OFFICE OF THE CITY MANAGER

CITY OF PALO ALTO

250 Hamilton Avenue, 7th Floor
Palo Alto, CA 94301
650.329.2392

October 10, 2016

Joe Simitian, Chair, Select Committee for South Bay Arrivals
County of Santa Clara
70 West Hedding Street, 10th Floor
San Jose, CA 95110

Dear Chair Simitian and Select Committee Members,

In our letter of March 2, 2016, we provided four specific route design recommendations to Mr. Glen Martin, FAA Western Regional Administrator. These focused on ways to reduce ground noise for citizens of Silicon Valley.

On July 7, 2016, we further defined and added to those recommendations. They are reprinted here:

1. Have the FAA create more "points" for aircraft to use while entering SFO. There is currently one point used for flights coming in from the north, west, or south. This point centralizes all arrival aircraft and noise over Palo Alto.

2. Redirect flights arriving from the south to the east; away from the Pacific Ocean coast to the mountains west of Interstate 5 and have aircraft enter the Bay from the east.

3. Shift the flights arriving from the north away from the Peninsula to Bay.

4. Ensure that the divisions and staff within FAA are working in partnership with each other to minimize noise through efficient organization of aircraft and utilizing arrival descents that limit speed brakes.

On September 29, 2016, at the Select Committee meeting, the FAA acknowledged the increase in flights from the *north* over the Peninsula. We appreciate this acknowledgement and the FAA's willingness to reroute as many aircraft as possible to the Bay (no. 3 printed above). Additionally the FAA acknowledge that the *Oceanic Trailered Arrivals* procedure from the *west* cause aircraft to fly below 8,000 ft. at the Woodside VOR. We support and appreciate the FAA's commitment to reevaluate higher crossing altitudes at this point, which will enhance environmental benefits without any

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tradeoffs between emission reductions and noise impacts. This action will provide some relief for the noise sensitive areas of the hill top and Mid-Peninsula residents.

Regarding flights from the *south*, we appreciate the Select Committee and FAA's interest in evaluate new ideas. As a result we asked Freytag & Associates (our professional technical consultants) to analyze two specific route proposals, with FAA compliant sound measurements, which reduce noise on arrivals from the south. The attached report provides a diagram of two proposed new routes: SERFR-EDDYY and HIGHR, including their FAA AEDT noise models and TARGETS (Terminal Area Route Generation Evaluation and Traffic Simulation) data.

- SERFR-EDDY is a variation of the current SERFR route but with a transition from waypoint EDDYY (with a new altitude of 8,000 ft) to waypoint DUMBA (altitude 4,500 ft) on the east shoreline of the Dumbarton Bridge.

- HIGHR is an alternative approach to offload SERFR traffic about 10 miles east of the current SERFR route, flying at high altitudes over sparsely populated hills east of I5, crossing the FAITH IAF at 8,000 ft, and entering the Bay from the south, thus maximizing descent over water.

Both proposed routes fly at much higher altitudes and delay descending to low altitudes until over industrial areas and the Bay, resulting in decreased noise impacts.

Additionally, and for comparison purposes, you will find graphics and noise modeling for SERFR TWO and BIG SUR THREE in the enclosed report.

- SERFR TWO is the existing route also referred to as SERFR.

- BIG SUR THREE, an old unused flight path, and close approximation of notional DAVYJ based on public information currently available given that the FAA has not released any specific details about the notional DAVYJ. It is placed here for comparison purposes.

We recommend that the FAA begin to immediately split SERFR TWO traffic between SERFR TWO and SERFR EDDYY. The FAA has acknowledged on several occasions that flights are currently being vectored off the SERFR TWO route. Therefore to route aircraft from waypoint EDDYY to waypoint DUMBA appears feasible, especially through FAA test procedures.

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Furthermore, we ask that the FAA offload aircraft from SERFR TWO to HIGHR during all evening hours and during the day whenever possible.

In addition to these two proposed routes, we want the Committee to understand that raising the altitude at the MENLO waypoint as proposed by the notional DAVYJ will not reduce noise by any significant measurement and is not a viable solution for our and adjacent communities. It is extremely important that the FAA look at the other transition points north, east and south of MENLO as possible points as acknowledged by Mr. Martin on September 29, 2016.

Thank you for your careful consideration of our short-term relief suggestions and the enclosed report.

Sincerely,

James Keene
City Manager

Cc. Congresswoman Anna Eshoo
Palo Alto Mayor and City Council
FAA Western Regional Director Glen Martin
Palo Alto City Attorney Molly Stump

CITY OF PALO ALTO

DNL Assessment of Four Flight Track Alternatives:

Two Standing: SERFR TWO and BSR THREE
Two New: SERFR-EDDYY and HIGHR

Submitted to the City of Palo Alto

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Dennis Hughes
Jack Freytag

10 October 2016

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1. EXECUTIVE SUMMARY

This reports the results of a noise analysis of current and alternative flight procedures for Palo Alto and adjacent cities. Each flight procedure is an approach to San Francisco International Airport (SFO) Runways 28 Left and 28 Right (RWY 28 L / R). These runways are utilized predominantly for arrivals throughout most day and nights, only varying under less usual wind conditions. All analyses are in terms of the national standard day-night average noise level (DNL) noise metric.

The four procedures analyzed are:

Standing Procedures:

- SERFR TWO (RNAV STAR): The current published, "preferred arrival procedure," to SFO used for aircraft from the south, and southeast, which are merged over the Monterey Bay, south of the Santa Cruz shoreline (EPICK), and then proceeding north, to WAYPOINTS (WP) EDDYY, SWELLS, and MENLO. Then tracking outbound from MENLO (FIX/WP), north-north west, to join the SFO RWY 28 L/R ILS, final approach course.

- BSR THREE STAR (**Approximation for notional DAVYJ**): An epithet for BIG SUR, a previously used instrument arrival similar to SERFR TWO for aircraft from the south, but at an angle about five miles west of SERFR TWO, then proceeding at a merging angle to the same MENLO fix for final ILS approach. This is similar to the notional DAVYJ approach under review by the Select Committee.

New Procedures:

- SERFR-EDDYY (RNAV AMENDMENT EAST TRANSITION): A proposed alternative approach to the aforementioned SERFR TWO initially tracking on SERFR TWO to EDDYY (WP) and then transitioning north to intersect the RWY 28 R ILS final approach course, at DUMBA (FIX/WP), on the east shoreline of the Dumbarton Bridge. Aircraft on this transition route would cross EDDYY (WP) between 7000' to 9000' (current procedure is 6000'), in a shallow descent primarily over salt evaporators and bay water, so as to cross DUMBA (WP) above 4500,' joining the SFO RWY 28 R ILS final approach course. This transition overflies the same impacted residential areas for approximately 4.7 miles (HWY 101) at higher altitudes, 7,000' to 9,000', versus 12.9 miles with the current track, through MENLO (FIX/WP) at low altitudes, 4000' and below.

- HIGHR: A proposed alternative STAR for aircraft approaching from the south-southeast, the normal SERFR flow, and would be *off-loaded,* routed to HIGHR (WP), approximately 10 miles east of the SERFR (WP), tracking north to the FAITH (WP/FIX) (IAF), transitioning to a straight-in approach northeast of Santa Clara joining, the SFO ILS or LOC RWY 28L or RNAV (GPS) RWY 28L above 8000', then conforming to the ILS profile.

The four arrival tracks are shown on Figure 1.1 below.

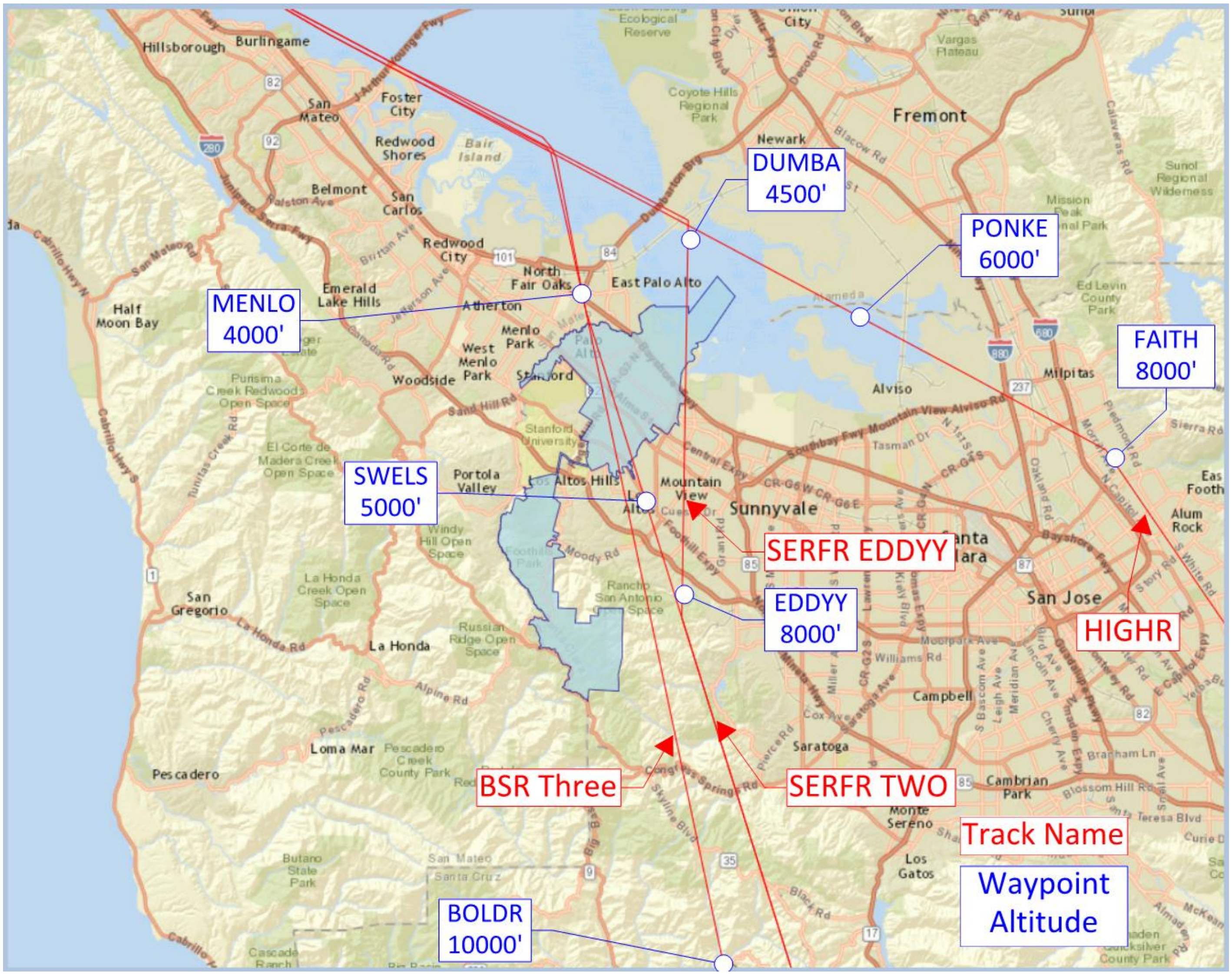


Figure 1.1 – Flight Track Alternatives

2. ANALYSIS

The noise exposure modeling employed the FAA's Aviation Environmental Design Tool (AEDT), Version 2c. The AEDT software is the only acceptable modeling program currently accepted by the FAA, per FAA Order 1050.1F.

An identical fleet mix (i.e., aircraft types) was used to model each route in order to afford a fair comparison. This fleet mix was taken from that of average recent weekday operations into San Francisco. Noise results will vary moderately with moderate changes in fleet mix. Table 2A presents the fleet mix used for the modeling.

Table 2A – Fleet Mix for DNL Noise Modeling

Aircraft	DAY (7am – 10pm)	Night (10pm – 7am)
B737	150	30
A-319/320	130	10
B757	20	10
B767	20	6
B747	12	4
B777	18	4
B787	15	4

Following are the noise contours for each of the tracks evaluated. Note that all DNL contours assume 100% of the traffic is using one flight path. The FAA design tool, Terminal Area Route Generation Evaluation and Traffic Simulation, TARGETS, was used to develop the propose alternatives, which in turn validates compliance with current FAA procedural criteria and flyability.

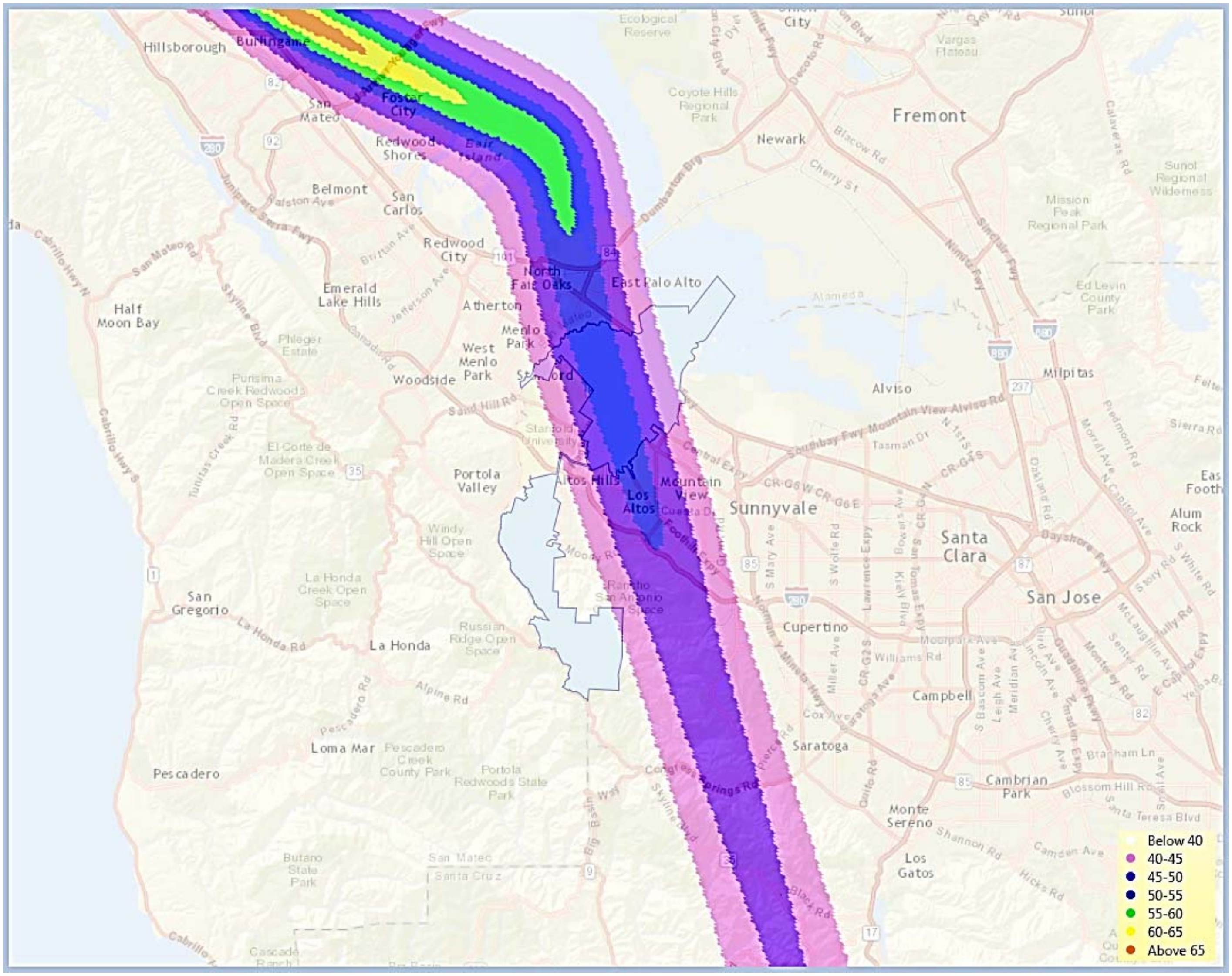


Figure 2.1 – SERFR DNL

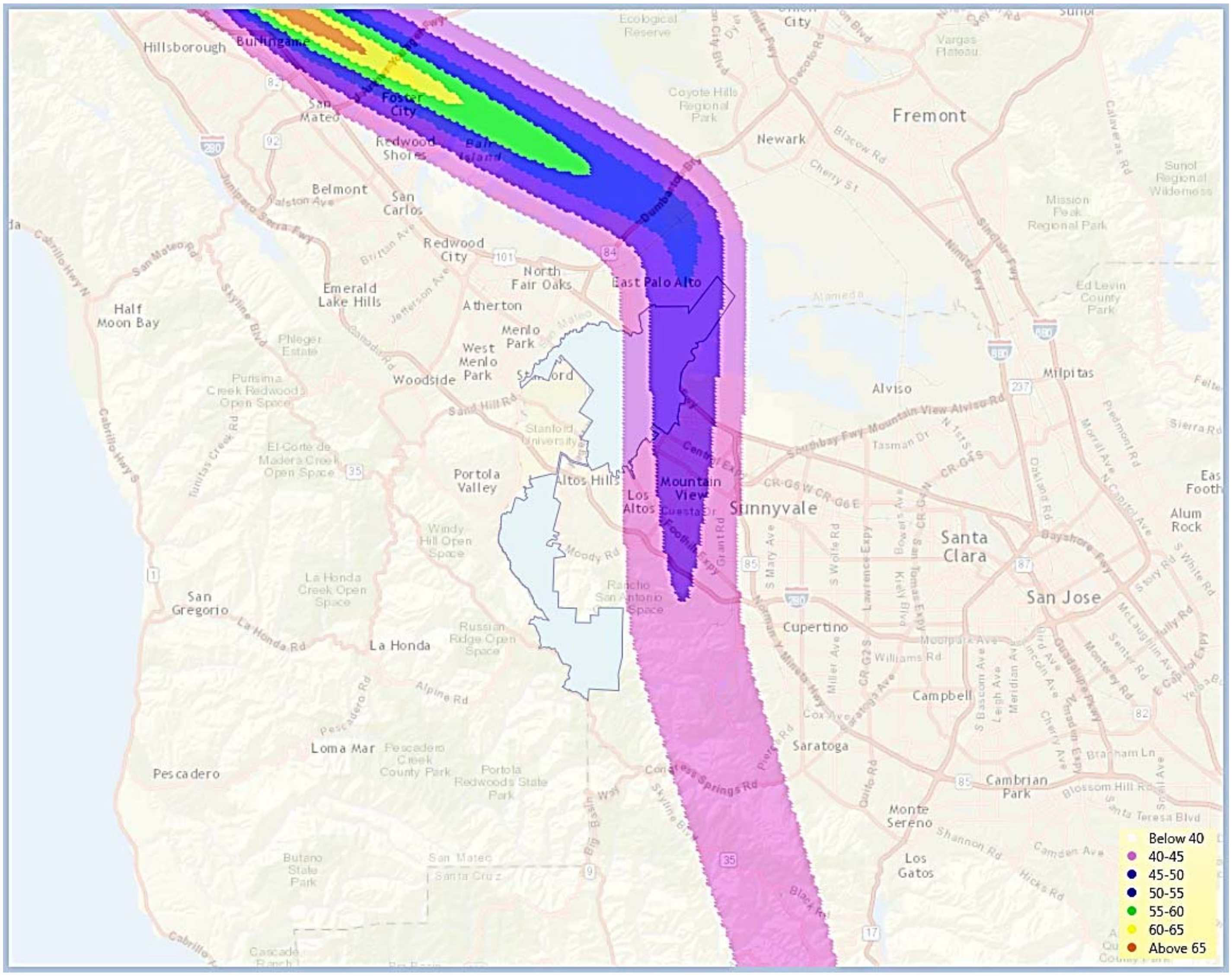


Figure 2.2 – SERFR EDDYY DNL

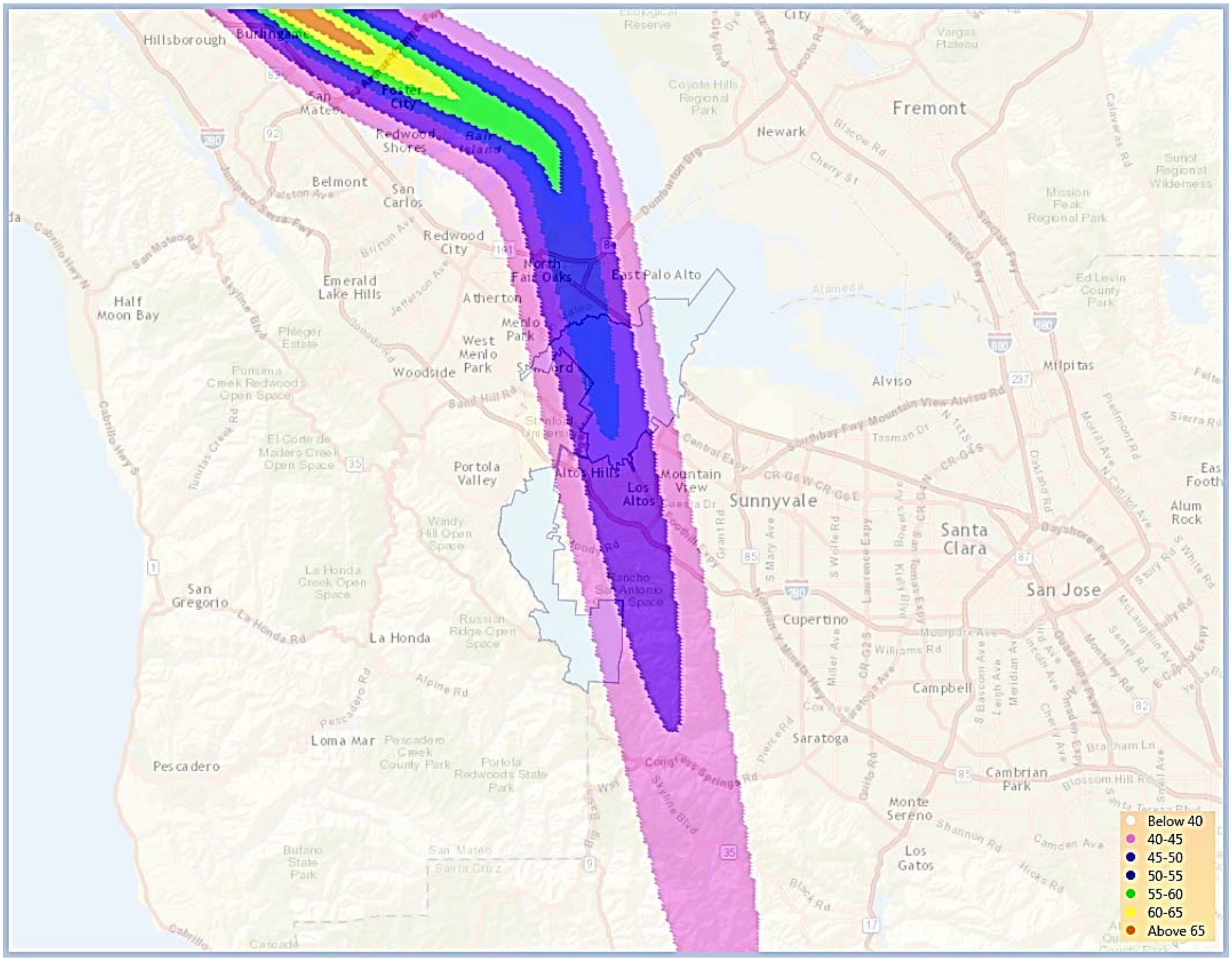


Figure 2.3 – BIG SUR THREE DNL (Approximation for notional DAVYJ)

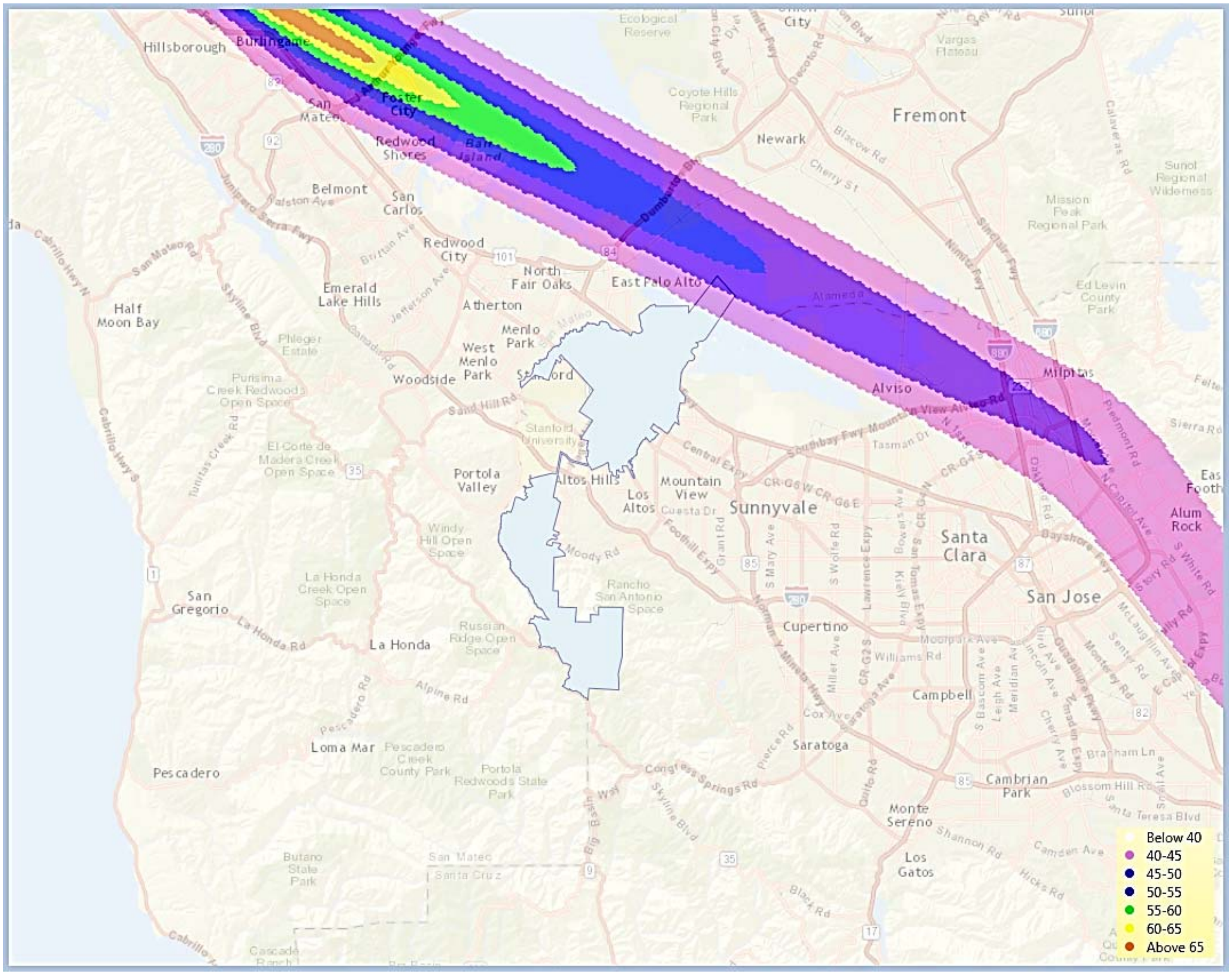
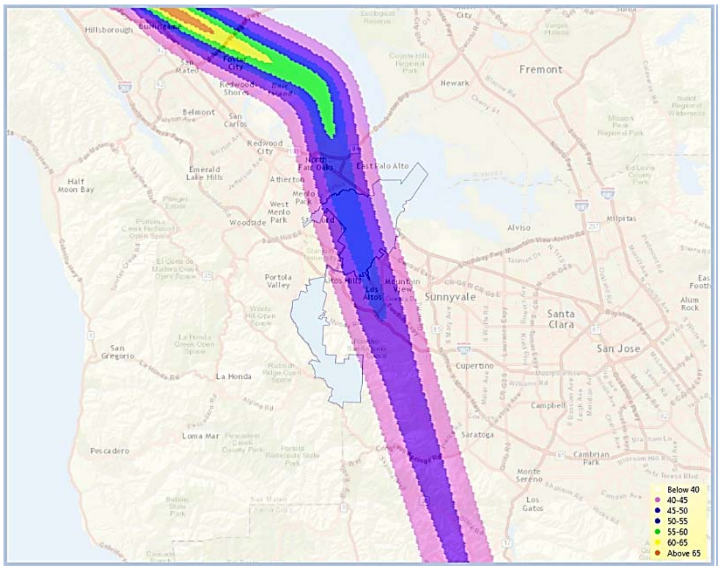


Figure 2.4 – HIGHR DNL

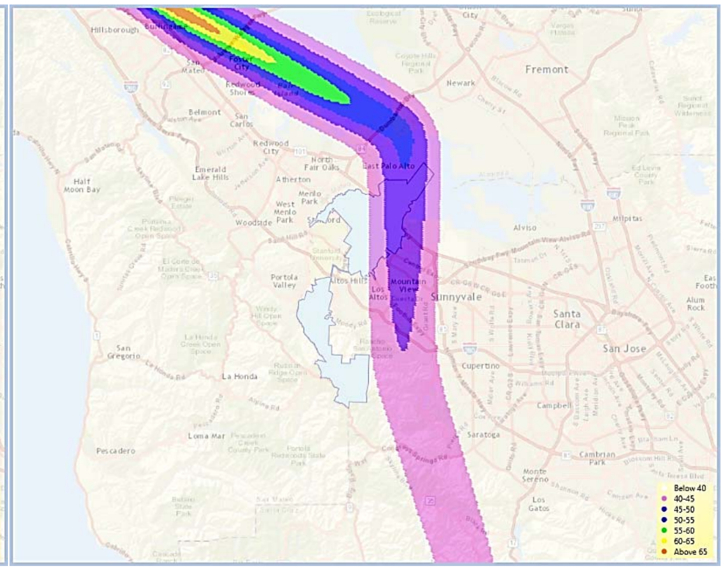
3. CONCLUSIONS

The noise exposure effects over Palo Alto and adjacent cities can be seen in the Figures 2.1, 2.2, 2.3 and 2.4 for each scenario.

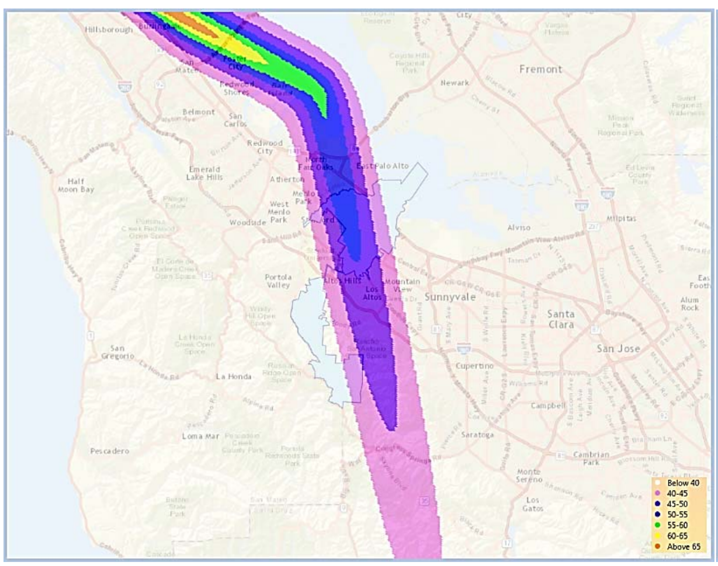
For comparison purposes below are the four DNL contours side by side.



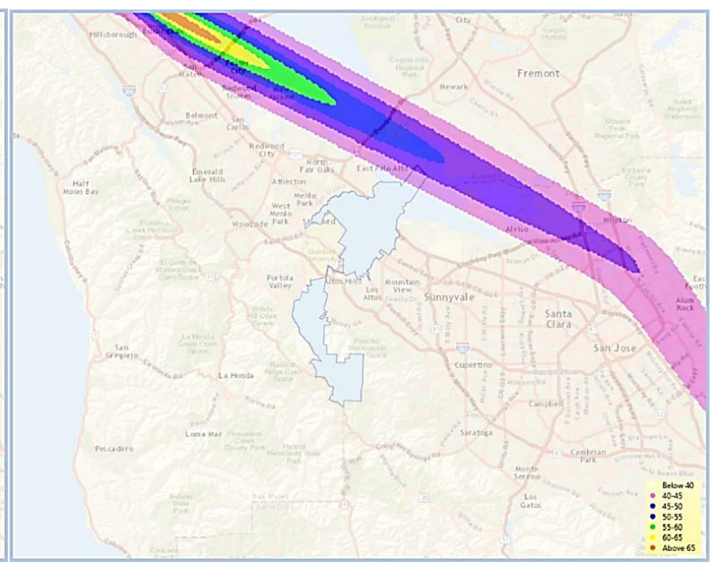
SERFR TWO



SERFR EDDYY



BIG SUR THREE (Comparison for DAVYJ)



HIGHR

Figure 3.1 – Four Alternative Arrivals, DNL Contours

Comparing SERFR EDDYY with the existing SERFR TWO shows a significant reduction in noise, likely due to the steeper descent. This transition over-flies the same impacted residential areas for approximately 4.7 miles (HWY 101) at higher altitudes, 7000’ to 9000’, versus 12.9 miles with the current track, through MENLO (FIX/WP) at low altitudes, 4000’ and below. Adjustments to the STAR insure containment in the current Class B Airspace and raising the altitude at EDDYY would allow for the BRIXX arrival (SJC) to be raised.

This transition could be used at any period of daylight hours, traffic permitting, and during nighttime hours. Thus, giving operational impact relief, low altitude (4000’) vectoring and instrument approaches, to Arastradero Preserve and the Cities of Portola Valley, Los Altos Hills, Los Altos, East Palo Alto, Palo Alto, Mountain View, Menlo Park, Atherton and Redwood City.

The HIGHR contour maximizes the route over water, minimizing residential noise impact. The HIGHR alternative could be used in lieu of the SERFR, depending on traffic demand, for arrivals into SFO. It could help balance the SERFR arrival load and reduce the percentage of aircraft vectored off the SERFR causing heavy environmental impact at lower altitudes over noise sensitive areas. Additionally, the STAR could be used as a “night time” preferred route to provide relief over the entire SERFR track. Its track over land would be higher and would connect with a current approach to the SFO airport, above 8000’.

These contours may be used in land use planning to compare and evaluate the benefit and effects of altering arrival routes to SFO RWY 28L/R.

Appendix A
Terminal Area Routes Generation Evaluation and Traffic Simulation (TARGETS) Data

SERFER-EDDY

DB	End Point	Latitude (D° M' S.ss")	Longitude (D° M' S.ss")	FO/FB	Leg	TC	MC	Distance	Altitude	Speed
NFDC	SERFR WP	N36 04 05.90	W121 21 52.79		IF					
NFDC	NRRLI WP	N36 29 44.16	W121 41 57.84	FB	TF	327.71	313.71	30.32	+21000	280
NFDC	WWAVS WP	N36 44 29.51	W121 53 39.24	FB	TF	327.49	313.49	17.48	+16000 -19000	280
NFDC	EPICK WP	N36 57 02.96	W121 57 09.62	FB	TF	347.37	333.37	12.85	+12000 -16000	280
NFDC	EDDYY WP	N37 19 35.22	W122 05 58.95	FB	TF	342.64	328.64	23.59	+7000 -9000	230

Runway Transition for SFO RWY 28 R:

DB	End Point	Latitude (D° M' S.ss")	Longitude (D° M' S.ss")	FO/FB	Leg	TC	MC	Distance	Altitud e	Speed
NFDC	EDDYY WP	N37 19 35.22	W122 05 58.95		IF				+7000 -9000	230
NFDC	DUMBA WP	N37 30 12.66	W122 05 46.13	FB	TF	.92	346.92	10.61	+4500	230

Runway Transition for SFO RWY 28L:

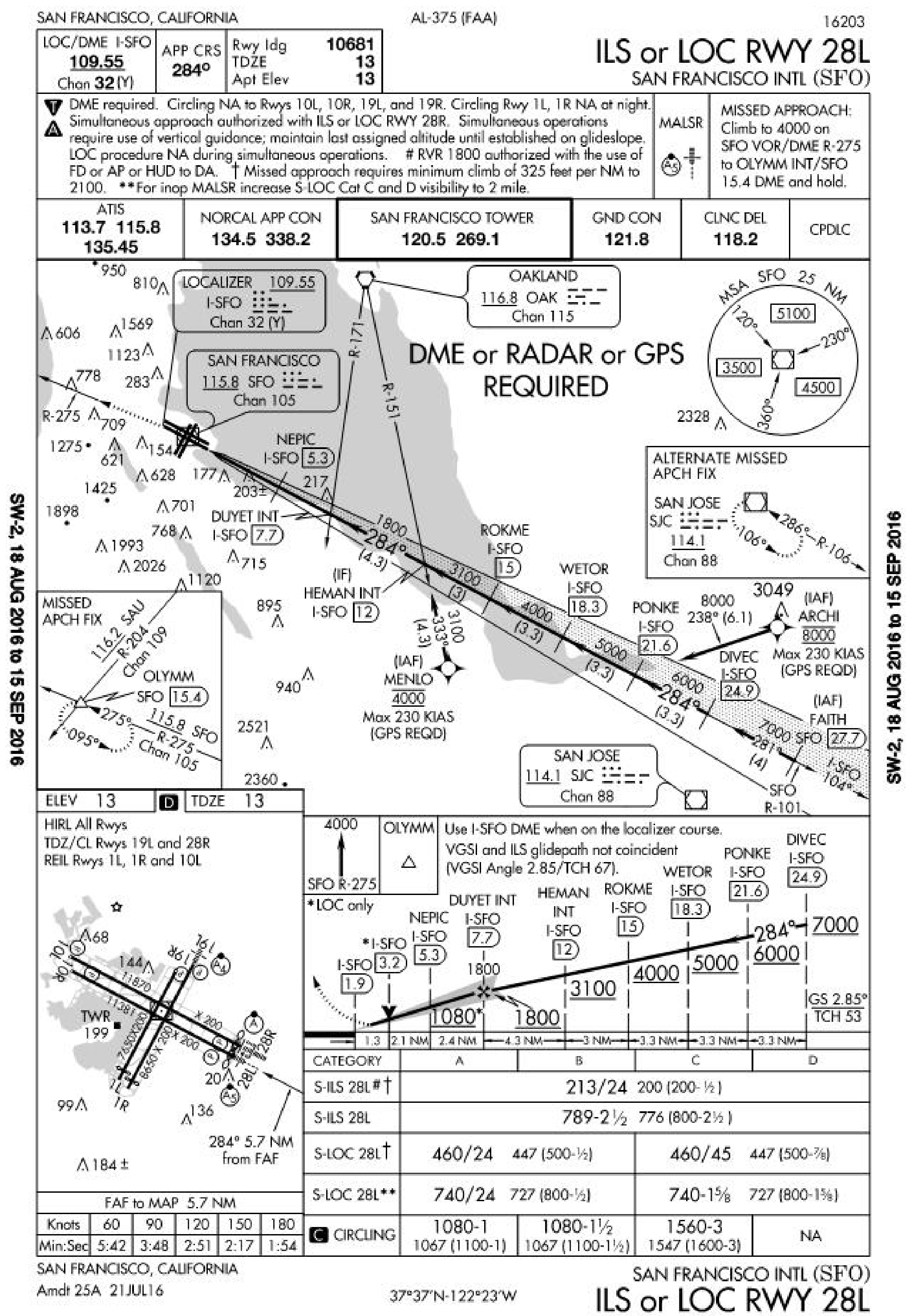
DB	End Point	Latitude (D° M' S.ss")	Longitude (D° M' S.ss")	FO/FB	Leg	TC	MC	Distance	Altitude	Speed
NFDC	EDDYY WP	N37 19 35.22	W122 05 58.95		IF				+7000 -9000	230
NFDC	MENLO WP	N37 27 49.27	W122 09 13.17	FB	TF	342.60	328.60	8.62	4000	210

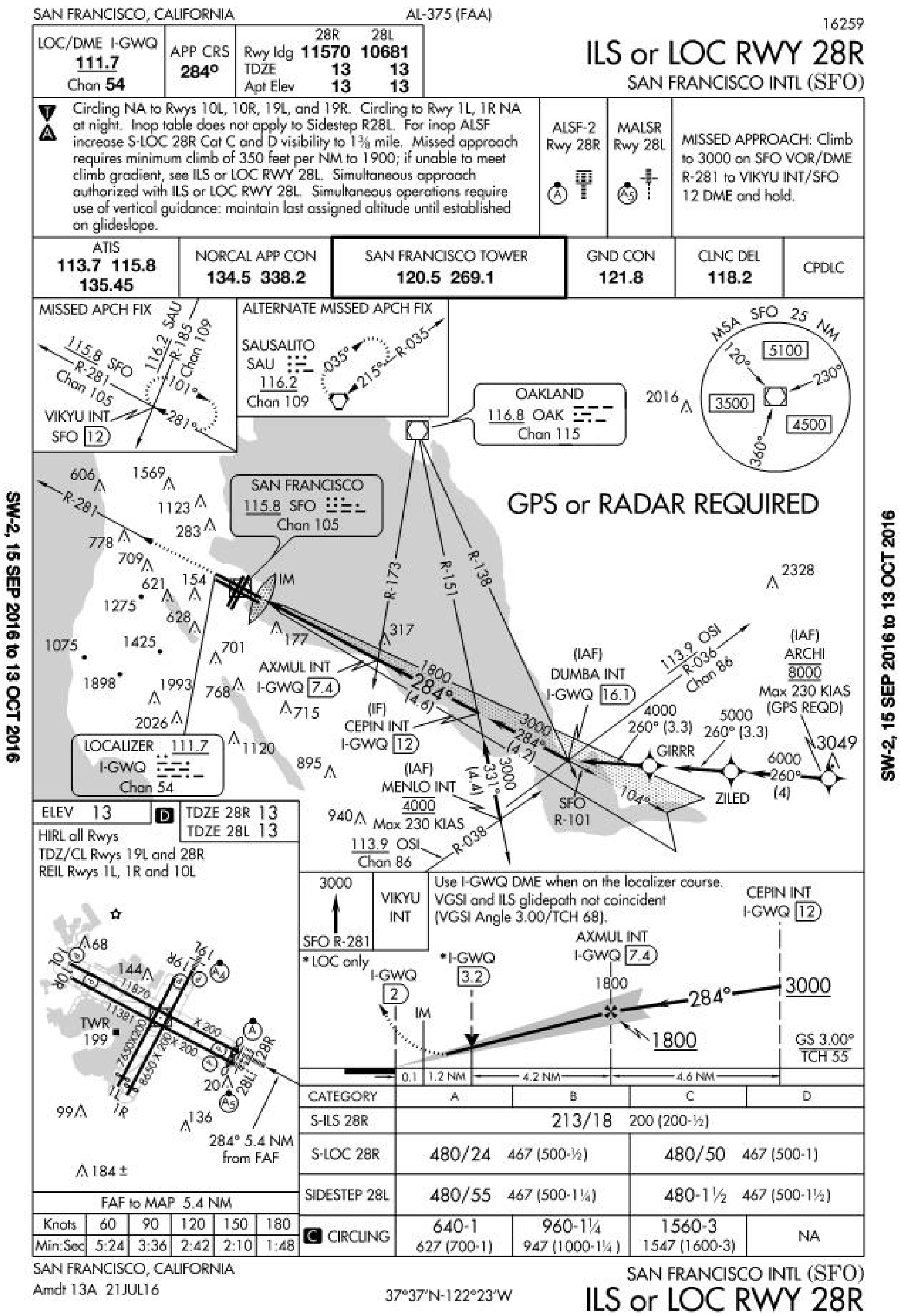
HIGHR

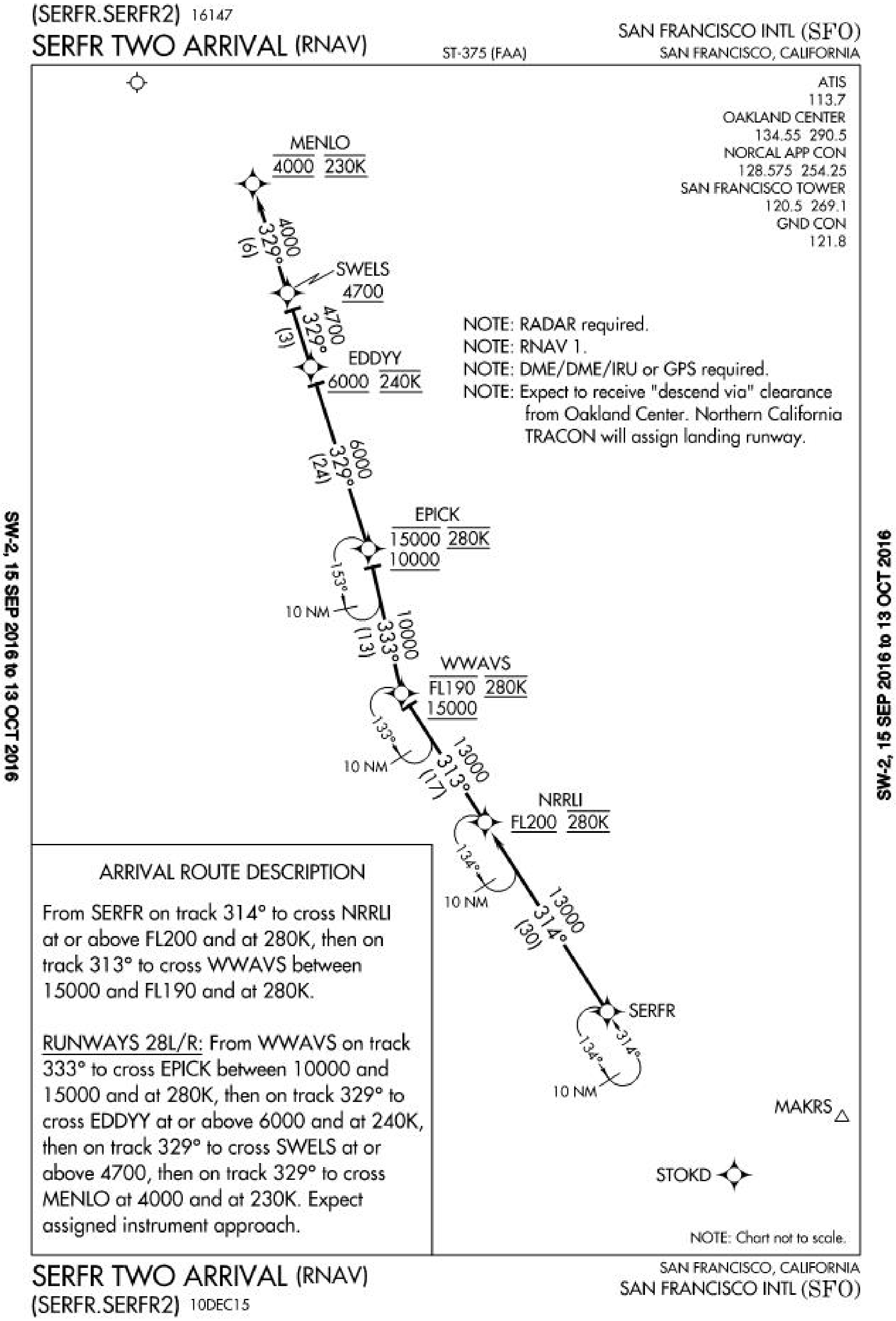
DB	End Point	Latitude (D° M' S.ss")	Longitude (D° M' S.ss")	FO/FB	Leg	TC	MC	Distance	Altitude	Speed
NFDC	HIGHR WP	N36 12 46.78	W121 07 22.22		IF				+26000	280
NFDC	ECYON WP	N37 09 22.71	W121 39 08.49	FB	TF	335.8	321.83	62.03	+12000	250
NFDC	FAITH WP	N37 24 04.38	W121 51 42.84	FB	TF	325.7	311.70	17.78	+8000	210

Appendix B

Published Approach Procedures


SAN FRANCISCO, CALIFORNIA
AL-375 (FAA)
16203
LOC/DME I-SFO
109.55
Chan 32 (Y)
APP CRS
284°
Rwy ldg 10681
TDZE 13
Apt Elev 13
ILS or LOC RWY 28L
SAN FRANCISCO INTL (SFO)
DME required. Circling NA to Rwys 10L, 10R, 19L, and 19R. Circling Rwy 1L, 1R NA at night. Simultaneous approach authorized with ILS or LOC RWY 28R. Simultaneous operations require use of vertical guidance; maintain last assigned altitude until established on glideslope. LOC procedure NA during simultaneous operations. # RVR 1800 authorized with the use of FD or AP or HUD to DA. † Missed approach requires minimum climb of 325 feet per NM to 2100. **For inop MALSR increase S-LOC Cat C and D visibility to 2 mile.
MALSR
MISSED APPROACH: Climb to 4000 on SFO VOR/DME R-275 to OLYMM INT/SFO 15.4 DME and hold.
ATIS
113.7 115.8
135.45
NORCAL APP CON
134.5 338.2
SAN FRANCISCO TOWER
120.5 269.1
GND CON
121.8
CLNC DEL
118.2
CPDLC
LOCALIZER 109.55
I-SFO
Chan 32 (Y)
SAN FRANCISCO
115.8 SFO
Chan 105
OAKLAND
116.8 OAK
Chan 115
DME or RADAR or GPS
REQUIRED
MSA SFO 25 NM
5100
3500
4500
ALTERNATE MISSED APCH FIX
SAN JOSE
SJC
114.1
Chan 88
NEPIC I-SFO 5.3
DUYET INT I-SFO 7.7
ROKME I-SFO 15
WETOR I-SFO 18.3
PONKE I-SFO 21.6
DIVEC I-SFO 24.9
(IF) HEMAN INT I-SFO 12
(IAF) MENLO 4000 Max 230 KIAS (GPS REQD)
(IAF) ARCHI 8000 Max 230 KIAS (GPS REQD)
(IAF) FAITH SFO 27.7
MISSED APCH FIX
OLYMM SFO 15.4
116.2 SAU R-204 Chan 109
115.8 SFO R-275 Chan 105
SAN JOSE
114.1 SJC
Chan 88
ELEV 13
TDZE 13
HIRL All Rwys
TDZ/CL Rwys 19L and 28R
REIL Rwys 1L, 1R and 10L
284° 5.7 NM from FAF
FAF to MAP 5.7 NM
Use I-SFO DME when on the localizer course.
VGSI and ILS glidepath not coincident (VGSI Angle 2.85/TCH 67).
*LOC only
GS 2.85°
TCH 53
CATEGORY A B C D
S-ILS 28L #† 213/24 200 (200-½)
S-ILS 28L 789-2½ 776 (800-2½)
S-LOC 28L† 460/24 447 (500-½) 460/45 447 (500-⅞)
S-LOC 28L** 740/24 727 (800-½) 740-1⅝ 727 (800-1⅝)
CIRCLING 1080-1 1067 (1100-1) 1080-1½ 1067 (1100-1½) 1560-3 1547 (1600-3) NA
Knots 60 90 120 150 180
Min:Sec 5:42 3:48 2:51 2:17 1:54
SAN FRANCISCO, CALIFORNIA
Amdt 25A 21JUL16
37°37'N-122°23'W
SAN FRANCISCO INTL (SFO)
ILS or LOC RWY 28L
SW-2, 18 AUG 2016 to 15 SEP 2016
SW-2, 18 AUG 2016 to 15 SEP 2016


SAN FRANCISCO, CALIFORNIA
AL-375 (FAA)
16259
ILS or LOC RWY 28R
SAN FRANCISCO INTL (SFO)
MISSED APPROACH: Climb to 3000 on SFO VOR/DME R-281 to VIKYU INT/SFO 12 DME and hold.
GPS or RADAR REQUIRED
SW-2, 15 SEP 2016 to 13 OCT 2016
Amdt 13A 21JUL16
37°37'N-122°23'W

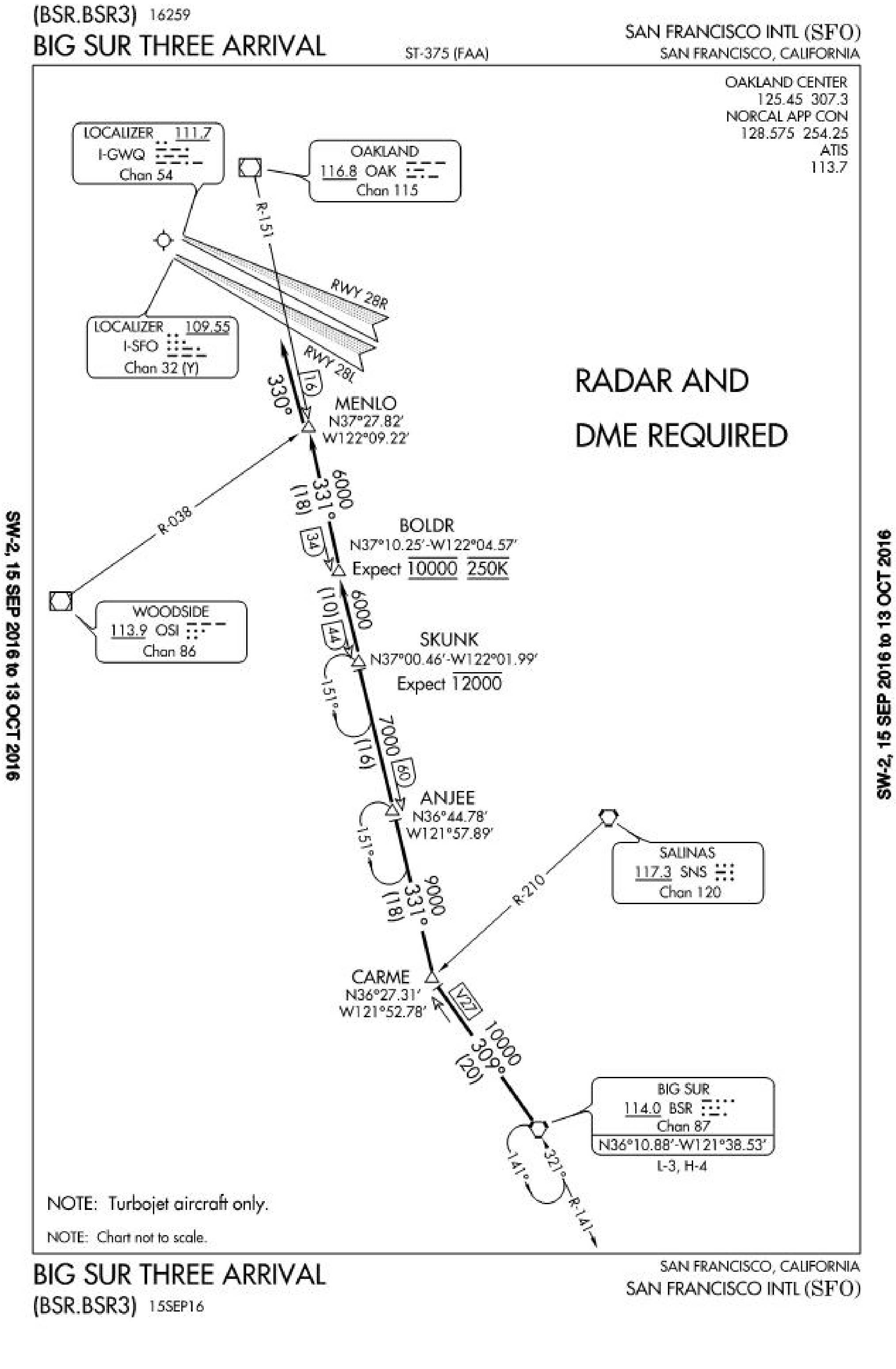


ARRIVAL ROUTE DESCRIPTION

From SERFR on track 314° to cross NRRLI at or above FL200 and at 280K, then on track 313° to cross WWAVS between 15000 and FL190 and at 280K.

RUNWAYS 28L/R: From WWAVS on track 333° to cross EPICK between 10000 and 15000 and at 280K, then on track 329° to cross EDDYY at or above 6000 and at 240K, then on track 329° to cross SWELS at or above 4700, then on track 329° to cross MENLO at 4000 and at 230K. Expect assigned instrument approach.

v


(BSR.BSR3) 16259
BIG SUR THREE ARRIVAL
ST-375 (FAA)
SAN FRANCISCO INTL (SFO)
SAN FRANCISCO, CALIFORNIA
OAKLAND CENTER
125.45 307.3
NORCAL APP CON
128.575 254.25
ATIS
113.7
LOCALIZER 111.7
I-GWQ
Chan 54
OAKLAND
116.8 OAK
Chan 115
R-151
RWY 28R
RWY 28L
LOCALIZER 109.55
I-SFO
Chan 32 (Y)
330°
16
MENLO
N37°27.82'
W122°09.22'
RADAR AND
DME REQUIRED
6000
331°
(18)
R-038
34
BOLDR
N37°10.25'-W122°04.57'
Expect 10000 250K
WOODSIDE
113.9 OSI
Chan 86
(10)
44
6000
SKUNK
N37°00.46'-W122°01.99'
Expect 12000
151°
7000
(16)
60
ANJEE
N36°44.78'
W121°57.89'
151°
9000
331°
(18)
SALINAS
117.3 SNS
Chan 120
R-210
CARME
N36°27.31'
W121°52.78'
V27
10000
309°
(20)
BIG SUR
114.0 BSR
Chan 87
N36°10.88'-W121°38.53'
L-3, H-4
141°
321°
R-141
NOTE: Turbojet aircraft only.
NOTE: Chart not to scale.
BIG SUR THREE ARRIVAL
(BSR.BSR3) 15SEP16
SAN FRANCISCO, CALIFORNIA
SAN FRANCISCO INTL (SFO)
SW-2, 15 SEP 2016 to 13 OCT 2016
SW-2, 15 SEP 2016 to 13 OCT 2016