

**EVALUATION OF GENERAL AVIATION AIRCRAFT
DEPARTURES FROM RUNWAYS 27L/R UNDER
VISUAL FLIGHT RULES
OAKLAND INTERNATIONAL AIRPORT**

NOISE ANALYSIS

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Prepared for:

**THE PORT OF OAKLAND
CITY OF ALAMEDA
CLASS
BERKELEY KEEP JETS OVER THE BAY**

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1.0 INTRODUCTION

The purpose of this report is to present the results of an analysis of the general aviation visual departures that originate in the North Field area of Oakland International Airport and overfly the residential areas of the City of Alameda. This analysis was done in response to Section 4.2(j) of the Phase II Settlement Agreement between the Port of Oakland, the City of Alameda, CLASS, and Berkeley Keep Jets Over the Bay Committee. Section 4.2(j) includes the following goal statement:

“The goal of the evaluation will be to identify, and establish a protocol for implementing procedures and/or mechanisms that will encourage pilots of general aviation aircraft departing from these runways to turn right as soon as is feasible (safety permitting), in order to reduce general aviation aircraft noise heard by City residents.”

This approach used in this study was based on using the airports ANOMS permanent noise monitoring and flight tracking system to identify the characteristics and extent of VFR overflights of the residential areas of the City of Alameda. Recommendations for reducing such overflights are developed to help reduce such overflights.

2.0 IDENTIFYING VFR OVERFLIGHTS OF THE CITY OF ALAMEDA

The first step of the analysis was to use the airport flight tracking system to examine a 9 day sample of flights and determine the number of flights and the tracks that overflow the residential areas of the City of Alameda. The sample used was October 1, 2002 through October 9, 2002. This time period was chosen at random and represents days in which the airport was in west flow, i.e., aircraft departed to the west and arrived from the east.

The flight tracks for VFR operations were difficult to identify using the airports noise monitoring and flight tracking system. The flight tracks are obtained from the FAA Air Traffic Control radar system. There is not a clear and consistent identifier for each track that can be used to segregate IFR and VFR flights. A technique was developed to create an approximate identification of VFR tracks. Exhibit 1 shows all of the flight tracks from the North Field for October 9, 2002. This includes a mix of VFR and IFR flights. Oakland Noise Abatement Office staff determined with the assistance of the FAA tower personnel that all VFR tracks are given a radar beacon code in a specific range. Unfortunately, occasionally some IFR flights and IFR training flights are given beacon codes in the same range. Exhibit 2 shows the flight tracks for aircraft that have beacon codes in the range that are generally VFR flights. The flights that make a turn to the right and head straight over the center of Alameda are on a heading of 313 degrees, the IFR heading. A review of the registration number for these flights indicate that 6 aircraft accounted for all of these flights over the center of Alameda on October 9, 2002. All were Cessna 172 single engine propeller aircraft.

A review of the tower tapes confirmed that these were all IFR flights or IFR training flights, primarily the latter. Note that an IFR training flight may be conducted under VFR or IFR conditions, but that even when these flights are conducted under VFR conditions, they are an IFR flight. A pilot practicing IFR flights will fly ‘under the hood’ which allows the pilot to see only the instruments. The check pilot riding with the pilot in training has full visibility outside the aircraft. Pilots are required to perform a minimum amount of IFR flight experience each year to maintain an IFR rating by the FAA. Most of the flights shown that fly over the center of Alameda are such IFR training flights. To eliminate these flights from the track plots, each tail number for each track over the center of Alameda was identified and the plot regenerated excluding these registration numbers. The resulting tracks for October 9, 2002 are shown in Exhibit 3. Exhibit 3 shows that there were 5 VFR flights from the North Field that overflew Alameda. Flight tracks for October 1, through October 8 are presented in the next section.

3.0 FLIGHT TRACK ANALYSIS

October 1 through October 8, 2002 VFR flight tracks are shown in Exhibits 4 through 11. On each of these days there were a number of IFR tracks that were included in the usually VFR beacon code range. The number of aircraft on these IFR tracks ranged from 11 on October 1, to a low of 3 on October 5, 6, and 7. It is clear that a resident on Bay Farm Island or in Alameda could not tell the difference between a VFR or IFR flight over this area.

The following table identifies the approximate number of VFR flights that overflew residential areas of Bay Farm Island or Alameda during the period of October 1 through October 9, 2002 (the data are approximate because the accuracy of the radar system is in the range of plus or minus 500 feet):

Date	VFR Overflights of Bay Farm	VFR Overflights of Alameda
October 1, 2002	0	7
October 2, 2002	0	9
October 3, 2002	0	9
October 4, 2002	1	8
October 5, 2002	0	3
October 6, 2002	0 (8 very close)	11
October 7, 2002	0	2 (plus 2 very close)
October 8, 2002	1	9
October 9, 2002	0	5

Exhibit 12 shows the type of aircraft annotated on the tracks that flew over residential areas of Alameda on October 8, 2002. This day was chosen solely because it appeared to be a typical day. All but one was a single engine propeller aircraft. The other was a twin propeller aircraft. One of the aircraft did not originate at Oakland, but originated at

Hayward. It's radar track was very long, originating in Hayward, following the Nimitz and Bay Bridge and circling downtown San Francisco near the terminus of the Bay Bridge and then returning over the Bay Bridge and down the Nimitz. This track was probably from a television or radio traffic aircraft. The track terminated near OAK, but it was not possible to determine which arrival track completed the flight. The point is that some of the overflights of Alameda are Hayward flights and the traffic patrol fixed wing aircraft that fly parallel to the Nimitz Freeway may be the source of some of the overflights.

The other VFR aircraft that overflow residential areas of Bay Farm Island and/or Alameda on October 8, 2002 included the following aircraft types (parenthetical numbers are the number of these types of aircraft):

- Cessna 172 (3), single engine piston
- Beech60, light twin engine piston
- Piper32 (2), single engine piston
- Beach35, single engine piston
- Cessna 152, single engine piston
- Lake, single engine piston

The altitude profiles for 2 of these flights are plotted in Exhibits 13 and 14. Exhibit 13 shows the altitude profile for the Beech60, a twin piston aircraft. It shows that after departing Oakland runway 27 Left and in a climbing right turn, it flew over the east side of Alameda at an altitude of just under 1100 feet and continued to climb. This aircraft flew over residential areas of Bay Farm and Alameda. Exhibit 14 shows the altitude profile for a Cessna 172 that departed Oakland Runway 27 Left and climbed in a right turn overflying the east side of Alameda at an altitude of just under 1100 feet and continuing to climb on a track that is more or less straight over the south end of Alameda.

In reviewing all of the VFR flights that overflow residential portions of Bay Farm Island or Alameda, the general pattern is that aircraft departed Runway 27 Left and made a right turn that was either too wide to miss the residential areas or did not turn through a sufficient radius to avoid overflying Alameda (straightened out too soon). On October 2, and October 6 there were aircraft that departed Runway 27 Left made a sharp right turn to head over San Leandro Bay and then turned back left, splitting the small channel between Bay Farm Island and Alameda.

The failure to avoid the residential areas can be attributed to one of 4 causes as follows:

- 1.0 The pilot was unaware of the noise abatement procedures
- 2.0 The pilot did a poor job of flying the procedures and drifted over the residential areas.
- 3.0 The pilot was confused by the noise abatement procedures and ended up flying a route over residential areas.

4.0 Due to safety reasons, such as conflict with other aircraft or instructions from the ATC, the pilot had to divert from the noise abatement procedures and overflow a residential area.

Each of these are discussed in the following section.

4.0 RECOMMENDATIONS

The 4 possible causes of pilots overlying residential areas was presented in the previous section. In this section, each of those is examined and recommendations are made for reducing the occurrence of deviation from the recommended procedures.

4.1 ***The pilot was unaware of the noise abatement procedures.*** The Port of Oakland has an ongoing program to talk to pilots, FBO's, flying clubs, and instructors. The Port of Oakland has published a pilot pamphlet entitled "Noise Abatement Procedures." This pamphlet is a fold out, 2 sided color pamphlet that is the size of, and hole punched to fit in a pilots 'Jeppeson' type Airway Manual. The two page pamphlet is shown in Exhibit 15 and Exhibit 16. This pamphlet is available from the airport staff and is easy to find on the airport website (www.flyoakland.com). The airport has posted a sign at the beginning of the runway to show pilots where the sensitive residential areas are (See Exhibit 17). However, it is still possible that some pilots are not getting the word. The airport should continue to distribute the noise abatement procedures pamphlet through the local FBOs, including the FBOs at Hayward Air Terminal. Provide multiple copies to the flight school for distribution to students. Continue to maintain a copy of the pamphlet on the website. General aviation pilots use the web as an information source regularly, and keeping the web page up to date is very important. In addition, airport staff should maintain regular contact with the news organizations that fly out of OAK and HWD and ensure that they have current copies of the procedures. The flight schools and the news organizations are responsible for the majority of flights, their cooperation is important.

4.2 ***The pilot did a poor job of flying the procedures and drifted over the residential areas.*** The noise abatement procedures are not difficult. Perhaps a student learning to fly may be slow in initiating the turn, may not turn sharp enough or exits the turn too early, but it is the instructors responsibility to keep the pilot where he is supposed to be. There has been some discussion of a sign or navaid in the vicinity of the golf course to remind pilots to turn and avoid residential areas. Such a sign or navaid would probably not be effective at or near the golf course. The takeoff profiles shown in Exhibits 13 and 14 show that the aircraft are in a steep climb with the aircraft nose up. In this position the aircraft have a notoriously poor view of the ground below them, particularly aircraft with low wings. In the nose up position, a sign or light or other navaid on the golf course

would not be visible to the pilot. A navaid that would be read using the cockpit instruments would probably not be used with VFR flights, as such flights are done using a 'see and be seen' philosophy. In such a mode it is important to minimize the need to concentrate on cockpit instruments. Given the poor view of the ground below the aircraft, the noise abatement procedures are flown best when the pilot anticipates where the residential areas are and makes the turn early enough to avoid them. Some airports have placed signs near the beginning of the runway to remind pilots of noise abatement. But it is not clear that such signs are effective, given the work load on pilots at the start of takeoff roll. Communication with the pilot directly prior to flight, is the better time to emphasize noise abatement. Pilot education is the key to keeping the aircraft on the tracks that are desired. The importance of the noise abatement procedures need to be emphasized to all pilots and the Port should investigate more ways to communicate the importance of noise abatement to all pilots through an ongoing and recurring outreach program. That outreach program should focus on the local FBOs, Hayward FBOs, the flight clubs and the flight school. Every opportunity to meet with FBOs and pilot groups should be used to emphasize the importance of the noise abatement tracks and the need to keep the right turn from drifting over Alameda. The Port should investigate the possibility of having the ATIS recording advise pilots that noise abatement procedures are in effect.

4.3 ***The pilot was confused by the noise abatement procedures and ended up flying a route over residential areas.*** The 'Noise Abatement Procedures' pamphlet published by the Port of Oakland is pretty clear and the residential areas are well marked in bold yellow dashed lines. While it is hard to imagine that the intent of the procedures could be misconstrued, there is the possibility some pilots may be confused. The pamphlet should be reviewed to determine if it can be made more clear and explicit without making the wording or graphics overly complex. It is important to keep the graphics simple, so that it will be easy to remember and will leave an impression on the reader that carry over into the cockpit. The following are some areas have been identified for review:

4.3.1 During the sample period of October 1, through October 9, 2002 most of the runway 27 departures occurred on Runway 27 Left because Runway 27 right was closed for part of this time. The tracks shown on the aerial photograph only come from Runway 27 Right. Even though during normal circumstances Runway 27 Right is predominately used, the tracks shown in the pamphlet should be attached to both runways so that pilots are clear that the turn is required from either runway. The point of this comment is that a pilot departing 27 Left will not see a recommended track for their flight over San Leandro Bay. Granted, it is not a reach to see the residential area outlined in bold yellow lines and conclude that they should stay south of the residential, but the graphic may be misinterpreted.

- 4.3.2 The Runway 27 Right departure only shows a daytime northbound route. The east and south bound route, in blue, is labeled ‘preferred nighttime departure.’ In fact that blue line is preferred for day and night departures. Perhaps a dashed blue/red line should be used and the legend changed to say ‘preferred nighttime and daytime east and southbound departure.’
- 4.3.3 The Runway 33 departure only shows a southbound departure. Perhaps the departure should be split and a northbound departure blended in with the 27 Right northbound departure.
- 4.3.4 The residential area outlined northeast of the airport near and along the Nimitz Freeway may mislead some pilots. The procedures request that pilots ‘avoid these hotel and residential areas,’ and yet the right hand pattern for Runway 27 Right goes directly over this area. This may create the appearance that it is ok to overfly residential areas in some unnamed circumstances. This conflicting information may send a mixed message, and weaken the attempt to keep aircraft away from Bay Farm Island and Alameda residential areas. This is not an easy conflict to resolve without complicating the graphic. Since Runway 27 Left is the preferred touch and go runway, is it necessary to show the pattern to Runway 27 Right? If not, eliminate it.

A sample revised aerial graphic for the pamphlet is provided as Exhibit 18.

4.4 *Due to safety reasons, such as conflict with other aircraft, or instructions from the ATC the pilot had to divert from the noise abatement procedures and overflew a residential area.* This type of deviation from the noise abatement tracks are difficult to avoid and will occur on occasion. Clearly, safety comes first, and the noise abatement procedures shall not interfere with safety.