

Comparison of 1993 and 2002 Safety Compatibility Zone Examples

BACKGROUND

In a series of memoranda prepared between October 2006 and January 2007, the potential effects of extending Runways 14 and 19 at the Charles M. Schulz-Sonoma County Airport (Airport) on Windsor school sites and the January 2001 *Comprehensive Airport Land Use Plan for Sonoma County* (CLUP) were presented. This memorandum updates the previous work to include additional discussion of the CLUP safety zones to the south of the Airport, which would not be affected by the extensions of Runways 14 and 19, but would need to be updated anyway.

The safety zone configurations used for the Airport portion of the CLUP were derived from the 1993 version of the *California Airport Land Use Planning Handbook* (Handbook). The 1993 edition of the Handbook contained a diagram depicting examples of safety zone configurations for general aviation runways. This diagram served as the basis for the 2001 CLUP safety zones. Runway length was the only identified variable among the three general aviation runway safety zone configuration examples illustrated in the 1993 Handbook. Exhibit 1 shows the current relationship between the Town of Windsor and the adopted 2001 CLUP safety zones. There is one public school site (Windsor High School/Windsor Oaks Academy), and one private school site (Days Private School) located within the adopted CLUP safety zones. Exhibit 2 depicts the adopted 2001 CLUP safety zones south of the Airport. There are no public or private schools located within the CLUP safety zones south of the Airport. Table 1 incorporates the “Land Use Compatibility Standards for Airport Safety Zones” as set forth in the 2001 CLUP.

Because the *California Airport Land Use Planning Handbook* was updated in 2002, after the CLUP had already been adopted, the simple extension of existing CLUP safety zones to coincide with the proposed runway extensions would not be consistent with the new safety zone guidance. Hence, the purpose of this memo is to illustrate the possible application of the new safety zone information as contained in the updated Handbook. Exhibit 3 depicts the refined safety compatibility zones contained in the January 2002 edition of the Handbook. Exhibit 4 shows how the 2002 Handbook safety zones to might be applied to existing Runways 14 and 19. Exhibit 5 shows how the 2002 Handbook safety zones could be applied to the extended Runways 14 and 19. Example 3: “Long General Aviation Runway” from Exhibit 3 was used as the basis for the comparison for Runway 14 and Example 2: “Medium General Aviation Runway” was used for Runway 19. Adjustments were made to the generic zones to account for special design considerations associated with the two runway ends. Table 2 sets forth the “Basic Safety Compatibility Qualities” from the 2002 Handbook safety zones.

Exhibit 6 depicts the application of the 2002 *Handbook* safety zones to Runways 1 and 32. Example 2: “Medium General Aviation Runway” from Exhibit 3 was used to illustrate the application of the 2002 *Handbook* safety zones to Runway 1. The “Large Air Carrier Runway” example from Exhibit 3 was applied to Runway 32 because it is the Airport’s precision instrument runway. Exhibit 7 consolidates the information presented in Exhibits 5 and 6.

DIFFERENCES BETWEEN OLD AND NEW SAFETY ZONE EXAMPLES

An important caveat included with the State’s 1993 analysis was that the safety zone shapes and sizes as shown were presented only to illustrate the way in which the accident data could be used to create a set of safety compatibility zones for an airport. The expectation was that the results would serve only as a starting point for Airport Land Use Commissions to use in delineating safety compatibility zones for a particular runway. However, the examples depicted in the 1993 *Handbook* sometimes became the end product with little consideration given to conditions present at a specific airport or to the relationship between the geometry of safety zones and the land use criteria applicable within them.

Given this status, the safety zone configuration examples from the 1993 *Handbook* were reexamined as part of the analysis for the 2002 *Handbook*. The major objectives in updating the *Handbook* were to expand upon the range of examples provided and to more clearly indicate the assumptions associated with each example. Additionally, various factors were identified which could and typically should be used to adjust the basic zones and/or safety criteria. The purpose of these changes was to emphasize that, rather than simply selecting a predefined set of compatibility zones from the *Handbook*, airport land use commissions are expected to evaluate the specific conditions at the airport involved and make adjustments to the zones as necessary.

The information depicted on Exhibits 1 through 7 is for informational and illustrative purposes only and does not represent a recommendation to or a commitment by the Airport, Airport Land Use Commission, or Board of Supervisors of Sonoma County for adoption or implementation. At the appropriate time, the Sonoma County Airport Land Use Commission will review and consider the status of the 2001 *CLUP* and take action as necessary.

Table 1
Land Use Compatibility Standards for Airport Safety Zones
Sonoma County

Safety Zones	Maximum Population Density ¹	Maximum Residential Density in Units Per Acre ²	Maximum Amount of Useable Open Space	Land Use ³
RPZ – Runway Protection Zone	0 ⁴	0 ⁴	90% of gross area	No petroleum or explosives. No above-grade powerlines. No significant obstructions. ⁴
ISZ – Inner Safety Zone	Uses in structures: ⁶ 40 persons/ac. Uses not in structures: 80 persons/ac.	0.2 dwelling units per acre	30% of gross area (25% maximum structural coverage.)	No shopping centers. No eating establishments. No meeting halls. No multi-story office buildings. No labor-intensive manufacturing plants. No hotels, motels. No concert halls, auditoriums, theaters. No stadiums, arenas. No public utility stations, plants. No public communications facilities. No schools, hospitals, nursing homes. No uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials. ⁷
ITZ – Inner Turning Zone	Uses in structures: 50 persons/ac. (see text for explanation) Uses not in structures: 100 persons/ac	Same as ISZ.	20% of gross area (30% maximum structural coverage.)	Same as ISZ.
OSZ – Outer Safety Zone	Uses in structures: 100 persons/ac. Uses not in structures: 200 persons/ac.	4 dwelling units per acre at the outer sub zones at the north end of Runways 14-32 and 1-19 at the Sonoma County Airport. 3 dwelling units per acre in all other OSZ's.	30% of gross area. (35% maximum structural coverage.)	No schools, hospitals, nursing homes. No uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials.
SSZ – Sideline Safety Zone	Uses in structures: 60 persons/ac. Uses not in structures: 120 persons/ac.	1.0 dwelling unit per acre	30% of gross area. (35% maximum structural coverage.)	No schools, hospitals, nursing homes. No uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials.
TPZ – Traffic Pattern Zone	Uses in structures: 150 persons/ac.	Sonoma County Airport: 5 dwelling units per acre. All others, 4 dwelling units per acre	15% of gross area	Discourage schools, auditoriums, ⁸ amphitheaters, stadiums. Discourage uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials.

Notes to Table 1:

- ¹ See Subsection 8.4.1.b for an explanation of the methodology for determining population density for any proposed use.
- ² Granny Units (Second Dwelling Units) are not restricted by this plan if such units are permitted under a local jurisdiction's zoning code.
- ³ The following uses shall be prohibited in all airport safety zones:

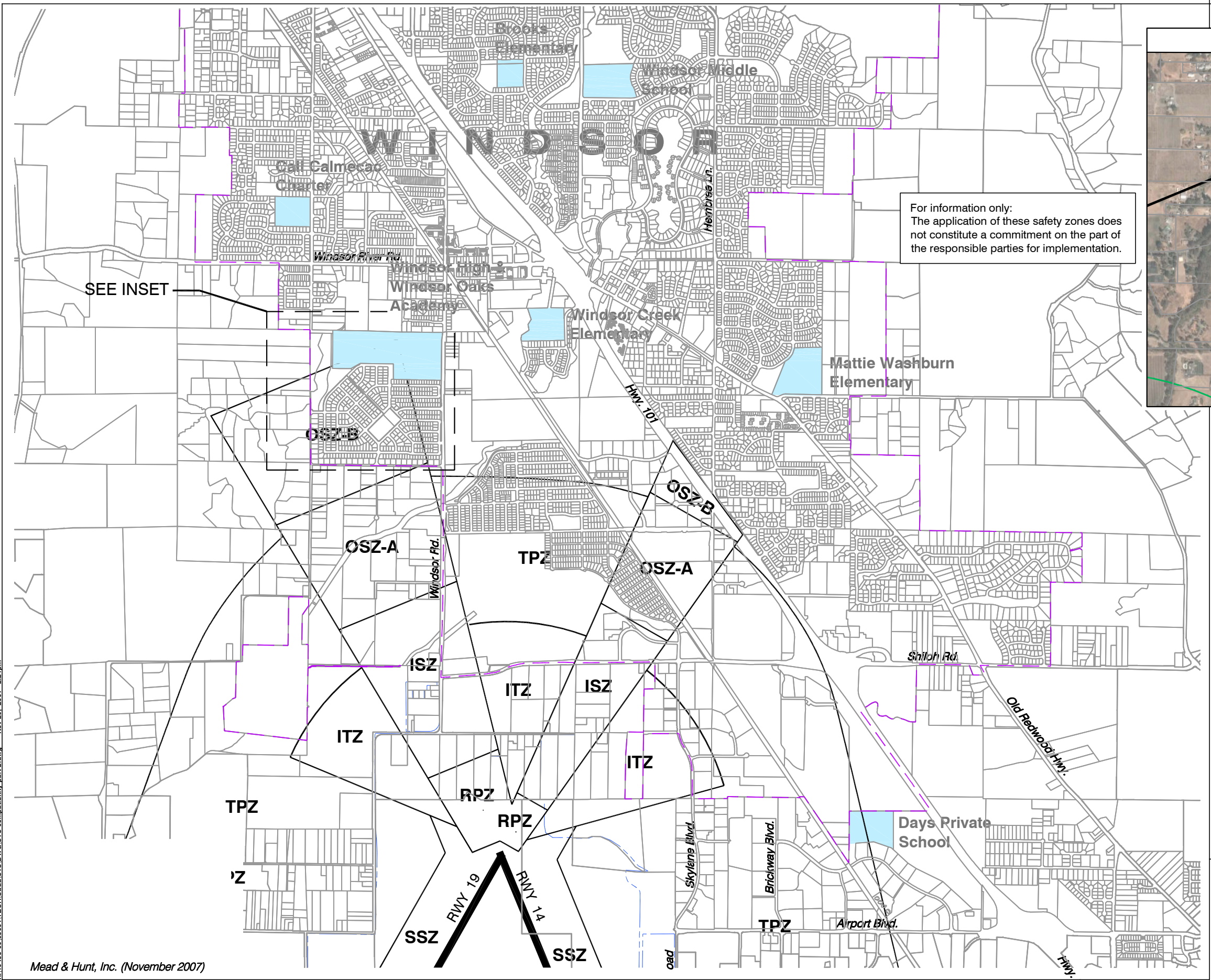
 - (a) Any use which would direct a steady light or flashing light of red, white, green, or amber colors associated with airport operations toward an aircraft engaged in an initial straight climb following takeoff or toward an aircraft engaged in a straight final approach toward a landing at an airport, other than an FAA approved navigational signal light or visual approach slope indicator.
 - (b) Any use which would cause sunlight to be reflected toward an aircraft engaged in an initial straight climb following takeoff or toward an aircraft engaged in a straight final approach toward a landing at an airport.
 - (c) Any use which would generate smoke or water vapor or which would attract large concentrations of birds, or which may otherwise affect safe air navigation within the area. Large water features, including, but not limited to, wetlands, and water storage ponds that could attract birds are generally prohibited, provided, however, that ponds which are designed so as not to attract birds (e.g., ponds devoid of shrubs and trees or similar habitat for birds) would be permitted. Food and fiber processing activities involving outdoor storage of food products and seeds which would attract birds would be prohibited. This prohibition would not apply to the cultivation of land, including orchards, vineyards, horticulture, or crop raising.
 - (d) Any use which would generate electrical interference that may be detrimental to the operation of aircraft and/or aircraft instrumentation.
- ⁴ No structures permitted in RPZ.
- ⁵ Significant obstructions include, but are not limited to, large trees, heavy fences and walls, tall and steep berms and retaining walls, non-frangible street light and sign standards, billboards.
- ⁶ A "structure" includes fully enclosed buildings and other facilities involving fixed seating and enclosures limiting the mobility of people, such as sports stadiums, outdoor arenas, and amphitheaters.
- ⁷ This does not apply to service stations involving retail sale of motor vehicle fuel if fuel storage tanks are installed underground.
- ⁸ See Subsection 8.6.5 in text.

Table 2
Land Use Compatibility Standards for Airport Safety Zones
Sonoma County

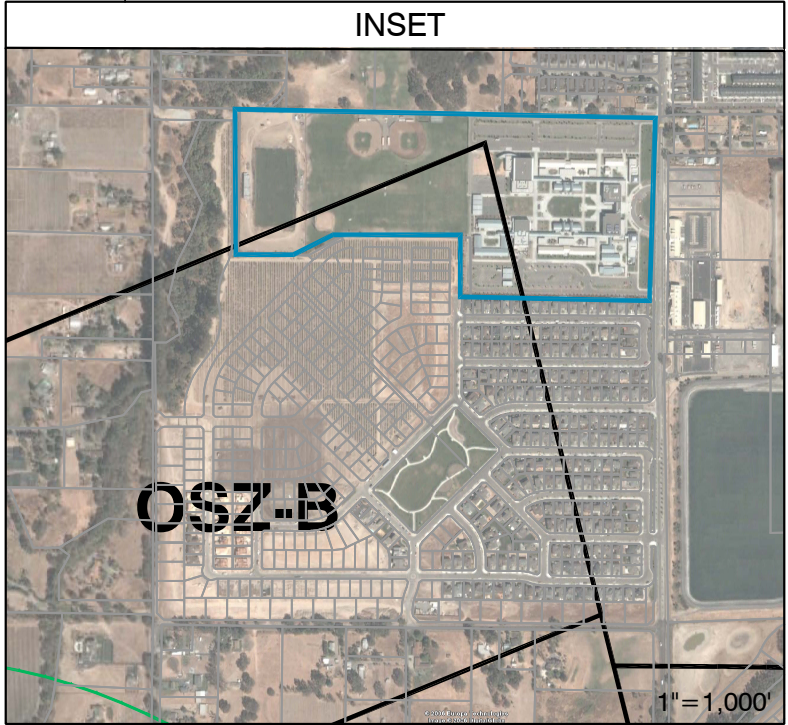
Safety Zones	Maximum Population Density ¹	Maximum Residential Density in Units Per Acre ²	Maximum Amount of Useable Open Space	Land Use ³
RPZ – Runway Protection Zone	0 ⁴	0 ⁴	90% of gross area	No petroleum or explosives. No above-grade powerlines. No significant obstructions. ⁴
ISZ – Inner Safety Zone	Uses in structures: ⁶ 40 persons/ac. Uses not in structures: 80 persons/ac.	0.2 dwelling units per acre	30% of gross area (25% maximum structural coverage.)	No shopping centers. No eating establishments. No meeting halls. No multi-story office buildings. No labor-intensive manufacturing plants. No hotels, motels. No concert halls, auditoriums, theaters. No stadiums, arenas. No public utility stations, plants. No public communications facilities. No schools, hospitals, nursing homes. No uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials. ⁷
ITZ – Inner Turning Zone	Uses in structures: 50 persons/ac. (see text for explanation) Uses not in structures: 100 persons/ac	Same as ISZ.	20% of gross area (30% maximum structural coverage.)	Same as ISZ.
OSZ – Outer Safety Zone	Uses in structures: 100 persons/ac. Uses not in structures: 200 persons/ac.	4 dwelling units per acre at the outer sub zones at the north end of Runways 14-32 and 1-19 at the Sonoma County Airport. 3 dwelling units per acre in all other OSZ's.	30% of gross area. (35% maximum structural coverage.)	No schools, hospitals, nursing homes. No uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials.
SSZ – Sideline Safety Zone	Uses in structures: 60 persons/ac. Uses not in structures: 120 persons/ac.	1.0 dwelling unit per acre	30% of gross area. (35% maximum structural coverage.)	No schools, hospitals, nursing homes. No uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials.
TPZ – Traffic Pattern Zone	Uses in structures: 150 persons/ac.	Sonoma County Airport: 5 dwelling units per acre. All others, 4 dwelling units per acre	15% of gross area	Discourage schools, auditoriums, ⁸ amphitheaters, stadiums. Discourage uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials.

- 1 See Subsection 8.4.1.b for an explanation of the methodology for determining population density for any proposed use.
- 2 Granny Units (Second Dwelling Units) are not restricted by this plan if such units are permitted under a local jurisdiction's zoning code.
- 3 The following uses shall be prohibited in all airport safety zones:
- (a) Any use which would direct a steady light or flashing light of red, white, green, or amber colors associated with airport operations toward an aircraft engaged in an initial straight climb following takeoff or toward an aircraft engaged in a straight final approach toward a landing at an airport, other than an FAA approved navigational signal light or visual approach slope indicator.
 - (b) Any use which would cause sunlight to be reflected toward an aircraft engaged in an initial straight climb following takeoff or toward an aircraft engaged in a straight final approach toward a landing at an airport.
 - (c) Any use which would generate smoke or water vapor or which would attract large concentrations of birds, or which may otherwise affect safe air navigation within the area. Large water features, including, but not limited to, wetlands, and water storage ponds that could attract birds are generally prohibited, provided, however, that ponds which are designed so as not to attract birds (e.g., ponds devoid of shrubs and trees or similar habitat for birds) would be permitted. Food and fiber processing activities involving outdoor storage of food products and seeds which would attract birds would be prohibited. This prohibition would not apply to the cultivation of land, including orchards, vineyards, horticulture, or crop raising.
 - (d) Any use which would generate electrical interference that may be detrimental to the operation of aircraft and/or aircraft instrumentation.
- 4 No structures permitted in RPZ.
- 5 Significant obstructions include, but are not limited to, large trees, heavy fences and walls, tall and steep berms and retaining walls, non-frangible street light and sign standards, billboards.
- 6 A "structure" includes fully enclosed buildings and other facilities involving fixed seating and enclosures limiting the mobility of people, such as sports stadiums, outdoor arenas, and amphitheaters.
- 7 This does not apply to service stations involving retail sale of motor vehicle fuel if fuel storage tanks are installed underground.
- 8 See Subsection 8.6.5 in text.

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For information only:
The application of these safety zones does
not constitute a commitment on the part of
the responsible parties for implementation.



Legend

ALUC Safety Zones

Existing Safety Zones

- RPZ** Runway Protection Zones
- ISZ** Inner Safety Zones
- ITZ** Inner Turning Zones
- OSZ** Outer Safety Zones
- SSZ** Sideline Safety Zones
- TPZ** Traffic Pattern Zones

Boundary Lines

- Airport Property Line
- Parcel Line
- City Limits
- Schools (Windsor Unified School District Sites)

Notes

Aerial Source: Google Earth.

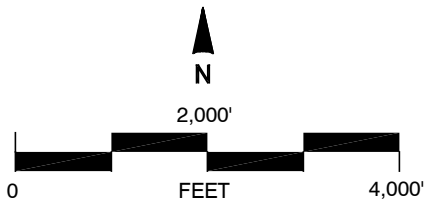
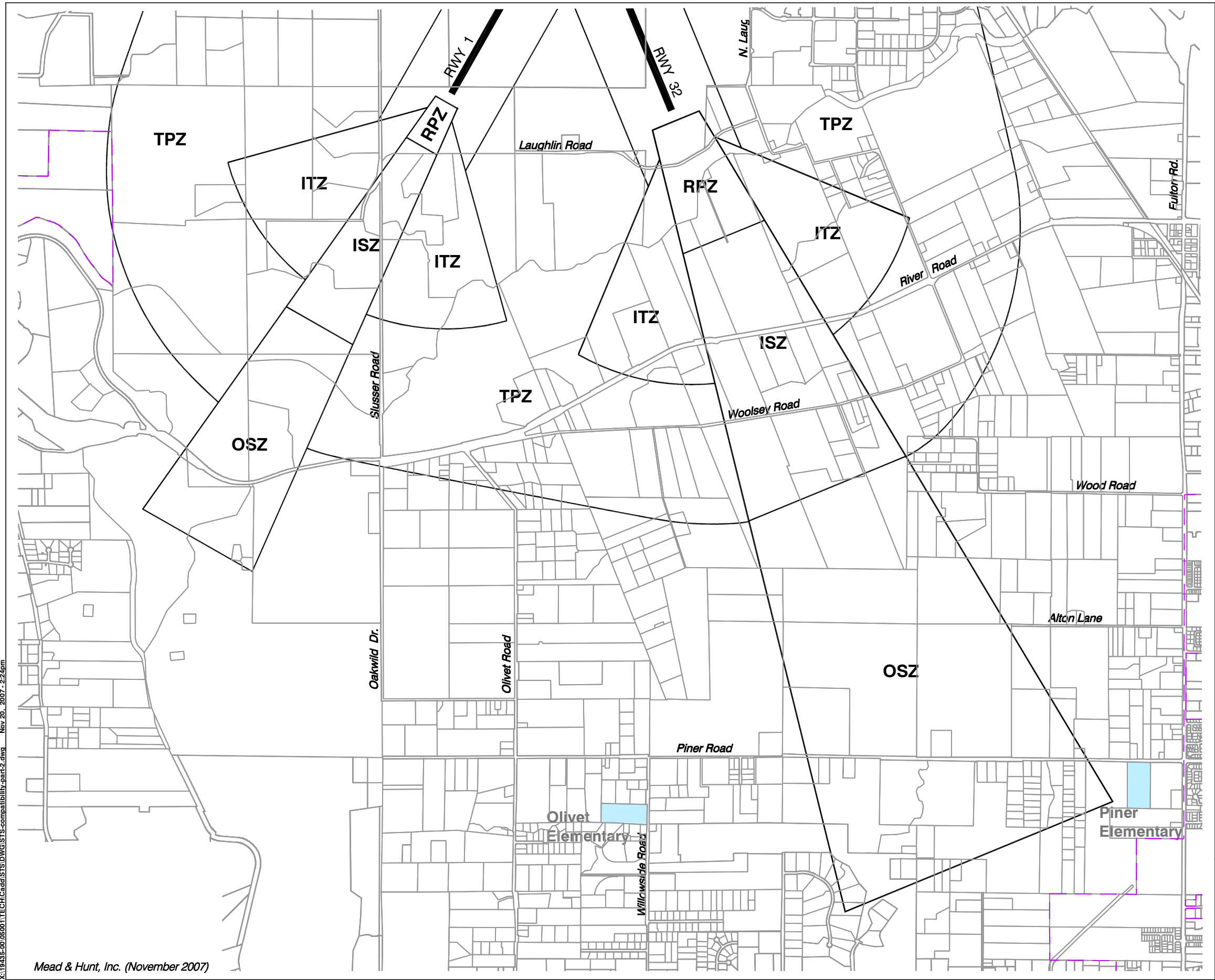


Exhibit 1

**Existing Runways 14 and 19
CLUP Safety Zones
(Adopted 2001)**

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Legend

- ALUC Safety Zones
- Existing Safety Zones
 - RPZ Runway Protection Zones
 - ISZ Inner Safety Zones
 - ITZ Inner Turning Zones
 - OSZ Outer Safety Zones
 - SSZ Sideline Safety Zones
 - TPZ Traffic Pattern Zones

- Boundary Lines
- Airport Property Line
 - Parcel Line
 - City Limits
 - Schools

Notes

Aerial Source: Google Earth.

For information only:
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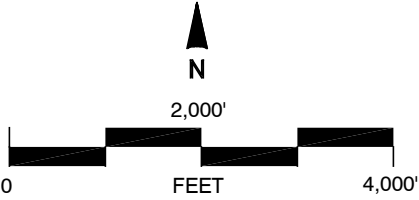


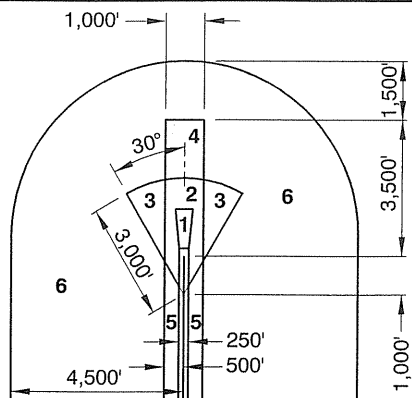
Exhibit 2

Existing Runways 1 and 32

CLUP Safety Zones

(Adopted 2001)

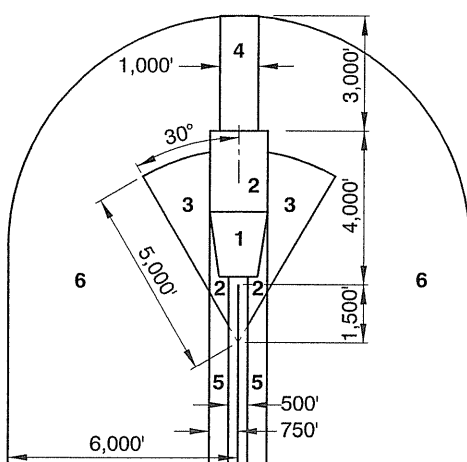
Charles M. Schulz - Sonoma County Airport



**Example 1:
Short General Aviation Runway**

Assumptions:

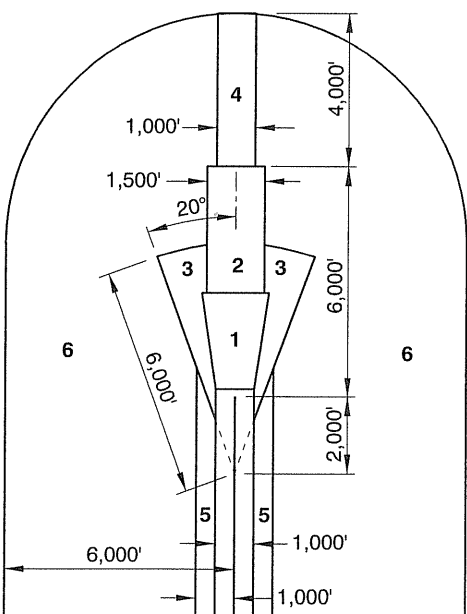
- Length less than 4,000 feet
- Approach visibility minimums ≥ 1 mile or visual approach only
- Zone 1 = 250' x 450' x 1,000'



**Example 2:
Medium General Aviation Runway**

Assumptions:

- Length 4,000 to 5,999 feet
- Approach visibility minimums $\geq 3/4$ mile and < 1 mile
- Zone 1 = 1,000' x 1,510' x 1,700'

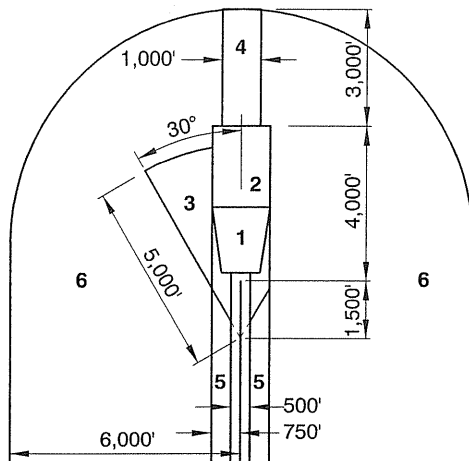


**Example 3:
Long General Aviation Runway**

Assumptions:

- Length 6,000 feet or more
- Approach visibility minimums $< 3/4$ mile
- Zone 1 = 1,000' x 1,750' x 2,500'

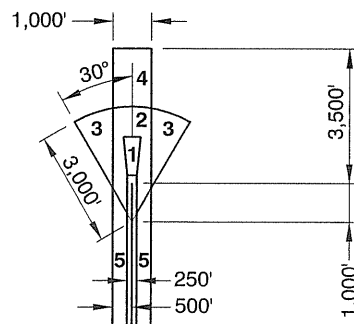
Exhibit 3.
Safety Compatibility Zone Examples
General Aviation Runways



Example 4: General Aviation Runway with Single-Sided Traffic Pattern

Assumptions:

- No traffic pattern on right
- Length 4,000 to 5,999 feet
- Approach visibility minimums $\geq 3/4$ mile and < 1 mile
- Zone 1 = 1,000' x 1,510' x 1,700'



Example 5: Low-Activity General Aviation Runway

Assumptions:

- Less than 2,000 takeoffs and landings per year at individual runway end.
- Length less than 4,000 feet
- Approach visibility minimums ≥ 1 mile or visual approach only
- Zone 1 = 250' x 450' x 1,000'

Legend

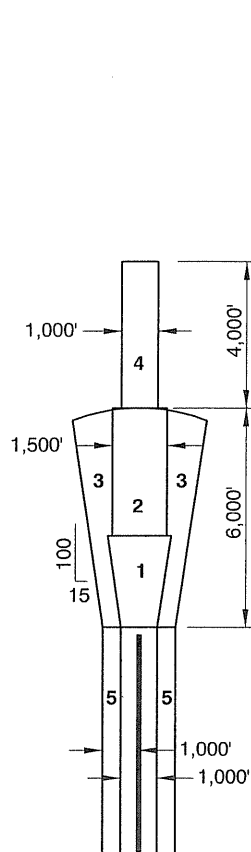
1. Runway Protection Zone
2. Inner Approach/Departure Zone
3. Inner Turning Zone
4. Outer Approach/Departure Zone
5. Sideline Zone
6. Traffic Pattern Zone

Notes:

- RPZ (Zone 1) size in each example is as indicated by FAA criteria for the approach type assumed. Adjustment may be necessary if the approach type differs.
- See Table 9A for factors to consider regarding other possible adjustments to these zones to reflect characteristics of a specific airport runway.
- See Tables 9B and 9C for guidance on compatibility criteria applicable with each zone.

These examples are intended to provide general guidance for establishment of airport safety compatibility zones. They do not represent California Department of Transportation standards or policy.

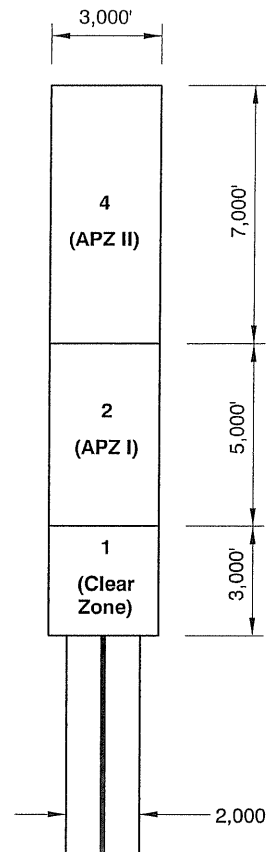
Exhibit 3, continued



Large Air Carrier Runway

Assumptions:

- Minimal light-aircraft general aviation activity
- Predominately straight-in and straight-out flight routes
- Approach visibility minimums < 3/4 mile
- Zone 1 = 1,000' x 1,750' x 2,500'



Military Runway for Large Aircraft

Assumptions:

- Military airport
- Predominately straight-in and straight-out flight routes (must modify for turning routes and traffic pattern activity)

Legend

1. Runway Protection Zone (Clear Zone)
2. Inner Approach/Departure Zone (Accident Potential Zone I)
3. Inner Turning Zone
4. Outer Approach/Departure Zone (Accident Potential Zone II)
5. Sideline Zone

Notes:

- RPZ (Zone 1) size in the large air carrier runway example is as indicated by FAA criteria for the approach type assumed. Adjustment may be necessary if the approach type differs.
- See Table 9A for factors to consider regarding other possible adjustments to these zones to reflect characteristics of a specific airport runway.
- See Tables 9B and 9C for guidance on compatibility criteria applicable with each zone.

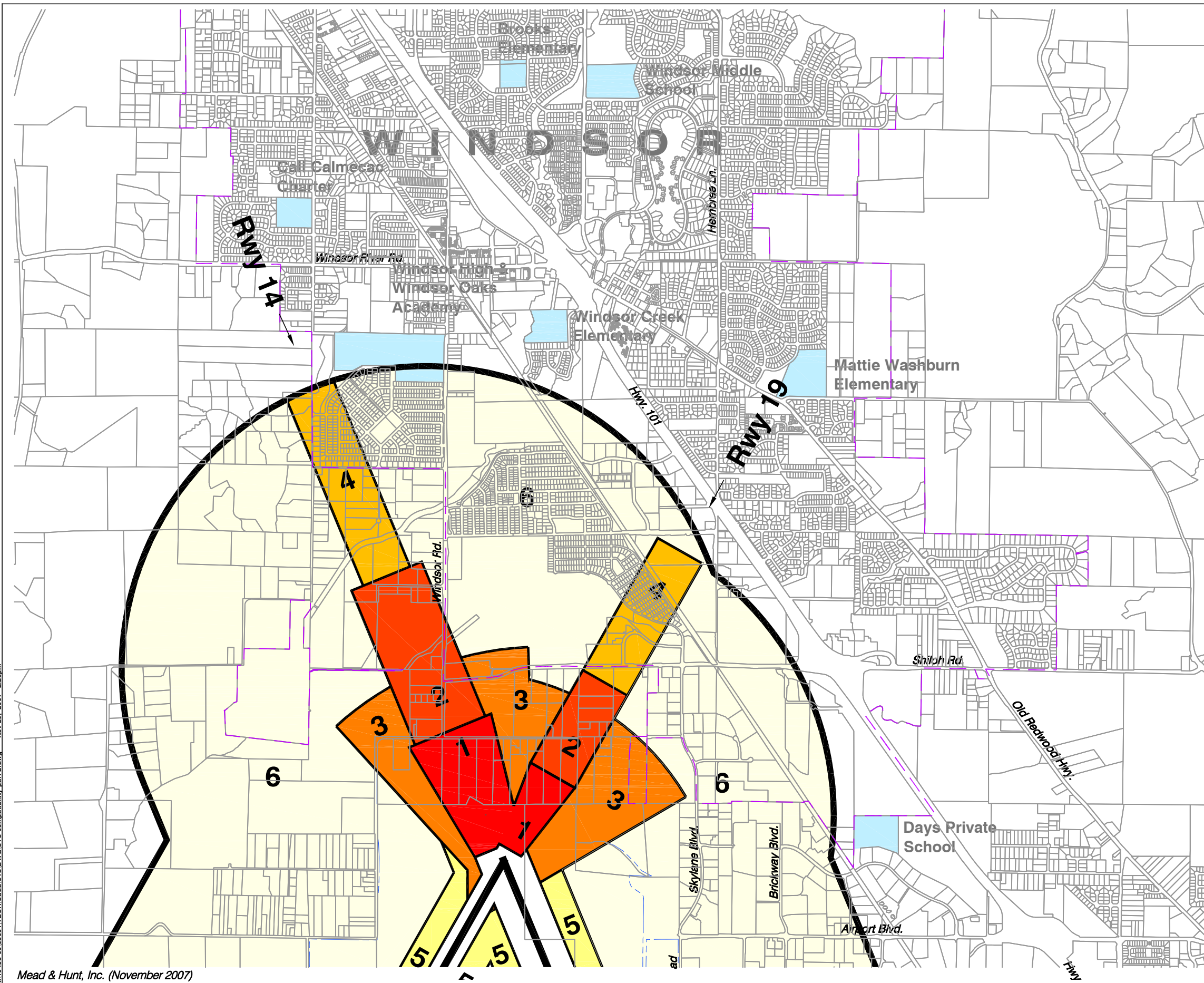
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Exhibit 3, continued

Safety Compatibility Zone Examples

Large Air Carrier and Military Runways

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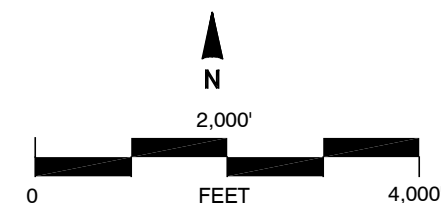
2002 California Airport Land Use
Planning Handbook Safety Zones

- Handbook Safety Zones
- 1 Runway Protection Zones
- 2 Inner Approach / Departure Zones
- 3 Inner Turning Zones
- 4 Outer Approach / Departure Zones
- 5 Sideline Safety Zones
- 6 Traffic Pattern Zones

Boundary Lines

- Airport Property Line
- Parcel Line
- City Limits
- Schools (Windsor Unified School District Sites)

For information only:
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the responsible parties for implementation.



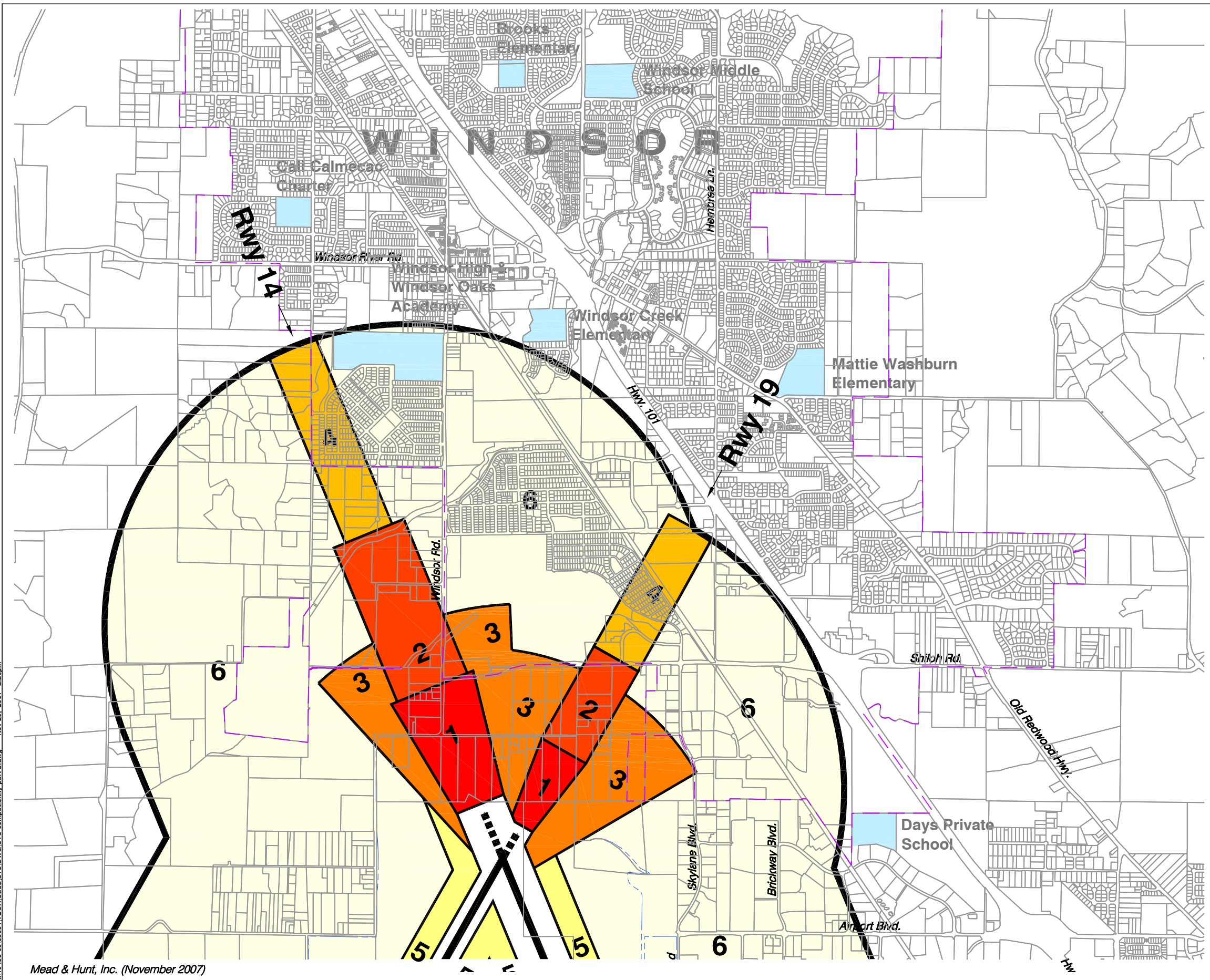
November 2007

Exhibit 4

Existing Runways 14 and 19 2002 Combined Handbook Safety Zones (Concept Only)

Charles M. Schulz - Sonoma County Airport

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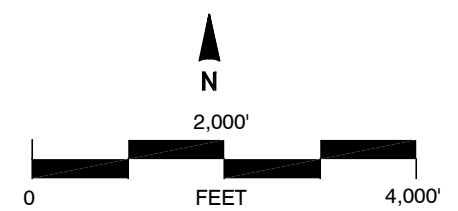
2002 California Airport Land Use Planning Handbook Safety Zones

- Handbook Safety Zones
- 1 Runway Protection Zones
- 2 Inner Approach / Departure Zones
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- 5 Sideline Safety Zones
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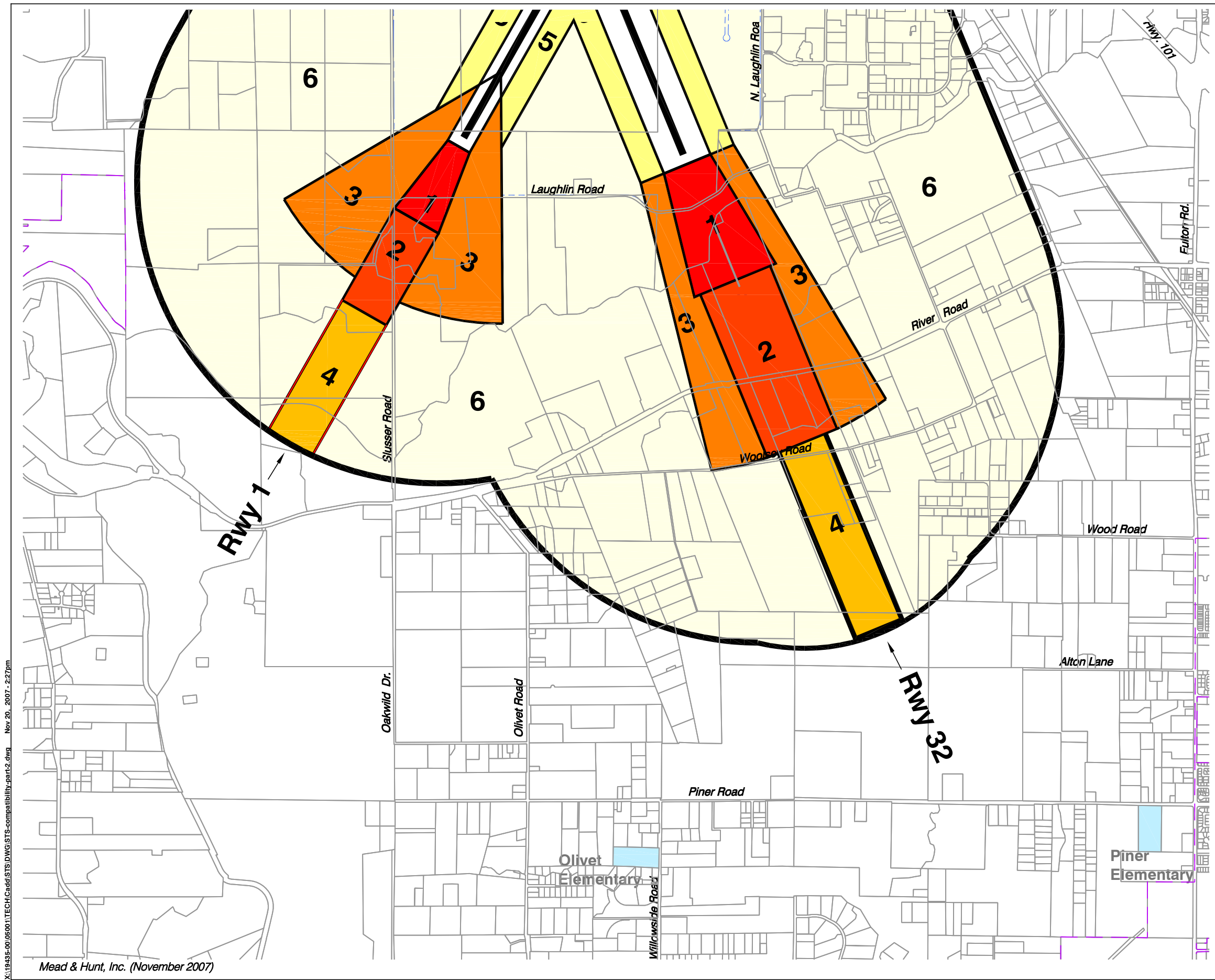


November 2007

Exhibit 5

Runways 14 and 19 with Extensions 2002 Combined Handbook Safety Zones (Concept Only)

Charles M. Schulz - Sonoma County Airport

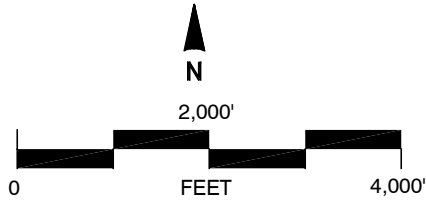


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- Handbook Safety Zones**
- Handbook Safety Zones with Runway 14 Extension
 - 1 Runway Protection Zones
 - 2 Inner Approach / Departure Zones
 - 3 Inner Turning Zones
 - 4 Outer Approach / Departure Zones
 - 5 Sideline Safety Zones
 - 6 Traffic Pattern Zones

- Boundary Lines**
- Airport Property Line
 - Parcel Line
 - City Limits
 - Schools

For information only:
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November 2007

Exhibit 6

Existing Runways 1 and 32
(Concept Only)

2002 Combined Handbook Safety Zones
Charles M. Schulz - Sonoma County Airport

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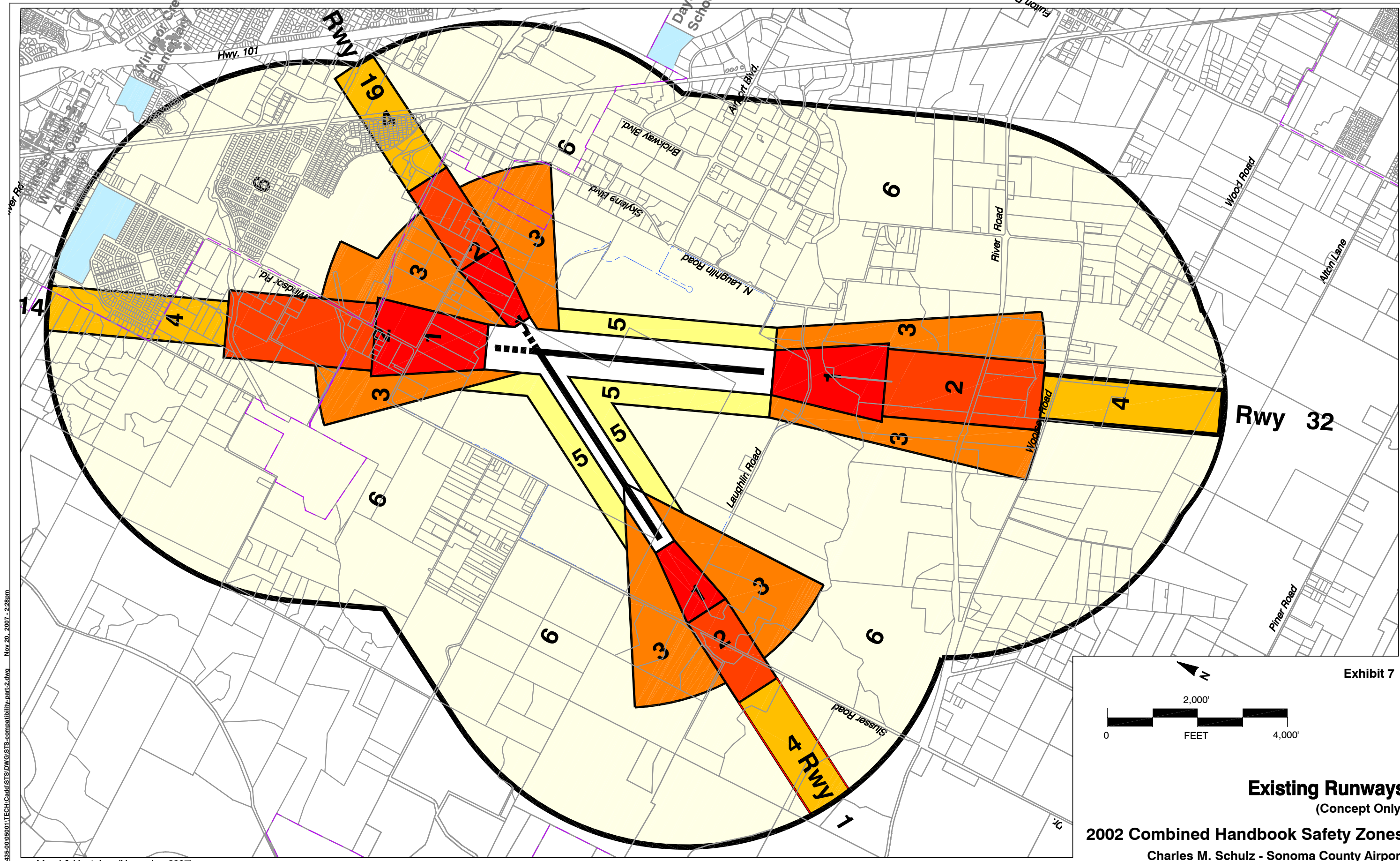


Exhibit 7

2,000'
0 FEET 4,000'

Existing Runways
(Concept Only)

2002 Combined Handbook Safety Zones
Charles M. Schulz - Sonoma County Airport

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