

CHAPTER 3

Oakland International Airport Policies

3.1 Purpose and Scope

This Airport Land Use Compatibility Plan (ALUCP) for Oakland International Airport (OAK) presents the criteria, maps, and policies to be utilized by the Alameda County Airport Land Use Commission (ALUC) and other local jurisdictions. These policies shall apply when reviewing proposals for land use development within the airport influence area (AIA) for its compatibility with airport operations. The ALUC and affected cities within the AIA shall also use these policies when modifying general plans, zoning ordinances, and other local land use policies. The authority for such reviews is derived from the California State Aeronautics Act (Public Utilities Code, Section 21670 *et seq.*).

This ALUCP is based on the OAK's most recent Airport Layout Plan (ALP), which depicts both current (2005) and future (2025) aviation and non-aviation related facilities. While State law (PUC Section 21675 (a)) normally requires that data included in an ALUCP address the anticipated growth of an airport over a minimum of a 20-year period following publication, a state law provision allowing an ALUC's compatibility plan to be based upon an airport layout plan, with the approval of the Division of Aeronautics, was added in 1990. While the timeframe addressed by the OAK's 2006 Master Plan extends to 2025, projects in the Master Plan primarily focus on a "near-term" (2010 – 2012) timeframe. The long-range, "unconstrained", activity forecasts would require additional runway facilities which are not recommended in the Master Plan or the ALP.

This ALUCP is intended to be used in conjunction with the countywide policies and procedures adopted by the ALUC, which are presented in Chapters 1 and 2 of this document.

3.1.1 Airport Influence Area

The policies within this ALUCP apply to all lands within the airport influence area (AIA), also known as the airport referral area. The AIA is the area within which the ALUC is authorized to review new local land use actions, plans, and policies. Figure 3-1 shows the AIA for OAK. This particular AIA was defined based on political boundaries, noise contours and flight tracks. The northernmost boundary of OAK's AIA begins at High Street in the City of Alameda and extends eastward to San Leandro Street. The AIA follows San Leandro Street south until it reaches Lewelling Boulevard in the City of Hayward, where it turns west. The AIA continues to follow Lewelling Boulevard westward until it reaches the Union Pacific Railroad tracks and turns south.

The AIA boundary follows the tracks until it turns east on West Winton Avenue, and continues south on Hesperian Boulevard. The AIA turns west on HWY 92 to the San Francisco Bay. The AIA includes portions of the cities of Oakland, San Leandro, Alameda, Hayward, and small unincorporated areas of Alameda County in the vicinity of the Airport, including San Lorenzo, located southeast of the Airport.

It is also important to note that the southern portion of the AIA for OAK intersects with the Hayward Executive Airport's (HWD) AIA (see Figure 3-2). Should a question of jurisdictional authority arise within this zone of intersect between the AIAs, *the Airport Land Use Compatibility plan with the most stringent land use policies will apply.*

3.2 Compatibility Zones

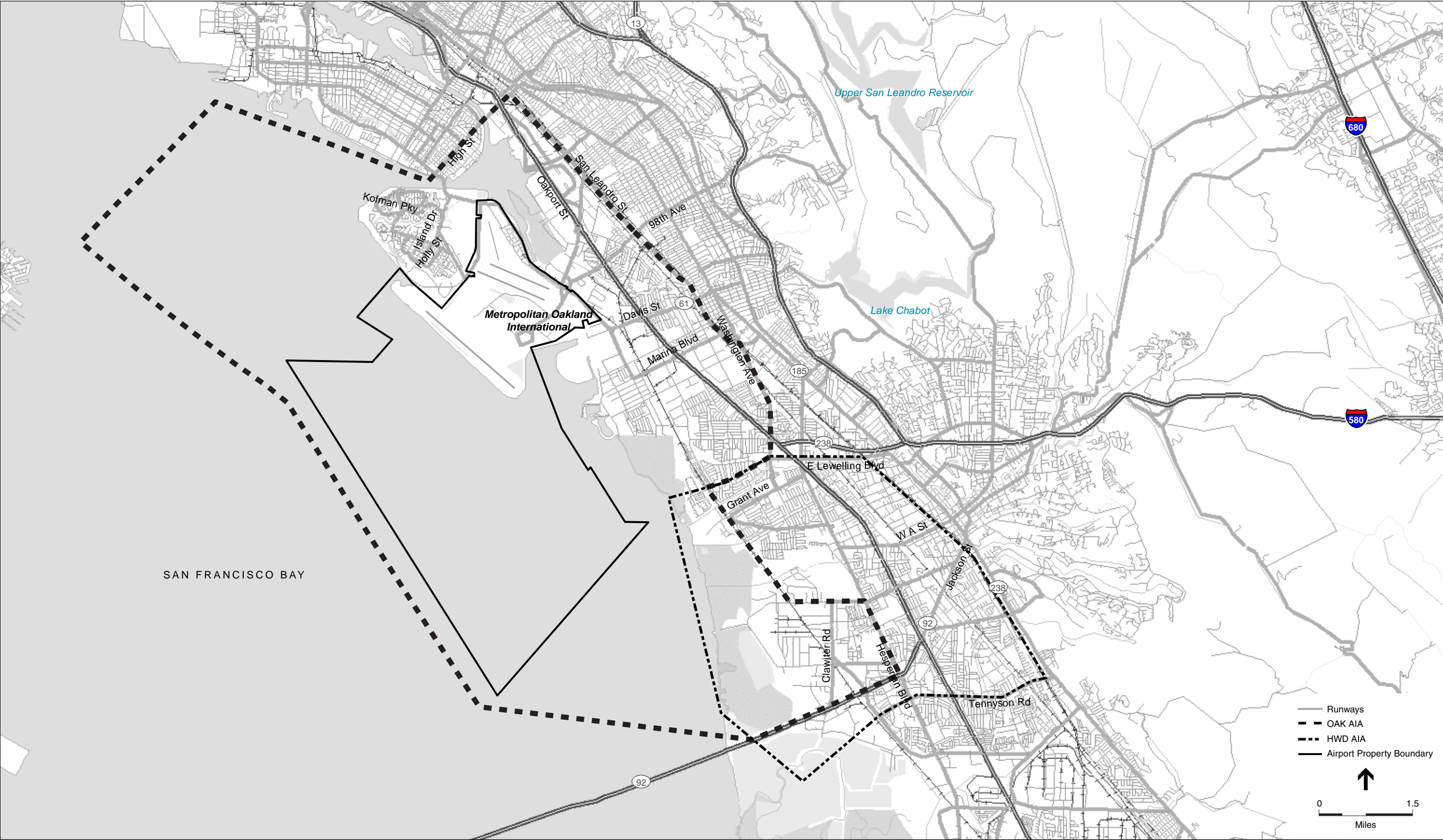
3.2.1 Noise Compatibility Zones

Figure 3-3 presents the projected (2010) noise contours associated with operations at OAK. As shown in the figure, the 60 and 65 Community Noise Equivalent Level (CNEL) contours associated with operations at OAK extend into the AIA for HWD. In most cases where the contours overlap, the noise exposure associated with the OAK contours exceeds the noise exposure that would be associated with the HWD contours. Therefore, when reviewing potential development projects or land use changes in areas where the OAK and HWD contours overlap, noise policies associated with the OAK ALUCP shall apply.

3.2.2 Safety Compatibility Zones

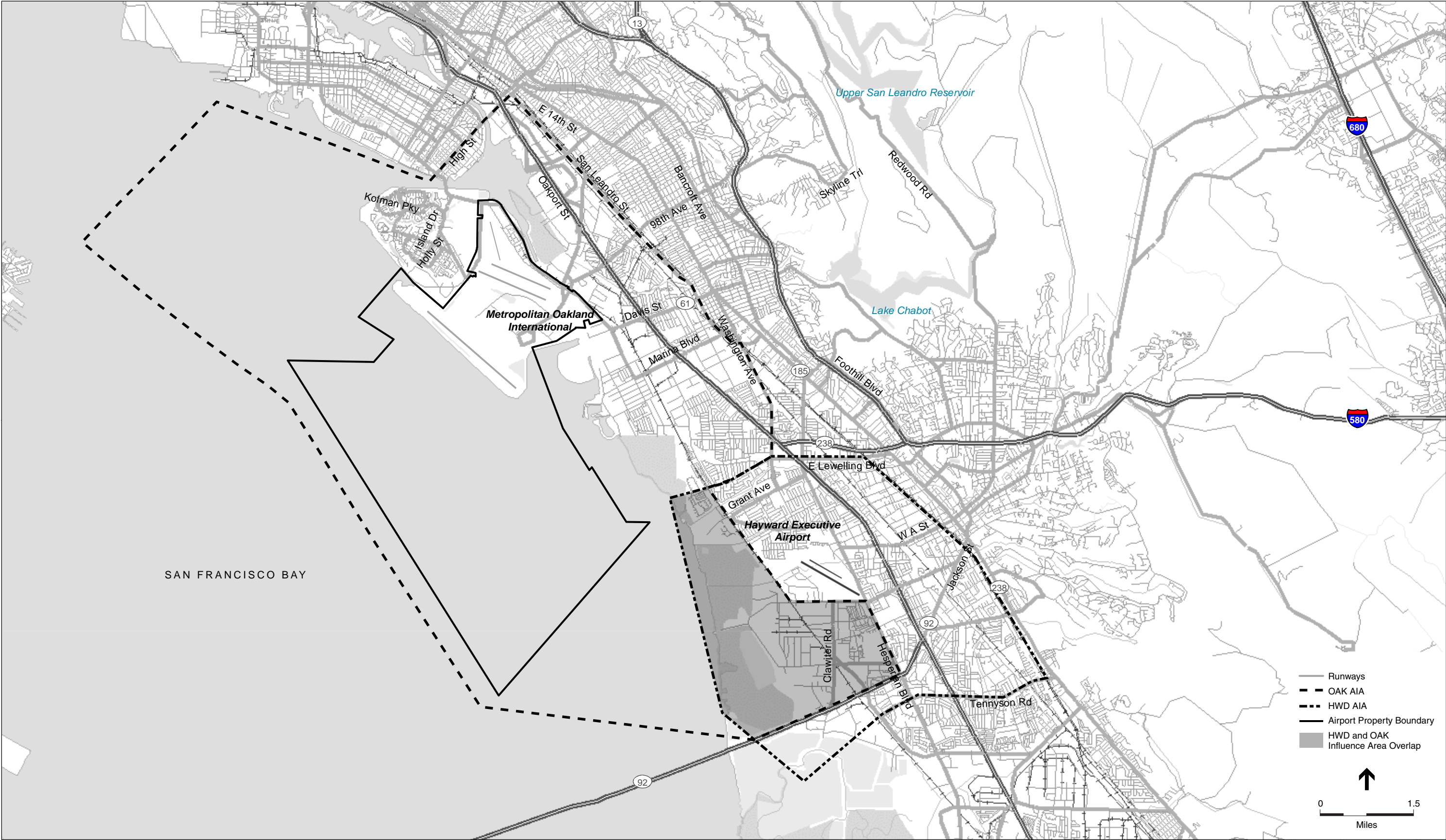
To depict the relative risks of aircraft accidents, the *California Airport Land Use Planning Handbook* (Caltrans, 2002) provides a set of safety zones, and the risk contours upon which they are based. The risk contours are derived from the accident location database described in the *Handbook* and show the relative concentrations of accidents near the ends of runways of different lengths. The safety zones are developed upon this data and are created for varying runway lengths and operational characteristics, while at the same time taking into account aeronautical factors that affect where aircraft accidents are most likely to occur. (For ease of application to land use compatibility planning, safety zones are depicted in regular geometric shapes, as opposed to the risk contours, and assume an equal distribution of arrivals and departures at each runway end.)

A total of seven different safety zones are shown in Figure 3-4. The choice of safety zone criteria appropriate for a particular zone is largely a function of risk acceptability. For example, some land uses represent unacceptable risks when located near aircraft operation areas and are prohibited (e.g., schools and hospitals). Where the risks associated with a particular land use are considered significant but tolerable, restrictions may be established to reduce the risk to an acceptable level. Acceptable land uses generally require no limitations (see Table 3-2 for a list of compatible land uses within each safety zone).



SOURCE: ESA Airports, ESRI, OAK Airport Master Plan

Figure 3-1
Airport Influence Area



SOURCE: ESA Airports, ESRI, OAK Airport Master Plan

Figure 3-2
HWD and OAK Influence Area Overlap

3.2.3 Airspace Protection Zones

The airspace protection zones established for the purpose of evaluating the airspace compatibility of land use development in the AIA of Oakland International Airport are depicted on Figure 3-5. The zones represent the imaginary surfaces defined for the Airport in accordance with Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace*.

3.2.4 Overflight Zones

The overflight zones established for the purpose of providing overflight notification for land uses in the AIA of OAK are depicted in Figure 3-6.

3.3 Compatibility Policies

3.3.1 Noise

3.3.1.1 Objective

Noise compatibility policies are established in order to prevent the development of noise-sensitive land uses in portions of the airport environ that are exposed to significant levels of aircraft noise.

3.3.1.2 Evaluation

The noise compatibility policies set forth in this section shall be used in conjunction with Figure 3-3 and Table 3-1 during the evaluation of proposed land uses within the AIA for OAK.

- a) The criteria in this section indicate the maximum acceptable airport-related noise levels, which are measured in terms of CNEL, for a range of land uses.
- b) Within the two noise exposure ranges, each land use type is shown as “compatible”, “conditional”, or “incompatible”. The meaning of these terms is provided in Table 3-1 and differ for indoor versus outdoor uses.
- c) Land uses not specifically listed in Table 3-1 shall be evaluated using the criteria for similar listed uses.

3.3.1.3 Measurement

The magnitude of exposure experienced by land around OAK to airport-related noise shall be described in terms of CNEL.

- a) The noise contours depict the greatest annualized noise impact, measured in terms of CNEL, anticipated to be generated by the airport over the planning timeframe, which in accordance with state law, extends at least 20 years into the future.

- b) The noise contours depicted in Figure 3-3 were created for the current master plan for OAK and utilized by this ALUCP for the purpose of establishing the noise compatibility criteria herein. The ALUC should periodically review the projected CNEL contours and update them if and when appropriate.
- c) The threshold for evaluation is the projected 60 dB CNEL contour. All proposed land use changes that would sustain a noise exposure at a level that is less than 60 CNEL is considered consistent with the noise compatibility policies.

3.3.1.4 Factors Determining Noise Criteria

The factors considered during the development of noise criteria include the following:

- a) Established federal and state regulations and guidelines;
- b) Established local noise-abatement policies, general and specific plan policies;
- c) The degree to which noise would affect the activity associated with a particular land use, and ordinances; and
- d) The extent of outdoor activity associated with a particular land use.

3.3.1.5 Appropriate Noise Levels for Specific Types of Land Use Development

- a) The maximum CNEL considered acceptable for new residential uses in the vicinity of OAK is anything less than the 65 CNEL contour as shown on Figure 3-3.
- b) The compatibility of new nonresidential development with noise levels generated by the Airport is provided in Table 3-1.
 - 1) Buildings associated with land uses listed as “conditional” must have added sound attenuation as necessary to meet the interior noise level standards indicated in Table 3-1 and in Policy 3.3.1.6.
 - 2) Land uses not specifically identified shall be evaluated using the criteria for listed land uses of a similar nature.

3.3.1.6 Interior Noise Levels

Land uses for which interior activities may be easily disrupted by noise shall be required to comply with the following interior noise level criteria:

- a) The maximum, aircraft-related, interior noise level which shall be considered acceptable for land uses within the AIA is 45 dB CNEL in (calculations should assume windows are closed):

- 1) Living and sleeping areas of single- or multi-family residences;
 - 2) Hotels and motels;
 - 3) Hospitals and nursing homes;
 - 4) Churches, meeting halls, office buildings, and mortuaries; and
 - 5) Schools, libraries, and museums.
- b) The maximum, aircraft-related, interior noise level which shall be considered acceptable for land uses within the AIA is 50 dB CNEL in (calculations should assume windows are closed):
- 1) Office environments;
 - 2) Eating and drinking establishments; and
 - 3) Other miscellaneous commercial facilities.
- c) When reviewed as part of a general plan or zoning ordinance amendment or as a major land use action, evidence that proposed structures will be designed to comply with these criteria shall be submitted to the ALUC under the following circumstances: Any hotel or motel, church, meeting hall, office building, mortuary, museum, or other noise-sensitive non-residential use within OAK's 65-dB CNEL contour.

3.3.1.7 Engine Run-Up and Testing Noise

ALUC consideration of noise from engine run-up and testing noise activities shall be limited as follows:

- a) Aircraft noise associated with pre-flight engine run-ups, taxiing of aircraft to and from runways, and other operation of aircraft on the ground is considered part of airport operations and is not subject to ALUC regulation. Engine testing noise is not normally included in the noise contours prepared for an airport and has not been considered in preparation of the noise contours presented in Figure 3-3. However, the ALUC may consider noise from these sources when reviewing the compatibility of proposed land uses near OAK to the extent that this noise is reflected in airport noise contours approved by the airport proprietor and the ALUC.
- b) Noise from aircraft ground operations also should be considered by the ALUC when reviewing airport master plans or development plans in accordance with the mandatory and voluntary review policies discussed in Chapter 2.
- c) Noise from the testing of aircraft engines on airport property is not deemed an activity inherent in the operation of an airport, and it is not an airport-related impact addressed by this ALUCP. Noise from these sources should be addressed by the noise policies of local agencies in the same manner as noise from other industrial sources.

**TABLE 3-1
NOISE COMPATIBILITY CRITERIA**

Land Use Category	Exterior Noise Exposure (dB CNEL)		
	60	65	70
Agricultural, Recreational, and Animal-Related			
Outdoor amphitheaters			
Zoos; animal shelters; neighborhood parks; playgrounds			
Regional parks; athletic fields; golf courses; outdoor spectator sports; water recreation facilities			
Nature preserves; wildlife preserves; livestock breeding or farming			
Agriculture (except residences and livestock); fishing			
Residential, Lodging, and Care			
Residential, (including single-family, multi-family, and mobile homes)*			
Residential hotels; retirement homes; hospitals; nursing homes; intermediate care facilities			
Hotels; motels; other transient lodging			
Public			
Schools; libraries			
Auditoriums; concert halls; indoor arenas; places of worship; cemeteries			
Commercial and Industrial			
Office buildings; office areas of industrial facilities; medical clinics; clinical laboratories; commercial - retail; shopping centers; restaurants; movie theaters			
Commercial - wholesale; research and development			
Industrial; manufacturing; utilities; public rights-of-way			

Land Use	Acceptability	Interpretation/Comments
	Compatible	<i>Indoor Uses:</i> Standard construction methods will sufficiently attenuate exterior noise to an acceptable indoor community noise equivalent level (CNEL). <i>Outdoor Uses:</i> Activities associated with the land use may be carried out with essentially no interference from aircraft noise. * The maximum acceptable noise exposure for new residential development in the vicinity of OAK is anything below 60 CNEL (see Policy 3.3.1.2 (b).)
	Conditional	<i>Indoor Uses:</i> Building structure must be capable of attenuating exterior noise to the indoor CNEL of 45 dB; standard construction methods will normally suffice. <i>Outdoor Uses:</i> CNEL is acceptable for outdoor activities, although some noise interference may occur; caution should be exercised with regard to noise-sensitive uses.
	Incompatible	<i>Indoor Uses:</i> Unacceptable noise interference if windows are open; at exposures above 65 dB CNEL, extensive mitigation techniques are required to make the indoor environment acceptable for performance of activities. <i>Outdoor Uses:</i> Severe noise interference makes outdoor activities unacceptable.

Source: ESA, 2007; *California Airport Land Use Compatibility Handbook* (Caltrans, 2002); PUC 21001 *et seq.*, California State Aeronautics Act.

Note: The layout of this table was created using the framework developed in previous compatibility plans (Mead & Hunt, 2006).

3.3.2 Safety

3.3.2.1 Objective

Land use safety compatibility criteria are developed to minimize the risks to people and property on the ground as well as those people in an aircraft in the event of an accident or emergency landing occurring outside the airport boundary. Policies set forth in this section focus on reducing the potential consequences of such events when they occur. The most stringent land use controls shall be applied to the areas with greatest risk potential.

3.3.2.2 Evaluation

The safety compatibility of proposed uses within OAK's AIA should be evaluated in accordance with the policies set forth in this section, including the safety zones presented on Figure 3-4 and the criteria listed in Table 3-2.

- a) The criteria in Table 3-2 indicate whether a particular type of land use is “compatible”, “conditional”, or “incompatible” with the exposure to aircraft accident risks. The meaning of these terms is provided in the table.
- b) Land uses not specifically listed should be evaluated using the criteria for similar listed uses.

3.3.2.3 Measurement

The concept of risk is essential to maintaining a high degree of safety in an airport environment. For the purposes of this ALUCP, the risk that potential aircraft accidents pose to land around OAK shall be defined in terms of the geographic distribution of where accidents are most likely to occur. Due to the infrequency of aircraft accidents, the pattern of accidents at any one airport cannot be used to predict where future accidents are most likely to occur around a particular airport. The safety zones depicted in the *California Airport Land Use Compatibility Handbook (Handbook)*, and upon which the safety zones in the ALUCP are based, were formulated using the accident distribution patterns presented in the *Handbook* for similar airports nationwide.

3.3.2.4 Factors Determining Safety Criteria

In determining criteria for each safety zone and the overall approach to this compatibility factor, the following issues were considered:

- a) Locations, delineated in respect to the runway, where aircraft accidents near general aviation airports typically occur. The most stringent land use controls should be applied to the areas where the greatest risk of aircraft accidents is likely to occur (as delineated by the Caltrans *Handbook*).

- b) Runway length and approach categories for each runway at OAK. These factors are reflected in the safety zone shapes and sizes, and are based upon zones suggested in the Caltrans *Handbook*.
- c) Encroachment of incompatible land uses. The Caltrans *Handbook* suggests that, “because many general aviation airports are located on the fringes of urban areas, both the threat of new incompatible development and the opportunity for ALUCs to help preserve a compatible airport land use relationship are great.” The location of OAK in a dense urban setting amplifies the need to strike a balance between making land use decisions that will benefit both local jurisdictions and the public airport serving them, while preserving the safety of the general public.

3.3.2.5 Airport Safety Zones

A total of seven different safety zones were identified as shown in Figure 3-4. As described above, the choice of safety zone criteria appropriate for a particular zone is largely a function of risk acceptability. Land uses (e.g., schools and hospitals) which, for a given proximity to the airport, are judged to represent unacceptable risks must be prohibited. Where the risks of a particular land use are considered significant but tolerable, establishment of restrictions may reduce the risk to an acceptable level. Uses which are basically acceptable generally require no limitations (see Table 3-2 for a list of compatible land uses within each safety zone).

In certain situations, such as venues accommodating the assemblage of large numbers of people (i.e., sports stadiums, amphitheaters, etc.), the perceived risk of an aircraft accident occurring in a location where large amounts of people have restricted mobility may be perceived as an intolerable risk no matter where it may be located within an AIA.

- a) For the purpose of presenting safety policies, each safety zone shall be considered as such:
 - Zone 1: Runway Protection Zones
 - Zone 2: Inner Approach / Departure Zones
 - Zone 3: Inner Turning Zones
 - Zone 4: Outer Approach / Departure Zones
 - Zone 5: Sideline Zones
 - Zone 6: Traffic Pattern Zone
 - Zone 7: Other Airport Environs

As shown on Figure 3-4, most of the safety zones associated with the South Field (commercial runway) extend over the San Francisco Bay. However, Safety Zones 2, 3, and 5 remain over land. The Portions of the safety zones extending over the Bay are provided for illustration purposes only.

3.3.2.6 Residential Development Criteria

The development of new residential land uses is restricted in the following ways:

- a) In Safety Zone 1, no new dwellings shall be constructed.
- b) In Safety Zones 2, 3, 4, and 5, new dwellings are not recommended within the zone boundaries. However, due to the existing urban nature of the surrounding environs and the existing residential land use, infill may be allowed up to an average of the surrounding residential use (except for high density residential), provided that other safety criteria identified in this plan are satisfied (see Policy 2.7.5.7(a) for infill criteria). Additional criteria for residential development in these zones are as follows:
 - 1) The minimum adjacent open space required is approximately 0.5 acre (see Policy 3.3.2.11).
 - 2) Clustering to meet these criteria is recommended for projects of 10.0 acres or more with one 0.5 acre open space area to be provided per each 10 acres of the site.
 - 3) For projects of less than 10 acres, compliance with the clustering condition is desirable, but not required as a condition for development approval.
 - 4) The clustering of residential development must not result in the density within any single 1.0-acre area exceeding 20.0 dwelling units per acre.
- c) In Safety Zones 6 and 7, residential development is not restricted.

3.3.2.7 Nonresidential Development Criteria

The following criteria apply to most proposed nonresidential development. Separate or additional criteria for land uses of special concern are described in Policy 3.3.2.8. For the purposes of the ALUCP, the primary measure of risk exposure for people on the ground in the event of an aircraft accident is based in the number of people concentrated in areas most susceptible to the risk of aircraft accidents.

- a) With respect to the vicinity of OAK, the maximum acceptable intensity of new nonresidential development, including all people (e.g., employees, customers/visitors) who may be at a particular location at any single point in time, both indoor and outdoors, shall be limited to the intensities indicated in Table 3-2. Nonresidential intensity criteria reflect a mix of intensities for rural/suburban and urban settings (as set forth in Table 9C of the Caltrans *Handbook*), which reflects the current environment around OAK.
- b) The compatibility of a proposed nonresidential land use shall be evaluated using the land use types listed in Table 3-2.
 - 1) The nonresidential uses are categorized primarily with respect to the typical occupancy load factor of the use measured in terms of square footage per

occupant. Also indicated in the table is the California Building Code (CBC) classification under which each facility is presumed to be constructed.

- 2) Proposed development not listed in Table 3-2 shall be evaluated by comparison to a similar use on the list.
- c) Land uses shown in Table 3-2 as being considered “compatible” within a particular safety zone are presumed to comply with the intensity limits. However, abnormal examples of these uses may require review to ensure compliance with the criteria.
- d) Land use shown as “conditional” should comply with the conditions listed in the table.
 - 1) In circumstances where a floor area ratio limit is cited as a conditional criterion, the limit is based on a typical occupancy level (floor area square footage per person) as defined by the CBC for that use¹. The assumed occupancy levels are shown in the table.
 - 2) Local jurisdictions may make exceptions for rare, special events for which a facility is not designated and normally not used and for which extra safety precautions can be taken as appropriate.
 - 3) The ALUC may allow intensity bonuses for conditional uses within a particular safety zone when risk-reducing building design techniques are employed. Risk-reduction building features include:
 - Concrete walls;
 - Limited number and size of windows;
 - Upgraded roof strength;
 - No skylights;
 - Enhanced fire sprinkler system;
 - Single-story height; and/or
 - Increased number of emergency exits.

In these circumstances, the ALUC should allow no more than 1.5 to 3.0 times the basic intensity (as determined in Table 3-2) required.

3.3.2.8 Land Uses of Particular Concern

Land uses which pose the greatest concern are those in which the occupants have reduced effective mobility or are unable to respond in emergency situations. Children’s schools, day care centers, hospitals, nursing homes, and other uses in which the majority of occupants are children, elderly, and/or handicapped shall be prohibited within Zones 1 through 5.

- a) For the purposes of these criteria, children’s schools include all grades through grade 12.

¹ The equation for determining the appropriate floor area ratio is as follows:
Floor area ratio = $\frac{(\text{allowable usage density}) \times (\text{occupancy load factor})}{43,560 \text{ square feet in one acre}}$

- b) Day care centers and family day care homes are defined by state law. Non-commercial day care centers ancillary to a place of business are permitted in Zones 2 through 5 provided that the overall use of the property meets the intensity criteria indicated below. Family day care homes are permitted in any location where residential development is permitted and the intensity of the day care home is ≤ 6 people. Commercial day care centers are conditionally compatible in Zone 6.
- c) In-patient health care facilities include hospitals, health care facilities, and other types of non-ambulatory medical centers. Land uses of these types are prohibited in Safety Zones 1 through 5, and permissible in Zones 6 and 7.
- d) Out-patient health care facilities such as health care centers, clinics, dentists' offices, and other types of ambulatory facilities are conditionally acceptable in Safety Zone 3 and 4 provided that the conditional criteria in Table 3-2 are achieved.
- e) Storage of fuel and other hazardous materials within the airport environs are restricted as follows:
 - 1) Within Zones 1 and 2, storage of any such substance is prohibited.
 - 2) Within Zones 3, special measures to minimize risk in the event of an aircraft accident are to be determined by the appropriate permitting agency. Aboveground fuel storage of more than 6,000 gallons is prohibited.

3.3.2.9 Mixed-Use Development

If a combination of land use types listed separately in Table 3-2 is proposed for a single project or site, the following policies apply:

- a) Where residential and nonresidential uses are proposed to be located in the same or nearby buildings, both residential and nonresidential density criteria must be achieved. The number of dwelling units shall not exceed the density limits indicated in Table 3-2. Both occupancy totals (residential and nonresidential) will be considered with respect to the nonresidential usage intensity criteria cited in the table.
 - 1) Except as designated below in paragraph (2), this mixed-use development criterion is proposed for dense, urban-type developments where the overall usage intensity and ambient noise levels are relatively high.
 - 2) Mixed-use development is prohibited where the residential component would be exposed to noise levels exceeding the limits set in Policy 3.3.1.5.
- b) Where proposed development will constitute a mixture of nonresidential land uses as identified in Table 3-2, the total number of occupants for all uses shall be added to determine the total number of people on the site. The total number of occupants on the site shall not exceed the maximum set forth in Table 3-2.

- 1) The number of people for each use shall be estimated to equal the square footage of that use divided by the occupancy load factor (square footage per person) cited in Table 3-2.
- 2) If an occupancy load factor is not provided for a specific use, the number of occupants may be estimated by using parking space requirements of the affected jurisdiction.

3.3.2.10 Criteria for Clustering of Development

The ALUC generally supports clustering to enhance safety compatibility in the vicinity of airports. Clustering occurs when development is concentrated on one portion of a site or within an overall safety zone, leaving other areas as open space because of terrain, environmental, or other considerations. If the area remaining undeveloped is relatively level and free of large obstacles, clustering provides for a greater amount of open space towards which a pilot can land the aircraft; thus reducing the risk of harm to people on the ground. However, an aircraft still has the potential to strike a clustered site, and as such, limitations on the maximum concentrations of dwellings or people in a small area of a large project site are appropriate.

- a) No development shall be clustered in a manner that would exceed the intensity limits listed as incompatible in Table 3-2.
- b) An intensity bonus of up to 3.0 times the normal allowable intensity (as described in Table 3-2) can be applied for development that employs risk reduction design standards as described in Policy 2.7.6.7(e).

3.3.2.11 Open Land

In the event of an emergency landing, risks to both people in the aircraft and on the ground can be minimized by providing as much open land as possible in the vicinity of the airport.

- a) To be considered “open land”, an area should:
 - 1) Be free of obstacles such as large trees, walls, or poles, and overhead wires.
 - 2) Have minimum dimensions of approximately 75 feet by 300 feet (0.5 acre).
- b) Open land areas should be oriented with the typical direction of aircraft flight over the location.
- c) Roads and automobile parking areas are considered acceptable as open land areas.
- d) Open land areas should be identified at the general or specific plan level, or as part of large (greater than 20 acres) development projects.
- e) Open land should not preserve or create habitat that could pose hazards to aircraft. For example, wildlife refuges, mitigation banks, wetlands, and other uses that provide habitat or food sources for birds or other wildlife that are hazardous to aircraft operations.
- f) Clustering of development, as detailed in Policy 3.3.2.10, is encouraged to increase the amount of open land.

**TABLE 3-2
SAFETY COMPATIBILITY CRITERIA**

Types of Land Use	Description of Occupancy	Safety Zones							Criteria for Conditional Uses
<i>Note: Multiple categories may apply to same project</i>		1	2	3	4	5	6	7	
Maximum Nonresidential Intensity (People/Acre)		10	60	100	100	150	No Limit	No Limit	
Required Open Land		100%	40%	30%	20%	20%	0%	0%	
CBC Groups*									
A-1	High capacity indoor assembly room (≥1,000 people): professional sports arena, concert hall, etc.								Zones 7: Allowable if no other suitable site outside AIA is available.
A-2 - A-2.1	Medium to large indoor assembly room (≥300, <1,000 people): malls, theaters, meeting halls, etc. (approx. 15 s.f./ person)								
A-3	Low capacity indoor assembly room (<300 people) meeting rooms, college or university lecture halls, places of worship, etc. (approx. 60 s.f./ person)			0.14	0.14				Zones 3, 4: Floor area ratio as indicated
A-4	Large outdoor assembly area (>1,000 people): amusement park area, amphitheaters, stadiums, etc.								Zones 6, 7: Allowable if no other suitable site outside AIA is available.
	Medium outdoor assembly area (≥300, <999 people): fair grounds, etc.								Zones 3, 4, 6: Allowable if no other suitable site outside AIA is available.
	Small outdoor assembly area (>50, ≤299 people): camp ground, community pool, etc.								Zones 3, 4, 6: Allowable if no other suitable site outside AIA is available.
B	Office buildings (approx. 215 s.q./ person)		0.30	0.49	0.49	0.74			Zones 2, 3, 4, 5: Floor area ratio as indicated. Also see Policy 3.3.2.7(c)(3).
B	Small eateries/drinking establishments (approx. 60 s.f./ person)			0.14	0.14	0.21			Zones 3, 4, 5: Floor area ratio as indicated. Also see Policy 3.3.2.7(c)(3).
B	Misc. medium sized businesses (approx. 200 s.f./ person): salons, electronics stores, etc.		0.28	0.46	0.46	0.69			Zones 2, 3, 4, 5: Floor area ratio as indicated. Also see Policy 3.3.2.7(c)(3).
E-1 - E-2	Children's schools (K - 12)								Projects to be reviewed on a case-by-case basis. Risk reduction building design per 3.3.2.7 should be implemented.

**TABLE 3-2
SAFETY COMPATIBILITY CRITERIA**

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<i>Note: Multiple categories may apply to same project</i>		1	2	3	4	5	6	7	
Maximum Nonresidential Intensity (People/Acre)		10	60	100	100	150	No Limit	No Limit	
Required Open Land		100%	40%	30%	20%	20%	0%	0%	
E-3	Commercial Daycare center (≥6 people)								Projects to be reviewed on a case-by-case basis. Risk reduction building design per 3.3.2.7 should be implemented.
F-1, 2	Manufacturing, research and development (300 s.f./ person) ¹			0.69	0.69	1.03			Zones 3, 4, 5: Floor area ratio as indicated. Also see Policy 3.3.2.7(c)(3).
H-1, 2, 3, 4, 5, 6, 7	Occupancies utilizing hazardous (flammable, explosive, corrosive, or toxic) materials								Zones 3 - 5: Special measures to minimize risk in the event of an aircraft accident to be determined by permitting agencies
I-1.1	Nurseries for full-time care of children (≤14 people)								
I-1.1 - I-1.2	Health care facilities: hospitals, health care centers, sanitariums, nursing homes for nonambulatory patients, etc. (approx. 250 s.f./ person)								
I-2	Congregate care facilities (>5 patients): nursing homes for ambulatory patients, assisted living facilities (approx. 100 s.f./ person)								
I-3	Jails, prisons, mental institutions, etc.								Zones 6, 7: Allowable if no other suitable site outside AIA is available.
M	Mixed use retail centers with restaurant facilities (approx. 110 s.f./ person)		0.15	0.25	0.25	0.38			Zones 2, 3, 4, 5: Floor area ratio as indicated
	Retail center with no restaurant facilities (approx. 170 s.f./ person)		0.23						Zones 2: Floor area ratio as indicated
R-1, R-2	Short-term lodging Facilities (≤ 30 nights): hotels, motels, etc. (approx. 200 s.f./person)			0.46	0.46				Zones 3,4: Floor area ratio as indicated
	Long-term lodging facilities (> 30 days): extended-stay hotels, dormitories, etc.								
R-2.1-2.1.1	Residential care facilities for the elderly (<6, ≥6 non-ambulatory clients)								

**TABLE 3-2
SAFETY COMPATIBILITY CRITERIA**

Types of Land Use	Description of Occupancy	Safety Zones							Criteria for Conditional Uses
<i>Note: Multiple categories may apply to same project</i>		1	2	3	4	5	6	7	
Maximum Nonresidential Intensity (People/Acre)		10	60	100	100	150	No Limit	No Limit	
Required Open Land		100%	40%	30%	20%	20%	0%	0%	
R-2.2 - 2.2.1	Residential care facilities for the elderly (<6, ≥6 ambulatory clients)								
R-2.3 - 2.3.1	Residential-based hospice facilities (<6, ≥6 bedridden clients)								
R-3	Low density residential (0 – 8 d.u./ acre ²)								See Policy 3.3.2.6 (b) (1) – (4)
	Medium density residential (8 – 21 d.u./ acre ²)								See Policy 3.3.2.6 (b) (1) – (4)
	High density residential (21 – 30 d.u./ acre ²)								
S-1	Storage of hazardous materials: gas stations, etc.								Zones 3 – 5: See policy 3.3.2.8 (e)(2).
S-2	Warehouses, distribution facilities (approx. 500 s.f./ person)		0.69	1.15					
S-3	Repair garages not requiring use of flammable objects								
S-4	Open parking garages								
U-1	Private garages, carports, and agricultural buildings								
U-2	Tanks and towers								See Section 3.3.3 for airspace protection policies
Other Types of Land Uses									
Agriculture	Truck and specialty crops ³								
	Field crops (grains, rice, but no stalk crops)								
	Field crops (corn and other stalk crops) ³								
	Pasture and range land								
	Orchards and vineyards ³								
	Dry farm and grain ³								
	Tree farms, landscape nurseries, and greenhouses								
	Fish farms								
	Feed lots and stockyards								
	Poultry farms								
	Dairy farms								
Natural Uses	Forest reserves								
	Fish and game reserves								
	Land reserves and open space								
	Waterways (rivers, creeks, swamps bays, lakes) ³								Zone 7: Refer to FAA Advisory Circular 150/5200-33B for

**TABLE 3-2
SAFETY COMPATIBILITY CRITERIA**

Types of Land Use	Description of Occupancy	Safety Zones							Criteria for Conditional Uses
<i>Note: Multiple categories may apply to same project</i>		1	2	3	4	5	6	7	
Maximum Nonresidential Intensity (People/Acre)		10	60	100	100	150	No Limit	No Limit	
Required Open Land		100%	40%	30%	20%	20%	0%	0%	
									appropriate mitigation.
Recreation	Golf courses ³								Zone 7: Refer to FAA Advisory Circular 150/5200-33B for appropriate mitigation.
	Parks (i.e., playgrounds, picnic areas, athletic fields, tennis courts, etc.) ³								Zones 2 – 4: See airspace protection policies in Section 3.3.3. Avoid vegetation and water uses that attract wildlife.
	Riding stables and trails								
	Marinas								
Utilities	Roadways								Zone 1: Not allowed in Object Free Area
	Reservoirs								
	Water treatment ³								Mitigation required to prevent attraction of wildlife hazards
	Electrical substations ⁴								Zone 3: Allowable if no other suitable site outside AIA is available.
	Power plants ⁴								Zone 7: Allowable if no other suitable site outside AIA is available. Also see Policy 3.3.3.7(b).
	Power lines ⁴								

	Compatible: Use is acceptable without conditional restraints (noise, airspace protection, and/or overflight limitations may still apply)
	Conditional: Use is considered acceptable if listed conditions are met
	Incompatible: Use should not be permitted under any circumstances

* **CBC Groups:** Describes building occupancy types established by the California Building Code (see Appendix D)

¹ These uses may generate dust, smoke, or other hazards to flight. Also see Section 3.3 for applicable policies.

² Ranges for dwelling units per acre derived from ranges similar to zoning from jurisdictions within OAK AIA.

³ These uses may attract birds or other wildlife considered potentially hazardous to flight.

⁴ Power lines, smoke stacks, or other tall objects associated with these uses may be hazards to flight. Also see Section 3.3

Source: ESA, 2007; *California Airport Land Use Planning Handbook* (Caltrans, 2002); California Building Code, 2001.

Note: The layout of this table was created using the framework developed in previous compatibility plans (Mead & Hunt, 2006).

3.3.3 Airspace Protection

3.3.3.1 Objective

Similar to safety policies, airspace protection criteria is intended to reduce the risk of harm to people and property resulting from an aircraft accident. This is accomplished by the establishment of compatibility policies that seek to prevent the creation of land use features that can be hazards to the airspace used by aircraft in flight and have the potential to cause an aircraft accident to occur. Such hazards may be physical, visual, or electronic.

3.3.3.2 Evaluation

Tall structures, trees, other objects, or high terrain on or near airports, may constitute hazards to aircraft. Federal regulations establish the criteria for evaluating potential obstructions. These regulations require that the FAA be notified of proposals related to the construction of potentially hazardous structures (see Appendix C). The FAA conducts aeronautical studies of proposed projects to determine whether they would pose risks to aircraft, but it does not have the authority to prevent their construction. The purpose of ALUC airspace protection policies, together with regulations established by local land use jurisdictions and the state government, is to avoid the creation of hazards to the navigable airspace. The policies set forth in this section apply to the entire AIA.

3.3.3.3 Measurement

FAR Part 77, *Objects Affecting Navigable Airspace*, provides guidance for the height of objects that may affect normal aviation operations. The guidance provided by Part 77 is not absolute, however. Deviation from the Part 77 standards does not necessarily mean that a proposed object is prohibited from construction, only that the offending object must be evaluated by the FAA and that mitigative actions, such as marking or lighting may be required. Figure 3-5 depicts the Part 77 surfaces in the vicinity of OAK.

3.3.3.4 Factors Determining Airspace Protection Criteria

As described above, airspace protection policies rely upon regulation enacted by FAA and the state of California; ALUC policies are intended to help implement the federal and state regulations.

- a) FAA has well-defined standards by which potential hazards to flight, especially airspace obstructions, can be assessed. However, FAA has no authority to prevent the creation of such hazards; that authority rests with state and local officials.
- b) California airspace protection standards mostly mirror those of the FAA; the primary difference being that state law gives the California Department of Transportation, Division of Aeronautics and local agencies the authority to enforce the standards.

3.3.3.5 FAA Notification

Proponents of a project that may exceed the elevation of a Part 77 surface must notify the FAA as required by FAR Part 77, Subpart B, by the State Aeronautics Act, and by Public Utilities Code Sections 21658 and 21659.

- a) Local jurisdictions shall inform project proponents of the requirements for notifying the FAA.
- b) FAA review is required for any proposed structure more than 200 feet above the ground level of its site. All such proposals also shall be submitted to the ALUC for review regardless of where in the county the object would be located.
- c) Any project submitted to the ALUC for airport land use compatibility review for reasons of height issues shall include a copy of FAR Part 77 notification to the FAA and the results of the FAA's analysis.
- d) FAA notification shall not automatically trigger an airport compatibility review of a project by the ALUC, unless the general plan of the jurisdiction in which the project is located has not been deemed compatible with this ALUCP.

3.3.3.6 Obstruction Marking and Lighting

FAA or the California Division of Aeronautics will determine the need for marking and lighting of obstructions as part of aeronautical studies conducted in accordance with FAR Part 77. Under most circumstances, when reviewing proposed structures that exceed the height criteria, The ALUC is expected to abide by the FAA's conclusions regarding marking and lighting requirements. However, situations may arise in which the ALUC, because of its particular knowledge of local airports and airspace, may reach a different conclusion than the FAA. In such instances, the ALUC may determine either that a proposed structure is unacceptable or that it is acceptable only with appropriate marking and lighting. Any marking and lighting that the ALUC may require shall be consistent with FAA standards as to color and other features.

3.3.3.7 Other Flight Hazards

Land uses that may cause visual, electronic, navigational, or bird strike hazards to aircraft in flight shall be allowed within the airport influence area only if the uses are consistent with FAA rules and regulations.

- a) Specific characteristics to be avoided include:
 - 1) Glare or distracting lights that could be mistaken for airport lights;
 - 2) Sources of dust, heat, steam, smoke, or thermal plumes that may impair pilot vision or create turbulence within the flight path;

- 3) Sources of electrical or other interference that could affect aircraft communications or navigation; and
 - 4) Any proposed use that creates an increased attraction for wildlife and that is inconsistent with FAA rules and regulations including, but not limited to, FAA Order 5200.5A, *Waste Disposal Sites On or Near Airports*, and Advisory Circular 150/5200-33B, *Hazardous Wildlife Attractants On or Near Airports*. Land uses with the possibility of attracting hazardous wildlife include landfills and certain recreational or agricultural uses that attract large flocks of birds..
- b) Due to their propensity to generate smoke, steam, and other visual and physical hazards to aircraft in flight, power plants should be avoided in the AIA. However, given the varying types of power plants (i.e., thermal, solar, wind, etc.), proposed land uses of this kind within the AIA should be evaluated on a case-by-case basis, and in accordance with FAA criteria and the policies set forth in this Plan.
 - c) In order to resolve any uncertainties or differences with regard to the significance of the above types of flight hazards, local agencies should consult with FAA officials and OAK management.

3.3.3.8 Avigation Easement Dedication

Avigation easements transfer certain property rights from the owner of a property to the owner of the airport (i.e., the Port of Oakland). ALUCs may recommend the dedication of an avigation easement as a condition for approval of development on property to restrict the heights of structures or trees. Avigation easements should be dedicated to the airport owner as a condition for any discretionary local approval of any residential or non-residential development within the area indicated on Figure 3-6.

- a) The avigation easement shall:
 - 1) Identify the potential hazard associated with the proposed project and its location within protected airspace;
 - 2) Identify the airport owner's right to clear or maintain the airspace from potential hazards;
 - 3) Identify the right to mark potential obstructions and notify aviators of such hazards; and
 - 4) Provide the right to pass within the identified airspace.
- b) Neither a separate overflight easement nor a separate real estate disclosure is required for properties for which an avigation easement is required.
- c) An example of an avigation easement is provided in Appendix E.

3.3.4 Overflight

3.3.4.1 Objective

Noise from the overhead flight of aircraft can be annoying and intrusive in locations beyond the limits of the noise contours identified in Section 3.3.1. While sensitivity to aircraft overflights will vary from person to person, the basic intent of overflight policies is to warn people near an airport of the presence of aircraft so that they have the ability to make informed decisions regarding the acquisition or lease of property within the influence area of an airport.

3.3.4.2 Evaluation

Unlike other compatibility factors such as noise, safety, or airspace protection, overflight compatibility policies do not restrict how land can be developed or used; rather, the policies in this section form the requirements for notification about airport proximity and aircraft overflights. These policies are to be applied with local agency approval of new development. The boundaries of the overflight zones around OAK are identified in Figure 3-6.

3.3.4.3 Measurement

Determining the boundaries of overflight noise exposure is difficult to determine as these locations extend well beyond the defined CNEL contours normally associated with areas of high noise exposure. The general locations over which aircraft routinely fly, including when they approach and depart an airport is generally used as an indicator of overflight annoyance concern. Furthermore, the FAA has determined that for the purposes of NEPA changes in Aircraft Flight tracks below 3,000 feet, AGL require more rigorous environmental review than those changes occurring above 3,000 feet AGL.

3.3.4.4 Factors Determining Overflight Criteria

In determining the overflight criteria for OAK, the following factors were considered:

- a) Limitations of ALUC authority of existing land uses. In order to be most effective, overflight policies would ideally apply to all real estate transactions; existing and new. However, the ALUC only has authority to set requirements for new development and to define the boundaries within which real estate transfer disclosure under state law is appropriate.
- b) Need for continuity of real estate disclosure to future property owners and tenants. It is recommended that real estate notifications run with the land and is provided to prospective future owners and tenants.
- c) Excessiveness of avigation easement dedication used solely for buyer awareness purposes. Avigation easements require the conveyance of property rights from the owner

to the party owning the easement, and as such, are best suited to locations where land use restrictions for noise, safety, or airspace protection is necessary.

3.3.4.5 Overflight Notification

As a condition for local agency approval of new residential land use development within the zone indicated on Figure 3-6, an overflight notification should be recorded.

- a) The overflight notification should contain the language provided by state law with regard to real estate transfer disclosure (see Policy 3.3.4.6) and should be of a format similar to that indicated in Appendix E.
- b) The notification should be evident to prospective buyers of the property and should appear with the property deed.
- c) A separate overflight notification is not required where an aviation easement is provided.
- d) Recording of an overflight notification is not required for nonresidential development.

3.3.4.6 Buyer Awareness Measures

Effective as of January 1, 2004, California state statutes (Business and Professional Code Section 11010 and Civil Code Sections 1102.6, 1103.4, and 1353) mandate that sellers or lessors of real property must disclose information regarding whether their property is situated within an AIA.

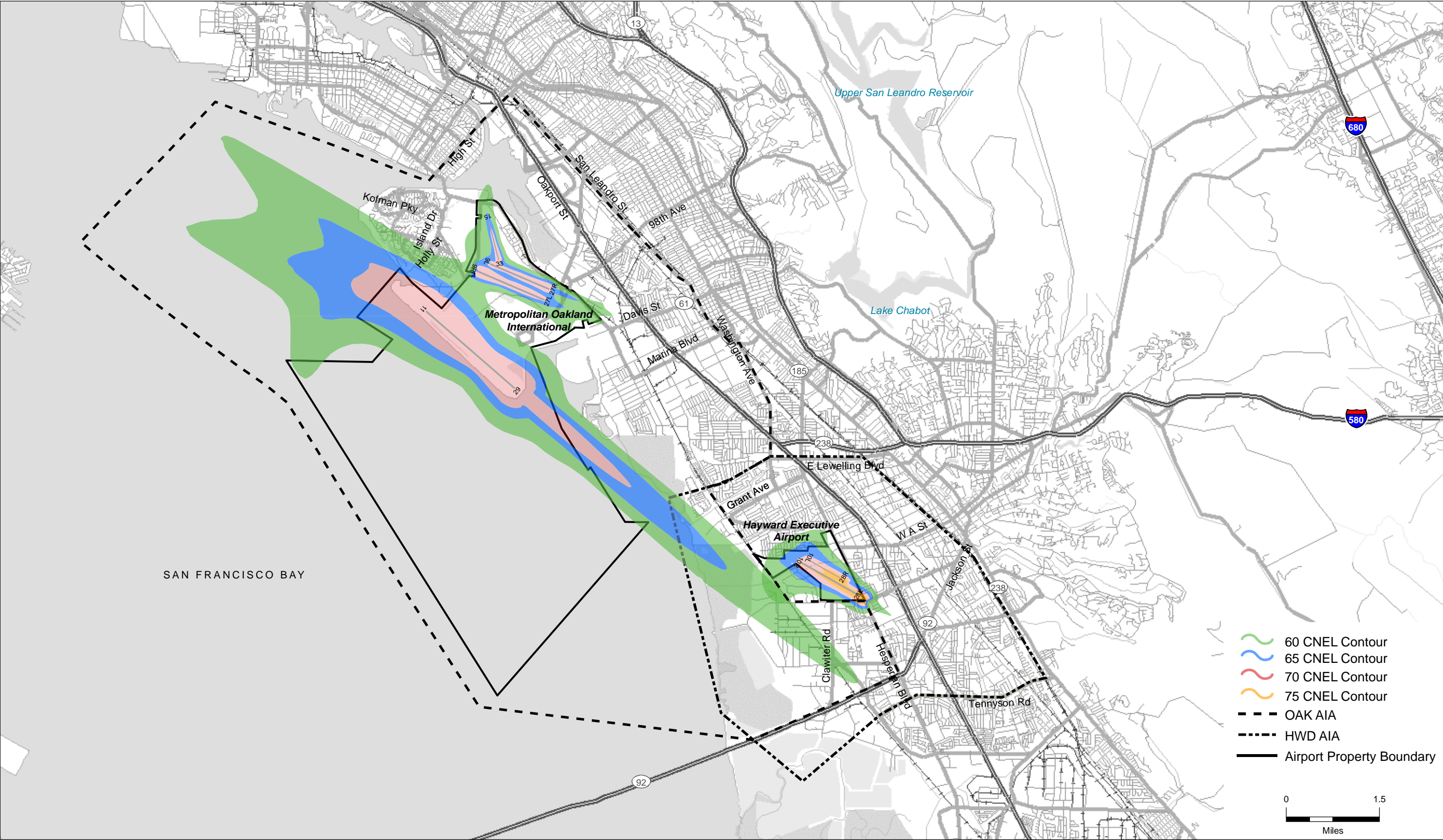
- a) These state requirements apply to the sale or lease of subdivided lands and condominium conversions and to the sale of certain existing residential property.
- b) Where disclosure is required, the state statutes dictate that the following statement shall be provided:

NOTICE OF AIRPORT IN VICINITY

This property is presently located in the vicinity of an airport, within what is known as an airport influence area. For that reason, the property may be subject to some of the annoyances or inconveniences associated with proximity to airport operations (for example: noise, vibration, or odors). Individual sensitivities to those annoyances can vary from person to person. You may wish to consider what airport annoyances, if any, are associated with the property before you complete your purchase and determine whether they are acceptable to you.

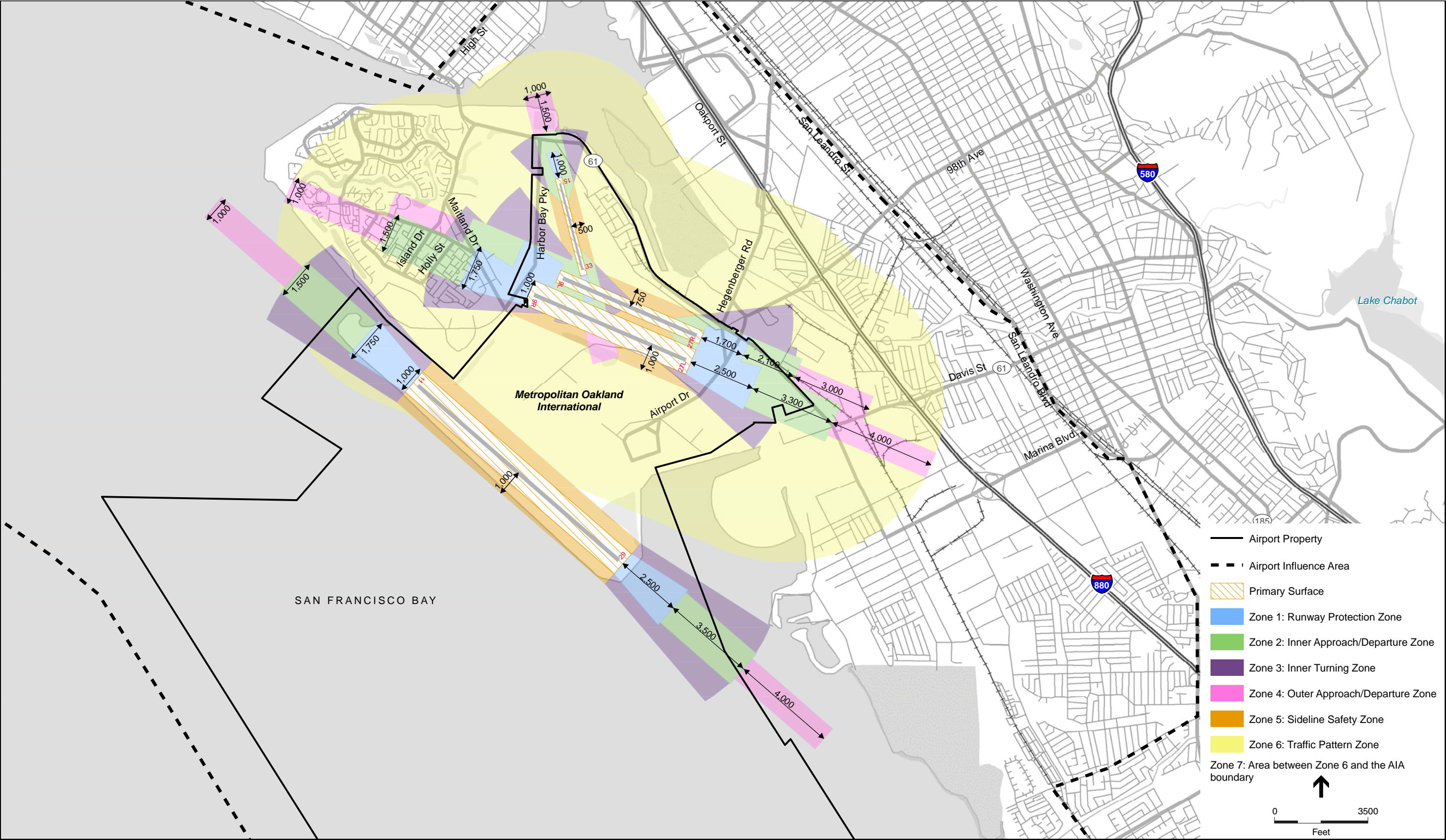
- c) Although not mandated by state law, the recommendation of this ALUCP is that the airport proximity disclosure should be provided as part of all real estate transactions involving private property (both new and existing) within the airport influence area.

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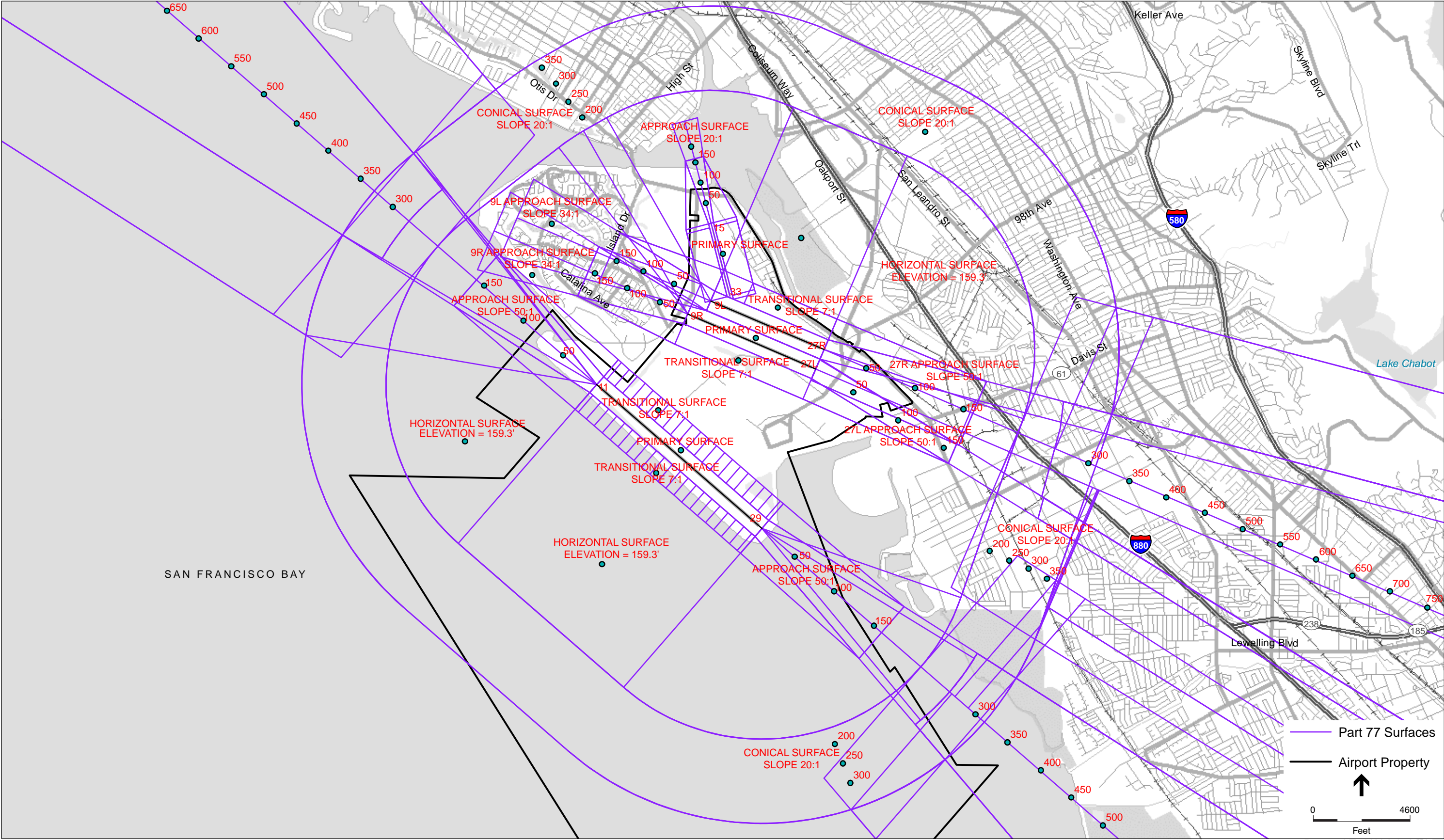
SOURCE: ESA Airports, ESRI, OAK Airport Master Plan, Caltrans California Airport Land Use Planning Handbook, 2002

Figure 3-3
Noise Compatibility Zones



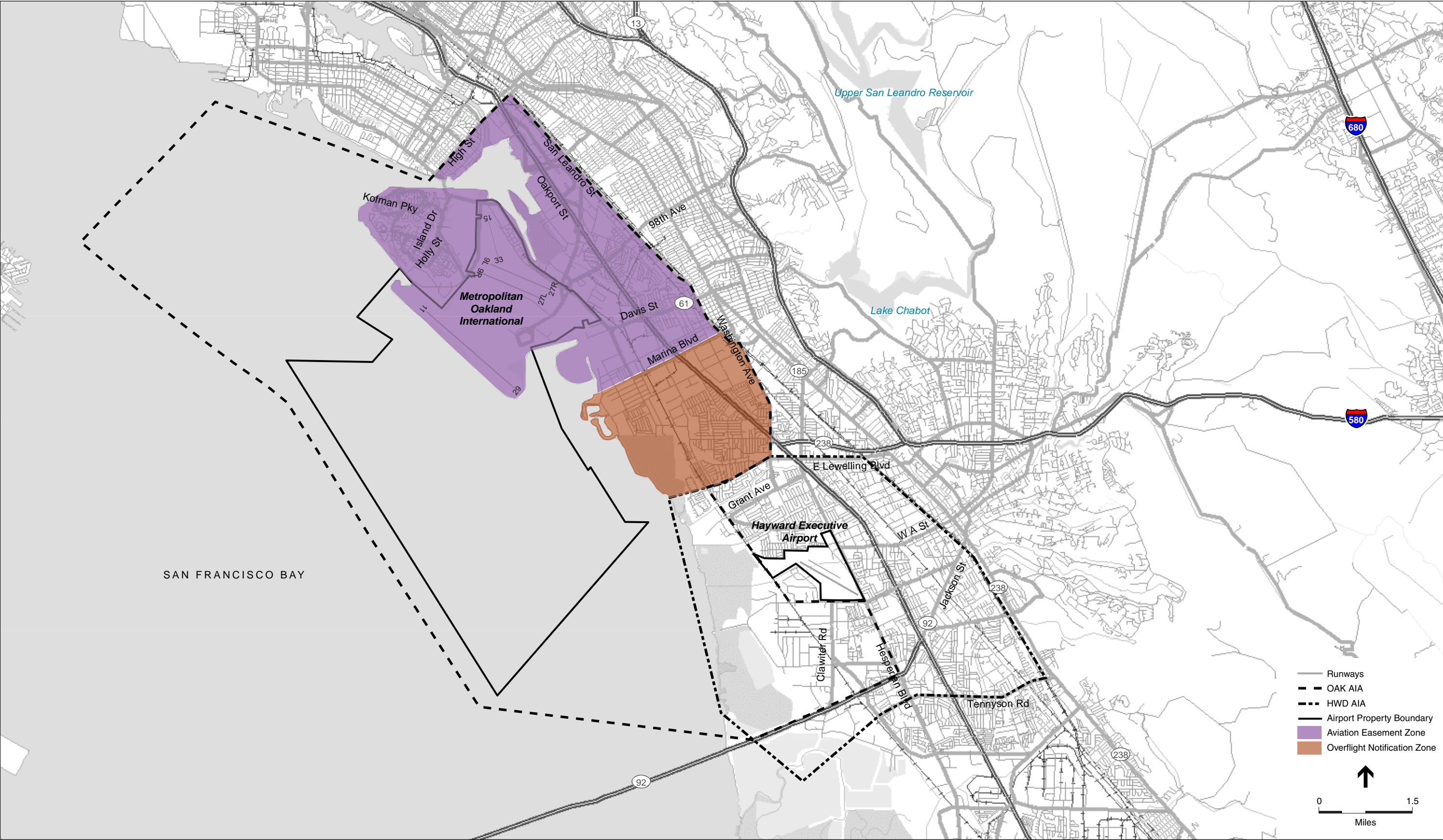
SOURCE: ESA Airports, ESRI, OAK Airport Master Plan, 2006, Caltrans California Airport Land Use Planning Handbook, 2002

Figure 3-4
Safety Compatibility Zones



SOURCE: ESA Airports, ESRI, OAK Airport Master Plan, 2006

Figure 3-5
Oakland International Airport FAR Part 77 Sufaces



SOURCE: ESA Airports, ESRI, OAK Airport Master Plan, 2006

Figure 3-6
OAK Overflight Compatibility Zones

