tr>
<td>No response</td>
<td>2.0</td>
</tr>
</tbody>
</table>

16. How long have you lived there?

<table>
<thead>
<tr>
<th>Length</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than two years</td>
<td>2.0%</td>
</tr>
<tr>
<td>2 - 4 years</td>
<td>12.0</td>
</tr>
<tr>
<td>4 - 10 years</td>
<td>29.0</td>
</tr>
<tr>
<td>More than 10 years</td>
<td>56.0</td>
</tr>
<tr>
<td>No response</td>
<td>0.0</td>
</tr>
</tbody>
</table>

17. Do you rent or own?

<table>
<thead>
<tr>
<th>Ownership</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rent</td>
<td>3.0%</td>
</tr>
<tr>
<td>Own</td>
<td>96.5</td>
</tr>
<tr>
<td>No response</td>
<td>0.5</td>
</tr>
</tbody>
</table>
18a. How many adults in your household?

1 2.0%
2 72.0
3 18.0
4 3.0
5 0.0
No response 0.5

18b. How many children?

0 38.0%
1 14.0
2 23.0
3 9.5
4 3.5
5 2.0
6 or more 4.0
No response 6.0

19 - 21. Generally, your experience with the ... has been:

<table>
<thead>
<tr>
<th></th>
<th>L.A. City Government</th>
<th>Airport Department</th>
<th>Planning Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>3.0%</td>
<td>3.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Good</td>
<td>23.0</td>
<td>2.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Average</td>
<td>22.0</td>
<td>11.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Poor</td>
<td>15.0</td>
<td>17.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Category</td>
<td>16.0%</td>
<td>35.0%</td>
<td>12.0%</td>
</tr>
<tr>
<td>------------------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Extremely poor</td>
<td>11.0</td>
<td>27.0</td>
<td>38.0</td>
</tr>
<tr>
<td>No experience</td>
<td>10.0</td>
<td>5.0</td>
<td>8.0</td>
</tr>
</tbody>
</table>

Source: Adapted from Los Angeles City Planning Department, City Plan Case 20345, Staff Recommendations, 1969.