

# HARRIS MILLER MILLER & HANSON INC.

8880 Cal Center Dr., Suite 430  
Sacramento, CA 95826  
T: 916.368.0707  
F: 916.368.1201  
W: www.hmmh.com

## TECHNICAL MEMORANDUM

---

**To:** San Diego Part 150 NTAG Members  
**From:** Bob Behr and Gene Reindel  
**Date:** January 15, 2009  
**Subject:** SAN Part 150 Update – Review of New Noise Abatement Alternative Measures and Land Use Measures

---

At the third Noise Technical Advisory Group (NTAG) Meeting and in subsequent discussions with the San Diego County Regional Airport Authority (SDCRAA) there were six alternative noise abatement measures selected for initial study as part of the Noise Compatibility Program (NCP) Update. In addition, various potential land use measures were evaluated for adequacy in preventing noncompatible land uses in the environs of San Diego International Airport (SAN). This memo summarizes the efforts thus far with the general background and preliminary results of each alternative in preparation for presenting to the NTAG at the fourth meeting on January 15, 2009.

### NOISE ABATEMENT MEASURES

The Noise Abatement Measures referred for initial study follow:

- Require the use of “John Wayne Airport-like” noise abatement departure profiles (NADP) for aircraft departing Runway 27
- Implement a preferential runway use program for aircraft arrivals between 2330 and 0630 hours (during the departure curfew)
- Implement RNAV procedure for the Runway 27 departures on the 290-degree heading
- Develop and implement a 310-degree heading for Runway 27 departures along with an RNAV procedure for aircraft adherence
- Develop and implement a left turn (over the bay) departure path for Runway 27 with the intended use of aircraft less than 75,000 lbs and regional jets
- Implement a Fly Quiet Program to recognize compliance with the Airport Use Regulations

The procedure for providing the results of each measure individually provided a challenge when attempting to consider the effects over the entire year and running the entire year’s data in RealContours. Therefore, for the first five proposed measures and for the “initial look”, HMMH selected a single day from the 2007 data (February 2, 2007) that, when modeled in RealContours, closely approximated the 2007 annual CNEL contours. These contours represent the baseline contours for comparison to the alternative measures. After the initial review, presentation of the measures and recommendations from NTAG members, SDCRAA will determine which measures to continue evaluating for inclusion as a recommended measure in the NCP. At that time, the full year of data will be run implementing the measures independently to determine the preferred measures. Once the preferred measures are selected, all of the measures will be modeled in conjunction with each other to provide a total perspective of the expected effects of the measures for the NCP Update.

## **Require the use of “John Wayne Airport-like” noise abatement departure profiles (NADP) for aircraft departing Runway 27**

As required under the San Diego County variance (required by the State of California) to operate SAN, the SDCRAA must evaluate the feasibility of implementing NADP similar to those conducted at John Wayne Airport (SNA) in the adjacent County of Orange.

In short and simplified, the published NADP's implemented at SNA require aircraft to use a full power takeoff and drastically cut power once the aircraft has reached 800-1,000 feet above the airfield and continue the power reduction until the aircraft is beyond the Pacific Ocean shoreline.

A full power takeoff at SAN (Runway 27) would increase noise behind the start-of-takeoff roll and negatively impact those residential areas at the expense of potentially reducing noise exposure to the west of the airport under the departure path, as shown for a single aircraft in the third NTAG meeting. Therefore, at the direction of the Authority, HMMH evaluated a modified SNA NADP that incorporates a de-rated thrust takeoff (rather than a full power takeoff), drastically reduce power (akin to SNA) when the aircraft reaches 800 feet above the airfield and continue the power reduction until the aircraft is beyond the Pacific Ocean shoreline.

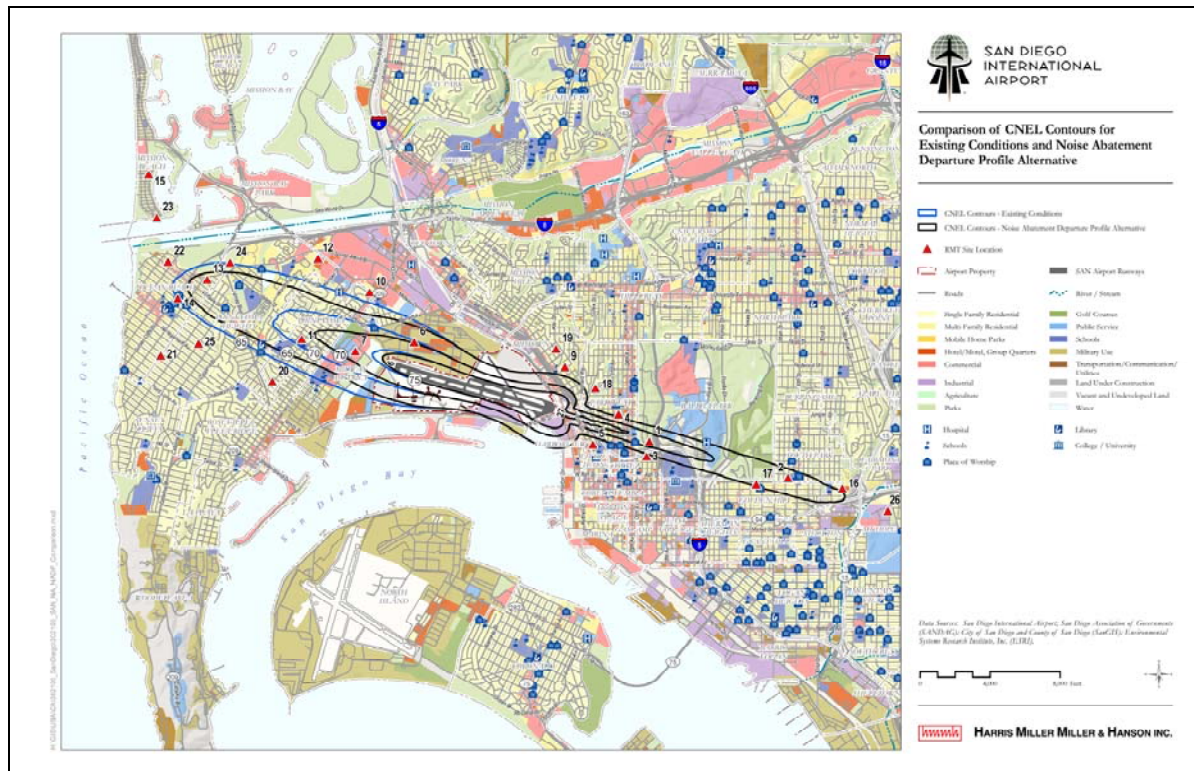
With the assistance of Boeing, HMMH modified the departure profiles in the FAA Integrated Noise Model, Version 7.0a (INM), for most all aircraft weighing over 75,000 pounds to the profile identified in the FAA Advisory Circular 91-53A (AC9153A) as “Close-in NADP”. This profile

- initiates a thrust cutback at an altitude of not less than 800 feet above the airport elevation (AFE) prior to initiating flaps or slats retraction
- maintains no less than the thrust level necessary to maintain the takeoff path engine-inoperative climb gradient
- coordinates pitchover rate and thrust reduction to allow indicated airspeed to decay no more than 5 knots below the all-engine target climb speed
- maintains speed and thrust to altitude of 3,000 feet AFE

HMMH used the INM to develop CNEL contours for the one representative day and provided a comparison to the baseline contours.

### ***Preliminary Evaluation Results:***

As shown in the following figure, the largest change in CNEL is in the area of the 70-CNEL contour, as would be expected from a “close-in NADP”. The CNEL differences are both along and to the side of the flight paths. Farther to the west the reduction is only slight due to the higher altitudes of the normal profiles when compared to the AC9153A profiles.



## Implement a preferential runway use program for aircraft arrivals between 2330 and 0630 hours (during the departure curfew)

The Noise Information Office receives complaints in relation to the early morning arrival on Runway 9. Due to the interest this procedure has received, the SDCRAA is interested in assessing the benefits of potentially implementing a nighttime runway use program for SAN arrivals.

HMMH evaluated the potential benefits and impacts of three alternatives

- require all aircraft to arrive Runway 27
- require all aircraft to arrive Runway 9
- allow aircraft to arrive without a preferential runway use program (no change)

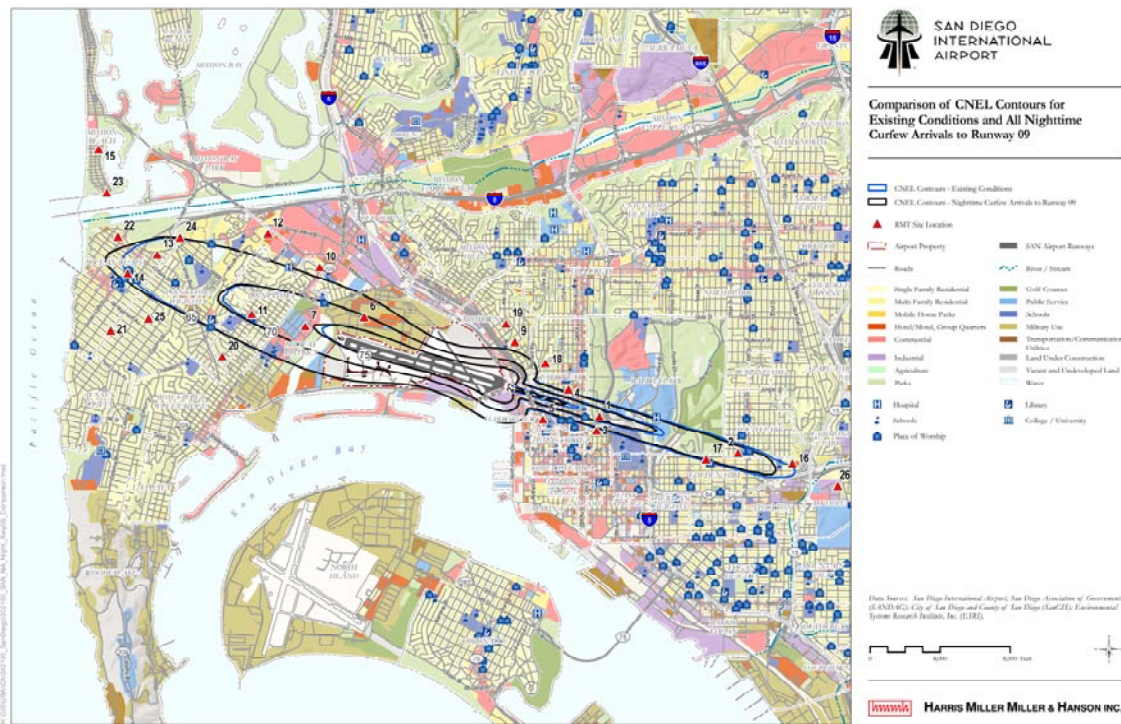
The evaluation involved generating modified CNEL contour sets for each of the two preferential runway use programs to compare to the existing CNEL contour set. Because this is a nighttime program, HMMH also determined (for each of the three scenarios listed above) the potential of awakenings from the complete nighttime operations using the Federal Interagency Committee on Aviation Noise (FICAN) recommended procedure, ANSI standard ANSI/ASA S12.9-2008 / Part 6<sup>1</sup>. A comparison of the three scenarios was conducted to further understand the potential benefits and impacts of a preferential nighttime runway use program at SAN.

<sup>1</sup> ANSI/ASA S12.9-2008/Part 6, Quantities and Procedures for Description and Measurement of Environmental Sound – Part 6: Methods for Estimation of Awakenings Associated with Outdoor Noise Events Heard in Homes.

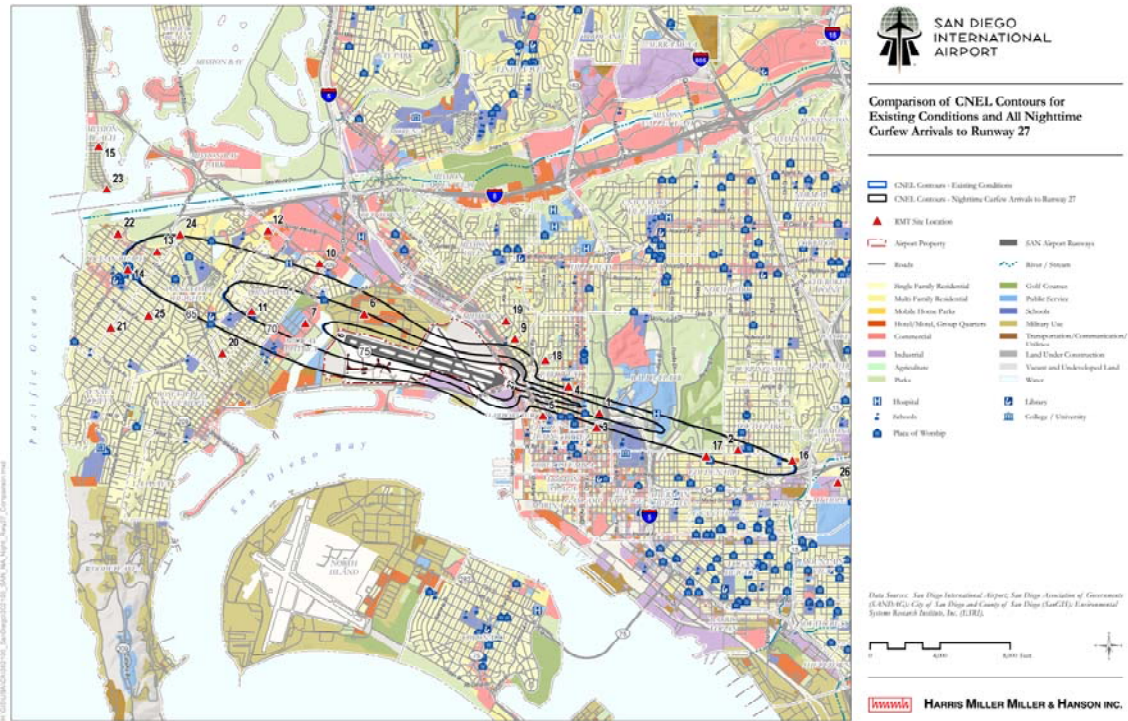
HMMH modeled the three scenarios by applying all the arrivals between 2330 and 0630 on the selected day to the respective runway alternatives. Of particular interest was the cargo arrival to Runway 9 generally between 0400 and 0430 several days a week. A representative track for this aircraft when it arrives on Runway 27 was added to the typical day RealContours for evaluating the “all Runway 27” scenario.

### **Preliminary Evaluation Results:**

The CNEL contours shown in the following graphics compare the existing annual-average day with the one nighttime arrival from the west to the two preferential runway cases. As shown, with Runway 9 as the preferential runway the contours extend to the west and retract to the east. With Runway 27 as the preferential runway the contours show very little change except at the tips of the 65 CNEL contour.



Runway 9 Preferential Runway



Runway 27 Preferential Runway

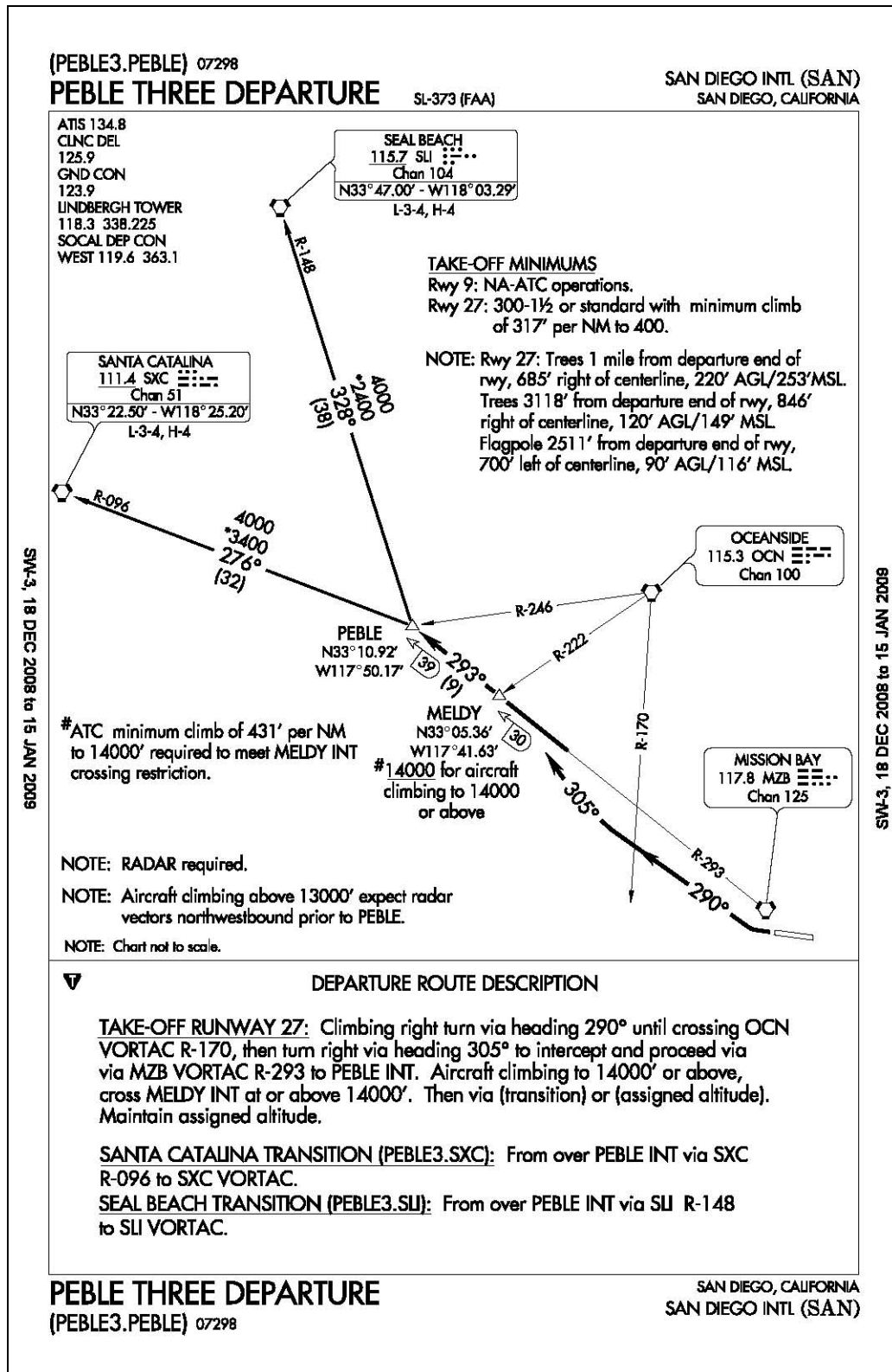
HMMH performed an analysis of potential awakenings based on the referenced ANSI standard looking at both sound-insulated and non-sound-insulated properties. The following table shows the population potentially awakened for the nighttime arrivals for the existing annual average day (AAD), Runway 9 preferential runway, and Runway 27 preferential runway.

<b>Population Potentially Awakened by Nighttime Arrivals to SAN</b>			
<b>Properties</b>	<b>Existing AAD</b>	<b>Runway 9 Preferential</b>	<b>Runway 27 Preferential</b>
Non-Sound Insulated	4581	1586	5297
Sound Insulated	55	73	63
Total	4636	1659	5360

## **Implement RNAV procedure for the Runway 27 departures on the 290-degree heading**

Area Navigation (RNAV) procedures help pilots precisely fly established routes in aircraft equipped with satellite navigation systems. The SDCRAA currently uses an RNAV procedure for aircraft departing Runway 27 using the 275-degree (or extended runway centerline) heading. This procedure provides for less aircraft dispersion over the ground due to changing wind patterns and velocity as the aircraft are flying an actual track versus a constant heading. This potential measure would implement a similar RNAV departure for the aircraft turning to the 290-degree heading after departure from Runway 27.

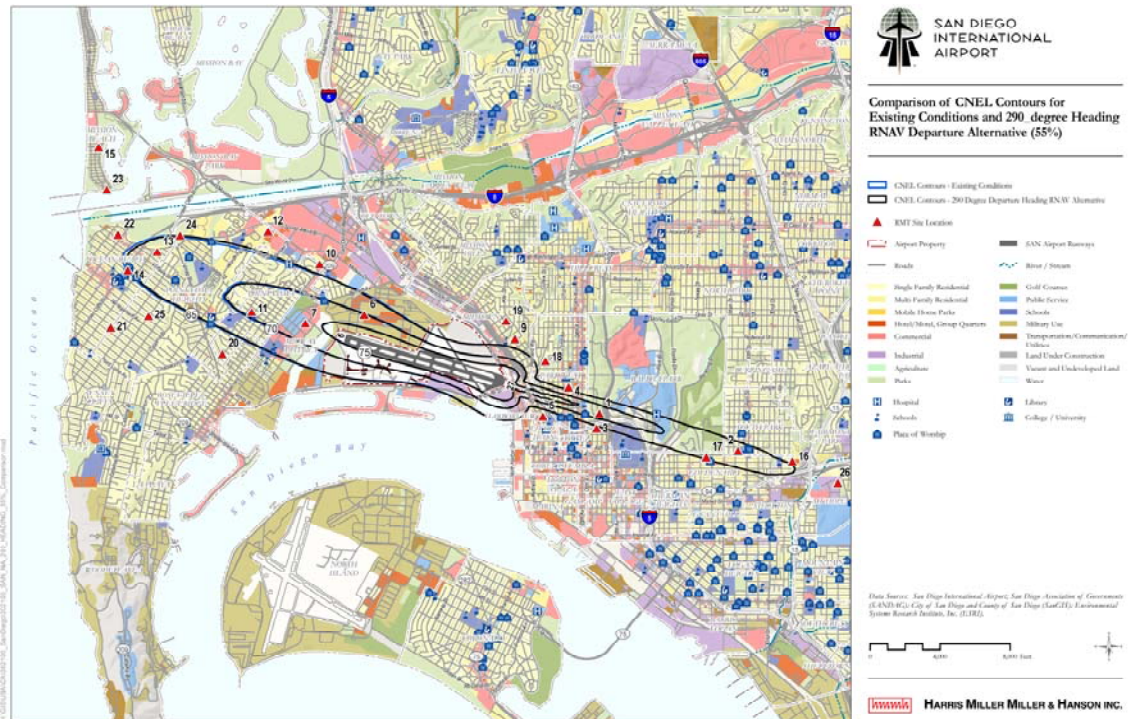
HMMH and the SDCRAA reviewed radar data to determine those aircraft that have this capability, determined how well the 275-degree heading departure track is flown using Required Navigation Performance (RNP), and evaluated the noise effects of this procedure on the existing 290-degree heading flight path. In a presentation to SDCRAA, the FAA provided data that indicated approximately 95% of the 275-degree heading departures used the RNP. HMMH reviewed a few days using a proprietary program and found up to approximately 55% of the departures appeared to be flying the RNP. This same percentage (55%) was then applied to the aircraft departing on the 290-degree heading using the Peble Three Departure (See following figure) for reference.



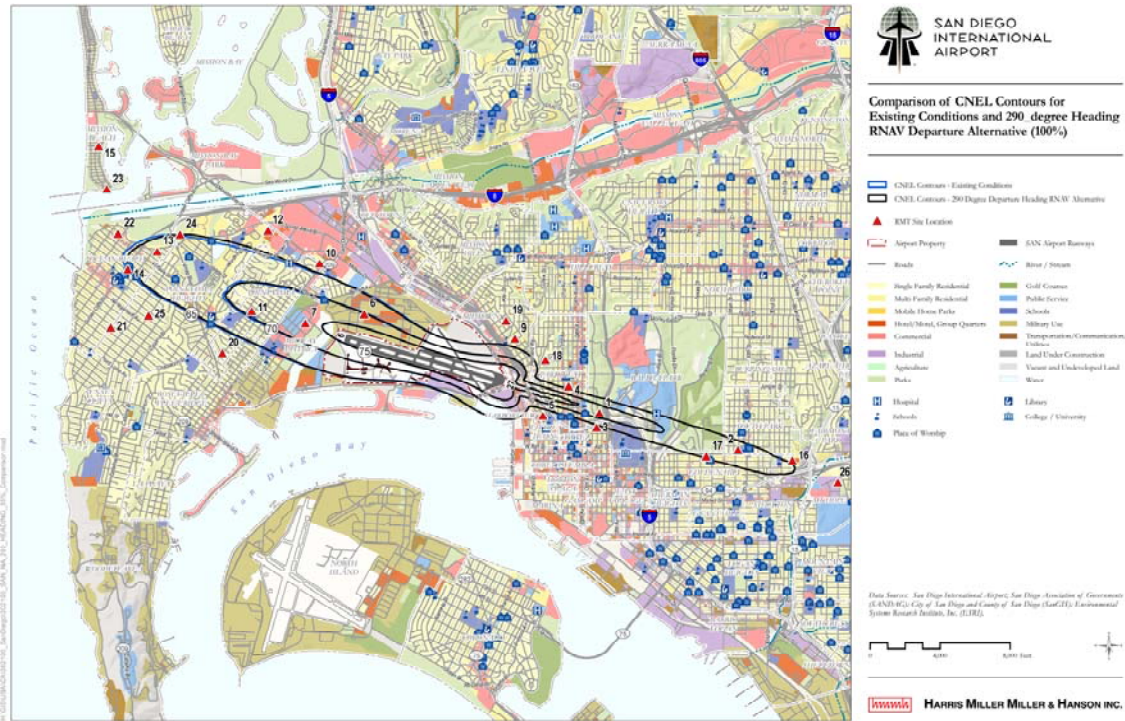
A navigation fix was placed along the Oceanside VORTAC 170-degree radial at the approximate location where the aircraft would initiate a turn from the 290-degree heading to the northwest to proceed to Meldy and Peble Intersections. Aircraft flight track dispersion was “tightened” around the primary flight track similar to that shown in radar data for the 275-degree heading departure. The operations were modeled and a comparison made with aircraft using the RNAV procedures on the 290-degree heading and the standard operations modeled for the baseline.

### **Preliminary Evaluation Results:**

The RNAV departure for the 290-degree heading has very little influence on the contour whether 55% or 100% of the aircraft departing on the 290-degree heading follow this procedure. As shown in the following two graphics, the CNEL 65 contour differences are minimal when compared to the existing 290-degree heading departure.



55% Adherence



100% Adherence

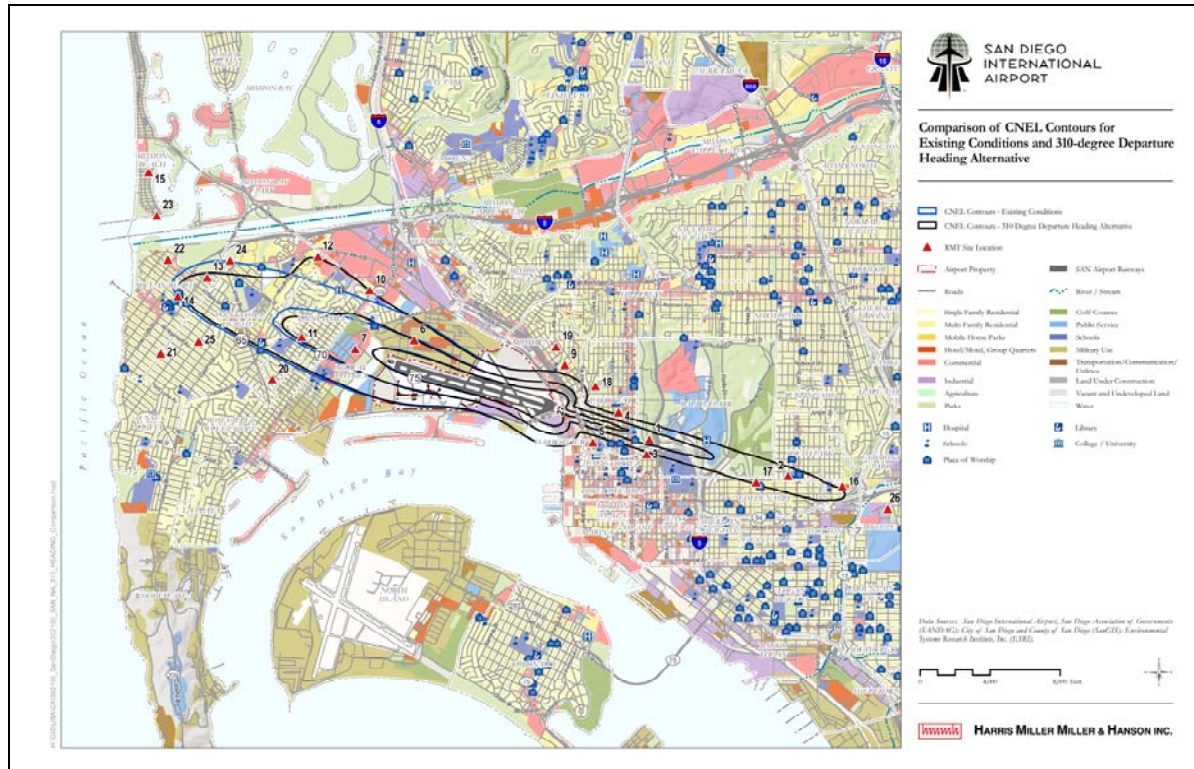
**Develop and implement a 310-degree heading for Runway 27 departures along with an RNAV procedure for aircraft adherence**

A standard process in noise abatement is to find areas of lower density population and derive flight paths that place aircraft over these lower density areas to reduce the number of people exposed to aircraft noise. In reviewing the land uses to the west of SAN, the SDCRAA recommended another flight path that has aircraft turn right even further than the 290-degree heading and fly a 310-degree heading, which would take the aircraft further to the north quicker and fly over less populated areas than those under the 275- and 290-degree headings.

HMMH developed a flight track for aircraft normally on the 290-degree heading that would turn to an approximate 310-degree heading after takeoff. At a designated fix location in the vicinity of the San Diego River Floodway, the aircraft would turn westerly flying over the uninhabited river bed until past the coast and then joining up with the existing 290-degree heading departure enroute to Peble Intersection. HMMH modeled all 290-degree heading operations using this proposed 310-degree heading and compared the resulting CNEL contours with the standard operations modeled for the baseline.

**Preliminary Evaluation Results:**

The following figure shows changes to the 65 and 70 CNEL contours due to the change in the 290-degree heading track to 310-degree heading track. If this measure is recommended for further evaluation, the next step is to determine the number of people exposed to 65 dB CNEL and above with and without this 310-degree heading track implemented.



## Develop and implement a left turn (over the bay) departure path for Runway 27 with the intended use of aircraft less than 75,000 lbs and regional jet aircraft

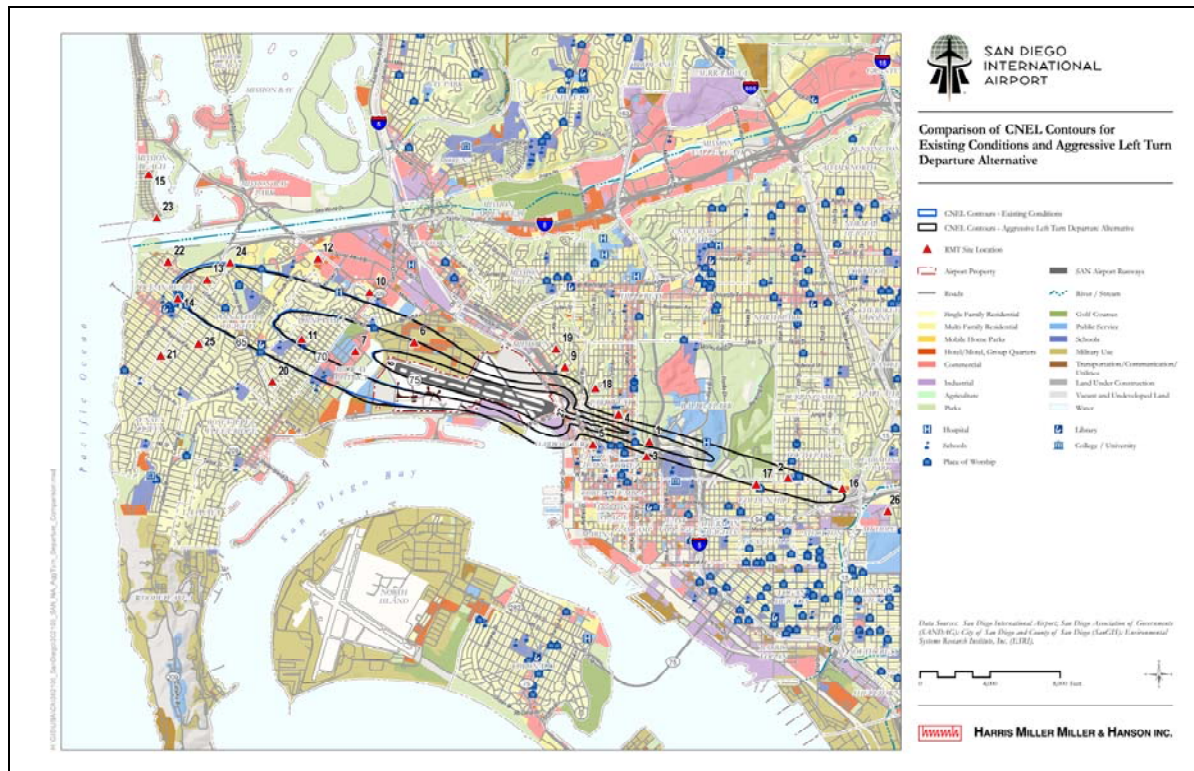
Another area of low density population in the SAN environs is the San Diego Bay. The SDCRAA asked HMMH to evaluate whether a flight path can be developed to make a hard left turn after departure and follow the Bay between Naval Air Station North Island and the Loma Peninsula.

HMMH discussed this flight path with Boeing who responded that they believe such a track would have limited use based on aircraft weight and recommended only General Aviation (GA) aircraft (less than 75,000 pounds) and maybe light regional jets, e.g. the Embraer Regional Jet (ERJ145) and the Canadian Regional Jet (CRJ) family of aircraft, be assigned this proposed flight path for modeling the potential change in noise exposure.

HMMH developed this “over the Bay” flight path and moved all GA aircraft weighing less than 75,000 pounds and regional jets (currently using the 275-degree heading flight path) to generate CNEI contours and compare to the existing contours in the baseline for a potential noise benefit.

### **Preliminary Evaluation Results:**

As shown in the following figure, the effects to the CNEI noise contours are minimal. There is a slight reduction to the west while a slight “bulge” is apparent where the aircraft would make their turn to fly to the southwest over the bay. Thus, from a CNEI perspective, there would be little decrease in the overall affected population.



## ***Implement a Fly Quiet Program to recognize compliance with the Airport Use Regulations***

Currently, the SDCRAA administers an air carrier recognition program that commends air carriers that operate without a single violation of the nighttime departure curfew, which restricts aircraft from departing SAN between 2330 and 0630. The commendations to the air carriers consist of a framed plaque and mention, by name, in the airport’s periodic community newsletter “*Noise Matters*” and to the Airport Noise Advisory Committee.

This recommended NCP measure is intended to provide a web-based format, updated periodically, to display the results of a formal Fly Quiet Program implemented by the Authority to better recognize air carriers’ achievements and better provide the community a thorough perspective of SAN aircraft operations. In addition, this program may provide reliable feedback to local air traffic control (ATC) with accurate information pertaining to the compliance of established arrival and departure procedures. This may assist ATC in honing their procedures to obtain improved compliance, thus minimizing the noise impact to the surrounding communities. A number of airports have successfully designed and implemented similar programs including San Francisco International Airport in California, which have resulted in air carriers striving to be recognized and learning what they must do to succeed with noise abatement at the airport. These programs have become one of many tools that airports and ATC use to help inform the operators of the existing noise abatement programs and inform the public to the successes.

This measure is intended to design (and implement) the Fly Quiet Program; however, the SDCRAA has already begun to develop ideas about potential elements of their Program, which include:

- current fleet mix by air carrier vs. ideal fleet mix for SAN
- number of total departures by air carrier vs. scheduled operations that may be impacted by the nighttime departure curfew
- number of total departures by air carrier vs. number of departures that deviated from IFR departure procedures
- number of total 275-degree heading departures by air carrier vs. number of 275-degree heading departures from aircraft likely equipped with satellite-based navigation equipment compared to number of RNAV departure
- number of community complaints in last reporting period by air carrier
- number of flight cancellations by air carrier for the sole purpose of compliance to the nighttime curfew

Since this measure requires no further evaluation to recommend it as an NCP measure, we have provided the complete details of this measure as is required for each recommended NCP measure. HMMH will provide similar details for all recommended NCP measures and include them in the NCP documentation.

**FAA action required for NCP approval:** Approve as a program measure of the updated NCP.

**Essential implementation actions and responsible entities:** SDCRAA staff with support from consultants as needed, will design a metrics-based Fly Quiet Program to adequately and periodically recognize air carriers that exceedingly comply with the noise abatement procedures and take extra steps to improve the aircraft noise exposure to the surrounding communities.

**Anticipated costs and funding sources:** Actual design and implementation cost of a Fly Quiet Program is dependent on the number of metrics/elements tracked and reported as part of the Program, but is estimated between \$100,000 and \$250,000. Program design and implementation is grant eligible under AIP if the FAA approves the program measure. Therefore, the cost of design and implementation is expected to be shared between the FAA and the SDCRAA.

**Anticipated schedule:** Upon receiving the Record of Approval (ROA) from the FAA, the SDCRAA expects to select a consultant to support the design and implementation of the Fly Quiet Program within 6 to 12 months. The design may be completed within 12 months and then implementation to follow in 6 to 12 months. Therefore, implementation is expected within two to three years of receiving the ROA from the FAA.

## LAND USE MEASURES

The attached memo from Mead & Hunt addresses the land use measures that were discussed at the last NTAG meeting in September 2008. This will be the basis for discussion at the NTAG meeting in January 2009. In summary, we are recommending three land use measures, which are:

- 1. The Airport Authority will continue to urge the City of San Diego to prohibit new incompatible land use development within the SAN environs. For noise-sensitive land uses proposed for development within the CNEL 65 dB contour, the Airport Authority will continue to urge the City to obtain avigation easements and engineered structural designs that provide compatible interior noise levels per Table 1 of 14 CFR Part 150.***
- 2. The Airport Authority will continue to serve as the San Diego County Airport Land Use Commission in accordance with state law.***
- 3. The Airport Authority, in its role as the San Diego County Airport Land Use Commission, will continue to encourage City participation in the compatibility planning process for SAN and will assist the City in reviewing and, as appropriate, modifying the City's plans, policies, and ordinances to best address airport land use compatibility concerns.***

**Attachment: Mead & Hunt Land Use Measures Memo**