



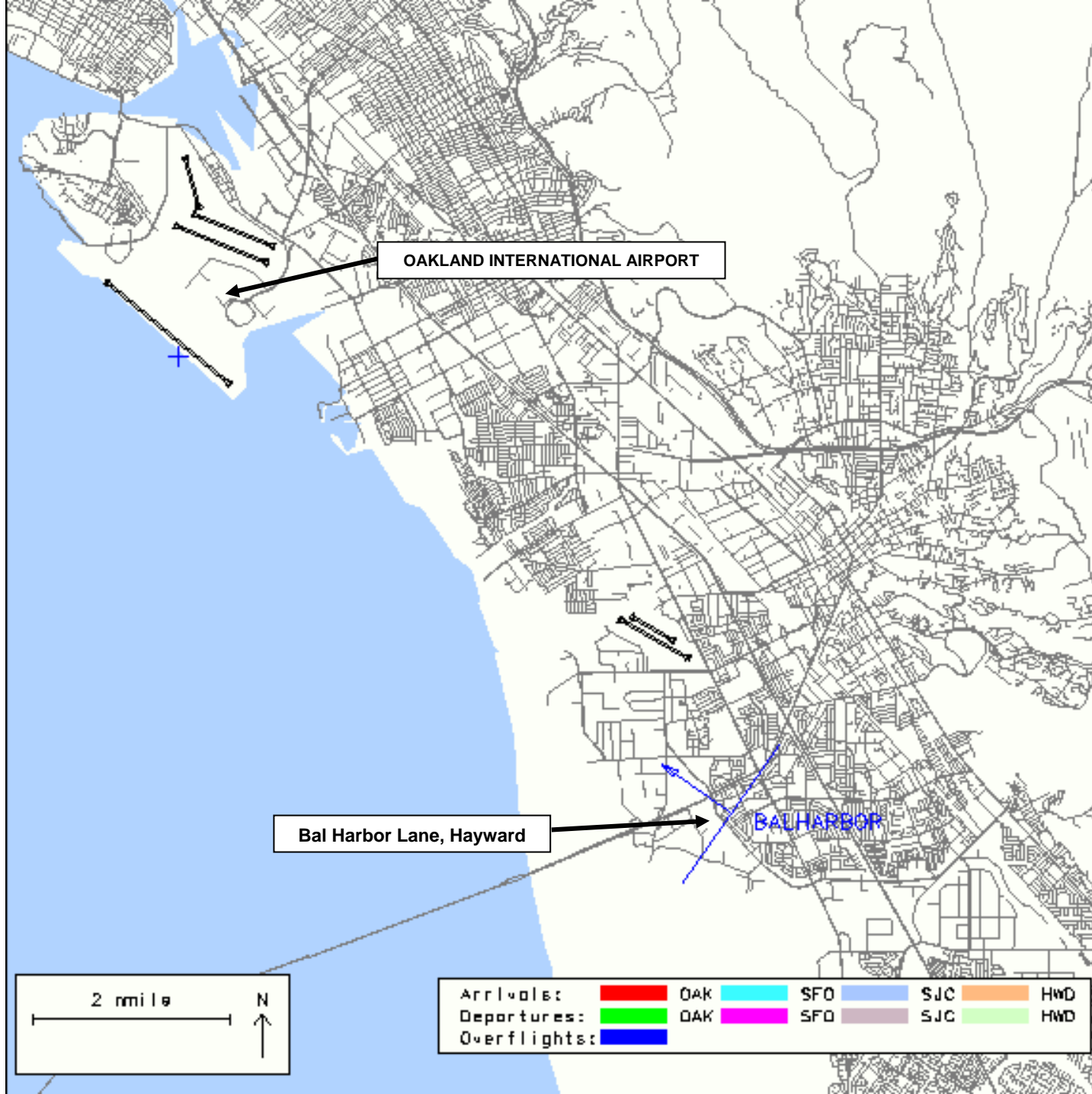
Oakland International Airport



A division of the Port of Oakland

Runway 29 ILS Noise Study Hayward, California

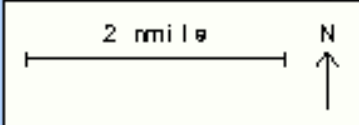
Airport-Community Noise Management Forum
Presented on July 20, 2005



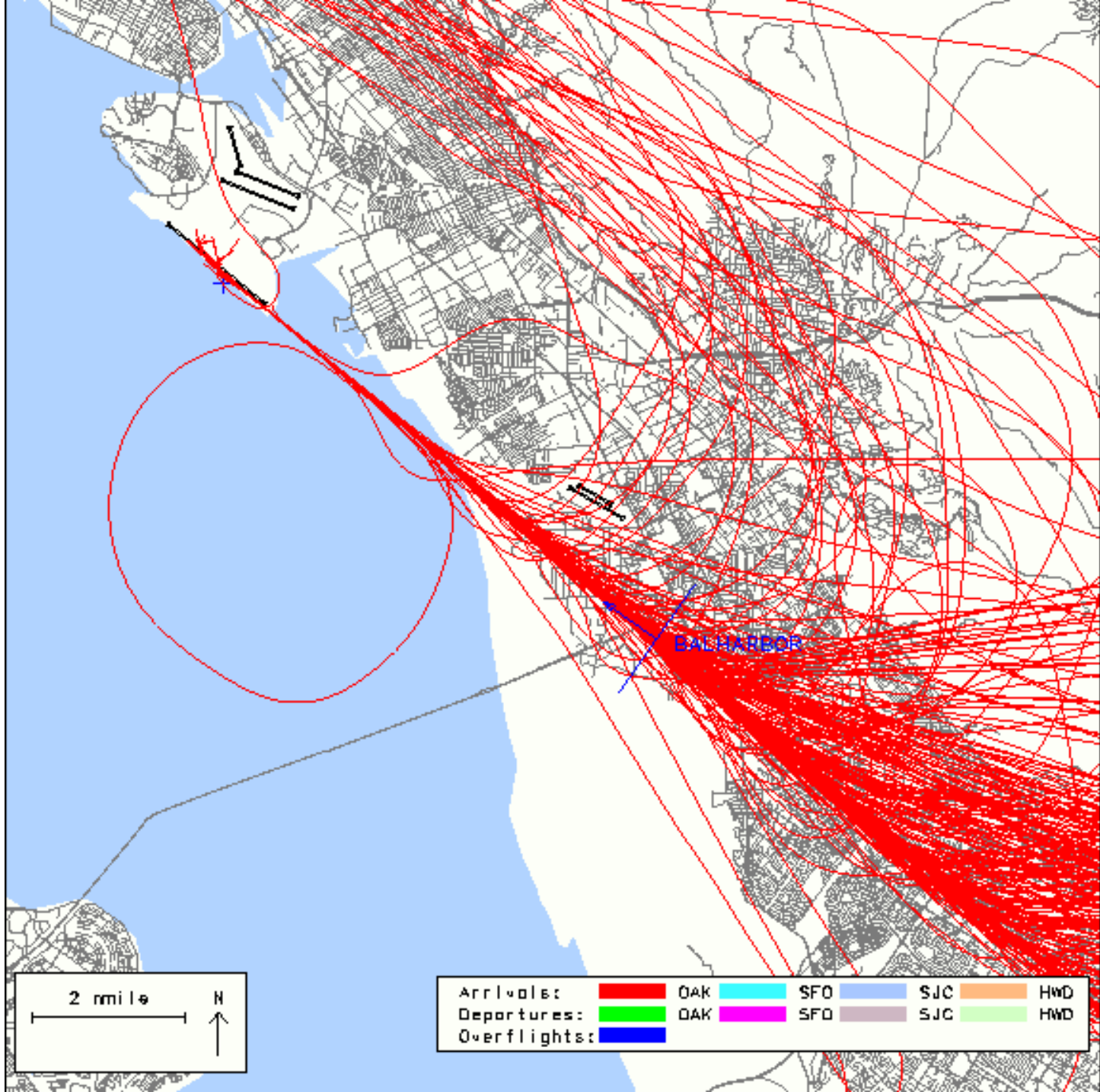
OAKLAND INTERNATIONAL AIRPORT

Bal Harbor Lane, Hayward

BAL HARBOR



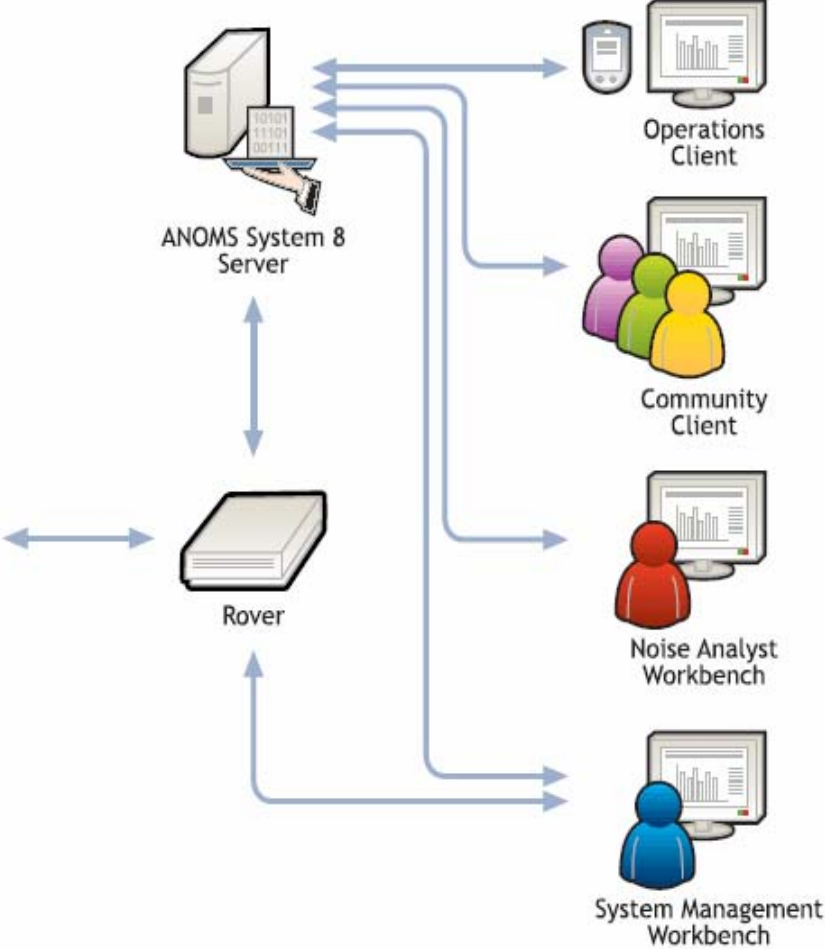
Arrivals:	Red	OAK	Cyan	SFO	Blue	SJ	Orange	HWD
Departures:	Green	OAK	Magenta	SFO	Purple	SJ	Light Green	HWD
Overflights:	Blue							

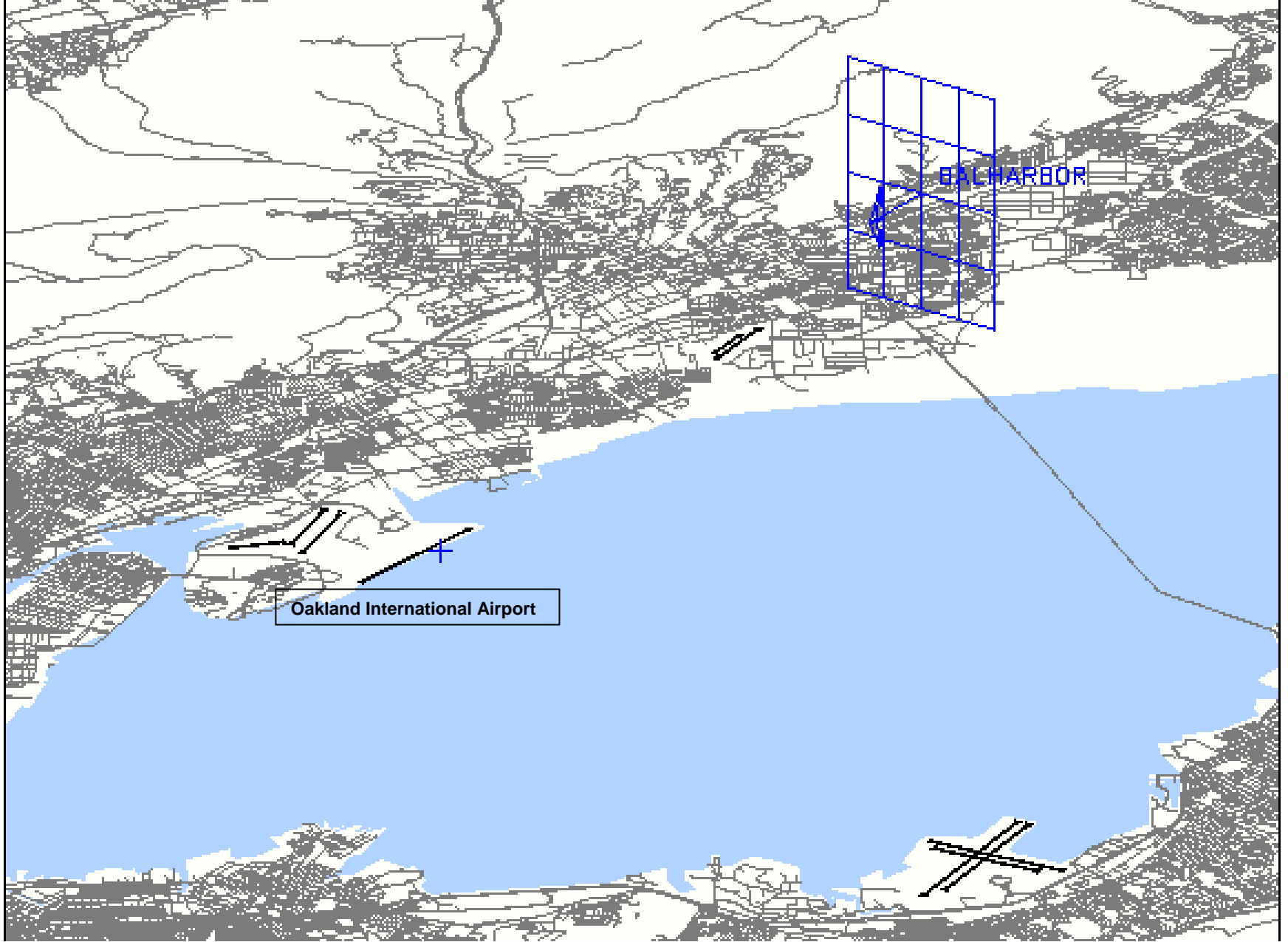




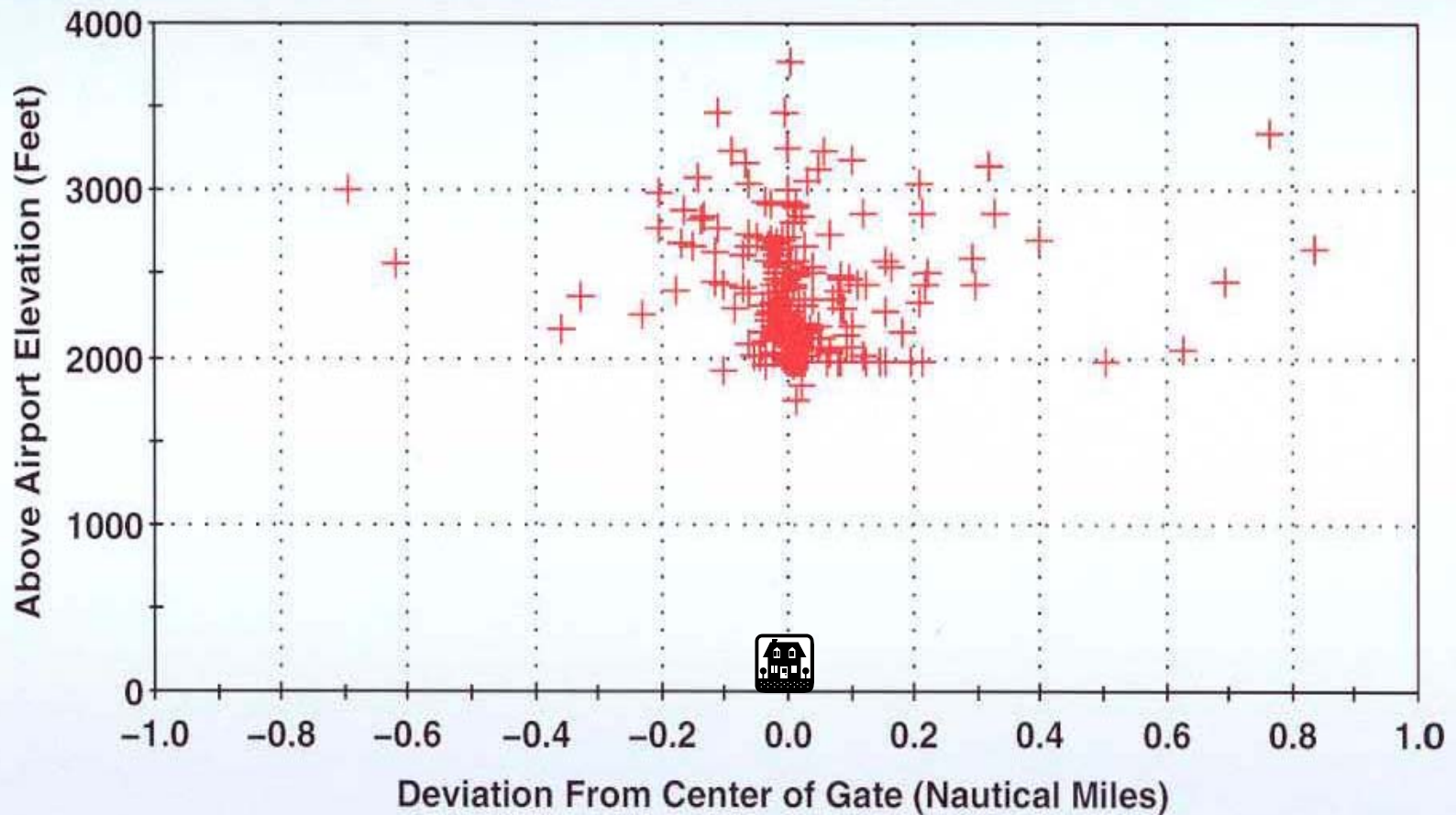
Sample Portable Noise Monitor Set-up

ANOMS System 8 Components





Hayward Site and BalHarbor “Window-in-the-Sky”



+ Arrival o Departure □ Overflight

Hayward Site and BalHarbor “Window-in-the-Sky”

20 August 2004 through 7 September 2004

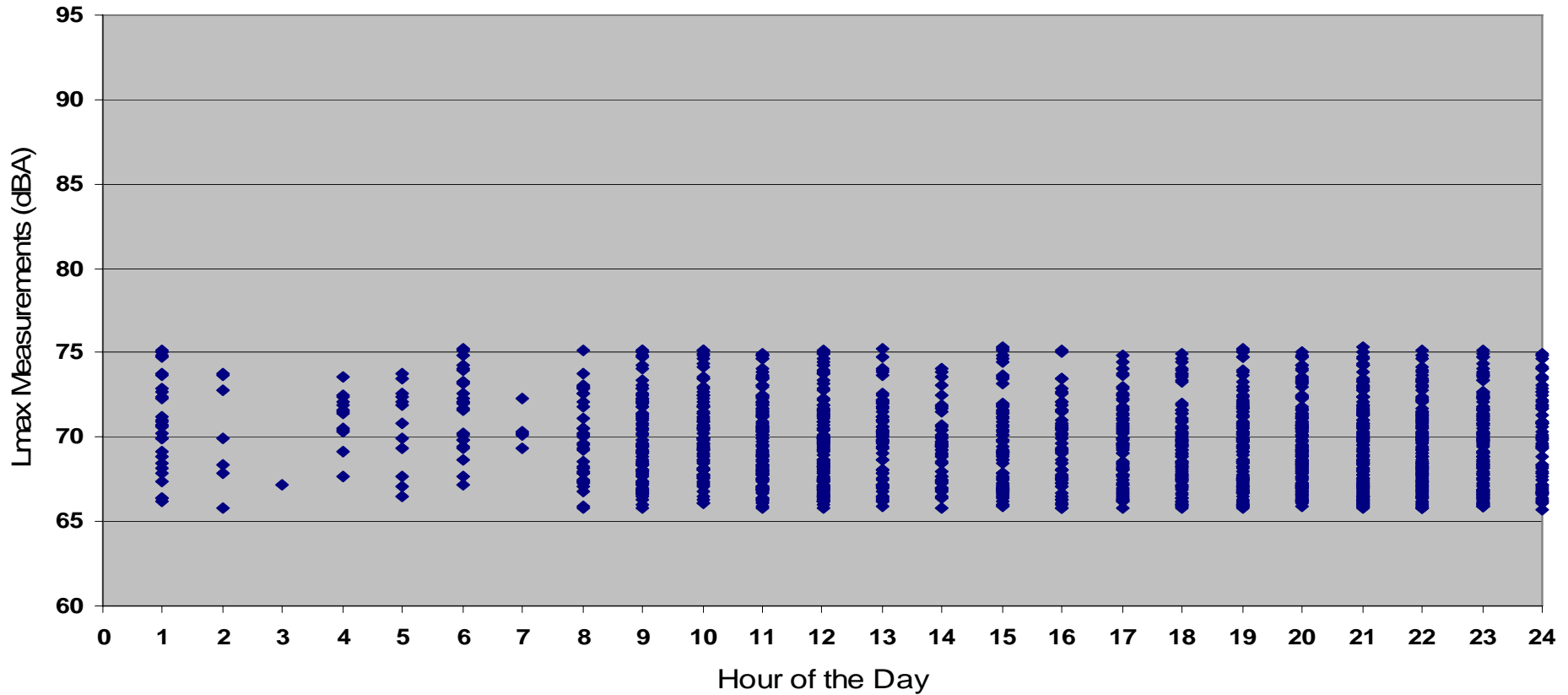
10 Full Days of Data Collected and Evaluated

Hayward Study Summary	
Average Daily Runway 29 Arrivals	231
Average Daily Arrivals In Gate	197
Average Daily Aircraft Noise Events	151
Average Aircraft Lmax	70 dBA
Average Aircraft SEL	79 dBA
Average Noise Event Duration	17 seconds
Average Daily Aircraft CNEL	CNEL 58 dBA
Average Daily Community CNEL	CNEL 59 dBA
Average Daily Total CNEL	CNEL 62 dBA

	Total Runway 29 Arrivals	Total Flights Through Gate	Percentage of Arrivals Through Gate	Total Number of Aircraft Noise Events	Percentage of Gate Flights w/Noise Events	Daily CNEL dBA Aircraft	Daily CNEL dBA Comm- unity	Daily CNEL dBA Total	Average Lmax Noise Level	Average SEL Noise Level
8/20/2004	264	224	85%	128	57%	59	58	62	70 dBA	78 dBA
8/21/2004	223	178	80%	120	67%	56	57	59	69 dBA	77 dBA
8/22/2004	213	186	87%	138	74%	55	56	59	68 dBA	77 dBA
8/23/2004	242	220	91%	142	65%	53	57	59	68 dBA	77 dBA
9/2/2004	259	222	86%	210	95%	63	59	65	71 dBA	81 dBA
9/3/2004	256	240	94%	212	88%	63	61	65	71 dBA	80 dBA
9/4/2004	213	175	82%	148	85%	59	61	63	70 dBA	80 dBA
9/5/2004	191	140	73%	121	86%	57	60	62	70 dBA	79 dBA
9/6/2004	213	183	86%	137	75%	58	60	62	70 dBA	79 dBA
9/7/2004	236	200	85%	151	76%	60	64	66	70 dBA	79 dBA
Totals	2,310	1,968	-	1,507	-	-	-	-	-	-
Averages	231	197	85%	151	77%	58	59	62	70 dBA	79 dBA

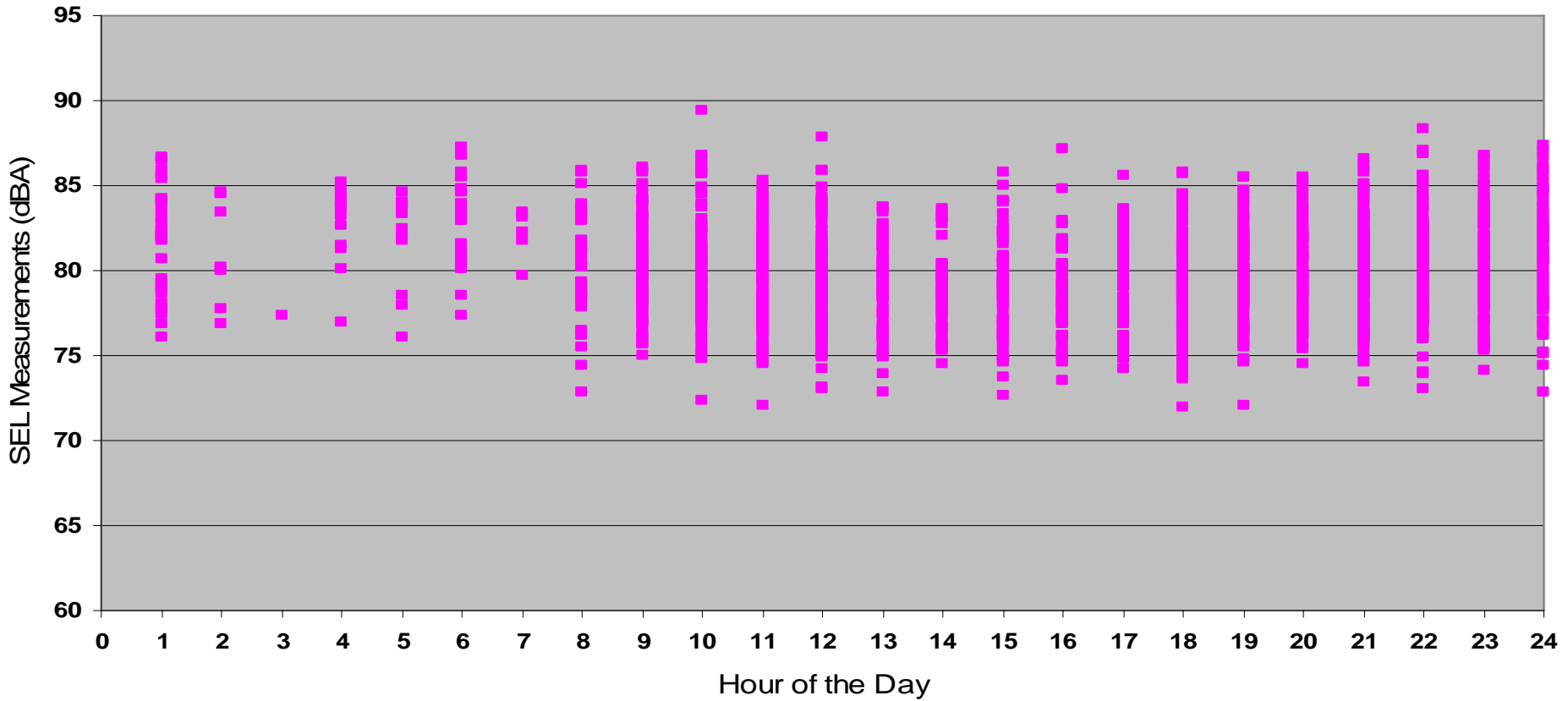
Aircraft Lmax Sound Levels

(10 Days - 1,507 Noise Events)

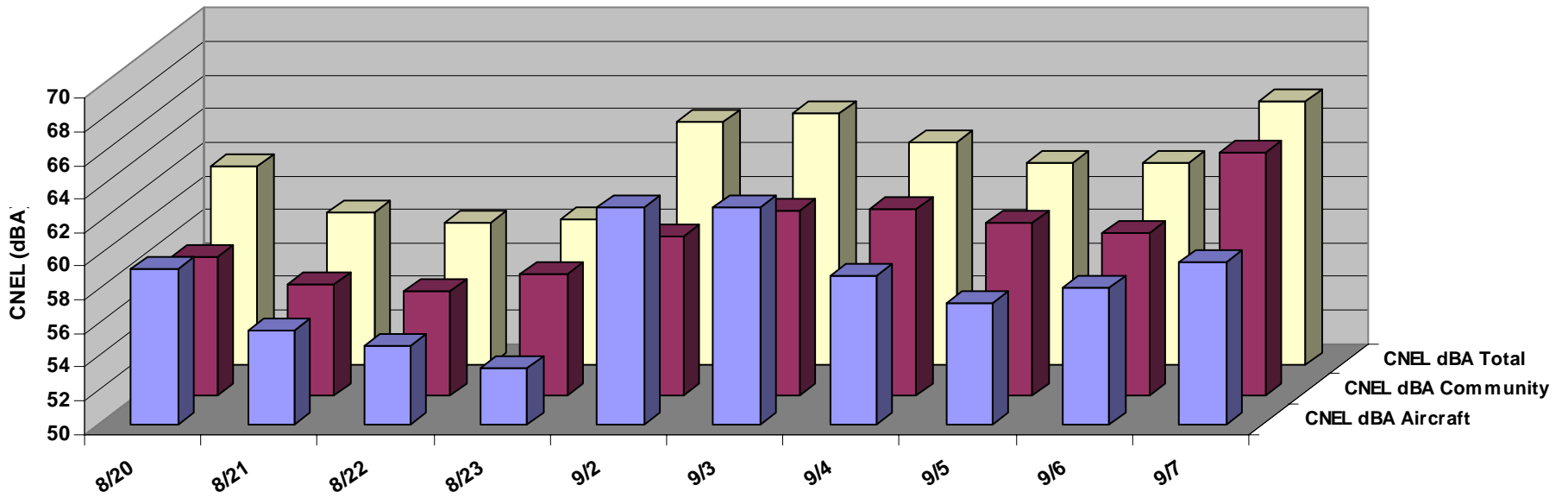


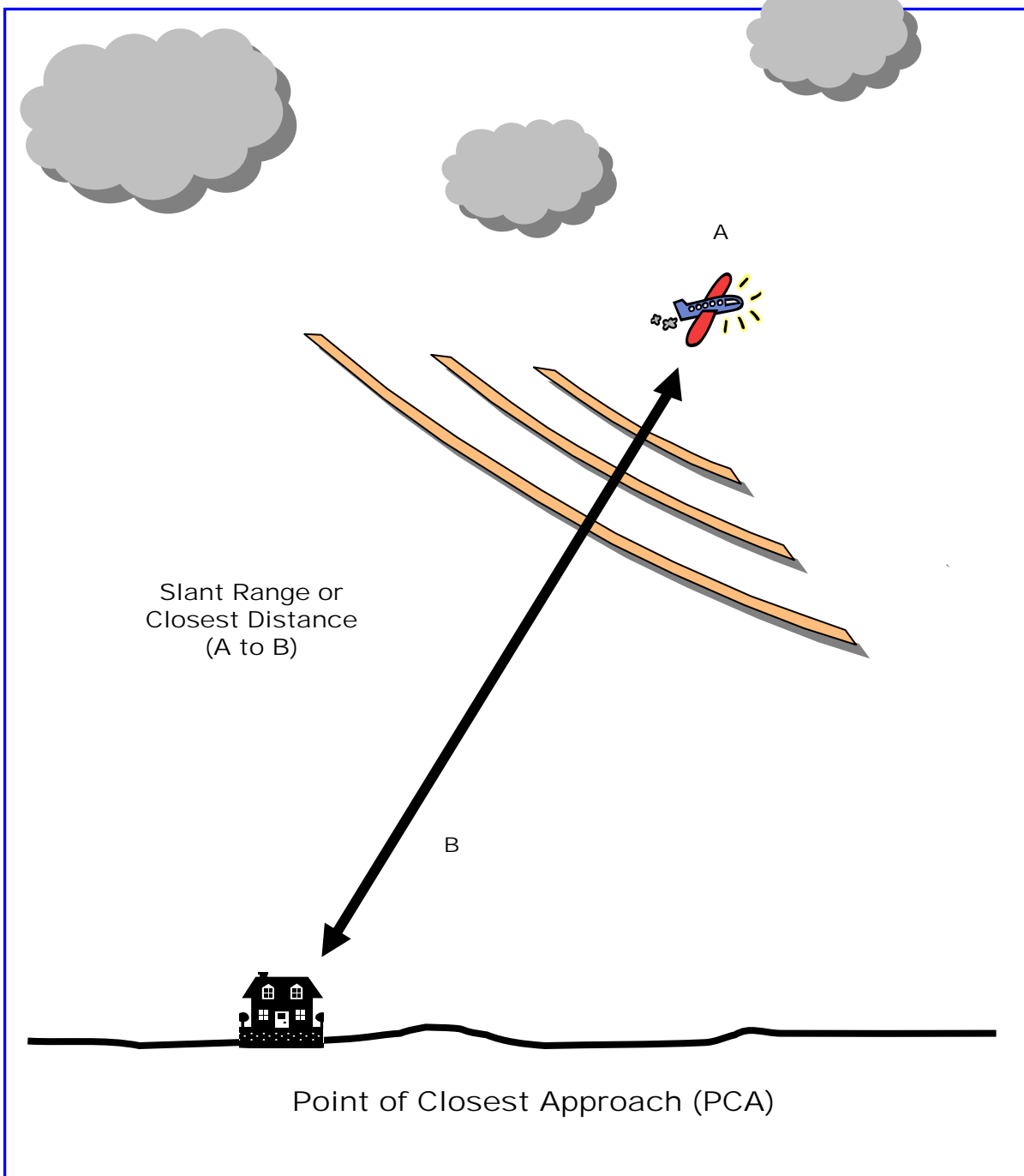
Aircraft SEL Sound Levels

(10 Days - 1,507 Noise Events)



Comparison of CNEL Contribution Levels



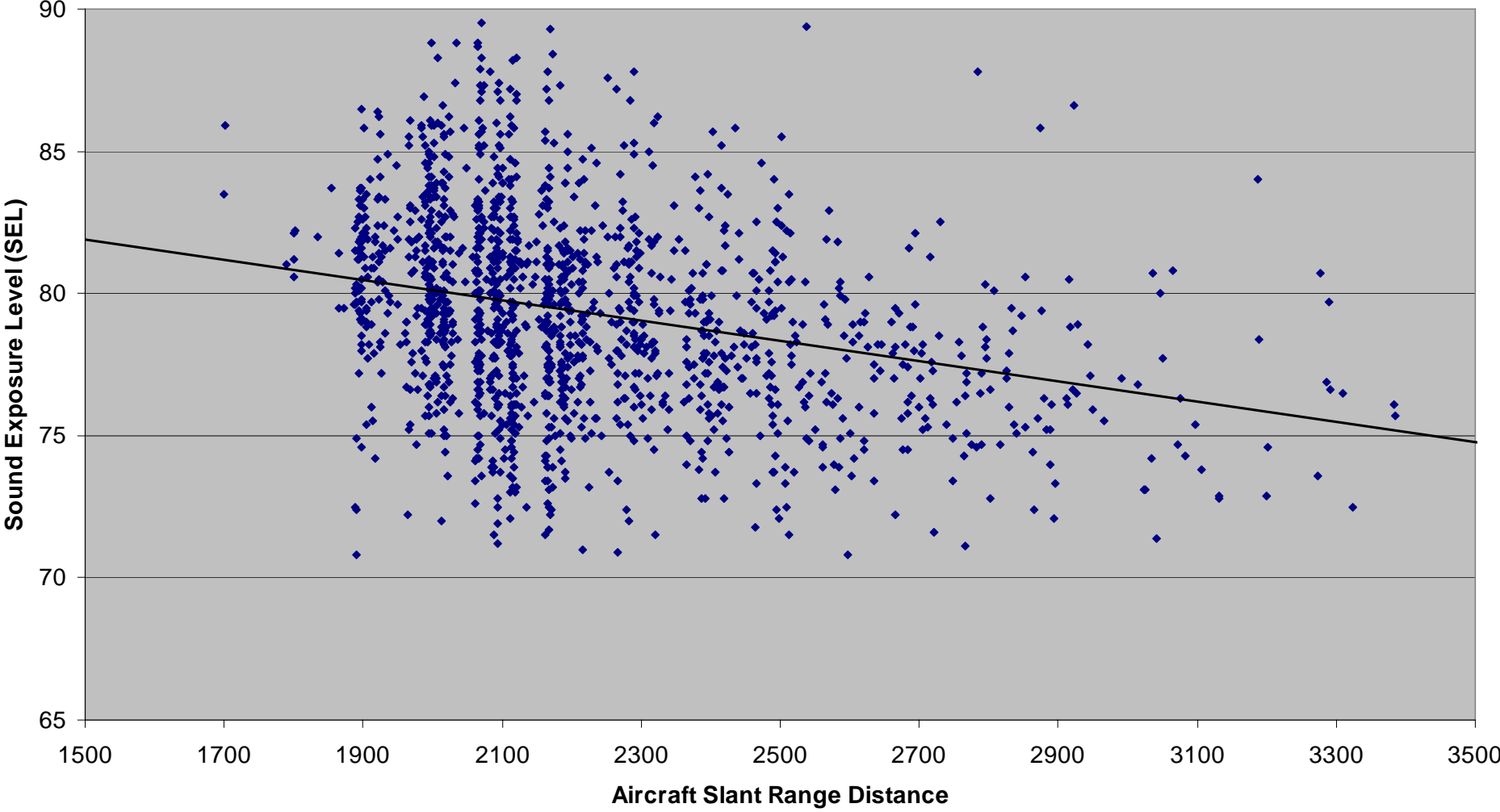


Slant Range Distance is the closest point between the noise source and the noise receiver....sometimes referred to as the PCA or Point of Closest Approach.

Sound Propagation Theory

- As sound propagates further from a source, the sound energy is spread over a greater and greater area, and the intensity (loudness) is less and less. In an ideal homogeneous atmosphere, the sound level from a point source, such as a faraway airplane, reduces by six decibels every time the distance between the source and receiver is doubled.

Correlation Between Sound Exposure Level and Aircraft Distance



Aircraft
Altitude
2,262 feet



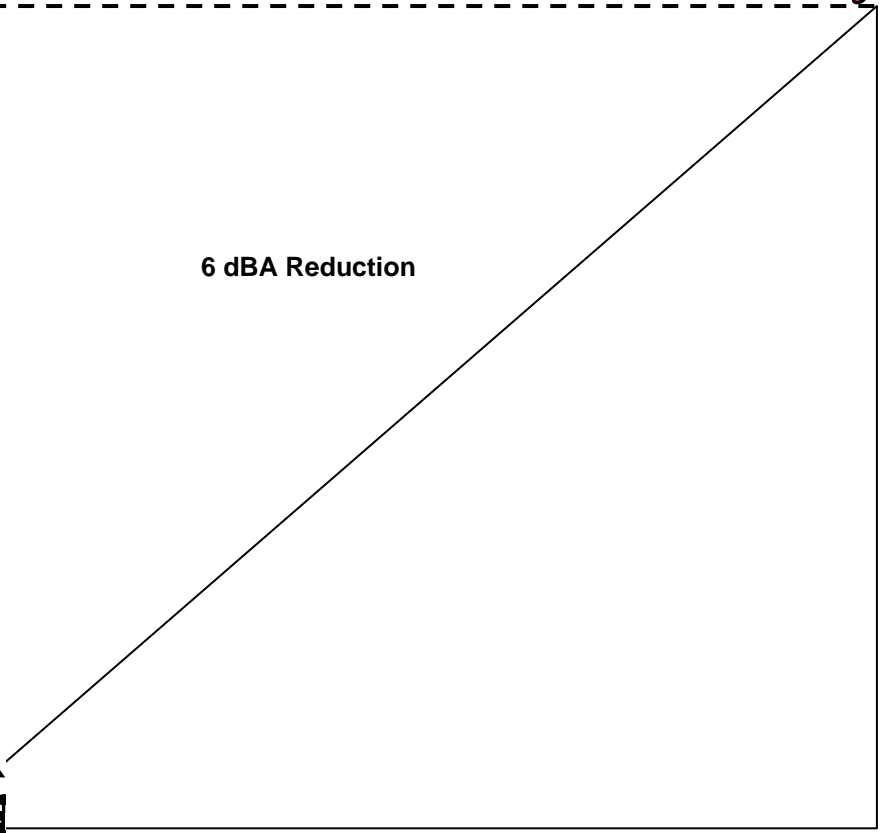
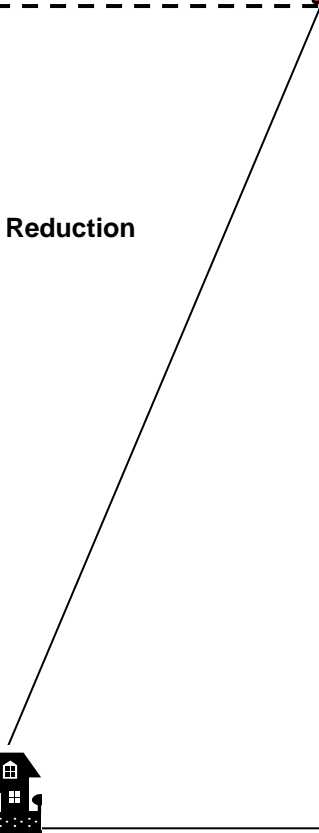
< 1 dBA Reduction

6 dBA Reduction



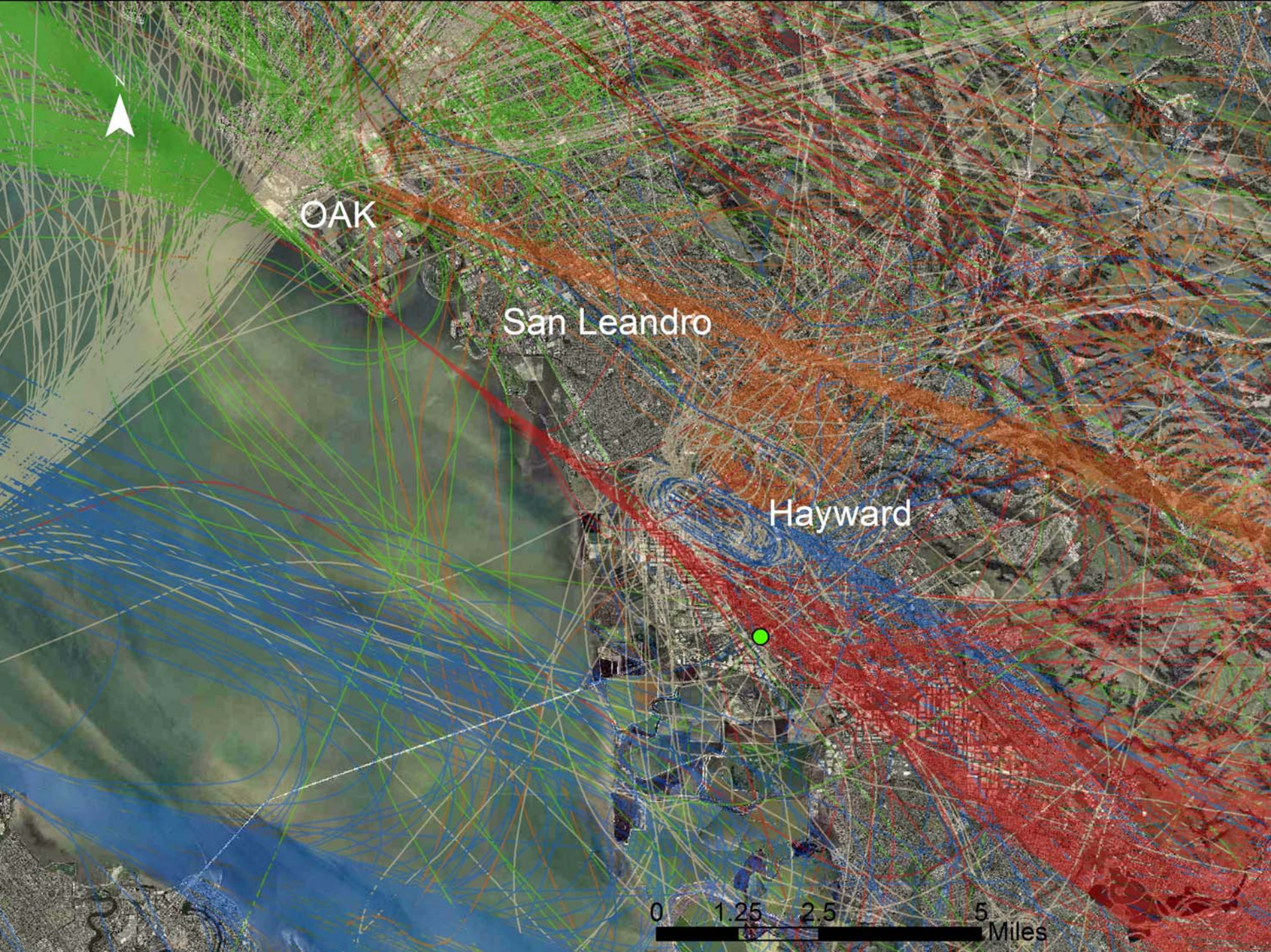
1,000 feet

5,000 feet



**Estimated Noise Level Reductions for Changes in Slant Range Distance
At 2755 Bal Harbor Lane, Hayward**

Average Aircraft Altitude	Aircraft Relocation Distance	Adjusted Aircraft Slant Range	Original Less Adjusted Distance	Potential Noise Level Reduction
2,262 ft.	1,000 ft.	2,473 ft.	211 ft.	<1 dBA
2,262 ft.	2,500 ft.	3,371 ft.	1,119 ft.	3 dBA
2,262 ft.	5,000 ft.	5,488 ft.	3,244 ft.	6 dBA



OAK

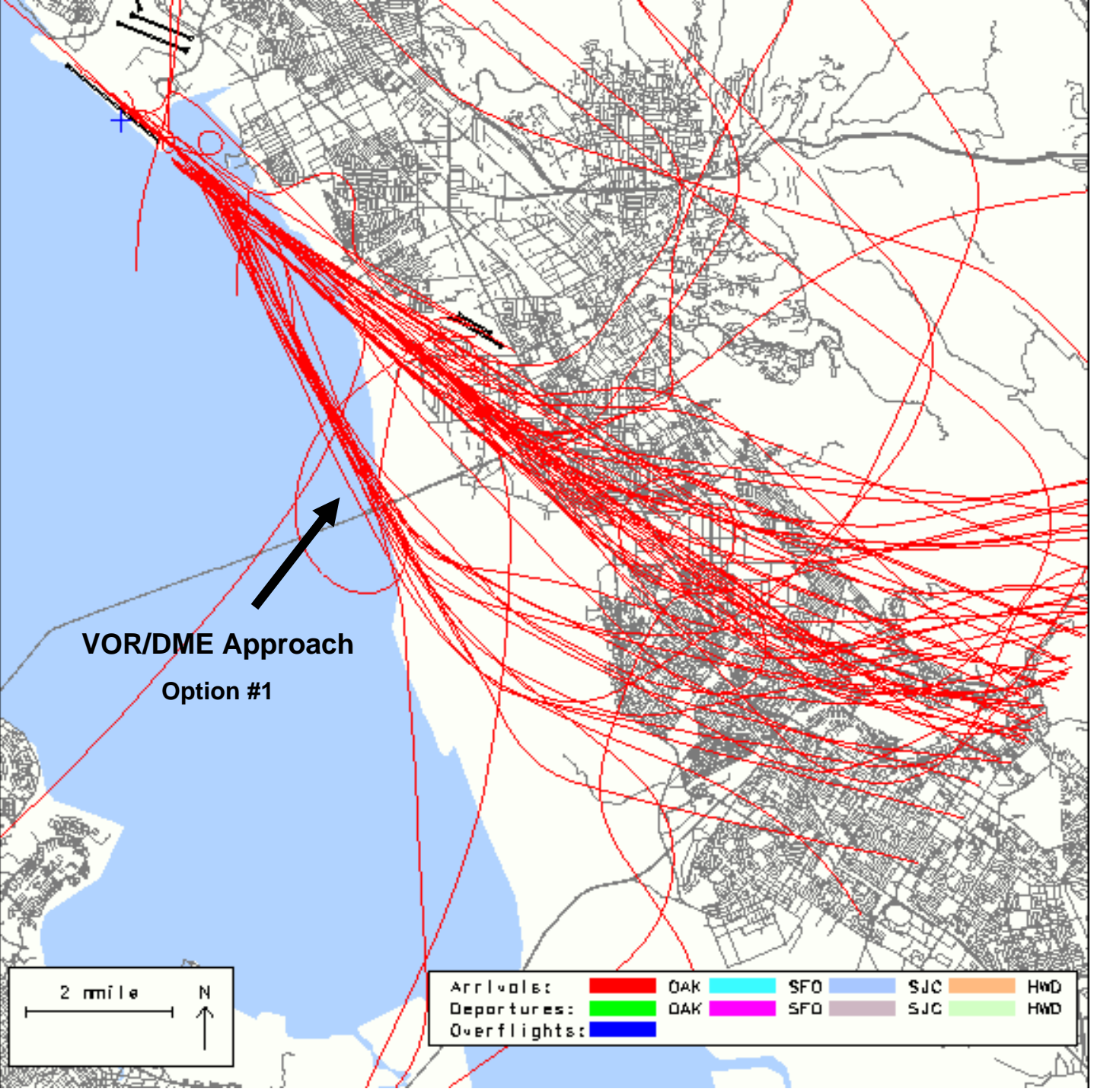
San Leandro

Hayward

0 1.25 2.5 5 Miles

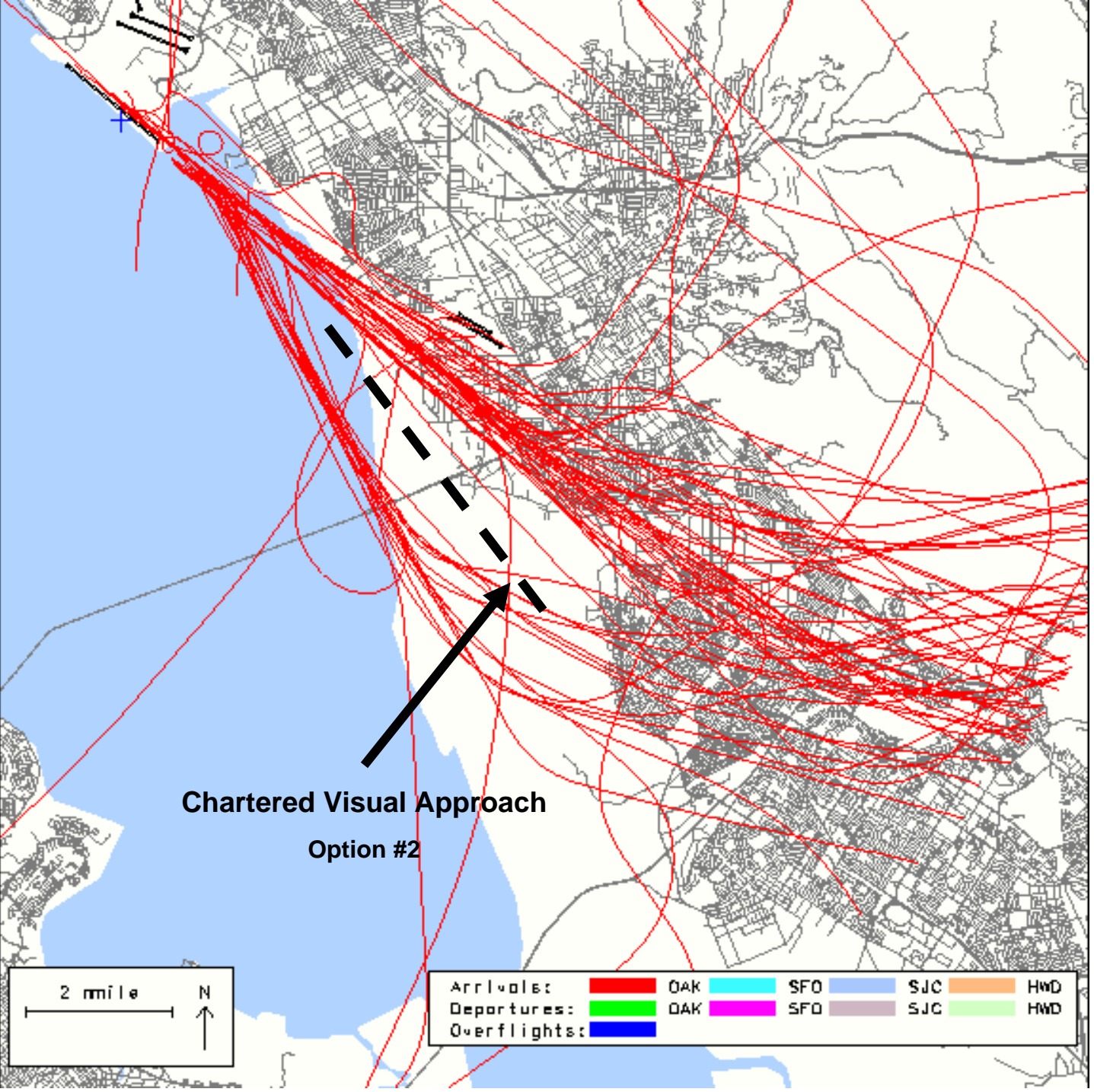
Noise Mitigation Proposals

- **Option #1** – Utilization of existing VOR/DME Runway 29 approach path during certain late night time periods.
- **Impacts** – Likely operational restrictions with Air Traffic resulting in limited use. Overflight/noise impacts on new neighborhoods.



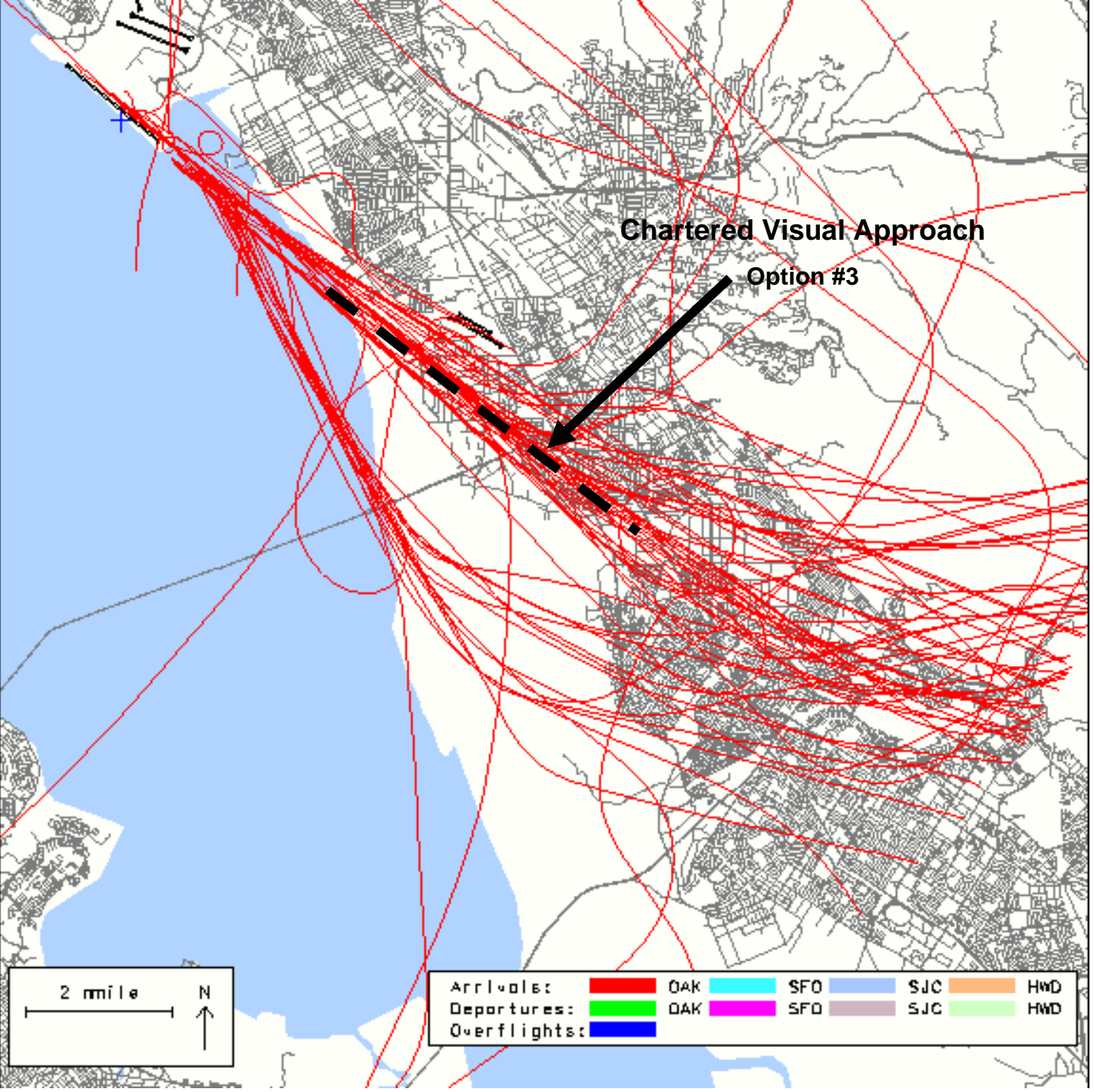
Noise Mitigation Proposals

- **Option #2** – Development of a **Chartered Visual Approach** utilizing an approach path between ILS localizer path and **VOR/DME** path.
- **Impacts** – Likely operational restrictions with Air Traffic resulting in limited use. Overflight/noise impacts on new neighborhoods.



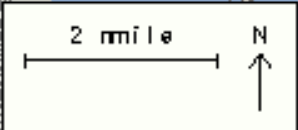
Noise Mitigation Proposals

- **Option #3** – Development of a **Charted Visual Approach** utilizing existing ILS Runway 29 approach path with proposed higher altitudes approaching Hayward area to mimic a Continuous Descent Approach (CDA).
- **Impacts** – Little to none with benefits to ATC operations (i.e. reduced phraseology). No new neighborhoods affected.

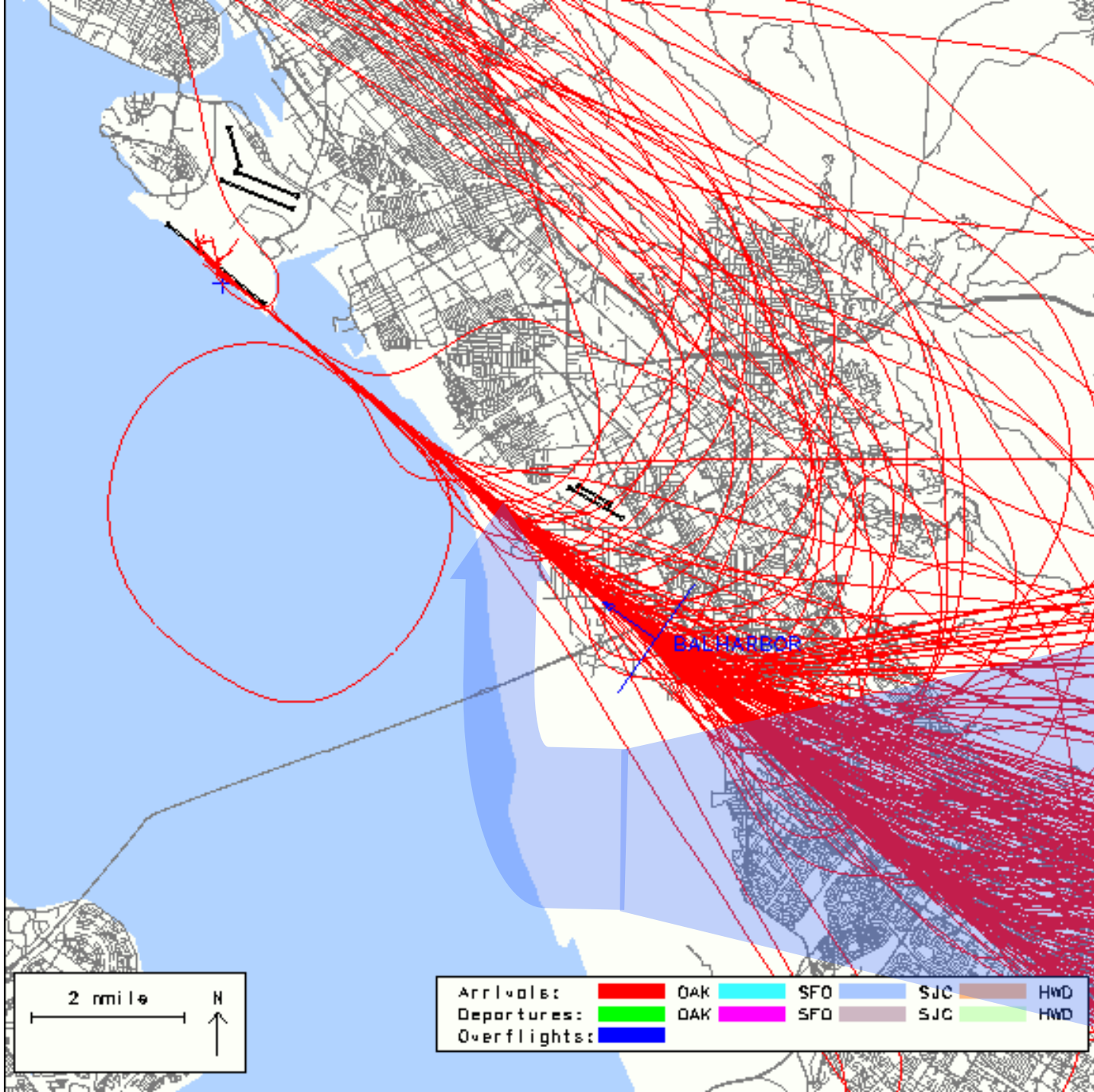


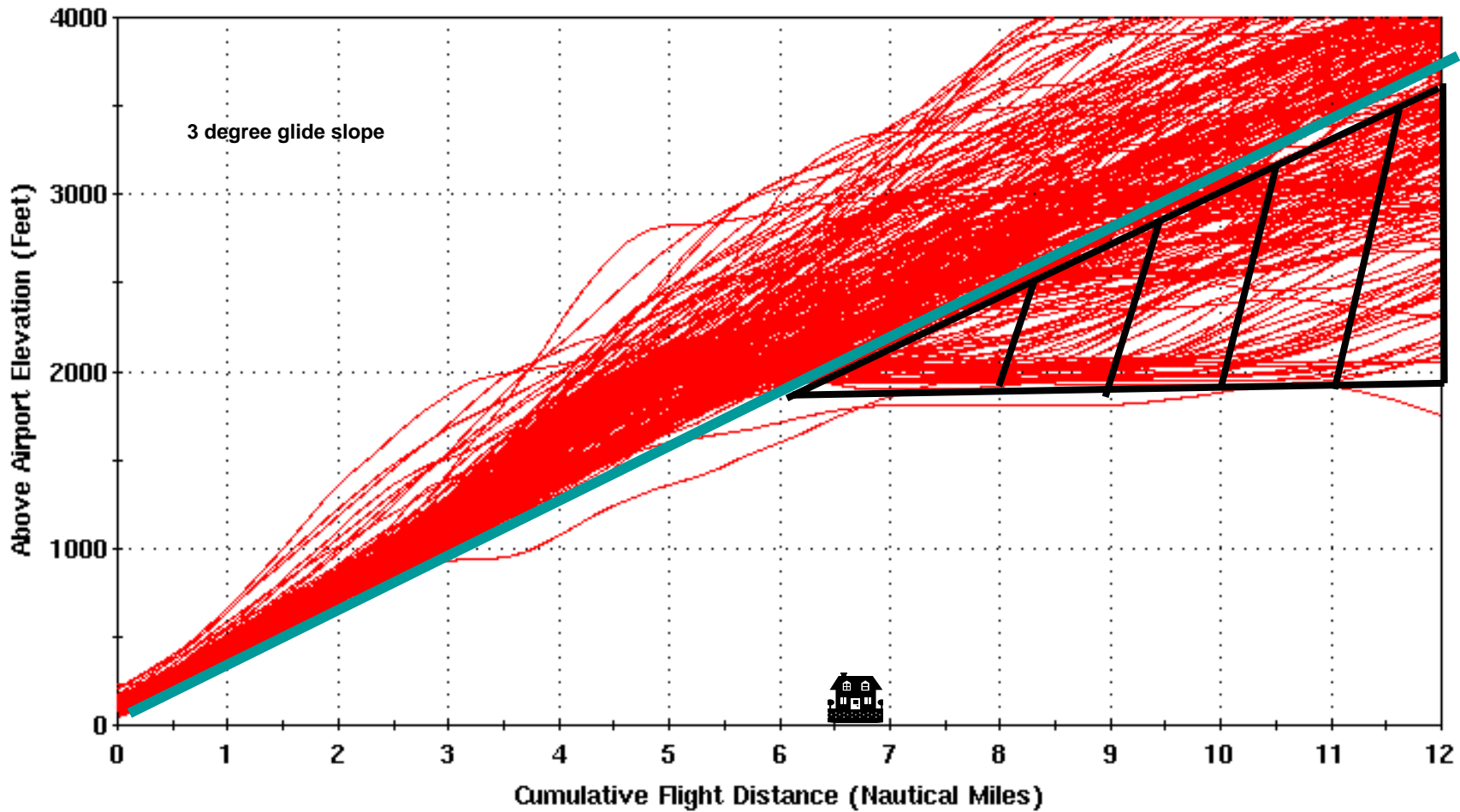
Chartered Visual Approach

Option #3



Arrivals:	Red	OAK	Cyan	SFO	Blue	SJC	Orange	HWD
Departures:	Green	OAK	Magenta	SFO	Purple	SJC	Light Green	HWD
Overflights:	Dark Blue							





— Arrival — Departure — Overflight

Aircraft Over-flights Likely to be Affected by CVA

CONCLUSION

- Aircraft CNEL 58 decibel level on Bal Harbor Lane, well below State and Federal standards (CNEL 65) for residential incompatibility.
- Aircraft noise contributes nearly one-half of the total environmental sound levels on Bal Harbor Lane.
- Approximately 200 transport type aircraft pass over daily depositing about 150 aircraft noise events on Bal Harbor Lane.
- Average aircraft noise levels: Lmax 70 dBA; SEL 79 dBA.
- Infeasible to redirect air traffic to avoid neighborhood due to technical capabilities and noise shift to other communities.
- Chartered Visual Approach (CVA) is recommended.
- CVA may not be helpful to Bal Harbor Lane residents but should be beneficial to other South Bay communities.

