**NP-4.3 Residential Subdivisions and Lot Splits are Incompatible within CNEL 70 dB Contour**

The subdivision of land and the splitting of lots to enable the construction of additional housing within the CNEL 70 dB contour shall be incompatible and inconsistent with this ALUCP.

**NP-4.4 Residential Rezonings are Incompatible Within CNEL 70 dB Contour**

The rezoning of land for residential use within the CNEL 70 dB contour shall be considered incompatible and inconsistent with this ALUCP.

## 4.4 Safety Compatibility Policies

The safety compatibility policies are established with a twofold purpose:

1. To protect the public health, safety, and welfare by minimizing the public's exposure to the risk associated with potential aircraft accidents in the Airport vicinity.
2. To protect the public interest in providing for the orderly development of SFO by preventing the creation of new safety problems in the Airport environs.

Compared to noise, safety is a much more difficult concern to address in airport/land use compatibility policies. A major reason is that safety policies address uncertain events that may occasionally occur with aircraft operations, whereas noise policies deal with known, more or less predictable, events that occur with every aircraft operation.

Because aircraft accidents happen infrequently, and the time, place, and consequences of their occurrence cannot be accurately predicted, the concept of risk is central to the assessment of safety compatibility. In terms of airport/land use compatibility planning, two questions must be addressed to determine the relative degree of risk posed by potential aircraft accidents in various locations:

- Accident Frequency – Where and when do aircraft accidents typically occur in the vicinity of an airport?
- Accident Severity – What aircraft and land use characteristics contribute to the consequences of an accident when one occurs?

The overall objective of safety compatibility guidelines is to minimize the risks associated with potential aircraft accidents. There are two components to this objective:

- Safety of Persons on the Ground – The most fundamental safety compatibility component is to provide for the safety of people and property on the ground in the event of an aircraft accident near an airport.
- Safety of Aircraft Occupants – The other safety compatibility component is to enhance the chances of survival of the occupants of an aircraft involved in an accident that occurs beyond the runway environment.

The Caltrans *Airport Land Use Planning Handbook* provides guidance on the delineation of safety zones and the application of land use policies in those zones. [5] The safety zones at SFO are based on the *Handbook* guidance, with adjustments to reflect the specific operating characteristics of the Airport. The safety compatibility policy framework is also based on *Handbook* guidance. The safety compatibility policies of this ALUCP were designed to work in tandem with the airspace protection policies, described in Section 4.5. The land use compatibility standards established in Table IV-2 restrict the development of land uses that could pose particular hazards to the public or to vulnerable populations in case of an aircraft accident.[6] The maximum building height limits established under the airspace protection policies in Section 4.5 are set at the lowest elevation of the combined airspace surfaces at SFO, including Part 77 airport obstruction surfaces, TERPS obstacle clearance surfaces, and one-engine inoperative clearance surfaces. The airspace surfaces are generally lowest immediately off the runway ends in the safety zones. This maximum height restriction effectively limits the maximum density of residential uses and the intensity of nonresidential uses.[7]

The following safety compatibility policies (SP) shall apply to the ALUCP.

### SP-1 SAFETY COMPATIBILITY ZONES

**Exhibit IV-7** depicts the safety compatibility zones in the vicinity of SFO. Five zones are established, as follows:

- **Zone 1 -- Runway Protection Zone and Object Free Area (RPZ-OFA):** Zone 1 includes the RPZ and the OFA, areas defined according to FAA airport design criteria. [8] The RPZ is a trapezoid-shaped area off each runway end, with the dimensions based on the runway approach visibility minimums and the type of aircraft using the runway. The OFA is a rectangular area centered on each runway within which objects, other than those serving a specific aeronautical purpose, are to be prohibited. Zone 1is an area of relatively high accident risk that FAA encourages airport proprietors to own and keep free of objects, structures, and incompatible uses, including places of assembly (housing, churches, schools, shopping centers, hospitals, and the like), fuel storage, and wildlife attractants.
- **Zone 2 -- Inner Approach/Departure Zone (IADZ):** Zone 2, the IADZ, is designated along the extended centerline of each runway beginning at the outer edge of the RPZ. It is an area of secondary accident risk that tends to be overflown by most aircraft arrivals and departures off each runway end.
- **Zone 3 -- Inner Turning Zone (ITZ):** Zone 3, the ITZ, lies alongside the RPZ and IADZ. It is an area overflown by aircraft making turns at low altitude immediately after takeoff. It tends

[5] California Department of Transportation, Division of Aeronautics, *California Airport Land Use Planning Handbook*, October 2011, pp. 3-11 – 3-28, 4-13 – 4-34, and Appendices E and F.

[6] For purposes of this ALUCP, vulnerable populations are those with effective limited mobility, including hospital and nursing home patients and children in schools and day care centers.

[7] The Caltrans *Handbook* measures residential density in dwelling units per acre and nonresidential intensity in people (occupants) per acre. The rationale for the definition of safety zones and policies is discussed in greater detail in **Appendix E** of this ALUCP.

[8] FAA Advisory Circular 150/5300-13, Airport Design, Section 211 and 307.

to be subject to lower accident risk than the IADZ.

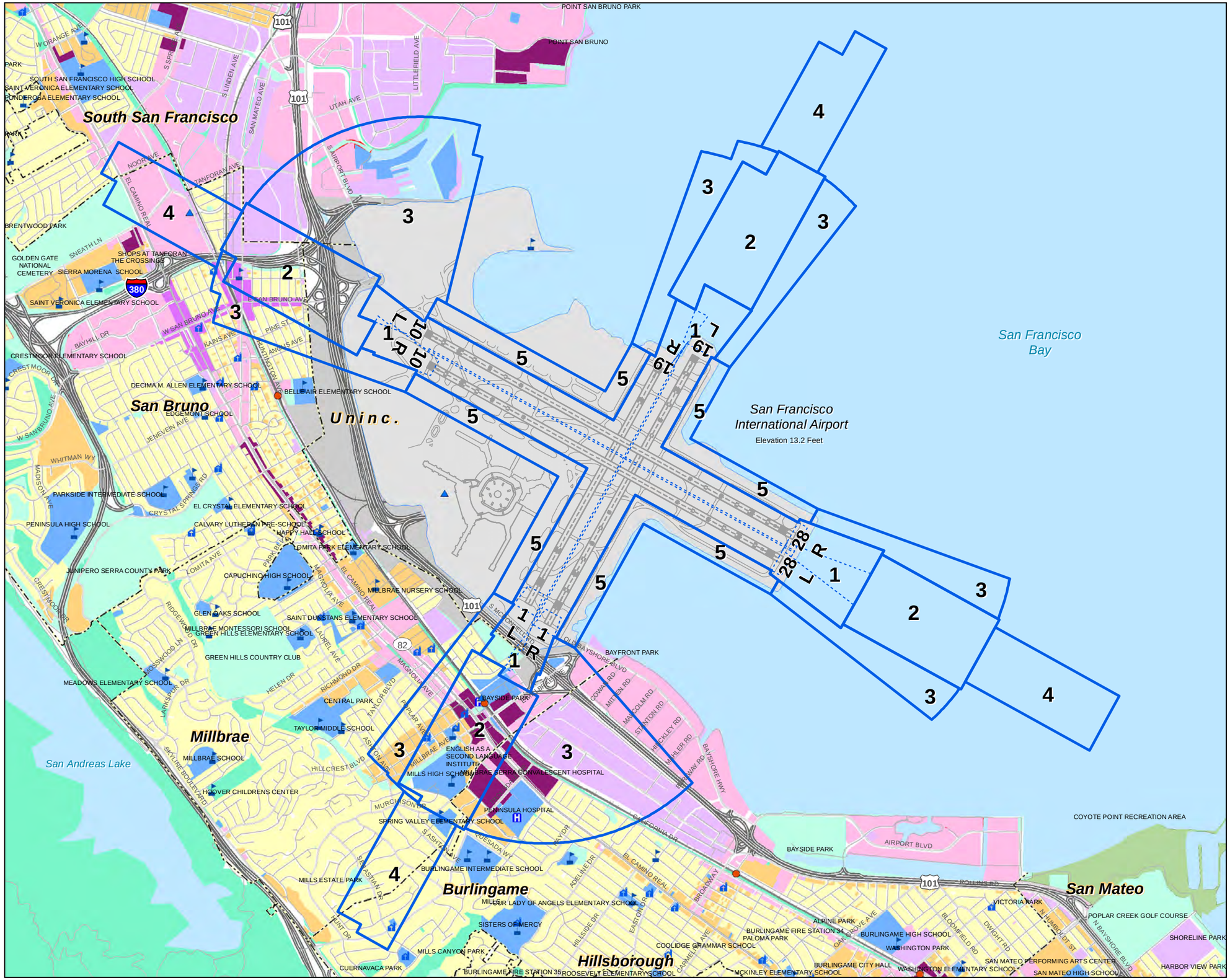
- **Zone 4 -- Outer Approach/Departure Zone (OADZ):** Zone 4, the OADZ, extends along the extended runway centerline immediately beyond the IADZ. It is subject to overflights of aircraft on approach and straight-out departures. At SFO, the OADZ off the west end of Runways 10R-28L and 10L-28R is overflown by a high proportion of departures using Runways 28L and 28R, especially long-haul departures by heavy, wide-body aircraft.
- **Zone 5 – Sideline Zone (SZ):** Zone 5, the SZ, is a rectangular area centered on each runway centerline with a width of 2,000 feet and a length extending 200 feet beyond each runway end. This area is subject to accident risks associated with aircraft losing directional control on takeoff or after landing. At SFO, the SZ is entirely on Airport property.

**Exhibit IV-8** presents a close-up view of the safety zones off the west end of Runways 10L-28R and 10R-28L. The RPZs have the following dimensions: 500-foot inner width, 1,010-foot outer width, and 1,700-foot length.

Zone 2 (the IADZ) off each runway extends 4,300 feet beyond the RPZ, with the lateral boundaries extending 750 feet on either side of the extended runway centerline. Zone 4, (the OADZ) extends 4,000 feet beyond Zone 2, with the lateral boundaries extending 500 feet either side of the extended runway centerline.

Zone 3, (the ITZ) extends 6,000 feet from the inner edge of the RPZ on both sides of Zone 2. On the north side, the shape of Zone 3 is designed to capture the area overflown by departures turning right on standard instrument departure routes.[9] The eastern boundary follows a radial 75 degrees northeast of the extended runway centerline.

[9] Three published instrument departures at SFO require aircraft using Runways 28L and 28R to turn right immediately after takeoff – the Quiet Two, the Rebas, and the Shoreline One departures. http://www.airnav.com/airport/KSFO, accessed February 20, 2012.




**LEGEND**

**Safety Compatibility Zones**

- 1 - Runway Protection Zone-Object Free Area
- 2 - Inner Approach/Departure Zone
- 3 - Inner Turning Zone
- 4 - Outer Approach/Departure Zone
- 5 - Sideline Zonee

Internal boundaries of ALP-defined areas

Airport Property

- BART Station
- CALTRAIN Station
- School
- Place of Worship
- Hospital
- Municipal Boundary
- Railroad
- Freeway
- Road

Planned Land Use Per General Plans:

- Public
- Multi-Family Residential
- Single Family Residential
- Mixed Use
- Transit Oriented Development
- Commercial
- Industrial, Transportation, and Utilities
- Local Park, Golf Course, Cemetery
- Regional Park or Recreation Area
- Open Space
- Planned use not mapped

**Sources:**

Safety Compatibility Zones:
- Jacobs Consultancy Team, 2009; Ricondo & Associates, Inc., 2011

County Base Maps:
- San Mateo County Planning & Building Department, 2007

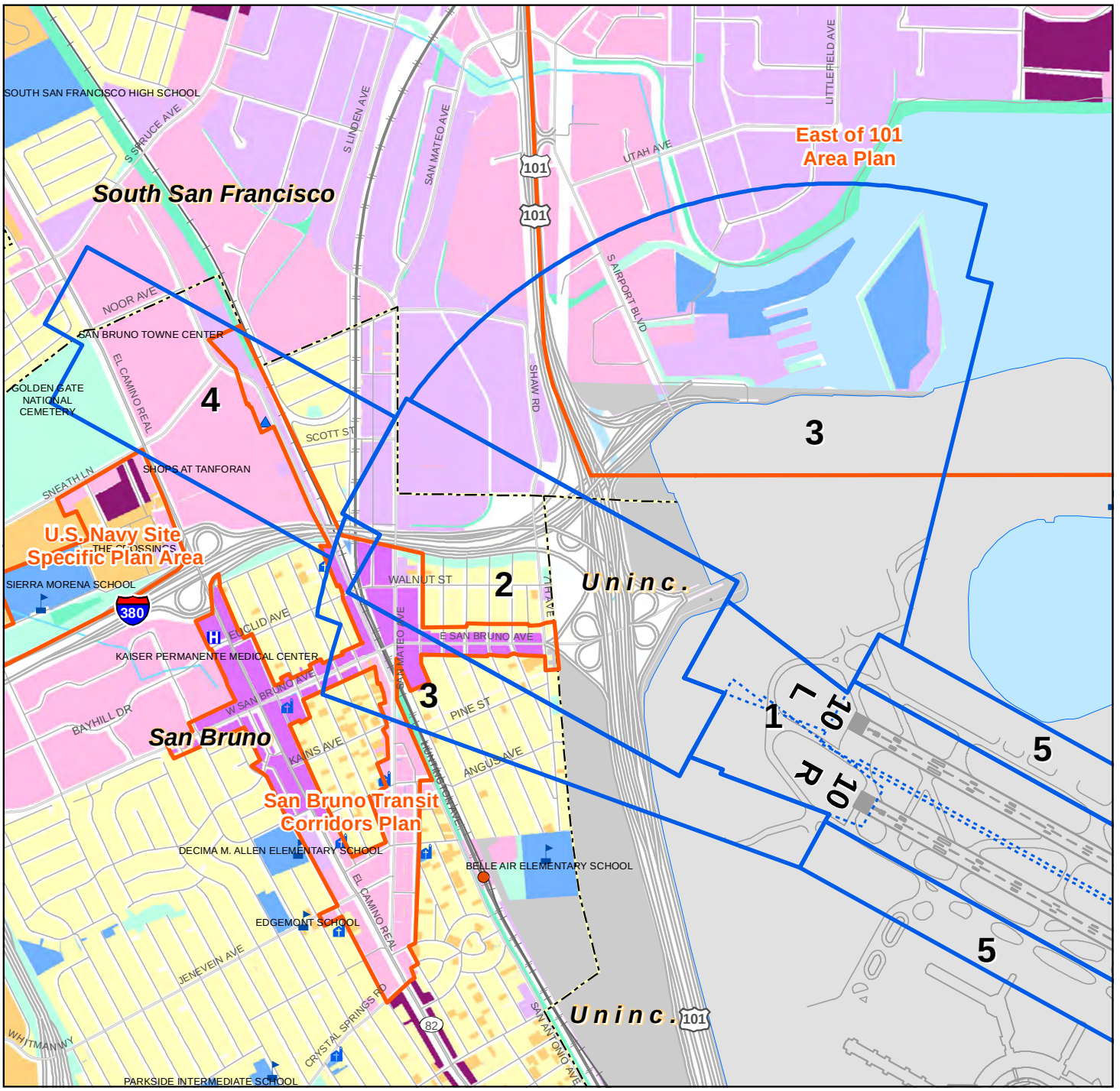
Local Plans:
- Burlingame Bayfront Specific Area Plan, August 2006
- Burlingame Downtown Specific Plan, January 2009
- Burlingame General Map, September 1984
- North Burlingame/ Rollins Road Specific Plan, February 2007
- Colma Municipal Code Zoning Maps, December 2003
- Daly City General Plan Land Use Map, 1987
- Hillsborough General Plan, March 2005
- Millbrae Land Use Plan, November 1998
- Pacifica General Plan, August 1996
- San Bruno General Plan, December 2008
- San Mateo City Land Use Plan, March 2007
- San Mateo County Zoning Map, 1992
- South San Francisco General Plan, 1998

NORTH

0 0.125 0.25 0.5 Miles

Exhibit IV-7
**SAFETY COMPATIBILITY ZONES**
Comprehensive Airport Land Use Plan
for the Environs of San Francisco International Airport

**C/CAG**
City/County Association of Governments
of San Mateo County, California




**LEGEND**

**Safety Compatibility Zones**

- 1 - Runway Protection Zone-Object Free Area
- 2 - Inner Approach/Departure Zone
- 3 - Inner Turning Zone
- 4 - Outer Approach/Departure Zone
- 5 - Sideline Zones
- Internal boundaries of ALP-defined areas
- Specific Plan Area
- Airport Property
- BART Station
- CALTRAIN Station
- School
- Place of Worship
- Hospital
- Municipal Boundary
- Railroad
- Freeway
- Major Road
- Road

**Planned Land Use Per General Plans**

- Public
- Multi-Family Residential
- Single Family Residential
- Mixed Use
- Transit Oriented Development
- Commercial
- Industrial, Transportation, and Utilities
- Local Park, Golf Course, Cemetery
- Regional Park or Recreation Area
- Open Space

NORTH

0 0.125 0.25 0.5 Miles

Sources:

Local Plans:
- San Bruno General Plan, December 2008
- South San Francisco General Plan, 1998

Exhibit IV-8

**SAFETY COMPATIBILITY ZONES IN THE CITIES OF SOUTH SAN FRANCISCO AND SAN BRUNO**

Comprehensive Airport Land Use Plan
for the Environs of San Francisco International Airport

**C/CAG**

City/County Association of Governments
of San Mateo County, California

**Exhibit IV-9** depicts the safety zones off the south end of Runways 1L-19R and 1R-19L. In Zone 1, the RPZs have a 500-foot inner width, 1,010-foot outer width and 1,700-foot length. Zone 2 (the IADZ) extends 4,300 feet from the outer edge of the RPZ and is 1,500 feet wide, centered on the extended runway centerline. Zone 3 (the ITZ) extends 6,000 feet from the inner edge of each RPZ. On the east side, Zone 3 is fanned 70 degrees east of the extended runway centerline. This reflects the left departure turns made by nearly all aircraft taking off on Runways 19L and 19R and 19R.[10] Zone 4, the OADZ, extends 4,000 feet beyond the end of Zone 2.

### SP-2 SAFETY COMPATIBILITY LAND USE CRITERIA

The land use compatibility criteria for safety are established in **Table IV-2**. The safety compatibility criteria are generally based on the guidelines provided in the *California Airport Land Use Planning Handbook*, although modifications have been made in recognition of the intense level of existing development in the airport vicinity. See Appendix E for a discussion of the factors that were considered in establishing the safety compatibility policies.

The criteria include two categories – uses that are incompatible and uses that should be avoided in the respective zones.

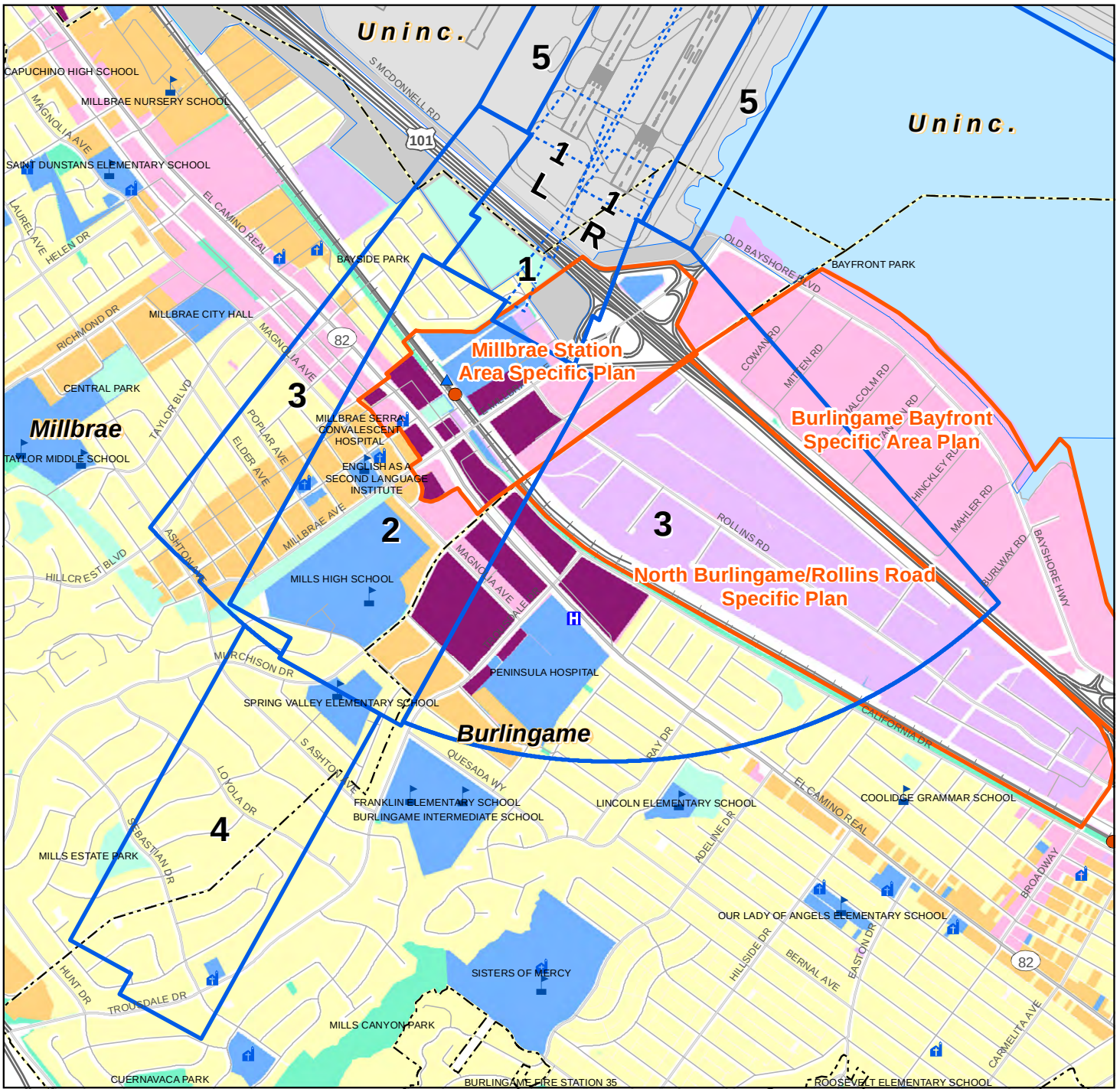
- Incompatible Uses – uses that are incompatible within the safety zone.
- Uses to be Avoided – uses that should not be allowed in the safety zone unless no feasible alternative is available, as determined by the land use agency with permitting authority. Where these uses are allowed, habitable structures shall be provided with at least 50 percent more exits than required by applicable codes. If the 50 percent calculation results in a fraction, the fractional number shall be rounded up to the next whole number.

## ZONE 1 – RUNWAY PROTECTION ZONE AND OBJECT FREE AREA (RPZ-OFA)

Zone 1 is the zone where the accident risk is highest. At SFO, the RPZs for Runways 10R and 10L are on Airport property or on public highway right-of-way. Most of the RPZs for Runways 1L and 1R are on Airport property or public right-of-way. Part of the RPZs lie in Bayside Park and small areas extend onto private property. All of the OFAs (Object Free Areas) are on Airport property.

The compatibility criteria presented in Table IV-2 declare that all new structures in Zone 1 are incompatible. All but very low intensity nonresidential uses, at the outer edges of the RPZs, are to be avoided. Examples of potentially acceptable nonresidential uses include parking lots and outdoor equipment storage.

[10] All published instrument departure procedures for Runways 19L and 19R require aircraft to turn left immediately after takeoff. http://www.airnav.com/airport/KSFO, accessed February 20, 2012.




**LEGEND**

**Safety Compatibility Zones**

- 1 - Runway Protection Zone-Object Free Area
- 2 - Inner Approach/Departure Zone
- 3 - Inner Turning Zone
- 4 - Outer Approach/Departure Zone
- 5 - Sideline Zones
- Internal boundaries of ALP-defined areas
- Specific Plan Area
- Airport Property
- BART Station
- CALTRAIN Station
- School
- Place of Worship
- Hospital
- Municipal Boundary
- Railroad
- Freeway
- Major Road
- Road

**Planned Land Use Per General Plans**

- Public
- Multi-Family Residential
- Single Family Residential
- Mixed Use
- Transit Oriented Development
- Commercial
- Industrial, Transportation, and Utilities
- Local Park, Golf Course, Cemetery
- Regional Park or Recreation Area
- Open Space

NORTH

0 0.125 0.25 0.5 Miles

Sources:

Local Plans:
- San Bruno General Plan, December 2008
- South San Francisco General Plan, 1998

ExhibitIV-9

**SAFETY COMPATIBILITY ZONES IN THE CITIES OF BURLINGAME AND MILLBRAE**

Comprehensive Airport Land Use Plan
for the Environs of San Francisco International Airport

**C/CAG**

City/County Association of Governments
of San Mateo County, California

**Table IV-2 (1 of 2) Safety Compatibility Criteria**

| | LAND USE CRITERIA | |
|---|---|---|
| **ZONE** | **INCOMPATIBLE**[1/] | **AVOID**[1/] |
| Zone 1: Runway Protection Zone and Object Free Area (RPZ-OFA) | | |
| | All new structures[3/]<br>Places of assembly not in structures<br>Hazardous uses[2/]<br>Critical public utilities[2/] | Nonresidential uses except very low intensity uses[4/] in the "controlled activity area." [2/] |
| **Zone 2: Inner Approach/Departure Zone (IADZ)** | | |
| | Children's schools[2/]<br>Large child day care centers and noncommercial employer-sponsored centers ancillary to a place of business[2/]<br>Hospitals, nursing homes<br>Hazardous uses[2/]<br>Critical public utilities[2/]<br>Theaters, meeting halls, places of assembly seating more than 300 people<br>Stadiums, arenas | --- |
| **Zone 3: Inner Turning Zone (ITZ)** | | |
| | Biosafety Level 3 and 4 facilities [2/]<br>Children's schools [2/]<br>Large child day care centers [2/]<br>Hospitals, nursing homes<br>Stadiums, arenas | Hazardous uses other than Biosafety Level 3 and 4 facilities[2/]<br>Critical public utilities[2/] |
| **Zone 4: Outer Approach/Departure Zone (OADZ)** | | |
| | Biosafety Level 3 and 4 facilities[2/]<br>Children's schools [2/]<br>Large child day care centers [2/]<br>Hospitals, nursing homes<br>Stadiums, arenas | Hazardous uses other than Biosafety Level 3 and 4 facilities [2/]<br>Critical public utilities[2/] |
| **Zone 5: Sideline Zone (SZ)** | | |
| | Children's schools[2/]<br>Large child day care facilities and noncommercial employer-sponsored centers ancillary to a place of business<br>Hospitals, nursing homes<br>Hazardous uses[2/]<br>Critical public utilities[2/]<br>Stadiums, arenas | --- |

**Table IV-2 (2 of 2) Safety Compatibility Criteria**

Notes:

1/ *Avoid:* Use is not fully compatible and should not be permitted unless no feasible alternative is available. Where use is allowed, habitable structures shall be provided with at least 50 percent more exits than required by applicable codes. Where the 50-percent factor results in a fraction, the number of additional exits shall be rounded to the next highest whole number.

*Incompatible* Use is not compatible in the indicated zones and cannot be permitted.

2/ Definitions

- *Biosafety Level 3 and 4 facilities:* Medical and biological research facilities involving the storage and processing of extremely toxic or infectious agents. See Policy SP-3 for additional detail.
- *Children's schools:* Public and private schools serving preschool through grade 12, excluding commercial services.
- *Controlled Activity Area: The lateral edges of the RPZ, outside the Runway Safety Area (RSA) and the extension of the RSA, which extends to the outer edge of the RPZ. See FAA Advisory Circular 150/5300-13, Airport Design, Section 212a.(1)(b).*
- *Critical public utilities:* Facilities that, if disabled by an aircraft accident, could lead to public safety or health emergencies. They include the following: electrical power generation plants, electrical substations, wastewater treatment plants, and public water treatment facilities.
- *Hazardous uses:* Uses involving the manufacture, storage, or processing of flammable, explosive ,or toxic materials that would substantially aggravate the consequences of an aircraft accident. See Policy SP-3 for additional detail.
- *Large child day care centers:* Commercial facilities defined in accordance with Health and Safety Code, Section 1596.70, et seq., and licensed to serve 15 or more children. Family day care homes and noncommercial employer-sponsored facilities ancillary to place of business are allowed.

3/ Structures serving specific aeronautical functions are allowed, in compliance with applicable FAA design standards.

4/ Examples include parking lots and outdoor equipment storage.

SOURCE: Ricondo & Associates, Inc., June 2012.
PREPARED BY: Ricondo & Associates, Inc., June 2012.

## ZONE 2 -- INNER APPROACH/DEPARTURE ZONE (IADZ)

In Zone 2, the IADZ, a variety of uses that involve hazardous materials, critical public utilities, theaters, meeting halls, places of assembly seating more than 300 people, stadiums, arenas, and those accommodating potentially vulnerable populations – such as children's schools, child day care facilities, hospitals, and nursing homes – are incompatible.

## ZONE 3 -- INNER TURNING ZONE (ITZ)

The compatibility criteria in Zone 3, the ITZ, are somewhat less restrictive than in Zone 2. This is because the area is subject to less accident risk by virtue of the lower density of overflights in this area. In Zone 3, stadiums, arenas, and uses accommodating potentially vulnerable populations are incompatible. Hazardous uses and critical public utilities are not incompatible in Zone 3, but are classified as uses to be avoided. This means that they should not be permitted unless no feasible alternative is available.

## ZONE 4 - OUTER APPROACH/DEPARTURE ZONE (OADZ)

The compatibility criteria in Zone 4,the OADZ, are the same as in Zone 3.

## ZONE 5 – SIDELINE ZONE (SZ)

The compatibility criteria in Zone 5 are the same as those in Zone 2.

### SP-3 HAZARDOUS USES

Hazardous uses, facilities involving the manufacture, processing, or storage of hazardous materials, can pose serious risks to the public in case of aircraft accidents. Hazardous materials of particular concern in this ALUCP, and which are covered by the safety compatibility criteria in Table IV-2, are the following:

**A. Aboveground fuel storage** — This includes storage tanks with capacities greater than 10,000 gallons of any substance containing at least 5 percent petroleum.[11] Project sponsors must provide evidence of compliance with all applicable regulations prior to the issuance of development permits.

**B. Facilities where toxic substances are manufactured, processed or stored** — Proposed land use projects involving the manufacture or storage of toxic substances may be allowed if the amounts of the substances do not exceed the threshold planning quantities for hazardous and extremely hazardous substances specified by the EPA.[12]

**C. Explosives and fireworks manufacturing and storage** — Proposed land use projects involving the manufacture or storage of explosive materials may be allowed in safety zones only in compliance with the applicable regulations of the California Division of Occupational Safety and Health (Section 5252, Table EX-1). Project sponsors must provide evidence of compliance with applicable state regulations prior to the issuance of any development permits.[13]

**D. Medical and biological research facilities handling highly toxic or infectious agents** — These facilities are classified by "Biosafety Levels."[14] Biosafety Level 1 does not involve hazardous materials and is not subject to the restrictions on hazardous uses in Table IV-2. Definitions of the other three biosafety levels are quoted from *Biosafety in Microbiological and Biomedical Laboratories*, below.[15]

a. Biosafety Level 2 practices, equipment, and facility design and construction are applicable to clinical, diagnostic, teaching, and other laboratories in which work is done with the broad spectrum of indigenous moderate-risk agents that are present in the community

[11] State of California, California Health and Safety Code, Section 25270 (*Aboveground Petroleum Storage Act*).

[12] Title 40 Code of Federal Regulations Part 355, Subpart D, Appendices A & B.

[13] California Code of Regulations, Title 8, Subchapter 7 *General Industry Safety Orders*, Group 18 *Explosives and Pyrotechnics*, Article 114 *Storage of Explosives*.

[14] *Biosafety in Microbiological and Biomedical Laboratories*, 5th Edition, 2009, published by the U.S. Department of Health and Human Services in concert with the Public Health Service, Centers for Disease Control and Prevention, and National Institutes of Health, or any successor publication.

[15] *Biosafety in Microbiological and Biomedical Laboratories*, 5th Edition, 2009, published by the U.S. Department of Health and Human Services in concert with the Public Health Service, Centers for Disease Control and Prevention, and National Institutes of Health, pp. 25-26.

and associated with human disease of varying severity.

b. Biosafety Level 3 practices, safety equipment, and facility design and construction are applicable to clinical, diagnostic, teaching, research, or production facilities in which work is done with indigenous or exotic agents with a potential for respiratory transmission, and which may cause serious and potentially lethal infection.

c. Biosafety Level 4 practices, safety equipment, and facility design and construction are applicable for work with dangerous and exotic agents that pose a high individual risk of life-threatening disease, which may be transmitted via the aerosol route and for which there is no available vaccine or therapy.

## 4.5 Airspace Protection

The compatibility of proposed land uses with respect to airspace protection shall be evaluated in accordance with the policies set forth in this section. These policies are established with a twofold purpose:

1. To protect the public health, safety, and welfare by minimizing the public's exposure to potential safety hazards that could be created through the construction of tall structures.

2. To protect the public interest in providing for the orderly development of SFO by ensuring that new development in the Airport environs avoids compromising the airspace in the Airport vicinity. This avoids the degradation in the safety, utility, efficiency, and air service capability of the Airport that could be caused by the attendant need to raise visibility minimums, increase minimum rates of climb, or cancel, restrict, or redesign flight procedures.

### 4.5.1 FEDERAL REGULATIONS REGARDING TALL STRUCTURES

14 Code of Federal Regulations (CFR) Part 77, *Safe, Efficient Use and Preservation of the Navigable Airspace*, governs the FAA's review of proposed construction exceeding certain height limits, defines airspace obstruction criteria, and provides for FAA aeronautical studies of proposed construction. **Appendix F** describes the FAA airspace review process and the extent of FAA authority related to airspace protection.

### 4.5.2 PART 77, SUBPART B, NOTIFICATION PROCESS

Federal regulations require any person proposing to build a new structure or alter an existing structure with a height that would exceed the elevations described in CFR Part 77, Subpart B, Section 77.9, to prepare an FAA Form 7460-1, *Notice of Proposed Construction or Alteration*, and submit the notice to the FAA. The regulations apply to buildings and other structures or portions of structures, such as mechanical equipment, flag poles, and other projections that may exceed the aforementioned elevations.